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ACTION TIGER

3rd Edition



**TIGER ACTION PLANS OF
13 TIGER RANGE COUNTRIES**

ACTION TIGER

3rd Edition



Tiger Action Plans of 13 Tiger Range Countries



Compiled by
Secretariat of Global Tiger Forum
B-16, 1st Floor, Sector 64, Gautam Budh Nagar,
Noida-201301, Uttar Pradesh, India

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Published by Wildlife Trust of India

The Wildlife Trust of India (WTI) is a non-profit conservation organisation committed to conserve nature, especially endangered species and threatened habitats, in partnership with communities and governments.

Its vision is to secure the natural heritage of India.

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Inside title photo © S P Yadav, DIG, NTCA

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Cover design : Shaleen Attre/WTI

Layout: Ranjesh K Gupta/John Kunjukunju/Shaleen Attre

Printed at: Summit Advertising, New Delhi
Printways, New Delhi

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प्रकाश जावडेकर
Prakash Javadekar



राज्य मंत्री (स्वतंत्र प्रभार)
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ENVIRONMENT, FORESTS AND CLIMATE CHANGE
GOVERNMENT OF INDIA

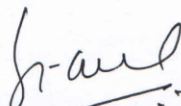
08th September, 2014

From the Minister's Desk

I am pleased to introduce the third edition of the 'Action Tiger', which is a consolidated document containing the latest National Tiger Action Plans (NTAPs) of 13 tiger range countries. The third edition of the Action Tiger includes the updated versions of NTAP of India and Vietnam, which had become due for revision in the meantime.

As you are perhaps aware, India not only holds most of the world's tiger population in the wild but also has the largest number of source sites of the species. This document is of particular importance as it comes at a time when my Ministry is taking several bold new initiatives for instituting the best science-based conservation policies to strengthen the conservation of our flora and fauna, including the tiger.

I am confident, with our partners in other tiger range countries, we will effectively secure the future of the wild tiger, based on good science and sound policy. I would like to congratulate the authors from each tiger range country who have worked hard for preparing this important document. It will play important role in guiding us to save this magnificent species in its natural habitat in all tiger range countries.


(Prakash Javadekar)



GLOBAL TIGER FORUM

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29th August 2014

Foreword

Tiger is the flagship-umbrella species of Asia's forests. Owing to its status as a terminal consumer in the ecological pyramid, tiger is a sound indicator of the integrity, sustainability, and health of an ecosystem.

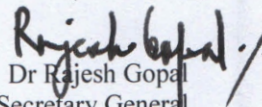
The need for country specific Tiger Action Plan requires no elaboration. The status of tiger continues to remain endangered globally owing to several limiting factors, many of which are specific to the range countries.

Over the years, the tiger range countries have institutionalised several best practices to secure the future of wild tigers. These include control of poaching and illegal trade, habitat management, engaging with communities and mobilizing domestic funding. The substantial conservation efforts are now showing an increasing trend in tiger population of India (20%) and Nepal (63%).

The GTF Secretariat has been compiling and publishing the National Tiger Action Plans (NTAPs) of 13 Tiger Range Countries as an "Action Tiger". The third edition of this Action Tiger includes the updated or currently valid NTAPs of all tiger range countries.

It gives me immense pleasure to place this document in the public domain for the use of tiger range countries and conservationists.

On behalf of the GTF, I thank the International Fund for Animal Welfare (IFAW) and its India partner, Wildlife Trust of India (WTI) for taking up the job of compiling this document voluntarily, financing the cost of its printing, and for their continued commitment in its revised versions.


Dr Rajesh Gopal
Secretary General
Global Tiger Forum

Preface

It gives me great pleasure to introduce the Global Tiger Forum's third volume compilation of the National Tiger Action Plans from the 13 tiger range countries of the world.

The tiger, despite being the subject of global conservation efforts, still faces immense dangers including habitat loss, poaching and increasing conflicts with people.

The previous volumes of the Action Tiger document have been critical in helping governments and the international conservation and animal welfare community come to a shared understanding of priorities and requirements for action plans to help save tigers.

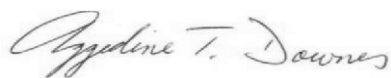
Tiger numbers in some tiger range countries have shown a positive increase. These increases can be seen as proof that collaborative actions can have positive results, and it should encourage us all to do more in a coordinated effort to secure the species. Wild tiger numbers are still too precarious for us to become complacent.

In an ever-changing world, our plans and actions must evolve as well. The tiger range countries and the Global Tiger Forum have shown great leadership in publishing this volume of the Action Tiger.

This volume will provide the best, most recent information needed by governments and concerned non-governmental organisations, such as the International Fund for Animal Welfare (IFAW) and its Indian partner, Wildlife Trust of India (WTI), to effectively implement programs to save this iconic species.

At IFAW, we will use the information to inform our programs that provide wildlife crime and poaching prevention training and equipment in tiger range states and public education in many countries to encourage more effective protection of the species.

I thank all 13 tiger range countries for their cooperation in bringing out this document. I also thank the GTF for their leadership in uniting the world to save tigers.



Azzedine T. Downes
President and CEO
IFAW - International Fund for Animal Welfare

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EDITOR'S NOTE

The International Fund for Animal Welfare (IFAW) and its India partner Wildlife Trust of India (WTI) are proud to be associated with the Global Tiger Forum (GTF), and are committed to strengthening it as part of their efforts at conserving the majestic tiger.

IFAW-WTI's support to the GTF began in 2005 with a placement of a Technical Officer to help out at the GTF Secretariat. While assisting in the functioning of the GTF, the Technical Officer additionally helped compile National Tiger Action Plans (NTAPs) of various Tiger Range Countries (TRCs) into a single document titled "Action Tiger" to provide stakeholders a comprehensive insight into the respective conservation needs and priorities of each of these countries to conserve the magnificent animal. IFAW besides seconding the Technical Officer to the GTF, also makes payment towards the annual membership fees of Cambodia. In 2007, the 1st edition of "Action Tiger", comprising NTAPs of 12 of the 13 TRCs was published. The 2nd edition of "Action Tiger" published in 2011, added the NTAP of the Lao PDR, which was not included in the first edition.

Conservation needs and priorities to save the tiger vary amongst countries, and also within a single country, they may vary with time. This necessitates these documents to be periodically updated to suit the changing needs, and also to find solutions as we start understand the needs better.

IFAW-WTI are committed to periodically update this Action Tiger document for use by stakeholders including non-tiger range countries, NGO community and even individuals to help TRCs in their efforts to save the tiger. The third edition of the "Action Tiger" includes the updated versions of NTAPs of India and Vietnam, which had become due for. All National Tiger Action Plans compiled in this edition retain the original text without any change as was received from the respective tiger range countries.

I am grateful to Dr Rajesh Gopal, Secretary General, GTF, for giving IFAW-WTI the opportunity to bring out a comprehensive document that pieces together the needs of the species from across its distribution range for a unified holistic global approach at tiger conservation.

I end this note with a request to all to support all TRCs in their continued efforts to ensure effective implementation of these NTAPs, so that this species, so easily recognized as the face of wildlife conservation worldwide, is safe from extinction.



Vivek Menon
Sr. Advisor to EVP and Regional Director- South Asia
International Fund for Animal Welfare (IFAW)
Executive Director, Wildlife Trust of India

BANGLADESH TIGER ACTION PLAN

2009-2017



**BANGLADESH FOREST
DEPARTMENT**



**MINISTRY OF ENVIRONMENT
AND FORESTS**



BANGLADESH FOREST DEPARTMENT

MINISTRY OF ENVIRONMENT AND FORESTS

Suggested citation: Ahmad, I. U., C. J. Greenwood, A. C. D. Barlow, M. A. Islam, A. N. M. Hossain, M. M. H. Khan, J. L. D. Smith. 2009. Bangladesh Tiger Action Plan 2009-2017. Bangladesh Forest Department, Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.

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Photo credits: Elisabeth Fahrni Mansur and Rubaiyat Mansur Mowgli (front cover, p 15, 20, 25, 40, 54), NASA (p 19), M. Monirul. H. Khan (p 34), Zahangir Alom (p 14), Samiul Mohsanin (p 41).
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Layout and design: Tanjilur Rahman and Christina Greenwood

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ABBREVIATIONS USED IN THE TEXT

ACF	Assistant Conservator of Forests
BTAP	Bangladesh Tiger Action Plan
CBD	Convention on Biological Diversity
CCF	Chief Conservator of Forests
CF	Conservator of Forests
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DFO	Divisional Forest Officer
DWNP	Department of Wildlife and National Parks Peninsular Malaysia
FD	Bangladesh Forest Department
GIS	Geographical Information System
GoB	Government of Bangladesh
GPS	Geographical Positioning System
IPAC	Integrated Protected Area Co-management Project
MoEF	Ministry of Environment and Forest
MYCAT	Malaysian Conservation Alliance for Tigers
NGO	Non-Governmental Organisation
TCL	Tiger Conservation Landscape
THC	Tiger-Human Conflict
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WNCC	Wildlife and Nature Conservation Circle

PREFACE

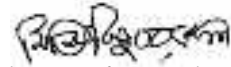
Wildlife is an integral part of a forest ecosystem. The further development of our wildlife conservation capabilities is therefore needed to deal with the threats faced by the tiger and other wildlife. To combat threats we need to improve our understanding of their root causes and how they impact tigers, so that we can focus conservation efforts for maximum effect. There is also a pressing need to address the severe tiger-human conflict in the Sundarbans, to minimize the resulting human misery and loss of tigers. In addition, given the potential of poaching to decimate tiger and prey populations, the department needs to develop dedicated wildlife staff to tackle this threat. These and other initiatives are outlined in the Bangladesh Tiger Action Plan, which is a policy-level document providing guidelines for tiger conservation efforts over the next eight years. These guidelines will be periodically revised to reflect new findings and adapt to changing conditions. Part A provides context about the current status of tigers in Bangladesh, and an overview of the Sundarbans ecosystem and its management. Part B outlines the threats to tigers, their prey, and their habitat in Bangladesh. This section also describes the challenges of building a successful tiger conservation programme capable of dealing with the threats. The action plan is outlined in Part C, which provides a vision, goals, and objectives to guide an integrated and holistic programme to address both threats and challenges to tiger conservation. To ensure involvement of those people who live around the forests are directly affected by tigers, the FD and partners plan to develop a participatory tiger conservation programme for the Sundarbans. This programme will facilitate collaboration with all stakeholders to implement tiger conservation activities and shape future conservation strategies.



Isthiaq U. Ahmad
Conservator of Forests
Wildlife Management and Nature Conservation Circle
Forest Department

FOREWORDS

The presence of the tiger has helped shape human culture, yet, despite its national and international popularity, the tiger is in trouble across its range. Most tiger populations are small and therefore more vulnerable to extinction. Bangladesh is fortunate, however, because we hold one of the largest remaining populations of wild tigers. The Sundarbans represents a last stronghold for the species. Bangladesh, therefore, has a big responsibility to secure this national treasure and ensure the continued existence of this species on earth. This Bangladesh Tiger Action Plan highlights the need for a strengthened conservation effort to achieve this aim, built through committed government efforts and partnership at all levels. As a government, we need to ensure that resources are channelled to the conservation of tigers and their remaining habitat to reflect their importance to the future of the species as a whole, and to the security of the Bangladeshi people.



Advocate Md. Mostafizar Rahman M.P.
State Minister, Ministry of Environment and Forests

Bangladesh's future is intertwined with that of its environment, so it is essential for biodiversity conservation to be mainstreamed into development policy and action. As the national animal of our country, the tiger represents an ideal focal point for our conservation efforts, particularly for the Sundarbans. As a symbol of ecosystem health, the tiger and its conservation are integral to the future of this forest. The conservation of the Sundarbans and the coastal greenbelt is critical for the security of the nation, particularly in light of predicted impacts of climate change. The Sundarbans provides essential ecological services for the whole region and the livelihoods of millions of local people. We must protect this precious national asset at any cost. The future of the Sundarbans and the benefits it provides are reliant upon responsible use of resources as part of a holistic conservation approach. In addition to domestic intervention, Bangladesh needs to reach out to the global community to tackle the international demand and illegal trade in tiger parts which directly threaten the future of our tigers and their forest. It is against these challenges that the Bangladesh Tiger Action Plan has been developed in order to provide guidelines for tiger conservation efforts over the next eight years.



Dr. Mihir Kanti Majumder
Secretary, Ministry of Environment and Forests

The Forest Department is committed to the conservation of the forests of Bangladesh for future generations to come. Our field staff in the Sundarbans face many hardships and dangers to protect our forest and its tigers. Our aim is to reinvigorate these field staff by making sure that they have the resources and capacity to carry out their duties and by rewarding initiative and hard toil. There is also a need for the development of wildlife management skills to face the unique challenges of tiger conservation in the Sundarbans. Indeed, the conservation of all of our forests and their wildlife will require further strengthening of skills in the field of biodiversity conservation and protected area management. One of our greatest challenges will be to find a balance between supporting human demands on the forest, whilst ensuring its continued existence. We need to reach out beyond the forest boundaries to dependent communities to find alternatives capable of reducing the pressure on the Sundarbans and its tigers.

The Bangladesh Tiger Action Plan provides us with the direction for this journey which can only be ensured by working together.



Md. Abdul Motaleb
Chief Conservator of Forests, Forest Department

ACKNOWLEDGEMENTS

This project was made possible by the vision of the Bangladesh Forest Department. Support was provided by the United States Fish and Wildlife Service, Zoological Society of London, Wildlife Trust of Bangladesh, and the University of Minnesota.

Earlier drafts of this document were greatly improved by the edits and insights from the following reviewers: Nasir Ahmed, Fred Bagley, Sujoy Banerjee, Shannon Barber-Meyer, Sarah Christie, Peter Cutter, Mihir Kanti Doe, John Goodrich, A.J.T. Johnsingh, Ullas Karanth, Linda Kerley, Niaz Ahmed Khan, Mohammad Ali Reza Khan, Matthew Linkie, Colby Loucks, Tom Maddox, Nalini Mohan, Sabir Bin Muzaffar, Razia Quadir, Alan Rabinowitz, S.M.A. Rashid, A.H.M. Ali Reza, George Schaller, Md. Sohrab Uddin Sarker, Rishi Sharma, Mahendra Shrestha, Neaz Ahmad Siddiqi, Paul M. Thompson, Eric Wikramanayake, and Robert Winterbottom.

During the two national review workshops, the following also gave valuable suggestions: Farid Uddin Ahmed, Md. Yunus Ali, M. Abdul Aziz, Fred Bagley, Haradan Banik, Philip Decosse, Ronald Halder, Enam Ul Haque, A.K. Fazlul Hoque, Md. Akbar Hossain, Anwar Hossain, Sirajul Hossain, Haseeb Md. Irfanullah, Md. Mozaharul Islam, Md. Shafiqul Islam, Md. Tariqul Islam, Md. Mofizul Kabir, Shirina Khatun, Md. Altaf Hossain Khan, Mihir Kanti Majumder, Md. Abdul Motaleb, Razia Quadir, M. Mahfuzur Rahman, Safiqur Rahman, Amalendra Saha, Sohrab Uddin Sarker, A.K.M. Shamsuddin, Ram Sharma, Neaz Ahmad Siddiqi, Rezaul Sikdar, and Abani Bhushan Thakur.

Special thanks also go to the Wildlife Trust of Bangladesh tiger project team who supported the authors in the creation of this plan: Md. Modinul Ahsan, M. Abdul Aziz, Suprio Chakma, Gawsia Wahidunnessa Chowdhury, Alam Howlader, Khairul Islam, Israt Jahan, Mostfa Khan, Samiul Mohsanin, Hasan Rahman, Mizan Rahman, and Mayeen Uddin.

EXECUTIVE SUMMARY

Wild tigers are a symbol of healthy ecosystems upon which biodiversity and mankind depend. Sitting at the top of the food pyramid tigers require large areas of land to support viable populations, so act as an umbrella species for securing the future of other species that share their habitat. Furthermore, tiger forests provide a range of ecological services vital to our own existence. Tigers are also a valuable part of human culture and a focal point of many tourist visits to Asia. Equally important is the tiger's intrinsic right to survive irrespective of the needs of mankind.

With fewer than 4,000 individuals left in the wild, the tiger is severely threatened throughout its range. The mangrove forests of the Bangladesh Sundarbans support one of the largest populations of tigers in the world with an estimated 300–500 tigers, and an unknown number of tigers occur in the Chittagong Hill Tracts bordering India and Myanmar. Bangladesh, therefore, has an opportunity to contribute significantly to the conservation of tigers and to benefit from their continued presence. However, tigers are threatened in Bangladesh by direct loss, prey depletion, and habitat degradation. Tigers are directly threatened by poaching to supply the increasing demand for tiger products. In addition, Bangladesh suffers high levels of tiger–human conflict, manifested in human killing, livestock depredation, and ultimately the retribution killings of tigers by affected local communities. Poaching of prey further reduces the capacity of the forest to support tigers, and unsustainable forest use and climate change threaten to reduce the area in which tigers can live. In building a successful tiger conservation effort, there are a range of challenges that need to be dealt with relating to: (1) institutional development and policy, (2) forest protection and law enforcement, (3) education and awareness, (4) research and monitoring, and (5) the need for collaboration.

The Bangladesh Tiger Action Plan (BTAP) marks the beginning of a structured approach to achieving long-term conservation of tigers in Bangladesh. The BTAP is a policy-level document that provides a vision, goals, and objectives to guide an integrated and focused tiger conservation programme. The vision is to ensure protected tiger landscapes in Bangladesh, where wild tigers thrive at optimum carrying capacities and which continue to provide essential ecological services to mankind. The main goal for the next eight years is to stabilise or increase the Sundarbans tiger population. The Bangladesh Forest Department, under the Ministry of Environment and Forests, is the custodian of the forest and its wildlife, but one of the most important aspects of the BTAP is the recognition that the immense task of tiger conservation necessitates support and expertise outside the normal remit of forest management. Therefore, the establishment of a Forest Department-led platform that facilitates collaboration for the implementation of conservation activities will be fundamental to its success.

PART A

Context







A tiger lying in the *nypa* palm at the edge of a Sundarbans canal

1. WHY IS IT IMPORTANT TO SAVE THE TIGER?

We have a stark choice to make about what kind of relationship we have with the earth. One option is to continue down the path of short-term economic gain enabled through unsustainable resource use and environmental degradation. The other option is a long-term strategy that ensures protection of the natural systems that support life, including our own.

The fates of humans and tigers are intertwined; tigers are an integral part of much of the remaining Asian forest ecosystems, which in turn supply the ecological services essential to our own existence. Tigers are an umbrella species, because they need large areas of land to live, and so saving tigers can also help secure the future of the biodiversity that make up the tiger's forest home. As the top predator, the tiger may help to regulate the number and distribution of prey, which in turn will impact forest structure, composition and regeneration (Ale and Whelan 2008; Wegge et al. 2009). Hence the loss of tigers may reduce ecosystem integrity and ability to adapt to changing environmental conditions.

Tigers have also become ingrained in our culture and so act as a flagship species, drawing public support for conserving an entire ecosystem. Tourists travel from far and wide for a chance to

glimpse the most magnificent of all cats, and so provide valuable sources of income and employment opportunities for tiger range countries.

Irrespective of their use to mankind, as a product of millions of years of evolution, tigers should also be given the chance to exist in their own right. The disappearance of tigers from the wild as a result of human actions, would be unpardonable and a sad reflection on our role as guardians of the natural world. If we can't save the tiger, then this will surely be a signal for the demise of thousands of other species and wild places.

Tigers are categorised as endangered because there are probably fewer than 4,000 individuals left in the wild, and three of the eight subspecies are now extinct (IUCN 2008). The remaining populations continue to be imperilled by poaching, depletion of their prey, and destruction of their habitat. The most recent summary of tiger status worldwide suggests they are living in only seven percent of their former range (Dinerstein et al. 2007). The remaining tiger populations are spread across 14 countries, and often in forests too small and isolated for their long-term persistence. The way forward is to identify landscapes that can support tigers, prioritise them in terms of their contribution to the species' survival, and then protect those areas (Sanderson et al. 2006).

With a relatively large tiger population in the Sundarbans (Barlow 2009), and reports of tigers still present in the Chittagong Hill Tracts, Bangladesh has

the opportunity to contribute substantially to the future of the species. As well as the ecological services these tiger landscapes provide, the tiger is the national animal of Bangladesh, the emblem of the East Bengal Regiment which fought for the country's liberation, the logo of the national cricket team, and otherwise deeply embedded in the country's culture.

It is distressing to imagine a Bangladesh or a world without wild tigers. With careful planning and concerted effort, that prospect does not have to become a reality.

2. TIGER DISTRIBUTION AND STATUS IN BANGLADESH

Tigers were once widespread in Bangladesh and even up to the 1930s they were reportedly present in 11 out of 17 districts (Mitra 1957). However, widespread hunting and forest depletion has reduced the tiger's range and numbers. Now the largest remaining population of tigers is in the Sundarbans, although there are also reports of

vagrant tigers in the Chittagong Hill Tracts (Khan 1986; Khan 2004; Reza *et al.* 2004). An area of forest near Teknaf was included as a survey landscape by Sanderson *et al.* (2006), but there have not been any reports of tiger presence there in recent decades (M.M.H. Khan pers. obs.).

Chittagong Hill Tracts: There are reports of tigers in the mixed evergreen hill tract valleys of Kassalong-Sajek and Sangu-Matamuhuri, which are contiguous with forests in India and Myanmar respectively (Khan 2004) (Fig. 1). Both of these sites are within an area classified as a Tiger Restoration Landscape, contiguous with the Northern Forest Complex-Namdapha-Royal Manas Global Priority Tiger Conservation Landscape (TCL) (Sanderson *et al.* 2006) (Fig. 1). Because of the unknown status of tigers in the Chittagong Hill Tracts, this BTAP will not focus on this area, apart from mentioning the need for a preliminary survey.

Sundarbans: This area has been identified as a Class 3 TCL of Global Priority (Sanderson *et al.* 2006), and at approximately 10,000 km², the Sundarbans of



The Sundarbans at high tide

Bangladesh and India is the largest mangrove forest in the world. This BTAP addresses tiger conservation in the 6,000 km² Bangladesh Sundarbans, referred to hereafter as 'the Sundarbans'.

Although some work has been published on Sundarbans tigers (for example, Hendrichs 1975; Seidensticker and Hai 1983; Blower 1985; Khan 1987; Tamang 1993; Reza *et al.* 2001a; Reza *et al.* 2001b; Bangladesh Forest Department 2004; Reza *et al.* 2004; Khan and Chivers 2007; Barlow *et al.* 2008; Barlow 2009), relatively little is known about their ecology and status compared to better studied populations in Nepal, India, and Russia (Smith and McDougal 1991; Carroll and Miquelle 2006; Karanth *et al.* 2006). Tigers are known to be present throughout the Sundarbans,

with higher concentrations found in the south and west compared to the north and east (Fig. 2) (Barlow *et al.* 2008).

A study using GPS collars recorded home ranges of two female tigers in the south-east of the Sundarbans. The two tigers were living in relatively good habitat with respect to other areas in the Sundarbans, but their small home ranges (< 20 km²) are still probably indicative of a very high density compared to other tiger habitats. Even if tiger home ranges are double this size in other areas of the forest, the Bangladesh side of the Sundarbans could still support 100-150 breeding females or 300-500 tigers overall (Barlow 2009).

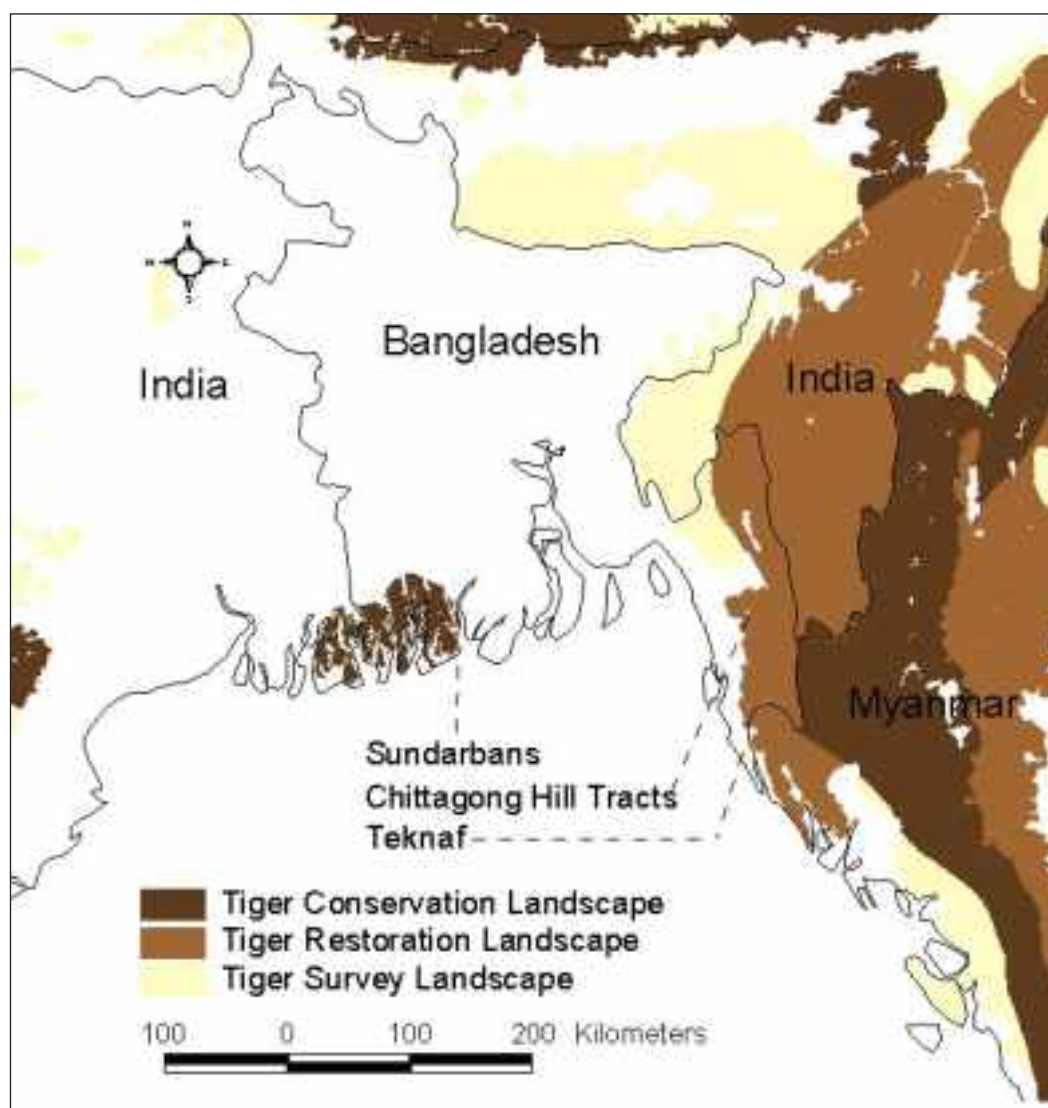


Figure 1. Tiger conservation areas in Bangladesh and adjoining countries (Sanderson *et al.* 2006)

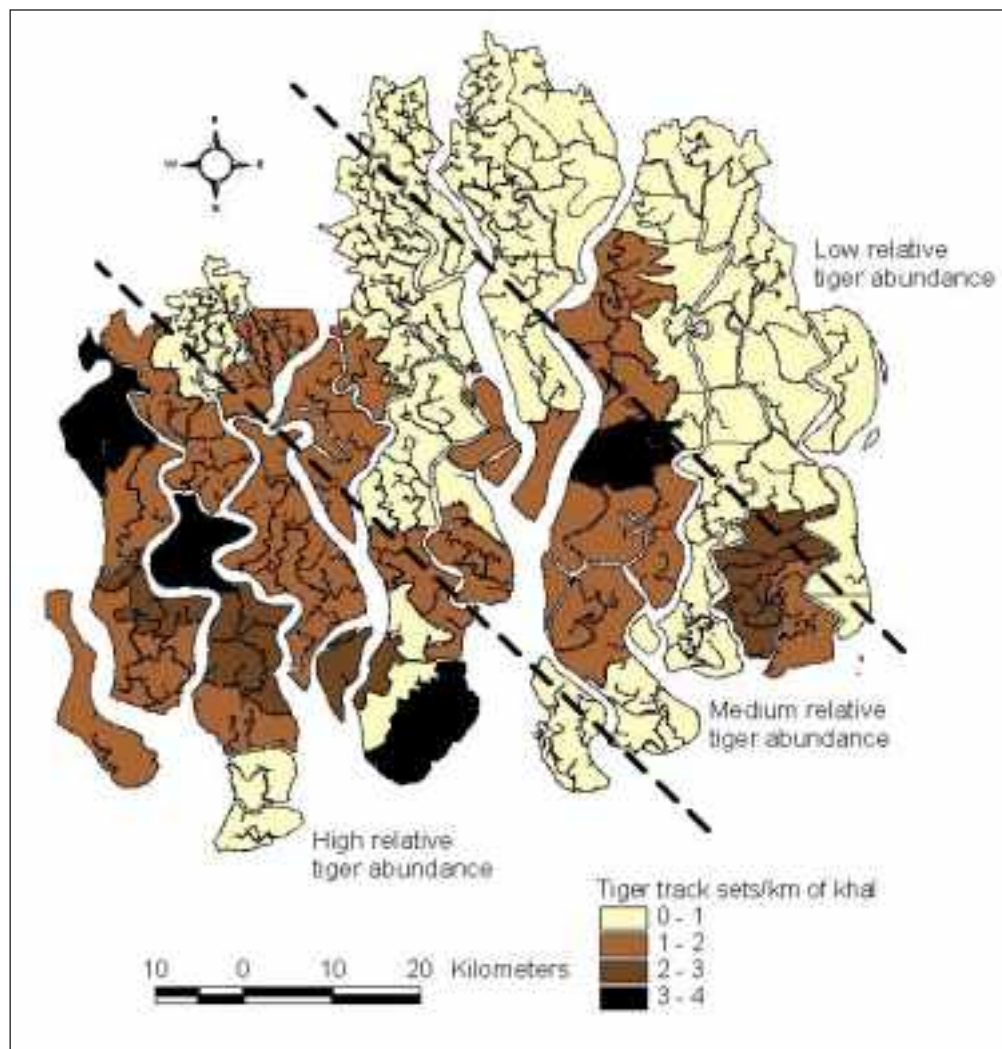


Figure 2. Relative abundance of tigers in the Sundarbans of Bangladesh (Barlow et al. 2008)



Satellite image of the Bangladesh and Indian Sundarbans

3. THE SUNDARBANS ECOSYSTEM AND ITS MANAGEMENT

Bangladesh lies in the vast fertile delta of three of the largest rivers in the world: the Ganges, the Brahmaputra, and the Meghna. The Sundarbans mangrove forest is found at the lower moribund end of the delta where it meets the Bay of Bengal. The Sundarbans continues to be shaped by the tonnes of sediment deposited by the rivers and ocean currents, and changes in human land use (Allison *et al.* 2003). The Sundarbans represents nearly half of the remaining forests of Bangladesh and is dominated by halophytic tree species such as *sundri* (*Heritiera fomes*), *gewa* (*Excoecaria agallocha*), *goran* (*Ceriops decandra*), *baen* (*Avicennia officinalis*), and *keora* (*Sonneratia apetala*). It is inhabited by some 49 mammal, 59 reptile, eight amphibian, 315 bird, and 200 to 300 fish species (Chaudhuri *et al.* 1994; Hussain and Acharya 1994; Khan 2004).

As well as protecting a unique array of biodiversity, saving the Sundarbans will also secure essential ecological services such as (1) trapping of sediment and land formation, (2) protection of human lives and habitation from regular cyclones, (3) its role as a nursery for fish and other aquatic life, (4) oxygen production, (5) waste recycling, (6) timber

production, (7) supply of food and building materials, and (8) carbon cycling (Biswas *et al.* 2007; Islam and Peterson 2008). Such services are of global and national importance, and fundamental to the livelihoods of the local people living along the Sundarbans border; several million people directly depend upon the collection of timber,

fuelwood, fibres, fish, shells, wax, honey, and other non-timber forest products. This resource extraction feeds both local needs and industry, with the forest producing almost half of the total timber and fuelwood for Bangladesh (Canonizado and Hossain 1998).

Each year as many as 100,000 Bangladeshi tourists make day trips to Karamjal, a tourist spot in the northern part of the Sundarbans (Md. Abdur Rob, Forest Department, pers. comm.). Here they can take short walks in the forest and view captive animals such as spotted deer (*Axis axis*), rhesus macaque monkeys (*Macaca mulatta*), and estuarine crocodiles (*Crocodylus porosus*). A handful of tour operators also run trips lasting three to four nights that go deeper into the forest to visit key sites, mainly inside the Sundarbans East Wildlife Sanctuary.

Regulation of resource extraction, tourism, revenue collection, and law enforcement is carried out by the FD, under the Ministry of Environment and



A basking estuarine crocodile

Forests. For management purposes, the forest and its waterways have been delineated into four ranges and 55 compartments, guarded by over 90 FD posts (Fig. 3). The Sundarbans is classified as a Reserved Forest, in which some forms of resource extraction are allowed, but it is illegal for anyone to live, cultivate land, or graze livestock in the forest. To ensure additional protection for wildlife habitat and natural resources, three areas within the forest have been designated as Wildlife

Sanctuaries: Sundarbans West (715 km²), Sundarbans South (370 km²), and Sundarbans East (312 km²). These Wildlife Sanctuaries are closed to any extraction of vegetation or wildlife and have been collectively declared a UNESCO World Heritage Site (Fig. 3) (Iftekhar and Islam 2004). The border between the Bangladesh and Indian sides of the forest is patrolled by Bangladeshi Rifles servicemen, and the Navy and Coast Guard patrol coastal waters.

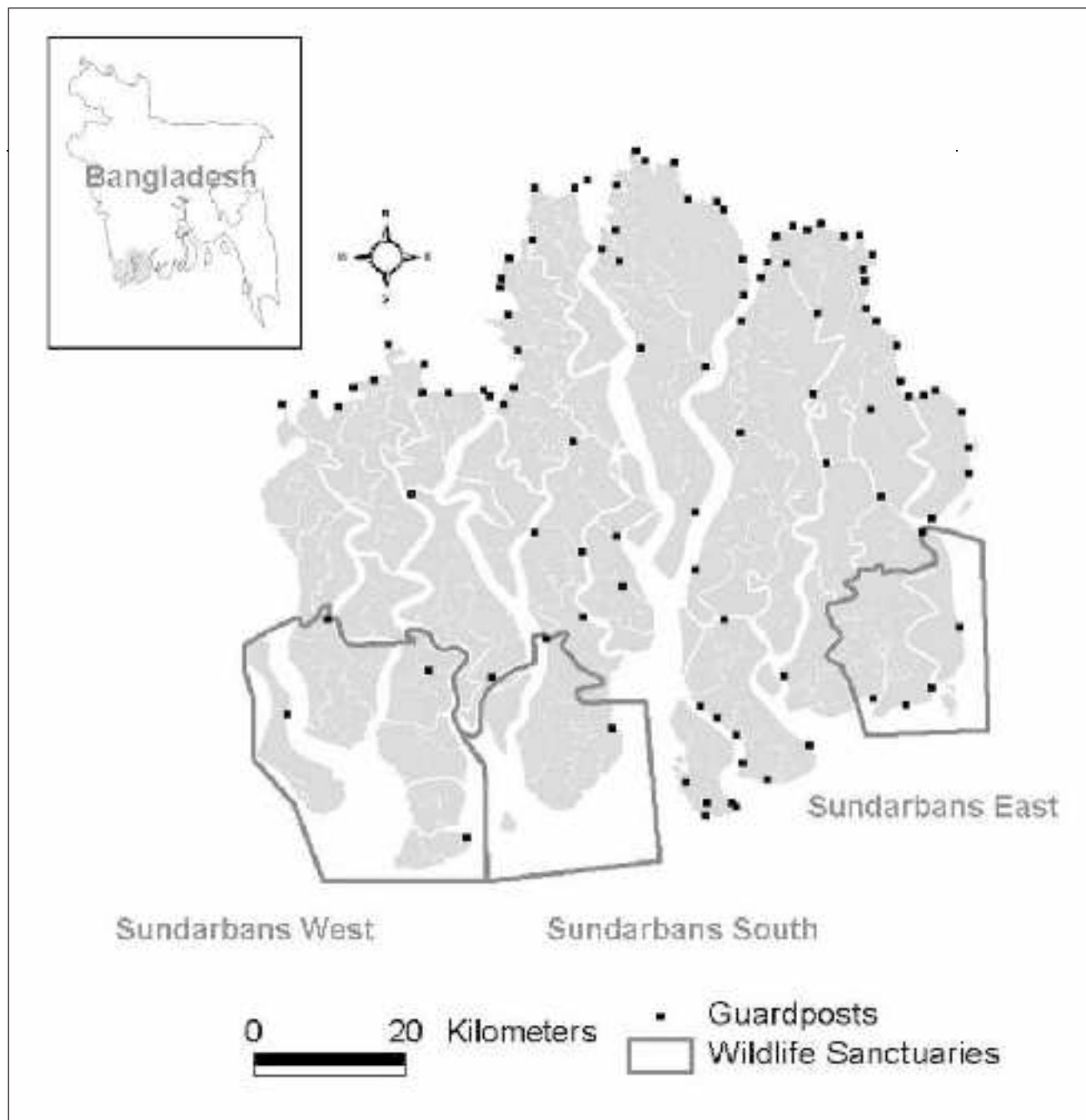


Figure 3. Wildlife sanctuaries and distribution of Forest Department guard posts in the Bangladesh Sundarbans

PART B

Threats and Challenges



1. THREATS

Like all living beings, tigers need food and space to survive. However, tigers, their prey, and their habitat are all threatened in Bangladesh. This section outlines current understanding about the nature, scale, and cause of these threats. There is a dearth of information across all threats, however, so it is inevitable that some are poorly defined and others have yet to be identified. In addition, the inferences regarding causality may be weak because often they are not based on empirical research. Further research and subsequent monitoring of threats are urgently needed.

1.1. Direct tiger loss

Tiger poaching and associated trade have potential to decimate a population over a short period of time (Kenny *et al.* 1995). Little is known about tiger poaching in Bangladesh, with cases only being documented from opportunistic arrests or seizures by the authorities. At present, low numbers of poaching incidents are reported from the Sundarbans, with up to two incidents each year (FD records), but the majority of incidents are unlikely to be detected due to the covert and illegal nature of this activity. There is also little known about the national demand for tiger parts, although a 1997 survey reported substantial trade in tiger skins, teeth, and claws (Nowell 2000). However, there is a high regional demand for tiger products and an established international trade (Nowell 2000; Nowell and Xu 2007), so it is unlikely that Bangladesh will be overlooked as a source of tiger parts, particularly as other tiger populations dwindle. The geographical position of Bangladesh between India and Myanmar, countries that experience rampant poaching, may further increase the vulnerability of the Sundarbans tigers (Nowell and Xu 2007).

Some tigers are also killed through retribution killings associated with tiger-human conflict (THC). FD records show that up to three tigers are killed each year (Reza *et al.* 2002a; Barlow 2009). These retribution killings are a result of bad feelings towards tigers due to human - or livestock - killing incidents or simply because the tiger is perceived as a threat when it strays into a village (FD Records; Barlow 2009). THC creates negative attitudes in local communities towards tigers, making achievement of long-term conservation objectives difficult (Box 1).

There is always the potential for tigers to die from disease, but there has been no research in this area. Furthermore, it is likely that tigers that die from disease will do so undetected unless the population is subject to intensive study. Captive tigers have died from Avian Influenza, and captive and wild tigers have died from Canine Distemper (Appel and Summers 1995; Myers *et al.* 1997; Keawcharoen *et al.* 2004; Goodrich *et al.* 2005). Feline Immunodeficiency Virus is also widespread amongst wild felids and has been found present in tigers (Olmsted *et al.* 1992). Other potential tiger diseases include Feline Chlamydophila, Dirofilaria, Feline Calicivirus, Feline Coronavirus, Feline Leukaemia Virus, Feline Herpes Virus, Feline Parvovirus, Tuberculosis, Pseudo-rabies, Rabies, and Sarcoptic Mange (John Lewis, Doctor of Veterinary Medicine, Wildlife Vets International pers. comm.). Another potential threat to the isolated Sundarbans population is inbreeding depression, but this may not be a high priority issue considering the relatively large size of the population.

1.2. Prey depletion

The number of tigers that an area can support is largely dependent upon the number of suitable prey (Smith *et al.* 1987; Karanth *et al.* 2004). The main prey for tigers in the Sundarbans is spotted deer (*Axis axis*) and to a lesser extent wild boar (*Sus scrofa*) (Reza *et al.* 2001a, 2001b, 2002b; Khan 2004). Barking deer (*Muntiacus muntjak*) are also present in low numbers, and may fall prey to tiger (Khan 2004). Earlier studies reported a more diverse range of prey species, including swamp deer (*Cervus duvauceli*), hog deer (*Axis porcinus*), and wild water buffalo (*Bubalus bubalis*), but these are no longer present (Curtis 1933; Seidensticker and Hai 1983; Blower 1985).



Prey depletion is a serious threat to any tiger population and there are signs that it is occurring in

Box 1. Tiger-human conflict in the Sundarbans

Finding solutions to minimise THC conflict is essential to reduce the misery inflicted on local communities and secure their support for tiger conservation. The Bangladesh Sundarbans suffers the highest level of human-killing by tigers in the world (Barlow 2009), and recent surveys suggest that livestock-killing and retaliatory killings of tigers are also acute problems (Rahman Unpubl. data). In addition to personal bereavement, the loss of a working family members or livestock is a significant economic loss to an already impoverished household. Conserving tigers in the Sundarbans, therefore, also includes a moral obligation to help the people that suffer because of the tiger's presence.

Human-killing usually affects people entering the forest to harvest resources, and is mainly concentrated in the west (Reza *et al.* 2002a; Barlow 2009). An average of 20 to 30 people are killed each year according to FD records (1984-2006), although up to 96 cases in a year have been documented in earlier periods (Curtis 1933; Hendrichs 1975). The total number of cases is probably higher than reported, however, because (1) some people who are injured but later succumb to their wounds are not recorded, and (2) some non-permit holders killed might not be reported to the FD (Jagrata Juba Shangha 2003).

Retaliatory killing of tigers is known to account for up to three tiger deaths a year. If tigers are found in villages or neighbouring fields, they are often killed by the villagers who surround the tiger and beat it to death with sticks. Poisoning, shooting, or snaring may also be used in

retribution killings, but the extent or effect of these practices is unknown. This additional source of tiger loss could have a sizeable impact on the long-term viability of the tiger population (Chapron *et al.* 2008; Goodrich *et al.* 2008).

Livestock depredation occurs in many villages along the forest boundary, particularly in the east. Results from preliminary surveys suggesting that about 80 livestock are killed every year (Khan Unpubl. data; Rahman Unpubl. data), but the causes and potential solutions for livestock depredation have yet to be identified.

First steps to reduce the conflict are being piloted by the FD and partners in the form of Tiger Response Teams. A boatbased team tackles human-killing inside the forest by providing medical assistance, transporting victims, retrieving bodies, and patrolling areas where human-killers are active. Village-based response teams are being created in the bordering village areas to deal with stray tigers and monitor livestock-killing. The teams are reached through a Tiger Hotline number publicised in FD posts and villages (Greenwood 2009).



Tiger Response Team boat unit patrolling in the west

the Sundarbans, with snaring apparently the most common practice (Jagrata Juba Shanga 2003). This technique can also kill non-target species such as tigers. Preliminary investigations suggest that many forest users poach deer as a secondary activity to support their own food requirements while working in the forest, and to supply friends and family when they return to their communities (Mohsanin Unpubl. data). The nature and scale of specialist poaching efforts are unknown, but the market for wild meat consumption is thought to be largely local (Khan 2004).

Prey could also be depleted through disease introduced by domestic animals; in some northern parts of the forest, deer share habitat with cows and goats which graze illegally inside the forest (Rahman Unpubl. data). No research has been carried out to understand disease occurrence in the prey population.

1.3. Habitat loss and degradation

Habitat loss and degradation imperil tigers by reducing, thinning, and fragmenting the area in which they can live and reproduce. The Sundarbans shares many threats to habitat in common with other tiger habitats, but also has a variety of factors unique to the socio-political landscape in which it is embedded and the particular dynamics of a mangrove ecosystem (Seidensticker and Hai 1983).

The Sundarbans is approximately half the size it was 200 years ago due to conversion to agricultural

land and shrimp farms (Curtis 1933; Biswas *et al.* 2008). However, despite being situated in the most densely populated country in the world, the current boundaries of the forest have been maintained since the early 1900s (Curtis 1933; Iftekhar and Islam 2004; Biswas *et al.* 2008). Studies suggest that coverage and density of larger diameter trees, canopy closure, and diversity have declined over the last 100 years or so (Canonizado and Hossain 1998; Iftekhar and Islam 2004; Iftekhar and Saenger 2007). However, the amount and rate of change is unclear as the studies have been based on past forest inventories which used a variety of methodologies, making comparisons to assess long term change over time problematic (Iftekhar and Saenger 2007).

A wood cutter with loaded boat

There are a number of potential threats to the Sundarbans, perhaps the most immediate of which is the unsustainable harvesting of timber and non-timber forest products (NTFP). The burgeoning population along the Sundarbans periphery have few alternative livelihood options and therefore little choice but to depend upon the forest for their survival; thousands of people enter the forest on a daily basis to harvest timber, fuel wood, fibres, and other non-timber forest products. The most economically valuable wood species is *sundry*, a hardwood generally used for building houses, making boats, anchor posts, and fuelwood (Canonizado and Hossein 1998). The legal harvest of *sundri* has been suspended since 1990 due to



declining stock, but some illegal felling continues (Canonizado and Hossein 1998). *Gewa* is the second most valuable timber species. It was cut for paper production in government owned newspaper mills until their closure in the early 2000s when they became a losing concern. *Gewa* continues to be used for building materials, out rigging for boats, fishing materials, and fuelwood (Canonizado and Hossein 1998). *Goran* trees are cut extensively for fuelwood, used by local communities and industries such as brick manufacturing.

Goran bark is rich in tannins which are used to preserve fishing nets and sails. Other timber species are *keora*, *kankra* (*Bruguiera* spp.), *baen*, *dhundal* (*Xylocarpus granatum*), *passur* (*Xylocarpus mekongensis*), and *singra* (*Cynometra ramiflora*), which are used as substitutes for *sundri* and *gewa*. *Nypa* palm (*Nypa fructicans*) and Sungrass (*Imperata* sp.) are also collected for thatching materials (Canonizado and Hossein 1998). Honey and wax

are collected by specialist teams of honey hunters hired by businessmen who then sell the products on the national market. Fishermen also enter the mangroves to gather fish, crabs, and other marine life. The FD licenses fishing and maintains records of this activity, but there is no scientific monitoring or management of fish stocks (Canonizado and Hossein 1998). The impact of current extraction levels on the overall ecosystem has not been quantified, but short term studies undertaken in the 1980s and 1990s suggest this may be the main cause of the mangrove's continued degradation (Iftekhar and Islam 2004). The Integrated Forest Management Plan for the Sundarbans Reserved Forest compared the inventories carried out in 1959, 1983, and 1996 (Canonizado and Hossein 1998). The report highlighted a rapid decline in *sundri* and *gewa* growing stock, and prescribed immediate regulatory measures and a strict 20 year felling schedule (1998-2018) to ensure sustainable extraction. However, the lack of resources for forest



A young fisherman with his equipment



Nypa collectors at work along canal banks

protection together with demand from expanding communities and industry undermine regulation of harvesting levels. Sustainable resource extraction will, therefore, only be realised through improved forest protection, alternative livelihoods, and alternative sources of essential forest products.

There is no human habitation permitted inside the forest other than FD, coast guard, and navy camps. Infrastructure within the forest is generally limited to the buildings of these camps and some tourist facilities such as walkways and watch towers. However, there are some semi-permanent fishing communities operating at the southern edge of the forest. These fishermen use forest materials for fuelwood and in the constructions of their jetties, shelters, and fish drying beds (Canonizado and Hossein 1998). The impact of these encampments on the forest, tigers, and prey has not yet been quantified. Some forest areas close to the villages in the north and north east appear to be degraded from local wood collection, and there is also illegal grazing of domestic livestock which could reduce the available food for prey (Rahman Unpubl. data).

Other threats are more difficult to quantify or even identify because (1) their effects are less visible and might only be measurable over the long-term, and (2) they may originate outside the forest. For example, there is little information about the presence of disease and its potential impact on the forest. There are some studies on a condition known as "Top Dying" in *sundri* trees, but its impact and causes are not clearly understood (Canonizado and Hossein 1998; Iftekhar and Islam 2004). The type and distribution of invasive species has been investigated; 23 invasive plants were identified and the rate of invasion was notably higher near river banks and some areas close to human habitation (Biswas *et al.* 2007). The 2007 study concluded that, whilst control of invasive species is only successful if undertaken before the plants become well-established, invasive species in the Sundarbans were still at a manageable level. However, monitoring and management intervention activities are not in place, and the impact on tiger and prey habitat is not fully understood.

Pollution of the rivers from industrial, shipping, tourism, urban, agricultural, and aquaculture sources may be damaging the Sundarbans. However, except



Fish drying stands in the south of the Sundarbans

for preliminary identification of some toxins, little work has been published on the extent and impact of pollution (Hussain and Acharya 1994). Large-scale mineral and gas exploration and extraction has not been carried out so far in the Sundarbans, and its potential impact on the ecosystem, in terms of pollution and habitat destruction, has not been estimated.

Sea-level rise caused by climate change has been noted as a serious threat to habitat in the Sundarbans, with current predictions suggesting substantial land loss from increased inundation over the next 50 years (Agrawala *et al.* 2003). These predictions do not take into account the changes in compensatory factors such as sedimentation rate and mangrove adaptation (Stanley and Hait 2000; Allison *et al.* 2003); the coastal areas of Bangladesh are currently growing by about 20 km² a year (Inman 2009), and mangroves in other areas are known to have flourished despite sea-level rises of at least 3.8 mm a year (Hendry and Digerfeldt 1989). Although improved understanding of this issue is required, some current estimates of sea-level rise are over 1 m by 2100 (Hansen 2007; Rahmstorf 2007; Pfeffer *et al.* 2008), so it is prudent to develop mitigation solutions before it is too late (MoEF 2008). Tropical cyclones are a regular occurrence in the region with approximately one cyclone per year hitting Bangladesh (Islam and Peterson 2008). Climate change is expected to increase cyclone frequency, which may be an additional source of stress to the forest. The MoEF has developed a 10 year Bangladesh Climate Change Strategy and Action Plan that outlines programmes to tackle the predicted effects of climate change, including expansion of the coastal greenbelt through mangrove afforestation (MoEF 2008).

Freshwater flow into the Sundarbans may also be affected by climate change-induced alterations in rainfall and melting of Himalayan snows (Agrawala 2003; MoEF 2008). Dry season freshwater flows have

fallen due to extraction of water from the upper reaches of the Ganges for irrigation, navigation, and industry. The building of the Farakka barrage in 1975, for example, has been directly linked to the reduction of freshwater flow into Bangladesh and the Sundarbans (Iftekhar and Islam 2004). Embankments and diversion of water for irrigation within Bangladesh also reduce freshwater flows. The combined impact of increased inundation from the sea and decreased freshwater flow may increase salinity levels, particularly in the dry season, which could change vegetation patterns (Agrawala 2003), and thus effect the distribution of tigers and prey.



A young girl bringing in her fishing net

2. CHALLENGES

There remains considerable scope to expand the list and understanding of threats. However, due to the risk of losing more tigers during the lengthy time needed to collect more information, conservation activities need to be implemented now. The development of an effective tiger conservation effort is a huge challenge; a complex and urgent task requiring a holistic approach that can be swiftly adapted to changing conditions and the emergence of new information. Carrying out such an approach will require a huge increase in capacity to develop and carry out conservation activities. Capacity requirements can be grouped into five areas: institutional development and policy, forest protection and law enforcement, education and awareness, research and monitoring, and collaboration. This section outlines the current state of each area with suggestions for improvements.

2.1. Institutional development and policy

The FD is the custodian of wildlife and forests for the entire country, and in recent years is strengthening its commitment to biodiversity conservation. The FD was formed in 1864 during the colonial period and is responsible for the management of the Sundarbans and all other forests in Bangladesh. It has a number of territorial divisions that are responsible for the prevention of illegal activities, regulation of legal extraction, permit issuance, and revenue collection. A FD Wildlife and Nature Conservation Circle (WNCC) was formed in 2001, which established dedicated posts to safeguard wildlife, primarily in protected areas (Mitchell *et al.* 2004). The WNCC does not yet have sufficient institutional presence or resources to fully carry out its intended role. In the Sundarbans the territorial DFOs, rather than WNCC staff, currently administer both the reserved forest and the wildlife sanctuary areas. Furthermore, staff are regularly transferred between wildlife and territorial posts and also between forests, hampering the development of wildlife or ecosystem conservation specialists. Indeed, the majority of FD staff have forestry-related backgrounds so additional biodiversity conservation skills across all staff could be developed.

Retaining staff within the WNCC would enable those personnel with an interest in wildlife and conservation to receive specialised training. In addition to protected area management, responsibilities of the WNCC should extend to wildlife monitoring, wildlife crime investigation, and human-wildlife conflict mitigation. A large amount of wildlife is found outside the protected areas and WNCC staff would therefore need appropriate resources and jurisdiction. For example, high densities of tigers, THC conflict incidents, and wildlife crime are found outside the three Sundarbans wildlife sanctuaries. Specialists could

also be retained in specific forests, for example, tiger and mangrove specialists in the Sundarbans. Retention of staff within a particular forest would also allow for improved relationships with local communities to be developed over the longer term.

Generalist biodiversity conservation and protected area management training can also be provided to the territorial divisions to build on their production forestry skills. A staff review process that measures performance based on wildlife abundance and habitat condition would strengthen the impact of these organisational changes and foster a professional approach to conservation and forest management. Furthermore, conservation of the Sundarbans requires development of fisheries and wetlands management skills.

As an initial step and to progress BTAP implementation, WNCC staff could be assigned to coordinate BTAP activities. Duties would include the development of a BTAP implementation plan; design of a monitoring and evaluation approach; liaison with decision-makers in the FD, MoEF, and other ministries; and the creation of a platform to facilitate



File keeping at Burigoalini FD office in the west of the Sundarbans

collaboration. Selected Sundarbans FD staff can be trained to deal with THC incidents, wildlife crime investigation, and tiger, prey, and habitat monitoring activities. Associated incentives are needed that provide benefits for working on BTAP activities, such as the opportunity to undertake specialist training and further study.

Whilst the importance of the Sundarbans and its tigers is recognised, their conservation needs to be integrated into the GoB's development agenda to ensure complimentary policy and action. An economic assessment of the Sundarbans ecosystem services, together with identification of conservation-friendly revenue generation schemes, would help to mainstream Sundarbans and tiger conservation into development policy and action. Raising cross-ministry and national awareness of the importance of the Sundarbans and its tigers is needed to further garner the political support for development and integration of Sundarbans tiger-friendly policy.

2.2. Forest protection and law enforcement

2.2.1. Sundarbans protection

In addition to the development of institutional biodiversity conservation capacity, an effective FD patrolling force is essential for the prevention of illegal and damaging activities such as poaching or unsustainable wood harvesting. There is an urgent need to improve human resources, infrastructure, and patrolling efforts.

Prior to a full evaluation, field observations suggest that FD resources are insufficient for carrying out effective patrolling. Some guard posts do not have boats, and many that do have slow wooden vessels and inadequate budget for maintenance or fuel. Accommodation conditions are basic and medical facilities are extremely limited. There are normally two or more guns assigned to each guard post, but some of these weapons and associated ammunition are obsolete or non-functional.

In any case, staff rarely use their arms as existing laws do not provide them enough protection if someone is killed or injured. There are also problems with drinking water and food supplies for some forest posts.

In addition, there is no risk allowance to compensate for the unique dangers faced by FD staff in the Sundarbans. Two FD staff were killed by tigers in 2005 and one staff member was killed by a cyclone in 2007. In 2009, two more FD staff were killed in confrontations with *dacoits* (local term for robbers and pirates). There is also no budget set aside to cope with emergency situations such as periodic cyclones. Cyclone Sidr struck in November 2007 and destroyed many guard posts in the eastern side of the Sundarbans. More than a year later, little repair work has been done, several guard posts are still deserted, and others have no boats or regular source of drinking water. A disaster recovery process is needed to ensure that patrolling levels are returned to normal as quickly as possible after these devastating storms.



A forest guard on evening patrol along a Sundarbans beach, where the southern edge of the forest meets the Bay of Bengal

2.2.2. Legislation

Prior to 1973, tiger hunting in Bangladesh was legal, and bounties were offered as an incentive. The Bangladesh Wildlife (Preservation) (Amendment) Act 1974 defines the tiger and the spotted deer as 'protected animals'; they cannot be killed or captured, except for cases of self defence, protection of crops and livestock, approved scientific research, or sanctioned transport or possession. In addition, where a tiger becomes a threat to human life, the animal can be officially notified by the Chief Conservator of Forests (CCF) for capturing or killing. The Act does not apply to any wildlife products in transit through Bangladesh as long as the products are accompanied by a transit customs document. This provision may be taken advantage of, because it is difficult for customs officials to confirm the source of wildlife products and authenticity of transit documentation.

Under the 1974 Act, a set of penalties was defined regardless of the wildlife concerned: imprisonment for six months to two years and/or a fine of Taka 500-2,000 (in 2009 equivalent to only US\$7-28). The Act also provides an option wherein a FD officer, upon seizure of a wildlife product, can request compensation for the product up to Taka 50,000 and confiscate any guns and licence held by the offender; a process that waives any further prosecution. At the time of writing, the market rate for spotted deer meat was Taka 200-

500 per kilogram, so a poacher can earn Taka 20,000 or more for an adult male deer. Also, considering that tiger skins can be sold for around Taka 70,000 (Mohsanin Unpubl. data), the current economic incentives to poach far outweigh the deterrents. At the time of writing, the 1974 Act was under revision which provides opportunity for a review of penalties. Three areas in the Sundarbans were declared as Wildlife Sanctuaries under this Act, the first in 1960 and the second and third in 1996. In these areas the Act prohibits the entry of people, cultivation of land, damage or destruction of vegetation, hunting or capturing wild animals, introduction of exotic species, straying of domestic animals, causing of fires, and water pollution. These Wildlife Sanctuaries were also declared a UNESCO World Heritage Site in 1997. A number of other national and international legislative initiatives have been established to offer some level of protection to the tiger, its habitat, and prey (Box 2).

An assessment is required to investigate legislative gaps, the sufficiency of existing penalties, the perceived risk of being punished, and barriers to prosecution. The establishment of a specialist Wildlife Crime Unit would strengthen enforcement by creating improved capacity to investigate domestic crime and illegal international trade. A review can also be undertaken to ensure Sundarbans management strategies adhere to international conventions and protocols. A revision of forest zonation may also be needed to account for the current distribution of tigers and human use patterns across the landscape.



Spotted deer grazing under a stand of *keora* trees

Box 2. Legislation, conventions, and national plans at a glance

National legislation

- Forest Act, 1927 (Amended in 2000): This Act makes provision for reserved forests; it prohibits the carrying of guns, grazing of cattle, felling of any tree, removal of any forest produce, and setting fire to and clearing of land for cultivation or any other purpose.
- Bangladesh Wildlife Order, 1973, and Bangladesh Wildlife (Preservation) (Amendment) Act, 1974: The tiger and the spotted deer are defined as 'protected animals' in Schedule 3 of the Order 1973. The Order was refined and enacted as Wildlife (Preservation) (Amendment) Act 1974. The three Sundarbans wildlife sanctuaries were set up under this Act.
- The Bangladesh Environment Conservation Act, 1995: This deals with cases of environmental degradation. In 1999 under the 1995 Act, Bangladesh declared the 10 km of land adjoining the Sundarbans as an Ecologically Critical Area (ECA). The ECA rules prohibit a number of activities from damaging natural trees, animals, and fish, to establishing factories that pollute soil, water, and air. However, this area was already converted to agriculture and aquaculture, and heavily populated before the ECA was declared.

International conventions

- CITES: The trade of tiger parts is prohibited under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Bangladesh acceded to CITES in 1982.
- Convention on Biological Diversity (CBD): Signed by Bangladesh in 1992, the objective of this treaty is the conservation of biodiversity which is identified as being essential to socioeconomic development. This BTAP will contribute to meeting such obligation through its aim to secure the future of the Sundarbans and its tigers.
- Ramsar Convention: The Sundarbans has been designated as a Wetland of International Importance under this convention, which Bangladesh ratified in 1992. The Ramsar Convention provides a framework for the conservation and wise use of wetland resources.
- UNESCO: The three Sundarbans wildlife sanctuaries were declared a UNESCO World Heritage Site in 1997, drawing national and international attention to this unique ecosystem.
- Kyoto Protocol: In 2001 Bangladesh ratified this protocol which aims to reduce greenhouse gases contributing to climate change. The Sundarbans represents an important carbon sequestration site for the country.

Related national strategies and plans

- Integrated Forest Management Plan for the Sundarbans Reserved Forest 1998: This plan provides a comprehensive report on current forest stocks and defines sustainable extraction levels for the next 20 years.
- National Biodiversity Strategy and Action Plan: A draft is under development (IUCN 2004).
- Bangladesh Capacity Development Action Plan for Sustainable Environmental Governance, 2007: This document identifies obligations under conventions including the CBD and Kyoto, and outlines a national plan for capacity development for biodiversity conservation and climate change adaptation (MoEF 2007).
- Bangladesh Climate Change Strategy and Action Plan, 2008: This plan was developed by the Department of Environment, MoEF. Under this plan, activities directly relevant to the BTAP include expansion of the coastal greenbelt through mangrove afforestation, development of monitoring systems to evaluate changes in ecosystem and biodiversity in all important and sensitive ecosystems, and climate change scenario modelling.

2.3. Education and awareness

Without political support, the BTAP and biodiversity conservation will continue to remain low on the government's agenda and separate from economic development plans and poverty reduction agendas. Support is also needed across a wide range of parties, from industry and private companies, to public organisations and local communities. Without it, the FD will not be supplied with the resources or legislative tools necessary to protect the forest, partners will not step forward to join in the tiger conservation challenge, and there will be little motivation to conserve and use natural resources sustainably.

Strategic use of education and awareness raising can support changes in knowledge, attitudes, and behaviour to help achieve conservation objectives. A tiger conservation education and awareness strategy is needed to guide the development of carefully targeted and measurable campaigns that are integrated with other BTAP programmes. Successful campaigns need to be creative in their messages and use targeted methods to engage different audiences (Hesselink *et al.* 2007). Training is needed to develop conservation communication and social marketing specialists in Bangladesh, who will then be able to design, implement, and evaluate campaigns.

In many cases, however, education and awareness alone may not be enough to change behaviours and must be used in conjunction with other conservation strategies. For example, forest users of the Sundarbans may know that they are using the forest unsustainably, but their immediate needs make it a matter of survival, in which case, education and awareness could be used to support other initiatives such as the development of alternative livelihoods.

2.4. Research and monitoring

Information is vital for policy formulation, development of field-level strategies, and monitoring tiger, prey, and habitat levels as indicators of overall success. Without basic understanding of a species or the ecosystem in which it lives, it is not possible to assess the impact of various threats or predict and evaluate the outcome of management activities. Equally, without understanding the socio-economic context, which is often the underlying cause of many of the threats, little headway will be made in the development of long-lasting solutions. This information is lacking for most tiger landscapes, and the Sundarbans is no exception (Sanderson *et al.* 2006).



Tiger conservation discussions in a local village

The information that could be obtained on Sundarbans tigers and the threats they face is infinite, but only some has potential to guide conservation actions. A prioritised national BTAP research and monitoring agenda would help direct research activities in line with management needs. It is unrealistic for the FD to collect all of the required information, so independent researchers should be engaged. It is also good practice to involve independent researchers in monitoring activities to ensure transparency in interpretation of results. However, currently there are few ecological and social studies being carried out that can directly inform conservation strategies and only a small number of people involved in tiger conservation research.

Public universities generally do not have enough funds to give national students the opportunity to undertake often costly Sundarbans fieldwork. Scholarships would increase the number of students able to undertake Sundarbans research and build a new generation of tiger conservationists for the country. Field stations could also be established close to the Sundarbans by universities and NGOs to facilitate research activities. A centre for tiger and Sundarbans conservation research would make research findings freely available and provide access



Radio-tracking tigers in the Sundarbans

to the latest approaches and techniques from around the world. This would encourage collaborative efforts and innovative research. There is also a need to improve the availability of national conservation biology undergraduate and graduate training, and the involvement of students and professionals with social science backgrounds.

2.5. Collaboration

The immense scale and multifaceted nature of tiger conservation requires a wide array of skills and resources. Collaboration with other government departments, local communities, academic institutions, national and international NGOs, and the private sector is needed to develop a successful tiger conservation effort.

There are a number of organisations already involved in different aspects of biological research, socio-economic studies, GIS projects, and biodiversity



Honey collectors – vulnerable to tiger attacks as they search the forest for honey combs

conservation activities across the country. A platform is needed to engage these and other organisations and coordinate an integrated tiger conservation programme. An FD-led alliance could facilitate this, following examples from other countries (Box 3). This

would also provide a platform for the FD and collaborators to support one another in securing funding to carry out BTAP activities.

It is also essential to engage with the people who directly rely upon the Sundarbans resources for their economic wellbeing and those whose lives are directly affected by tiger-human conflict. Integration of these communities into forest management will shift the overall paradigm from top-down policing to a more inclusive and mutually beneficial approach. This would build on previous and ongoing FD activities. The FD has implemented a range of social forestry initiatives over the past 30 years. Also, during 2003-2008 the USAID funded Nishorgo project piloted FD-community forest management in five protected areas (Mitchell 2004). The establishment of a co-

management framework specific to the Sundarbans would facilitate the development of conservation activities, including alternative livelihood options and solutions to deal with THC. There may also be opportunities to involve other GoB bodies in initiatives for tiger conservation.

Furthermore, conserving the Sundarbans tiger population will require the creation of a transboundary approach with neighbouring India. There have been previous meetings and joint initiatives, but a more sustained effort is needed to formulate an overall strategy, and facilitate coordination of activities such as research and anti-poaching. Bangladesh can also open dialogues with other countries to help combat the illegal trade in tiger parts.

Box 3. Collaboration for conservation: Examples from other countries

The Department of Wildlife and National Parks Peninsular Malaysia (DWNP) established the **Malaysian Conservation Alliance for Tigers (MYCAT)** in 2003. The aim of MYCAT is to facilitate and coordinate tiger conservation activities of partner organisations. The DWNP provides MYCAT with institutional support, and funds are acquired through donor grants (Yatim and Kawanishi 2003).

The Department of Environment and Forest in Assam set up a **Wildlife Areas Development and Welfare Trust** in 1996. The trust is authorised by the forest department to partner with nongovernmental organisations to help develop, fund, and implement conservation activities. The trust is proving so successful that other states in India are taking up the same approach (Wildlife Areas Development and Welfare Trust 2006).



Crab fishermen in the Sundarbans

PART C

Action Plan



1. OVERVIEW

This section contains the action plan for tiger conservation in Bangladesh over the next eight years. The eight year term for the BTAP was chosen as a sufficient length of time to mobilise a full scale conservation programme and realize achievement of objectives. The plan provides a vision for the future of tigers in Bangladesh and a set of goals to guide all conservation efforts. For each goal there are a set of objectives and a range of strategic actions to combat threats and challenges. As a strategic-level document, the BTAP does not contain a detailed implementation plan including activities, responsibilities, and budgets. Subsequent planning and mobilisation sessions will take the contents of the BTAP, turn these into project concepts, and develop the necessary collaboration needed to ensure their implementation.

2. VISION AND GOALS

Vision

Protected tiger landscapes in Bangladesh, where wild tigers thrive at optimum carrying capacities* and which continue to provide essential ecological services to mankind

Goals

Goals to address threats

- Increase or stabilise the Sundarbans tiger population
- Maintain sufficient prey base to support the Sundarbans tiger population
- Maintain sufficient habitat to support the Sundarbans tiger and prey populations
- Assess the viability of tiger populations in the Chittagong Hill Tracts

Goals to address challenges

- Improve conservation capacity in the FD and mainstream tiger conservation into the GoB's development agenda
- Improve law enforcement to ensure protection of tiger, prey, and habitat
- Build capacity to implement awareness and education programmes
- Build capacity to conduct tiger conservation research and monitoring
- Encourage collaboration to support the FD in the implementation of the BTAP



Brown-winged kingfisher (*Pelargopsis amauroptera*)

**Carrying capacity* is defined as the maximum population size that the environment can sustain over the long-term, considering the available resources. Currently there is insufficient information to determine the optimum carrying capacity of tigers in the Sundarbans, and therefore no way to know if we are currently at, near, or below that level. Furthermore, when determining the desired future states of tiger, prey, and habitat, it must be taken into account that the Sundarbans supports both tiger and human needs. Therefore, perhaps the most pressing question to be answered is: What levels of human use can the Sundarbans sustain, without imperilling the tiger population and the essential ecological services the area provides?

3. OBJECTIVES AND STRATEGIC ACTIONS

This section outlines a set of objectives and strategic actions to achieve the threats and challenges goals based on the information presented in Part B. The current lack of information on threats and the current and desired states of tiger, prey, and habitat make it difficult to develop SMART (specific, measurable, achievable, realistic, and time bound) objectives to address the threats. This will make it difficult to monitor and evaluate progress against these objectives. For example, the objective to 'reduce unsustainable resource use' is not yet SMART because 'sustainable' has not yet been defined, so it is unknown by how much resource use should be reduced, and over what time period. An increase in baseline information is therefore needed to improve definition of the threat objectives. Achievement of the challenge objectives is more straightforward because, in most cases, success can be measured by the completion of the strategic actions.



Honey collectors rowing together with the tide

Table 1. Threats objectives and strategic actions

Direct tiger loss	
GOAL: Increase or stabilise the Sundarbans tiger population	
Threat objective	Strategic action
Evaluate the current and desired state of occupancy, connectivity, and size of tiger population	Develop methods for assessing tiger occupancy, connectivity, and population size
	Define target state tiger occupancy, connectivity, and population size with respect to optimum carrying capacity
	Model trends in tiger occupancy, connectivity, and population size under various threat and management scenarios
	Monitor changes in occupancy, connectivity, and size of tiger population
Minimise prey poaching	Determine nature and scale of tiger poaching and trade in tiger parts
	Improve intelligence relating to tiger poaching incidents
	Improve effectiveness of law enforcement
	Ensure penalties are sufficient to deter poachers, consumers, and traders
	Raise awareness in target groups about legal protection and importance of tigers and their prey
	Improve prosecution rate of poaching, consumption, and trade in tiger parts
	Understand and reduce domestic socio-economic dependencies on tiger poaching
	Develop measures to contribute to the battle against the international trade in tiger parts
	Monitor levels of tiger poaching, consumption, and trade in Bangladesh
Minimise tiger-human conflict	Determine scale, nature, and causes of tiger, human, and livestock killing
	Develop THC mitigation activities and supporting protocol to reduce tiger, human, and livestock killings
	Monitor numbers of human, livestock, and tiger killings

Threat objective	Strategic action
Assess other potential threats	Complete risk assessment and prioritise mitigation activities for tiger disease
GOAL: Assess the viability of tiger populations in the Chittagong Hill Tracts	
Assess the viability of tiger populations in the Chittagong Hill Tracts	Carry out occupancy and abundance survey of tiger and prey

Prey depletion	
GOAL: Maintain sufficient prey base to support the Sundarbans tiger population	
Threat objective	Strategic action
Evaluate the current and desired state of occupancy, connectivity, and size of prey population	Develop methods for assessing prey occupancy, connectivity, and population size
	Define target state prey occupancy, connectivity, and population size with respect to optimum carrying capacity
	Model trends in prey occupancy, connectivity, and population size under various threat and management scenarios
	Monitor changes in occupancy, connectivity, and size of prey population
Minimise prey poaching	Determine nature and scale of prey poaching and trade in prey parts
	Improve intelligence relating to prey poaching incidents
	Improve effectiveness of law enforcement
	Ensure penalties are sufficient to deter poachers, consumers, and traders
	Raise awareness in target groups about legal protection and importance of tigers and their prey
	Improve prosecution rate of poaching, consumption, and trade in prey parts
	Understand and reduce socio-economic dependencies on prey poaching
	Monitor levels of prey poaching, consumption, and trade in Bangladesh
Minimise tiger-human conflict	Complete risk assessment and prioritise mitigation activities for prey disease

Habitat loss and degradation	
GOAL: Maintain sufficient habitat to support the Sundarbans tiger and prey populations	
Threat objective	Strategic action
Evaluate current and desired state of tiger and prey habitats	Investigate tiger and prey habitat requirements (area, cover, and composition)
	Monitor change in area, cover, and composition of tiger and prey habitat
Reduce unsustainable forest resource use	Determine nature and scale of unsustainable resource use
	Understand socio-economic dependencies of forest users on the Sundarbans and develop alternative income opportunities
	Improve effectiveness of law enforcement in the forest
	Improve prosecution rate of illegal activities
	Monitor human impact on forest resources and level of illegal activities
Mitigate affects of changes in freshwater flow, siltation rates, salinity changes, and sea level	Assess changes in freshwater flow, siltation rates, salinity changes, and sea-level to prioritise management response
	Develop and implement adaptation strategies (in line with the Bangladesh Climate Change Strategy and Action Plan 2008 (MoEF 2008))
Assess other potential threats	Complete risk assessment and prioritise mitigation activities for pollution, invasive species, and future mineral and gas exploration/extraction



Fisherwomen arranging their nets to collect shrimp fry

Table 2. Challenges objectives and strategic actions

Institutional development and policy	
GOAL: Improve conservation capacity in the FD and mainstream tiger conservation into the GoB's development agenda	
Challenge objective	Strategic action
Build management capacity to plan, implement, and monitor BTAP activities	Assign dedicated FD WNCC staff to direct BTAP implementation and coordinate collaboration efforts
	Prioritise BTAP threats and challenges to develop implementation strategies with collaboration and budget requirements
	Develop a monitoring and adaptive management processes
	Develop a management and stakeholder reporting process
Build field-level capacity to deal with immediate tiger conservation needs	Develop a THC protocol to improve management decision-making for different conflict scenarios
	Develop THC alleviation strategies including: - Village Tiger Response Teams to reduce tiger and livestock killing - Forest Tiger Response Teams to reduce human killing incidents - Specialist teams to deal with situations requiring tiger capture
	Establish a wildlife crime unit to tackle tiger and prey poaching
	Establish a research team to undertake tiger, prey, and habitat monitoring programmes
Build capacity for long term tiger conservation to last beyond the eight years of the BTAP	Enrol selected FD officers for further study in conservation related-disciplines and leadership training
	Develop a sustainable financing mechanism for tiger conservation
	Conduct an organisational review to understand opportunities for retention of wildlife staff within WNCC and also for FD staff within the Sundarbans
	Develop and institutionalise a wildlife conservation training programme for wildlife and forestry staff
	Link Sundarbans staff reviews and promotions to tiger conservation goals and objectives
	Assess options for building capacity to manage and conserve fisheries in the Sundarbans

Threat objective	Strategic action
Incorporate tiger conservation into development plans	Develop an approach to integrate tiger and biodiversity conservation into wider development policy and action
	Complete an economic assessment of the benefits of Sundarbans ecosystem services
	Develop a monitoring and adaptive management processes
	Develop revenue generation approaches based on conservation friendly activities
Build field-level capacity to deal with immediate tiger conservation needs	Raise awareness in high and mid-level officials of other Government ministries about tiger and Sundarbans conservation and its relationship to development policy
	Raise public awareness across the country by mainstreaming tiger and Sundarbans conservation issues into the media

Forest protection and law enforcement	
GOAL: Improve law enforcement to ensure protection of tiger, prey, and habitat	
Challenge objective	Strategic action
Improve law enforcement capacity in the Sundarbans	Develop and implement a forest protection strategy to improve FD patrolling, monitoring, staffing, work incentives, and staff living conditions
	Train FD staff in legislation and their role in its enforcement
Strengthen effectiveness of legislation	Assess current tiger conservation related legislation, penalties, prosecution rate, and perceived risk of being punished
	Review adherence to related international conventions and treaties
Build field-level capacity to deal with immediate tiger conservation needs	Review current zonation of Sundarbans in relation to human use and tiger/prey abundance

Education and awareness	
GOAL: Build national capacity to implement awareness and education programmes	
Challenge objective	Strategic action
Ensure awareness and education is targeted at priority audiences	Develop a national tiger conservation education and awareness strategy
Build capacity to implement awareness and education programmes	Organise training to build national skills in conservation communication and social marketing

Research and monitoring	
GOAL: Increase capacity to conduct tiger conservation research and monitoring	
Challenge objective	Strategic action
Improve law enforcement capacity in the Sundarbans	Develop a prioritised tiger conservation research and monitoring agenda to guide government agencies, academic institutions, NGOs, and individual researchers
Improve tiger conservation knowledge base, and research and learning facilities	Establish a centre and network for tiger conservation and Sundarbans research and knowledge management
	Develop a platform to facilitate sharing of information between national and international tiger conservation researchers
	Establish a research station close to the forest to facilitate Sundarbans field work
	Assess existing national and regional courses to understand need for an in-country conservation biology training programme
Build new generation of tiger conservation scientists	Set up tiger conservation scholarships to support study in a range of disciplines to tackle priority research and monitoring items

Collaboration	
GOAL: Encourage collaboration to support the FD in the implementation of the BTAP	
Challenge objective	Strategic action
Facilitate the engagement and coordination of collaborators	Develop a platform to build collaboration between the FD and other parties for technical and funding support for BTAP activities
Increase collaboration to increase available technical skills	Complete gap assessment of conservation skills to determine national and international collaboration requirements
	Engage relevant collaborators to help FD achieve BTAP objectives
	Facilitate training and skills sharing between collaborators to increase national capacity for tiger conservation

Challenge objective	Strategic action
Work with local communities to build joint solutions for tiger conservation	Develop a community collaboration approach for forest and tiger conservation including a supporting institutional structure
	Develop capacity of local community members in mangrove forest and tiger conservation, participatory planning, and development of alternative livelihoods
Engage other government bodies to increase BTAP implementation capacity	Undertake joint initiatives with other Government agencies in areas of common interest, e.g. incorporation of Sundarbans conservation material into educational initiatives arranged by the Ministry of Education
Engage neighbouring countries to implement transboundary conservation initiatives	Raise awareness in high and mid-level officials of other Government agencies in tiger and Sundarbans conservation issues
	Open communication channels to develop joint activities with government and non-government organisations in neighbouring countries
	Develop a platform to enable government collaboration on cross-border monitoring and control of illegal trade in tiger parts
	Develop links and networks for sharing research results and conducting collaborative transboundary research
Collaborate with the international community to tackle the trade in tiger parts	Form relationships with other governments to conduct joint initiatives aimed at reducing the international trade in tiger parts



A fishing trawler stranded at low tide

4. PRIORITISATION

To focus conservation efforts, the threats need to be prioritised in terms of their potential impact, and the current and desired states of tiger, prey, and habitat (TNC 2003; WWF 2007). This exercise will be carried out in the first year of BTAP implementation. In the meantime, tiger conservation activities will continue using informal judgement of threat priorities based on existing knowledge.

A second process will be carried out to prioritise strategic actions under each objective. A balance must be struck between resources spent on more research versus the need for immediate mitigation activities (Lee 1999; Wilhere 2002). Actions can be ranked based on criteria such as their potential benefit, cost, feasibility, and leverage (TNC 2003). This threat prioritisation and activity selection process will result in the formation of an overall eight year implementation plan containing milestones and strategic actions grouped into project concepts. Collaboration will be needed for both in the development of this prioritisation process and the subsequent implementation plan.

5. MONITORING AND EVALUATION

Monitoring and evaluation of progress against the BTAP goals will provide a way of measuring the success of the tiger conservation efforts, and enable the adaptation of conservation activities based on lessons learnt, new information, and changing conditions. Monitoring of tiger, prey, and habitat levels will be carried out every two years to assess the

achievement of progress against the threat goals (Box 4). Likewise, a two yearly monitoring approach will be devised to evaluate progress against the challenges goals. A process will also be developed for the evaluation of progress of strategic actions and achievement of their associated objectives. At the end of its eight year term, the BTAP will be updated for its next term, in light of completed activities and changing conditions.

6. HOW TO GET INVOLVED

The FD welcomes collaboration at all levels to support implementation of the BTAP. Those interested in becoming involved can get in touch with the FD who can provide further information on current tiger conservation work in Bangladesh and opportunities for collaboration.



Honey collection teams racing into the forest at the start of honey collecting season



Tourists coming ashore at Katka jetty in the East Wildlife Sanctuary

Box 4. Monitoring changes in tigers, prey, and habitat

It is notoriously difficult to count tigers, but if we are to monitor changes in their population and evaluate the effectiveness of our conservation activities, then we must find a way to overcome this challenge. There have been a number of unsuccessful attempts to count absolute numbers of Sundarbans tigers based on short field visits, interviews with forest workers, and the Indian pugmark method (Seidensticker 1987; Tamang 1993; Jalil 1998; Bangladesh Forest Department 2004). The Indian pugmark method is based on identifying individual tigers from their pugmarks, but this is no longer considered scientifically sound by authorities in India and international scientists (Karanth *et al.* 2003; Project Tiger 2005). Camera trapping has become a popular way of estimating tiger abundance, but the sheer size of the Sundarbans and the lack of identifiable tiger travel routes make this technique impractical for tracking changes in the whole population. However, camera trapping has been carried out to investigate tiger and prey density at some sites (Khan Unpubl. data).



Tiger tracks in the mud

A **tiger monitoring** system has recently been developed to measure changes in *relative* tiger abundance (rather than *absolute* numbers) over the entire Bangladesh Sundarbans. This survey works by counting the number of tiger tracks along *khal* (canal) banks in a systematic way across the forest. It is based on the assumption that in areas with more tracks, there are more tigers. If track numbers decrease in an area of the forest, then it will be assumed that tiger numbers have fallen, and management



Searching for tiger tracks along khal banks

action will be taken. It does not try to identify unique tigers from their tracks, rather it counts the total number of tiger tracks per kilometre of *khal* to produce a map showing the densities of tiger tracks across the whole forest. The first survey was completed in 2007 (Fig. 2), with the aim of repeating the survey every two years (Barlow *et al.* 2008). Likewise, monitoring systems need to be developed to track the changes in the prey population and also in habitat cover and composition. A system of **prey monitoring** using pellet counts to determine absolute abundance is currently under development for this purpose (Ahmed *et al.* Unpubl. data). With regards to habitat monitoring, previous studies to assess habitat change were based on one-off forest inventories devised using different methodologies, which made comparisons to work out change over time problematic (Iftekhar and Saenger 2007). Therefore, a standardised long-term **habitat monitoring** programme needs to be developed.

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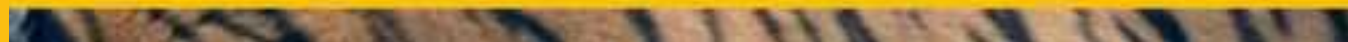
TIGER

ACTION PLAN

FOR THE KINGDOM OF BHUTAN 2006-2015

Nature Conservation Division
Department of Forests
Ministry of Agriculture
Royal Government of Bhutan

In collaboration with WWF Bhutan Program



TIGER ACTION PLAN FOR THE KINGDOM OF BHUTAN 2006-2015



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Save The Tiger Fund

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Ministry of Agriculture
Royal Government of Bhutan
ISBN 99936-666-0-2

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"WALKING THE EXTRA MILE"

M(1)MOA/MISCE/2005/

13 June 2005

FOREWORD

Guru Rinpoche brought Buddhism to Bhutan riding on the back of a flying tigress. The tiger is one of our four protector animals in the "Tag Seng Chung Druk" quartet (the other three animals being the mythical snow lion, garuda and dragon). Thus the tiger is a symbol of great reverence in Bhutanese society. Ecologically, it stands at the top of the food chain, and its presence in the forest symbolizes the well-being of many other species living with it. For all these reasons, the survival of the tiger is vital for the very existence of every Bhutanese.

It gives me immense pleasure to introduce the 'Tiger Action Plan for the Kingdom of Bhutan 2006-2015' that was put together by Bhutanese and international tiger experts during a meeting in Paro from 14-16 September 2004. The content of the Tiger Action Plan (TAP) was discussed during the conference and post-conference consultations with some of the world's best tiger experts. This document is the synthesis of their wisdom, knowledge and expertise, and signifies yet another commitment by the Royal Government of Bhutan towards tiger conservation.

The TAP has three main components viz. species conservation, habitat conservation and human-wildlife conflict management. It outlines some of the enabling environments which are necessary for its successful implementation. Environmental integrity is one of the four pillars of "Gross National Happiness", our development philosophy instituted by His Majesty the Druk Gyalpo. Successful implementation of the TAP will no doubt contribute significantly towards this. Ensuring the tiger's survival in the wild means protecting its habitat, prey species and a myriad of other species, ecosystems and processes.

I want to express my thanks to the Save the Tiger Fund, and our long-time conservation partner, WWF, for rendering assistance in this venture. Many thanks also go to all the international and Bhutanese participants at the meeting for putting this important document together.

I wish the Department of Forests every success in the implementation of the TAP, and in ensuring that future generations of Bhutanese will continue to hear the tiger roar in the pristine forests of Bhutan, in very natural conditions of abundant habitat and prey.

Tashi Delek.

Sangay Ngedup
Minister
Ministry of Agriculture

ACKNOWLEDGEMENT

We are grateful to H.E. Hon'ble Lyonpo Sangay Ngedup, Minister of Agriculture for his foreword that exemplifies his continued support for conservation.

We would like to acknowledge numerous persons, particularly the participants of the International Conference held in Paro from 14-16 September 2004, for their valuable comments and assistance received in shaping this important document - the Tiger Action Plan (TAP). Additional comments were received from AJT. Johnsingh, Ullas Karanth, Francine Madden, Tim O'Brien, John Seidensticker, Tshewang Wangchuk, Per Wegge, and Eric Wikramanayake from the international participants; Sangay Wangchuk, Karma Tshering, Deki Yonten, Ngawang Norbu, Sherub, Sonam Choden, Nagdrel Lhamo, Bap Pema of NCD, Tashi Wangchuk of the Bhutan Museum of Natural History and Kinzang Namgay, Chado Tenzin and Vijay Moktan of WWF Bhutan added more comments in the discussions that followed.

Tiger Sangay of NCD compiled all the materials from the Tiger Conference in Paro and put this document together. Tshewang Wangchuk of WWF International was instrumental in refining the contents of the TAP and Trishna Gurung of WWF International assisted in editing and layout of the document at FORMAT Graphics. The maps were produced with help from Kinley Gyeltshen and Kinga Deki of NCD. Kuensel, WWF, Bhutan Museum of Natural History, and NCD provided the photographs. Save the Tiger Fund and WWF provided financial and technical assistance for the meeting that has made this document possible.

The Nature Conservation Division and WWF wish to thank these individuals, agencies, and all the participants of the meeting who contributed materials and support for this document in various capacities.



Honourable Minister for Agriculture H.E. Lyonpo Sangay Ngedup with conference participants

EXECUTIVE SUMMARY

Bhutan is fortunate to have extensive forest area with approximately 35 percent of the country set aside in protected areas linked by biological corridors. While we are proud of our rich biodiversity, we also recognize that wildlife and human needs have to be reconciled. In this Tiger Action Plan we present our endeavour to safeguard and conserve the majestic tiger and its habitat in the country. While this plan is the culmination of the outputs from the Tiger Conference held in September 2004, and inputs from various Bhutanese and foreign experts, it is the beginning of a strategic and planned effort to enhance existing conservation programs and activities.

Recognizing existing opportunities and threats, this ten-year Action Plan takes into consideration some of the country's important commitments such as maintaining 60 percent forest cover, and the "middle path" approach to conservation. At the same time we hope to address one of the most crucial constraints to effective management and conservation of rich biodiversity, the lack of detailed information on many aspect of biodiversity.

The ultimate goal of the Action Plan is to maintain a viable interconnected population of breeding tigers in Bhutan, a population existing predominately on wild prey with minimal conflict between humans and tigers. We hope to achieve the above goal through three major areas of focus, namely: species conservation, habitat conservation, and human wildlife conflict management. The fourth section focuses on creating an enabling environment for achieving this goal through education and awareness, regional cooperation and human resource development. The main areas of focus for the initiation of the ecological study component of the program are in Royal Manas, Jigme Singye Wangchuck and Jigme Dorji National Parks. This contiguous tract of the Bhutan Biological Conservation Complex spans from the sub-tropical forests to alpine meadows. Once these areas are covered activities will be replicated in other areas.

The first theme, species conservation, focuses on developing field based information through various survey methods, suppression of killing of tiger and prey species, and halting the illegal trade of tiger parts and products and other endangered wildlife.

The second theme, habitat conservation, focuses on assessing the status of tiger and prey habitat, monitoring changes over time and identifying and resolving existing conflict land use policies affecting tiger and prey habitat through several means. This information will be used to develop a national "conservation radar" that will inform decision makers on impending threats well in time.

The third theme, human wildlife conflict management, will focus on determining the main causes of livestock depredation and reducing retaliatory killing through preventive and mitigative measures as well as incentives.

To further enhance these three focus areas, enabling factors such as education and awareness programs for various stakeholders and audiences, regional cooperation to reduce trans-boundary poaching and trade, and human resource development through increase in number of adequately trained staff will be carried out.

At the end of these ten years we will have developed a database on tiger and ungulate prey population status and acquired enough information on the ecology, demography, movement patterns and behavior of tigers in the selected sites. We will be able to confidently inform decision makers whether tiger and prey numbers are increasing or decreasing in particular locations as well as the cause of such changes. Where human wildlife conflicts are the cause of the demise of tigers, mitigative measures will have been tested and adopted.

Research projects concerned with tiger ecology, prey species and habitat conditions will be embarked upon and through experience, we hope to be able to exchange information with other international experts and scientists to further enhance our conservation programs.

1. INTRODUCTION

Nestled in the Eastern Himalayas, the Kingdom of Bhutan, with an area of 38,394 km² (RGoB 2002) represents a region that exhibits one of the richest diversities of wild plant and animal life on earth. Biological inventories have so far recorded some 7,000 vascular plants, 770 species of birds and 160 species of mammals (MoA 1998). Three main biophysical features are responsible for this incredible biodiversity. First, the country straddles two major biogeographical realms, the Palearctic characterized by temperate and alpine regions of the central and northern mountains, and the Indo- Malayan characterized by tropical and subtropical ecosystems of the lowlands and southern foothills. Second, climate and altitude vary between two extremes. Annual rainfall ranges from 5,000 mm in the southern part of the Country to less than 500 mm in the alpine highlands, and elevations range from 100 meters above sea level (masl) in the southern foothills to more than 7,000 masl in the northern mountains. The eastern part of the Himalayan region receives more rainfall than the western part and hence vegetation and treeline extends higher in the former. Lastly, over 72.5 percent of the country's geographical area is covered with undisturbed forests.

Bhutan's socio-political conditions have been, and continue to be, favorable for the conservation of biological diversity. The Royal Government of Bhutan (RGoB) is strongly committed to environmental conservation as reflected in various national policies and legislations. One of the most important commitments of the 1974 Forest Policy has been to maintain 60 percent of the country under forest cover, in perpetuity. This clause is now embodied in the new Constitution that was released for nationwide debate in 2005. Further, several factors provide optimum conditions for the continued conservation of the kingdom's rich environmental resources, namely;

- 1) a small population of less than one million,
- 2) a Buddhist ethic that strongly supports nature conservation,
- 3) the integration of conservation into mainstream economic development as one of the four pillars of Gross National Happiness (GNH), prime indicator of Bhutan's development philosophy,
- 4) the "middle path" conservation approach of avoiding the extremes of severe protectionism and outright destruction, and
- 5) Bhutan's rugged topography that makes many parts of the country inaccessible, and therefore out of reach of environmental degradation.

Nature conservation as a national program pre-dates planned development, which only began in 1961 with the advent of the Five-Year Development Plans. Traditional conservation ethics existed with the protection of important forests and catchment areas as the abodes of deities and spirits. This practice still exists in many parts of Bhutan. Nature conservation was initiated as a national program with the creation of the Department of Forests in 1952. Subsequently, it was enhanced by the establishment, in 1966, of the country's first protected area, the Manas Wildlife Sanctuary (now Royal Manas National Park) in southern Bhutan, followed by the enactment of the Bhutan Forest Act in 1969. Until 1984, all wildlife management responsibilities were vested in the various territorial divisions of the Department of Forests. In 1984, two functional entities, the Northern and Southern Wildlife Circles, were established under the administrative and technical assistance of the Department of Forests to oversee wildlife conservation and protected area management activities. In 1992, the two circles were integrated to form the Nature Conservation Division that currently functions as the nodal agency for overall planning, coordination, implementation and technical support of nature conservation and protected area management.



Much of Bhutan is marked by thick forests



In Bhutan tigers are found from the tropical south to the temperate north

2. STATUS OF TIGER CONSERVATION IN BHUTAN

2.1. Tiger Conservation Program

Although a specific program focusing primarily on tigers did not begin until 1996, many of the conservation needs of the species were addressed through the establishment and management of a network of protected areas and the enactment of the updated Forest & Nature Conservation Act of Bhutan in 1995, which replaced the Bhutan Forest Act (1969). The national protected areas system accounts for 26 percent of the country's area and encompasses the full range of all major ecosystems found in the country. An additional 9 percent of the country is included for conservation as biological corridors, based on results from tiger surveys. The Forest and Nature Conservation Act of Bhutan (1995) accords the tiger "fully protected" status: a status extended to 22 other species of wild animals and seven wild plants found in Bhutan.

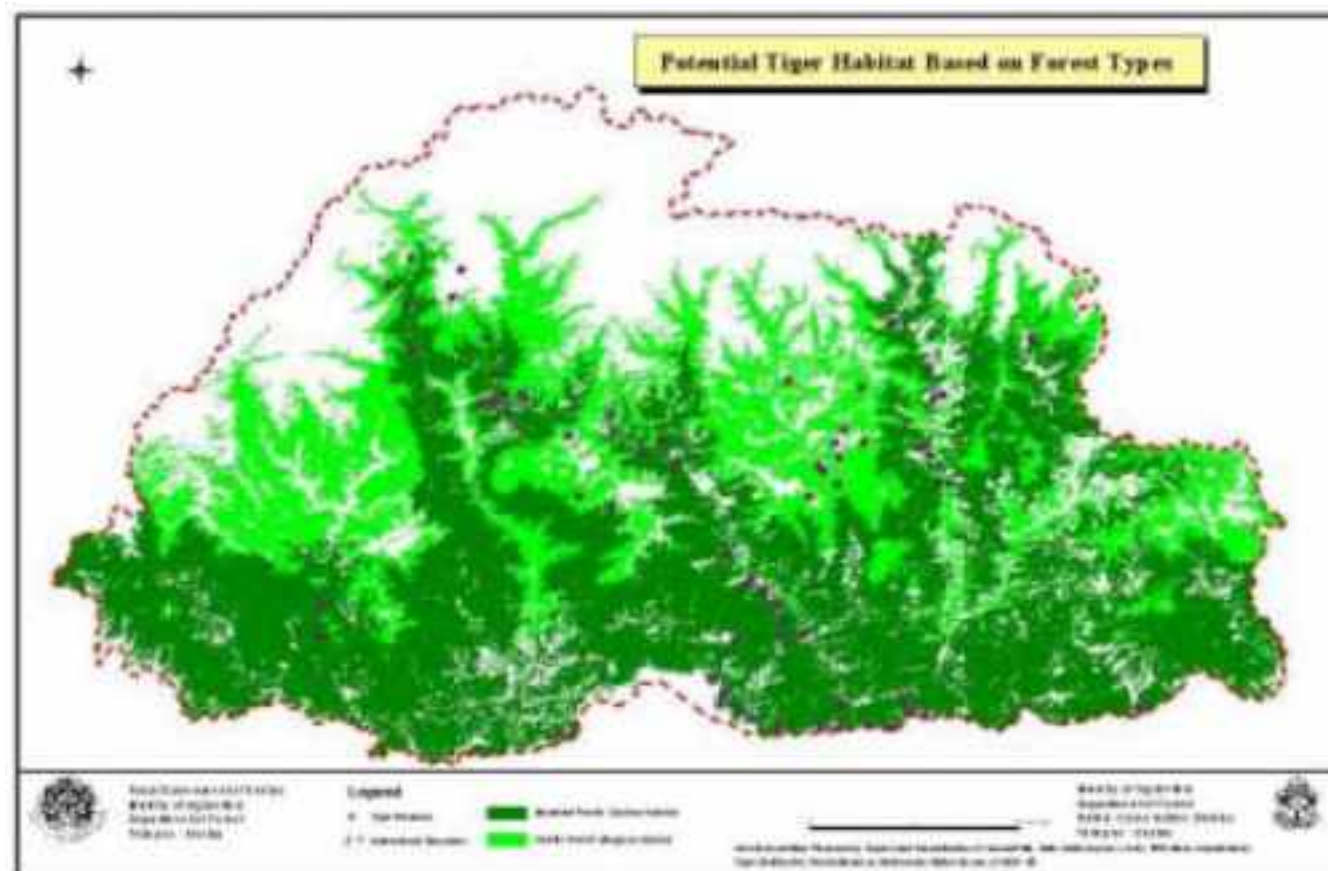
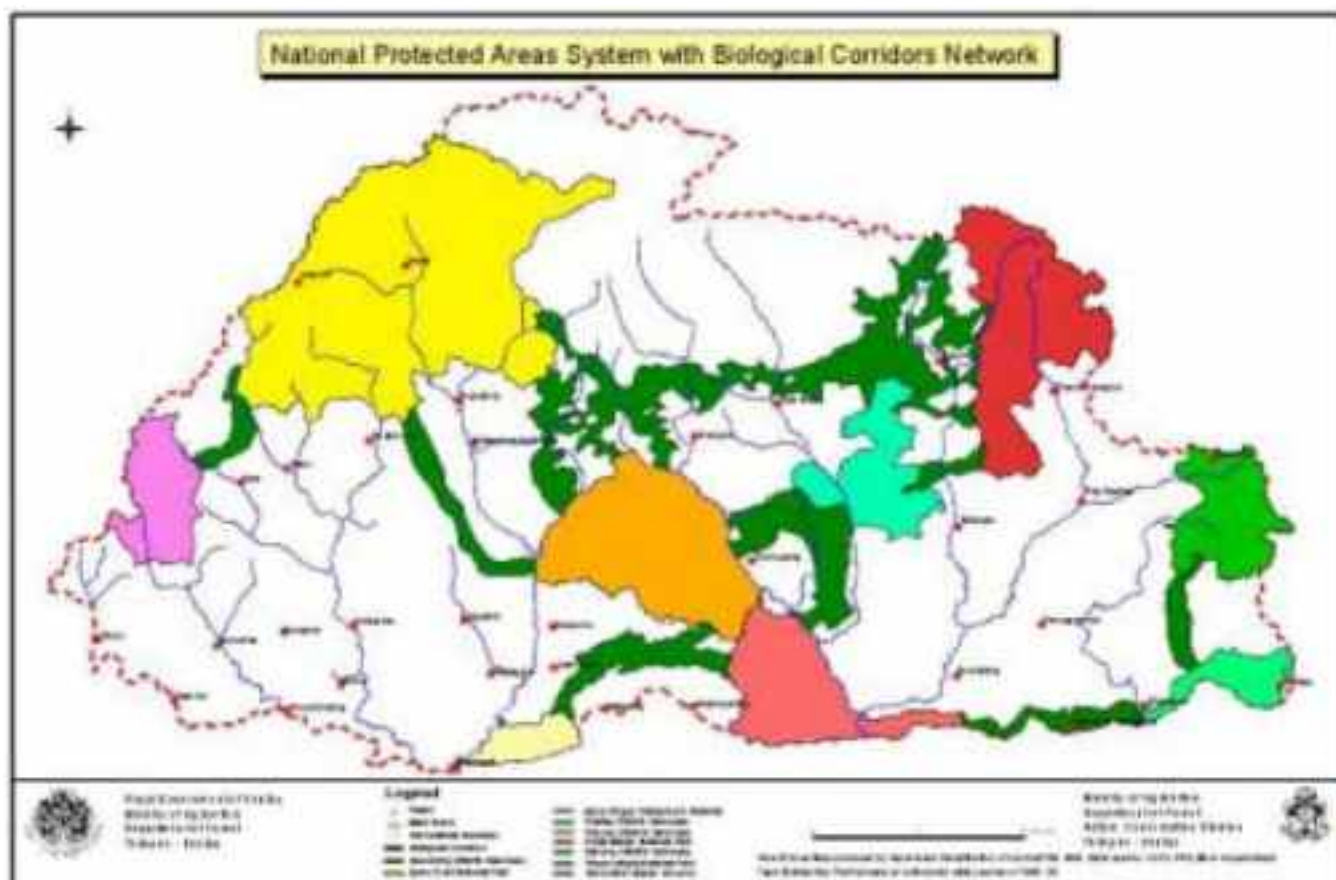
In 1996, the Department of Forests and WWF Bhutan Program initiated the Tiger Conservation Program aimed at achieving three objectives:

1. to complete a tiger survey for the entire country in order to assess presence/ non-presence, distribution, and density of tigers across Bhutan

2. to develop the capacity of protected area and territorial Forest Department staff to conduct technically competent tiger surveys and
3. to promote public awareness of tiger conservation and related issues.

Major achievements of the program, to date, are the following:

1. the formulation and endorsement by RGoB of a national strategy for tiger conservation based on a nationwide tiger sign survey, in 1998
2. the training of more than thirty-five Forest Department staff in and outside PAs on tiger and prey survey methodology
3. the declaration of nearly 9 percent of the country's total land area as biological corridors, thereby ensuring that critical forest areas outside the PAs are also protected in the long-run
4. the expansion of two protected areas viz. Thrumshingla National Park (from 768 to 905 km²) and Bomdeling Wildlife Sanctuary (1182 to 1545 km²) to include important tiger and snow leopard habitats, and
5. the establishment of the Tiger Conservation Fund to minimize human-wildlife conflict by compensating villagers for valuable livestock lost to predators like tigers, snow leopards, leopards and Himalayan black bears.



2.2. Tiger Population and Distribution

Prior to the survey initiated by the Tiger Conservation Program, the tiger population was assumed to be in the range of 80-240 (Jackson & Kemf 1996; Dorji & Santiapillai 1989). After completion of five nation-wide surveys, an analysis of the sign data yielded a conservative crude estimate of 67 to 81 adult animals and a total of approximately 115 to 150 animals, including juveniles (McDougal & Tshering 1998).

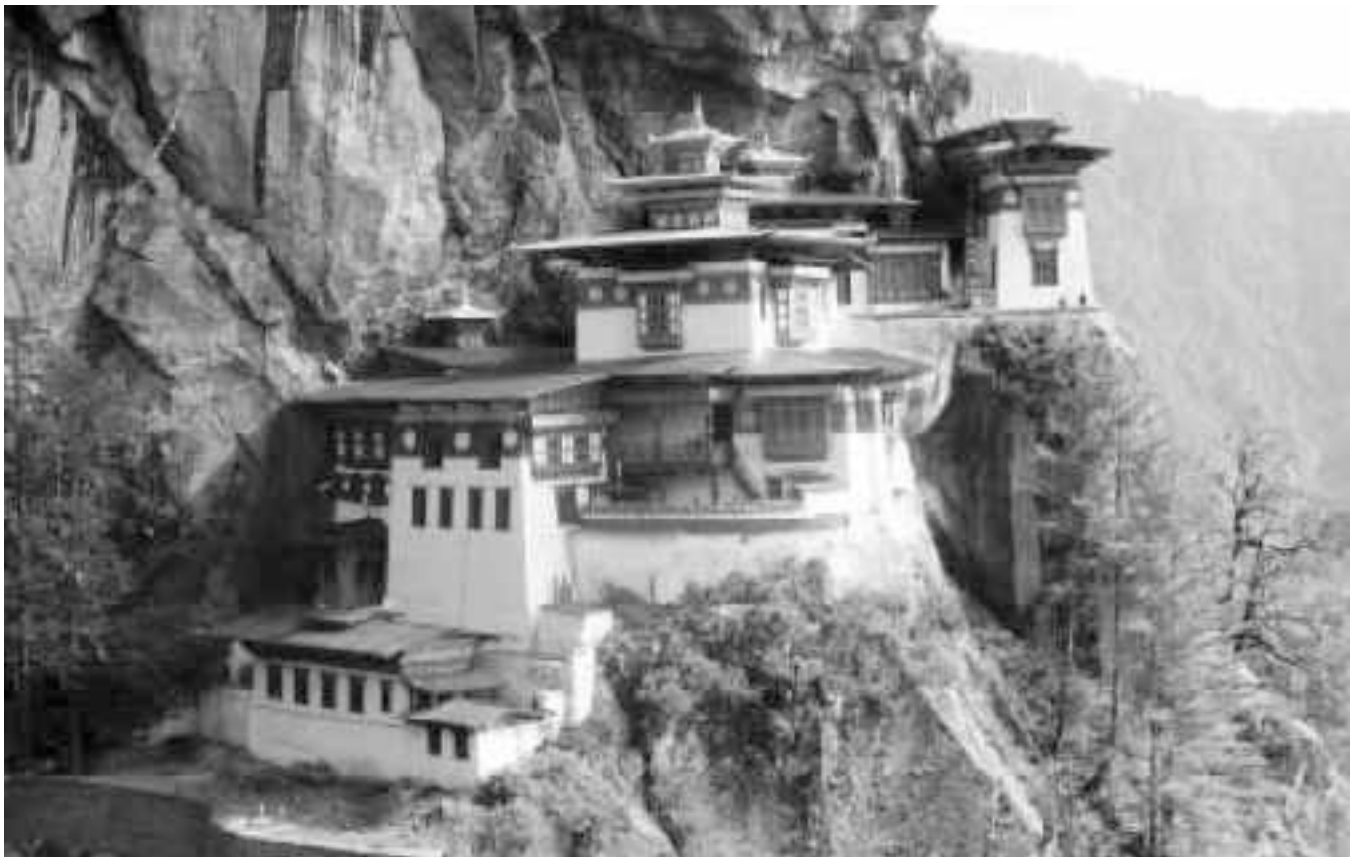
The tiger in Bhutan ranges from 100 masl in the south to as high as 4,100 m in the north. It is found in almost all parts of the country. Bhutan offers a wide range of habitat for tiger and prey and data from previous surveys have resulted into two different densities of tigers based on habitat type and elevation; there are more tigers in the south (subtropical forests) with a density of 1 tiger per 50 km², whereas in the central Himalayan region (temperate forests) the density is 1 tiger per 185 km² according to the last surveys (McDougal & Tshering 1998). These densities so obtained need

further verification through more rigorous monitoring as a next step.

2.3 National and Global Significance

There is global concern for the tiger's conservation and protection. Its numbers have declined drastically in the last century, reducing them to small fragmented populations. The species is near extinction mainly due to human interferences such as the destruction of habitat and poaching for skin and bones. The tiger stands at the top of the food chain and, therefore, serves as an indicator species of environmental health. In addition to this significant role, the tiger plays an important socio-cultural role in Asian myth, legend and folklore where it is respected and revered. Sadly, its parts are occasionally coveted for alleged strength, vigor and curative properties.

Conservation of the tiger is of great relevance to Bhutan's religious and cultural heritage as the tiger is believed to be one of the four power animals of the state religion, Buddhism (the other three are the



Taktshang-tiger's den temple

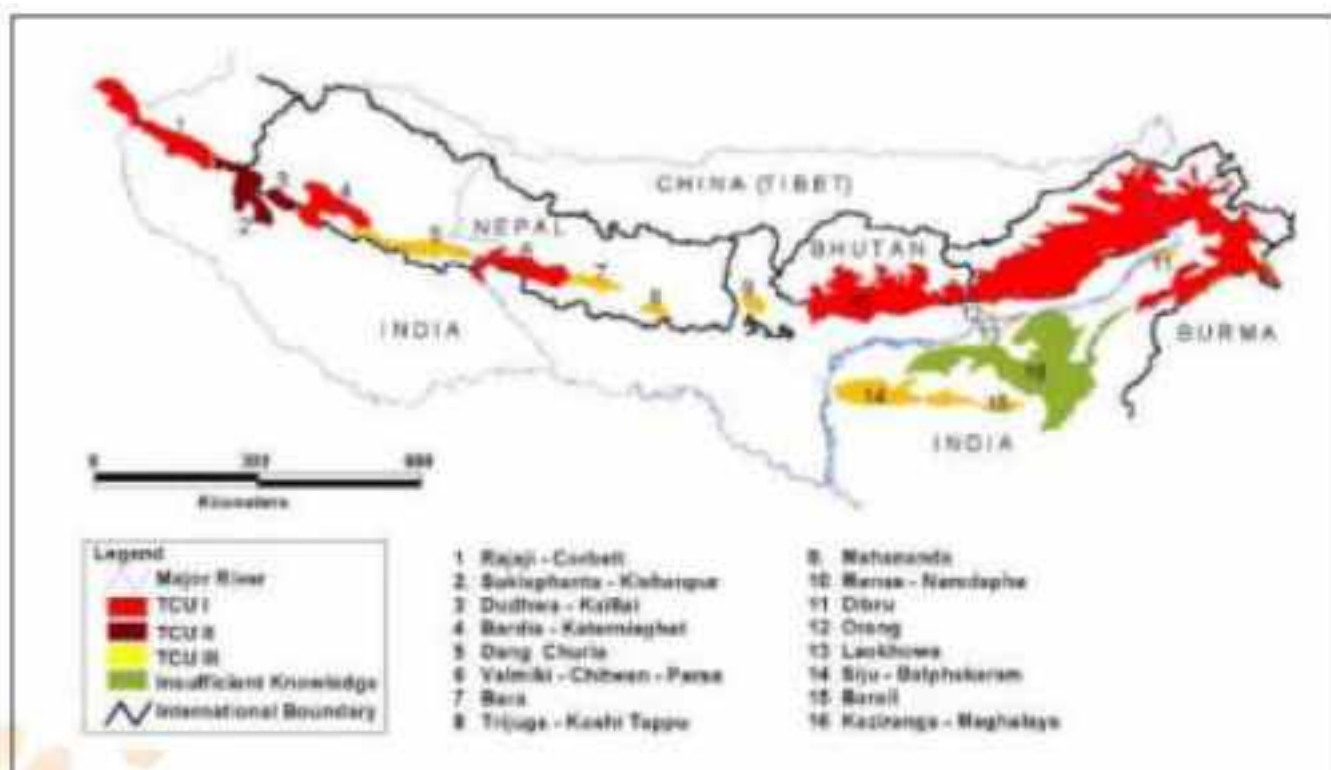


Dorji Drolod riding a tigress

mythical garuda, snow lion and dragon). Most Bhutanese are Buddhist and respect all forms of life. The tiger is also revered because it is believed to be the protector of Buddhism and the mount of Guru Rinpoche, who flew on the back of a tigress when he brought Buddhism to Bhutan in the eighth century. Taktshang, or "Tiger's Den" is one of the holiest temples in Bhutan.

Bhutan offers one of the best opportunities for the long-term survival of the tiger. Over a quarter of its surface area, about 10,714 km², was estimated to be potential tiger habitat (McDougal & Tshering 1998).

However, logically, all forested areas in Bhutan, connected with the main tiger habitat is potential tiger habitat. More surveys and field investigations need to be carried out to confirm this. Additionally, nowhere else can the tiger move in contiguous forests over such a wide range in altitude, from 100 to over 4000 masl. Bhutan is also one of the last places on earth where large cats such as the tiger can undergo evolutionary processes under fairly undisturbed natural conditions. Tigers exist at the edge of snow leopard habitat in the north, with leopards in much of Bhutan, and also with clouded leopards in the lower areas. They survive on different prey species in different



TCU's in the Eastern Himalayan Region (Source: WCS/WWF)

parts of a contiguous habitat across an altitudinal gradient, while sambar and wild pigs are the main prey. Not only is Bhutan's tiger population distributed throughout most parts of the country, the habitats also connect with those in India. Tigers in Bhutan move from Phibsoo Wildlife Sanctuary to the Manas Tiger Reserve and three Reserved Forests of Assam, and to Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary of West Bengal. This continuous distribution forms the nucleus of one of the two largest tiger populations in South Asia, the Manas-Namdapha Tiger Conservation Unit (TCU). The other population, in the Sundarban TCU, is shared between India and Bangladesh. Clearly, Bhutan's contribution will be crucial to the long-term survival of the tiger in the region.

3. OPPORTUNITIES

Bhutan is in a favorable and unique position with respect to tiger conservation compared to other tiger range countries, and can play a key role in this at regional and international levels. Unlike other countries, Bhutan offers an opportunity for preemptive conservation - a chance to act before the damage is actually done. This is attributed to the following factors:

3.1. Extensive Habitat

The country has ca. 72.5 percent of its total surface area under forest cover (LUPS 1997), providing potential habitat for tiger and prey species. This is also important for

many species that are endangered in other parts of the eastern Himalayan region. Tiger habitat in Bhutan contains several different prey species in one contiguous habitat: in the north, takin, sambar and wild pigs are the dominant prey while in the south it is mostly sambar, chital, gaur, and buffalo. Protected areas cover more than a quarter of the country's total land area. The tiger is confirmed present in six protected areas: Jigme Dorji National Park, Jigme Singye Wangchuck National Park, Royal Manas National Park, Thrumshingla National Park, Phibsoo Wildlife Sanctuary and Bomdeling Wildlife Sanctuary and is expected in the three others. All these protected areas have been legally recognized and have implemented conservation management activities.

Moreover, breeding tigers are found in the corridors between Jigme Dorji National Park and Jigme Singye Wangchuck National Park; between Jigme Singye Wangchuck National Park and Thrumshingla National Park; and between Thrumshingla National Park and Bomdeling Wildlife Sanctuary, making these linkages more than mere corridors for dispersing tigers. The National Tiger Conservation Strategy, adopted by the Royal Government of Bhutan in 1998, calls for protection of the corridors linking the protected areas where tigers are located resulting in the establishment of biological corridors. The biological corridor complex was gifted under the "Gift to the Earth" campaign of WWF in 1999 during His Majesty the King Jigme Singye Wangchuck's silver jubilee celebration of his glorious



Geo-referencing tiger sign locations during field surveys

reign. Aptly named the Bhutan Biological Conservation Complex (B2C2) this landscape spans across Bhutan, and is the focus of its conservation efforts. Moreover, the tiger population spanning the six protected areas in Bhutan spreads south into India's state of Assam, linking up directly with the 2,840 km² Manas Tiger Reserve. It spreads westward into West Bengal's Buxa Tiger Reserve (370 km²) and Jaldapara Wildlife Sanctuary (220 km²), both of which provide good forest cover.

3.2 Legislation

The tiger is listed as a "fully protected" species, as it is included in Schedule I of the Forest and Nature Conservation Act of Bhutan, 1995, and is equivalent to the status of Appendix 1 'endangered' in the IUCN Red Data Book. The penalties for killing a tiger, or being in possession of its parts/products, as per the Forest and Nature Conservation Act of 1995, include imprisonment of up to 5 years, and fines from Nu 50,000-200,000 (USD 1,100-4,400) or both. While this is enforced strictly, the monetary fine seems low at present - for this reason the government is revising the schedule of fines for wildlife crimes against endangered and threatened species.

3.3 Inaccessible Habitat and Wide Tiger Distribution

Bhutan is a mountainous country and the tiger inhabits very rugged terrain. The inaccessibility of this terrain makes it very difficult for poachers to hunt tigers as well as to exploit the forest frequented by tiger and prey. The extensive and contiguous nature of tiger and prey habitat in Bhutan

allows for a wide distribution of tigers, ranging from the sub-tropical south through the middle hills up to the temperate and alpine north. However, inaccessibility and the dense nature of the forests also present a challenge for carrying out tiger and prey surveys.

3.4 Pro-conservation Development Strategy and Stable Political Conditions

The development strategy and the national policy for development have emphasized long-term sustenance of the environment rather than short-term economic growth. The Royal Government has had a stable political system that always accorded high priority to conservation initiatives. These conditions have greatly aided conservation efforts in the country.



Tiger pugmark in Jigme Dorji National Park

Bhutan is also probably the only country where tiger conservation efforts entail pre-emptive and proactive efforts to maintain existing conditions. It does not have to deal with expensive restoration or rehabilitation of habitat.

4. KEY THREATS

4.1. Commercial Poaching and Wildlife Trade

Many parts of the tiger have medicinal value and, in addition, some parts are also made into high priced souvenirs. These parts and products have a lucrative market in the region, as well as in the United States



Poaching and illegal trade of Asian big cats is a threat

and Europe. In addition, Bhutan has a porous border with both India and China, making the transportation of wildlife parts and products across borders relatively easy. At present, there is no legislation to allow law enforcement agencies in Bhutan to check and apprehend foreign traders. The problem is compounded by the lack of manpower to effectively carry out Antipoaching patrolling.



Poorly aligned roads can fragment vital habitat

4.2 Fragmentation of Habitat

Bhutan is a developing nation. Consequently, many development activities have yet to be completed. For instance, in the current Five Year Plan, the Department of Roads has plans to construct 633 km of roads (DOR 2003), the Ministry of Agriculture plans to construct 183.8 km of farm roads (MOA 2003), and, the Forestry Development Corporation will construct 120 km of forest roads. By the end of 2007, a 937 km stretch of forests, with a width of 10 m, will be cleared for road construction, which will disturb



Improper alignment of transmission lines can cause breaks in habitat connectivity

wildlife habitat in various places. Bhutan Power Corporation will install 1033 km of transmission lines with a corridor width of 50 m, carrying power to India from the Chukha and Kurichu Hydroelectric Projects (BPC 2003). For the next five years, the Forestry Development Corporation has earmarked 2142.67 km² of forests for the harvesting of timber; an annual allowable cut of 208,088 m³ has been projected (FRDD 2001). Annually, the Forestry Development Corporation harvests 57,000 m³ of timber and 50,000 trees are marked for rural consumption. Additionally, Bhutan's natural resources have been under threat of forest fires, especially during the dry winter months. In the last twelve years (1992-2003) approximately 1,251 km² of forests have been destroyed in 803 forest fire incidences (Social Forestry Division 2004). All these factors cumulatively place a huge pressure on tiger and prey habitat all across the country



Huge projects require large amounts of timber for adequate housing infrastructure

While the northern and central temperate forests face potential fragmentation due to development activities, it is mainly the southern broadleaf forests that face a greater threat from hydropower projects, industries and infrastructure development. Although much of the tiger habitat within Bhutan is more or less contiguous, it is important to maintain connectivity of swathes of the level I TCU (number 10) with tiger reserves (Buxa and Manas) and other forests in India. This would allow for exchange of genes between a larger metapopulation of tigers and maintain genetic vigor in the long run.

4.3. Reconciling Tiger Conservation and Human Needs

Villagers in much of Bhutan still follow the age-old tradition of livestock rearing. They

move livestock to higher elevations during summer and back to lower grounds in winter. This practice has exacerbated human-wildlife conflict, resulting in depredation because livestock are left to graze freely in the forests. It is inevitable that a tiger will attack livestock, especially in areas where natural prey is scarce or steep terrain makes hunting difficult. Such conflict has led to retaliatory activities, notably the poisoning of carcasses with the intention of eliminating the threat to valuable property. There is an increasing trend in livestock depredation incidents in most parts of the country. This trend has led to increasing human-wildlife conflict that has resulted in retaliatory killings of tigers and other predators. In 2000, angry villagers near Thrumshingla National Park killed a tiger by poisoning a tiger kill. Tiger prey species such as wild pig and sambar cause considerable damage to agricultural crops. As much as 41.9 percent of all farm households on an average had reported crop damage by wild animals (MoA 2002). Villagers often set up snares and traps to catch these animals. The most widely used steel wire snares are indiscriminate and frequently kill predators as well. It is important to take this aspect of human

wildlife conflict into consideration as well. To this end, in 1995, the Department of Forests notified herders and farmers that such practices were considered illegal and that they would face legal action if found guilty.



Indiscriminate snaring kills many untargeted animals



Forestry official, veterinarian and community leader verifying livestock killed by tiger

4.4. Lack of Public Awareness on Tiger Conservation Issues

Approximately 79 percent of the Bhutanese population are agrarian and live in close proximity to tiger habitat. However, the people are, for the most part not aware of long-term consequences of environmental destruction. Often, many rural people and government officials do not understand clearly the dynamics of predator-prey relationships and, therefore, are unable to relate to the consequences of removing predators such as the tiger or wild dog. At other times they are compelled by economic forces to let survival and their immediate livelihoods take precedence over any longterm effect. It was through a livestock protection programme in the 1980s that many wild dog populations were exterminated from some regions of the country. A profusion of wild pigs followed the crash in wild dog populations, and soon farmers all across the country were lamenting about crop loss due to wild pigs. There is a gradual trend of urbanization and migration of youth from rural to urban areas. Increasingly, the urban youth are removed from their natural surroundings and lose awareness about the interconnected of the ecosystems that was so obvious in their rural settings.

4.5. Inadequate Database and Data Management

Although the tiger program has been up and running since 1996, the program still lacks a good information database. There is a definite need to set up a centralized database at NCD to store survey data from various field surveys. Information from previous surveys has not been properly stored and cannot be easily retrieved. Lack of a systematic procedure for data collection, compilation, analysis and development of management prescriptions remain as a stumbling block for better informed tiger conservation efforts. There are plans for numerous field studies including grid-based index, line transect, and camera-trapping surveys of tiger and prey species. In order for all of these efforts to be useful, a sound database has to be set up in NCD.

5. ACTION PLAN

Bhutan is fortunate to have an extensive land area under forest cover, with approximately 35 percent set aside in protected areas linked by biological corridors. A landscape approach to conservation is essential for the long-term survival of floral and faunal diversity. However, one of the impeding factors to the effective management and conservation of



Anti-poaching team briefing before heading out on a patrol



Conference participants visiting Jigme Dorji National Park

rich biodiversity is the lack of detailed information on this diverse biodiversity, be it the tiger, prey species or local socio-economic activities. It is recognized that such information is crucial for the successful implementation of any conservation and management interventions.

Bhutan's Tiger Action Plan (TAP) 2006 – 2015 will address the key threats identified above. The planning of the Tiger Action Plan was part of an international conference held in Bhutan in September 2004 to update the existing Tiger Conservation Strategy. The strategy used in designing the Tiger Action Plan had three focal themes: species conservation - covering the tiger, its prey species and their status; habitat conservation - including forests, protected areas and biological corridors; and, human-wildlife conflict management - including conflicts arising between humans and wildlife.

Participants were divided into three groups and discussions were held on topics of species conservation, habitat conservation and human wildlife conflict management. The groups conducted situational analyses, identified threats and recommended actions to mitigate these threats. These three themes were then integrated to formulate a Tiger Action Plan for the next decade. This TAP is arranged into three major themes: species conservation, habitat conservation, and human-wildlife conflict management.

In order to achieve the objectives within these themes, a fourth section focuses on creating an enabling environment, which includes an education and

awareness program, regional cooperation and human resource development.

5.1. Goal

To maintain a viable interconnected population of breeding tigers in Bhutan, a population existing predominately on wild prey with minimal conflict between humans and tigers.

5.2. Objectives Species Conservation

- In the first five years, develop fieldbased information on tiger and ungulate prey population status (ecology, demography, genetics), with special focus on three key areas (Royal Manas NP representing the subtropical belt, JSWNP representing the middle hills, and JDNP representing the northern temperate belt). This is then to be replicated in other areas representative of the whole country by 2015
- Suppress killing of tiger and prey species, and halt the illegal trade of tiger parts and products, and other endangered wildlife.

Habitat Conservation

- Assess country-wide tiger and prey habitat status and change over time using GIS and remote-sensing, identify critical areas for management intervention in order to maintain habitat contiguity
- Identify existing conflicting landuse policies affecting tiger and prey habitat and resolve them through multi-sectoral dialogue, and develop



The last nationwide tiger survey was conducted in 1998. At that time, the total population was estimated to be between 67 to 81 breeding tigers. There is a need to further update this result using more intensive surveys, and to determine the population trends.

In order to narrow down the study focus, three sites representing the PAs and NCD, after training them on survey methodology. Most of the staff selected have already undergone previous training on tiger and prey surveys.

In each of the sites, tiger and prey distribution and relative abundance will be surveyed using interviews, index-surveys, line transects, and capture-recapture sampling with double-sided camera-traps.

Additionally, the program will embark on research projects concerned with tiger ecology, prey species and habitat conditions in the country. The identified teams will undergo a short training program, and will then be trained on-the-job. One component of the field research will focus on analysis of tiger diet composition through scat analysis. A reference slide collection of ungulate hair and tissues will be developed for use by NCD. This will further provide information

on the genetic diversity and viability of the tiger population in Bhutan through noninvasive collection and analysis of tiger DNA materials (to be carried out at the PCR lab of the Ministry of Agriculture).

Information associated with tiger range, territory and movement patterns and behavior would be useful and provide better tools for conservation. Due to difficult terrain in much of the country, conventional VHF radio collars will be useful only in limited places like parts of RMNP where animals can be tracked from elephant-back, on foot and from vehicles. It might be possible to track animals on the eastern and northern sides of JSWNP from along the highway. However, resource permitting, GPS satellite collars should be used for radio telemetry studies as far as possible in most parts of Bhutan.

Output

- Data on tiger and prey distribution and their relative abundance in three PAs collected, which would then be extrapolated to the larger adjoining areas, and finally to the whole country
- Information on tiger ecology and ranging behavior in Bhutan collected
- A detailed report on the genetic profile and long-term viability of the tiger population in Bhutan produced

- Spatial distribution and habitat partition by wild herbivores in the three study areas determined
- Reference slide collection of ungulate hair and tissue samples, and an identification manual prepared

Activities

- Establish randomly selected gridbased study sites of adequate size in the field for routine monitoring of tiger and prey populations
- Conduct index surveys, line transect surveys, and capture-recapture sampling surveys using camera traps to evaluate tiger and prey distribution and relative abundance for each one of the three PAs selected
- Study the behavior and ecology of the tiger and its prey species using radio telemetry, camera trapping and other modern techniques
- Survey and assess tiger and prey habitat conditions
- Obtain, tranquilize and take genetic samples from collections of blood and tissue from wild tigers captured for radio telemetry or those that die from other causes
- Conduct DNA testing and other genetic studies of tigers
- Perform exploratory population viability modeling
- Establish a permanent monitoring system of the habitats of the main tiger prey species
- Determine food habits of tigers through tiger scat analysis, and develop a reference collection of ungulate hair samples and an identification manual

Objective A2: Suppress killing of tiger and prey species, and halt the illegal trade of tiger parts and products, and other endangered wildlife.

In the period between 1999 and 2003, three tigers were reported to have been poached based on apprehension reports compiled by the Forest Department. In the same period a total of 17 sambar and 19 musk deer poaching cases were reported (FPUD 2004). While these are relatively low figures, it is likely that several cases have gone unreported. Further, the low poaching record

is also a direct result of stringent antipoaching efforts by the Forest Department both inside the PAs and outside. In anticipation of and to prevent poaching, here is need to put in place an effective anti poaching patrol system that is well equipped, trained, and well-informed. An informer network comprising local community members should enhance detection of poachers and poaching activities. The existing penalties for wildlife crime, especially pertaining to killing of tiger and illegally trading in tiger parts is very low, and does not act as a deterrent: killing a tiger has a monetary fine ranging from Nu 50,000 (USD 1,100) to 2,00,000 (USD 4,400) and or imprisonment up to five years. This has to be reviewed and updated to make the penalties stronger so that they act as deterrents to wildlife crimes.

Output

- Two-hundred government officials representing various law enforcement, airport and border regulatory authorities, and tourism agencies trained in identification of wildlife and wildlife parts, CITES regulations and national and international legislation regarding illegal wildlife trade
- Killing of tiger and prey species and other wildlife crime reduced or stopped
- The Schedule of Fines in the Forest and Nature Conservation Act reviewed and updated

Activities

- Organize training on identification of wildlife parts and products for Forest Department, Customs, Police, Tourism, Bhutan Agriculture and Food Regulatory Authority (BAFRA), Immigration and other relevant law enforcement officials
- Establish network of informants using local communities to assist in detection of poachers and poaching activities
- Strengthen anti-poaching capacity by providing effective communication equipment and field gear
- Conduct regular anti-poaching patrols and surprise checks by PA and Forest Department staff
- Survey poached animals and plants, and identify and document trade routes, volumes and market forces.

B. Habitat Conservation

Objective B1: Identify critical areas of tiger and prey habitat for management intervention, using GIS and remote sensing, in order to maintain habitat integrity and contiguity

Bhutan is fast developing with a myriad of developmental activities occurring simultaneously across the country. As a result, there is a great risk that critical tiger and prey habitat will be converted for infrastructure development. This is especially true for the broadleaf forests that lie in the industrial belt of the south, which are also critical corridors connecting tiger habitat in India. In order to understand the dynamics of habitat change over time, a detailed analysis of forest cover change will be carried out using time-series satellite images. Such analyses will be coupled with ground-truthing where necessary. This will then provide a tool with which to identify critical breaks in habitat contiguity and highlight threatened areas. Having done this, appropriate habitat protection and management recommendations can be made.

Output

- Forest cover change maps (from 1960's - or earliest available - till present) developed
- Maps highlighting critical and potential breaks in connectivity developed
- Report on overall habitat status and management prescriptions produced
- Map of critical tiger and prey habitat developed

Activities

- Interpret satellite image and classify vegetation types based on existing LUSS vegetation types for one standard of vegetation classification
- Carry out forest cover change detection over time
- Identify critical and potential breaks, validate causes for these on the ground, and restore the breaks or remove potential threats
- Develop criteria for defining critical tiger and prey habitat developed based on information on tiger and prey distribution, usage of habitat, level of threat and others
- Delineate critical tiger and prey habitat, especially in the southern broadleaf belt that should be closely observed for upcoming or planned industrial or infrastructure development

Objective B2: Identify existing conflicting land-use policies affecting tiger and prey habitat and resolve them through multisectoral dialogue, and develop a legal mechanism to ensure future policies adequately accommodate tiger conservation concerns

A geo-referenced database on livestock depredation that will be crucial in the identification of depredation hotspots in the country. Once these hotspots are identified and mapped, detailed investigations must be carried out to understand the main causes of livestock depredation.

Output

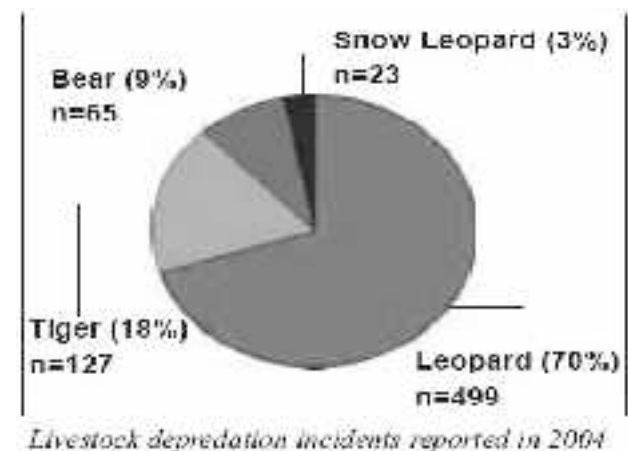
- Livestock depredation hotspot map produced
- Report on livestock depredation by tiger that highlights its relation to habitat quality, prey abundance, human influences and other factors
- Successful interventions tried and tested to prevent livestock depredation and mitigate human/wildlife conflict

Activities

Set up a geo-referenced database on livestock depredation and map hotspots. Conduct studies in areas that have the highest number of tiger depredation cases to compare with other tiger areas with little or no depredation. Explore appropriate remedial measures like providing improved breed of cattle (to discourage open grazing in the forest), reinforced corrals to protect cattle and other livestock, and improved animal husbandry practices.

Objective C2: Reduce retaliatory killing of tiger and prey species through prevention and mitigation measures as well as incentives.

At present, the program does not have any credible livestock data regarding: 1) livestock



holding, 2) livestock type/breed, 3) rearing systems (free ranging, migratory and stall-fed), 4) migratory routes and stations, and 5) population trends (whether the population is stable, increasing or decreasing by breed). Livestock information will be sought from the Department of Livestock and will be cross-checked with the RNR census database to build a database for future assessment on livestock-related issues. The program will also explore experimental measures for reducing livestock depredation, i.e. agriculture intensification programs designed to change the livelihood of people who depend solely on livestock, promotion of superior breeds, stall feeding, infrastructure enhancement and improved husbandry practices. In order to foster friendly relations with livestock owners and to prevent retaliatory killings, the program has started the ambitious Tiger Conservation Fund, a compensation scheme to compensate owners for livestock killed by tigers, snow leopards, common leopards or Himalayan black bears. This scheme was started two years ago and there is a need to study its effectiveness while exploring alternative measures or incentives to cash compensation.

Output

- Report on the analysis of the existing compensation scheme produced
- A database on livestock information and depredation cases in the country developed
- Various options for preventive and conflict mitigation measures explored and put in place
- Peoples' attitude towards, and acceptance of human-wildlife conflict studied

Activities

- Evaluate current compensation schemes and explore opportunities for improvement
- Collation of livestock information from various districts and other institutions
- Explore other opportunities and options to compensation
- Conduct survey on local people's perception on wildlife damages

Creating an Enabling Environment

D. Education and Awareness Program

Objective D1: Increase general awareness on the tiger's ecological and cultural significance to various stakeholders and audiences

The participation and ownership of local residents are the most important factors for the success of any conservation effort. Local communities should be made aware of the importance and significance of the conservation of endangered species like the tiger. The benefits of tiger conservation should be understood, appreciated and received by those who have to live with the tiger, often losing their primary source of livelihood to depredation.

Output:

- Education materials (print, electronic, audio/visual) on ecological and cultural significance of tigers prepared and distributed
- These materials included by Education Department in school curricula at different levels
- Education and awareness materials prepared and distributed to the urban and rural public, at border entry points, checkpoints and other relevant places

Activities:

- Printing of education materials on ecological and cultural significance of tigers in Bhutan
- Production of a 30-minute audiovisual as well as radio program on the status of tigers in Bhutan, threats to its survival, and long-term conservation needs
- Consultation meeting with the Education Department, particularly the Curriculum Division, to discuss the inclusion of tiger-specific chapters in science and environmental studies in the lower school curricula
- Discussion with Sherubtse College, Natural Resources Training Institute, Ugyen Wangchuck Institute of Forestry and Environmental Studies and Bhutan Forestry Institute to include tigerspecific chapters in their lesson plans
- Identify network of institutions, nature clubs, schools and community groups in the urban and rural public, at border entry points, check-posts and other relevant places to distribute printed educational material

E. Regional Cooperation

Objective 5: Reduce trans-boundary poaching through bilateral dialogue, legislation and enforcement, and explore trans-boundary cooperation to maintain and improve habitat linkages.

Tiger habitat in Bhutan spreads across at least six protected areas (additional surveys are likely to yield positive data from more areas). It is further connected to India at Manas Tiger Reserve in Assam, and Buxa

Tiger Reserve and Jaldapara Wildlife Sanctuary in West Bengal. This forms a contiguous tiger habitat all the way to Namdapha in Arunachal Pradesh on the Myanmar border, resulting in one of the largest contiguous TCU's in the region. Bhutan is a landlocked nation that shares open borders with India in the east, west and south, and China in the north. These extensive borders are very porous and are often actively used for poaching and illegal wildlife trade activities. It is of utmost importance to collate information on transboundary issues of wildlife trade and poaching in order to understand their nature and extent.

There is a need to organize frequent transboundary meetings to discuss crossborder poaching and wildlife trade. A Memorandum of Understanding (MOU) that will include detailed legal provisions for prosecuting and extraditing foreign offenders has to be signed between the Royal Government of Bhutan and the Government of India. In addition, joint antipoaching patrols need to be stepped up to monitor border protected areas such as Royal Manas National Park, Phibsoo and Khaling Wildlife Sanctuaries. Exchange visits between Bhutanese and Indian Forest officials will allow them to share experiences on PA management, and discuss issues of common concern especially regarding poaching, habitat destruction and other wildlife crimes.

Output

- Protocol and Memorandum of Understanding drawn up and signed between the Royal Government of Bhutan and Government of India
- Joint anti-poaching patrolling of border protected areas increased
- Joint exchanges of field visits to share experiences and discuss issues of common concern increased

Activities

- Identify and establish a baseline of hotspots in poaching and wildlife trade activities
- Study the current legislation gaps and protocol developed for the prosecution of international poachers that will be the main content of the MOU with the Indian authorities
- Initiate dialogue on trans-boundary conservation issues between India and Bhutan

- Conduct joint inspection and patrols of border PAs with Indian authorities
- Arrange exchange visits between Bhutanese and Indian forest officials

F. Human Resources Development

Objective 6: Increase the number of adequately trained staff of NCD/DOF and partners to implement the Tiger Action Plan.

At present, the country is acutely short of human resource at all levels. This is especially true in the protected areas. To cope with this, the Department of Forests has employed villagers as forest guards to help reinforce the protection of forests. These village forest guards need basic training in surveying and monitoring wildlife. There is also a need for additional training to locally trained foresters in order to update their skills in survey methodologies adapted to local conditions. These trainings will be in the form of specialized courses, study tours and attendance at various regional and international conferences and workshops on tiger and wildlife conservation. In order to implement the Tiger Action Plan, the following capacity building activities are foreseen:

Training on Survey Methodologies and Monitoring Techniques

Presently, untrained personnel execute the program activities in the field and as a result, information generated is not compatible or useful. The program will train some (territorial divisions and parks) field staffs on survey methodologies and monitoring techniques for two weeks. The training will enhance their capacity to carry out program activities independently.

Training on Advanced and Intensive Research and Sampling Methods

The Tiger Conservation Program will initiate and implement field research projects as required. To enhance the capability of locally trained staff members, they will join a twelve week intensive course on research and survey methodologies in a regional institution such as the Wildlife Institute of India. The course will be tailor-made to meet our requirements and is expected to include: 1) development of research proposals, 2) various survey

techniques such as camera trapping, pellet group sampling, line transects, etc. 3) data collection, 4) identification of animal signs, 5) tracking animals using radio telemetry, 6) use of GPS, 7) statistical analysis (spatial analysis using GIS), 8) conservation biology (including wildlife health and medicine) and, 9) tranquilizing animals. Upon completion of the training, they will form the core team for program implementation.

- Training on advanced and intensive research and sampling methods
- Long-term studies
- Training in scat analysis
- Training on capture and recapture sampling
- Training on image classification using GIS and remote sensing
- Training on survey methodologies and monitoring techniques
- In-country training on survey methods
- In-country workshop
- Regional and international meetings
- Hosting General Assembly and Executive Committee Meeting of the Global Tiger Forum in the year of the Tiger (2010)
- Training course in management of wild tigers
- Training in wildlife management and conservation biology

Output

- 50 staff from territorial forest divisions and six protected areas trained in the region on these specialized courses viz. research and sampling methods, scat analysis, capture and recapture sampling, survey methodologies and monitoring techniques and image classification and remote sensing
- 400 staff involved with the program will attend or participate in the in-country training and workshop, and attend
- courses on wildlife management and conservation biology
- 70 senior staff attended regional and international meetings, workshops and conferences on matters related to tiger and wildlife conservation

Activities

- Co-ordinate and organize various training needs of the program staff (as per annexure 2)

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ANNEXURE 1: LIST OF CONFERENCE PARTICIPANTS

National Participants

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Nature Conservation Division

4. Sangay Wangchuk, Joint Director, Nature Conservation Division
5. Raling Ngawang, Head, Data and Information Management Section
6. Ngawang Norbu, GIS Officer In-charge, D & IM Section
7. Karma Tenzin, Ethno-botanist, D&IM Section
8. Karma Tshering, Head, Management Planning and ICDP Section
9. Sonam Choden, Env. Education Officer, MP & ICDP Section
10. Namgay Dendup, Ranger Officer, ICDP, MP & ICDP Section
11. Deki Yonten, Head, SCREaM Section
12. Sherub, Ornithologist, SCREaM Section
13. Nagdrel Lhamo, CITES, SCREaM Section
14. D.S.Rai, ADF, SCREaM Section
15. Sangay, Co-ordinator, Tiger Program, SCREaM Section
16. Sherab Wangchuk, Deputy Ranger, Tiger Program, SCREaM Section

Protected Area System

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20. Thinley Dorji, Park Manager, Royal Manas National Park.
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ANNEXURE 2

Human Resource Development

Training on Advance and Intensive Research and Sampling Methods

The Tiger Conservation Program will enhance the capability of the program staff that are locally trained with a twelve-week course on advanced and intensive research and sampling methods. The course is expected to include: 1) development of research proposals, 2) various survey techniques such as camera trapping, pellet group sampling, line transects, etc. 3) data collection, 4) identification of animal signs, 5) tracking animals using radio telemetry equipments, 6) use of GPS and geo-referencing, 7) statistical analysis (including spatial analysis using GIS), 8) conservation biology (including wildlife health and medicine) and, 9) immobilization and translocation of animals. The staffs will be sent to reputed institutions in the region.

Long-term Studies

The program plans for long-term research where studies can be integrated with higher degrees. Dedicated and motivated staff from the Nature Conservation Division and Protected Areas could pursue independent studies for postgraduate degrees (Diploma, MSc and PhD).

Training in Scat Analysis

The program will identify two staff to undergo a two-week training on scat analysis handling and management at the Wildlife Institute of India. They will carry out scat analysis to determine tiger diet composition.

Training on Capture and Recapture Sampling

The program will send three staff to attend a three-week on-the-job training at the Centre of Wildlife Studies, India, on capture and recapture sampling. They will then train other staff in camera trapping exercises, and conduct capture and recapture samplings in selected study areas.

Training on Image Classification Using GIS and Remote Sensing

The program will be updating land-use maps and will need to carry out habitat classification from satellite images. At present, the GIS unit of NCD does not have the capability to carry out image classification using GIS and RS. Therefore, two GIS personnel will be trained in image classification using GIS and RS at either ESRI or ITC (Netherlands). As far as possible expertise from other agencies such as Land Use and Stastistic Section and Survey of Bhutan will be used.

Study Tours and Training on Surveying Methodologies and Monitoring Techniques

The program will send the staff who are closely involved with the program on a study tour to Nepal and India. Such trainings and tours will expose them to tiger conservation efforts and challenges outside their immediate experience.

In-country Training on Survey Methods

A week-long in-country training and refresher course will be conducted for forestry and park staff on survey methodologies and monitoring techniques that are necessary to carry out wildlife surveys. The training will also cover the tigers and its conservation efforts and It will be attended by 40 staff from various territorial forest divisions and parks and held every alternate year.

In-country Workshop

A one-day in-country workshop will be held to report on survey and research finding as well as on the compensation results. This workshop will be organized once every three years.

Regional and International meetings

As Bhutan has recently ratified and joined CITES (2002), this allows for the CITES management authority and scientific authority personnel to attend CITES meetings. It is important for the Bhutanese government officials to keep abreast of what is happening in relation to tiger conservation in the region and internationally.

General Assembly and Executive Committee Meeting of the Global Tiger Forum

The Global Tiger Forum Secretariat has requested Bhutan to host its General Assembly and Executive Committee meeting, which we would like to host in the Year of the Tiger (2010), to showcase our commitment to tiger conservation. The meeting will be attended by all members of the Global Tiger Forum, as well as by organizations that have a stake in tiger conservation.

Training Course in Management of Wild Tigers

The Wildlife Institute of India (WII) has conducted a three-week course on the management of wild tigers. The program would like to request the Institute to organize a similar training course for Bhutanese staff in Bhutan. It will be attended by select staff that have proven their dedication to tiger conservation.

Training in Wildlife Management and Conservation Biology

The Smithsonian Institution has conducted several training on wildlife management and conservation biology in various countries. The program will request it to conduct a similar training in Bhutan. About 50 staff from the forestry divisions and parks including researchers will attend the three-week session.

BUDGET AND WORKPLAN (BHUTAN)

	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	Amount in USD										
Activities											
Goal: 'to maintain a viable interconnected population of breeding tigers in Bhutan, a population existing predominately on wild prey with minimal conflict between humans and tigers'											
Species Conservation											
Objective: • In the first five years, develop field-based information on tiger and ungulate prey population status (ecology, demography, genetics), with special focus on three key areas (Royal Manas NP representing the subtropical belt, JSWNP representing the middle hills, and JDNP representing the northern temperate belt). This is then to be replicated in other areas representative of the whole country by 2015											
Data on tiger and prey distribution and their relative abundance in three PAs collected, which would then be extrapolated to the larger adjoining areas, and finally to the whole country	4705.00	4705.00	4705.00	4705.00	4705.00	2350.00	2350.00	2350.00	2350.00	2350.00	35275.00
Establish randomly selected grid-based study sites of adequate size in the field, for routine monitoring of tiger and prey populations	4705.00	4705.00	4705.00	4705.00	4705.00	2350.00	2350.00	2350.00	2350.00	2350.00	35275.00
Information on tiger ecology and ranging behavior in Bhutan collected	11765.00	11765.00	11765.00	11765.00	11765.00	5880.00	5880.00	5880.00	5880.00	5880.00	88225.00
Conduct index surveys, line transect surveys, and capture-recapture sampling surveys using camera traps to evaluate tiger and prey distribution and relative abundance for each one of the three PAs selected	11765.00	11765.00	11765.00	11765.00	11765.00	5880.00	5880.00	5880.00	5880.00	5880.00	88225.00

Output	Activities	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
		Amount in USD										
A detailed report on the genetic profile and long term viability of the tiger population in Bhutan produced	Study the behaviour and ecology of the tiger and its prey species using radio telemetry, camera trapping and other modern techniques					11765.00	11765.00	11765.00	11765.00	11765.00	5880.00	64705.00
Spatial distribution and habitat partition by wild herbivores in the three study areas determined	Survey and assess tiger and prey habitat conditions	2350.00	2350.00	2350.00	2350.00	2350.00						11750.00
Obtain, tranquilize and take genetic samples from collections of blood and tissue from wild tigers captured for radio-telemetry or that died from other causes.	Reference slide collection of ungulate hair and tissue samples, and an identification manual prepared											35294.12
	Conduct DNA testing and other genetic studies of tigers.						11765.00	11765.00	11765.00	11765.00	11765.00	58825.0
	Perform exploratory population viability modeling							5880.00	5880.00	5880.00	5880.35	23520.00
	Establish a permanent monitoring system of the habitats of the main tiger prey species	2350.00	2350.00	2350.00	2350.00	2350.00						11750.00

Output	Activities	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Amount in USD												
	Determine food habits of tigers through tiger scat analysis, and develop a reference collection of ungulate hair samples and an identification manual	2350.00	4705.00	4705.00	2350.00	2350.00						16460.00
Objective: • Suppress killing of tiger and prey species, and halt the illegal trade of tiger parts and products, and other endangered wildlife.												
200 government officials representing various law enforcement, airport and border regulatory authorities, and tourism agencies trained in identification of wildlife and wildlife parts, on CITES regulations, and on national and international legislation regarding illegal wildlife trade	Organize training on identification of wildlife parts and products for Forest Department, Customs, Police, Tourism, Bhutan Agriculture and Food Regulatory Authority (BAFRA), Immigration and other relevant law enforcement officials	4705.00	4705.00	4705.00	4705.00	18820.00						
Killing of tiger and prey species, and other wildlife crime reduced or stopped		2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	23500.00

	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	Amount in USD										
	Activities										
The Schedule of fines in the Forest and Nature Conservation Act reviewed and updated	9410.00	9410.00	9410.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	61165.00
	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	11750.00
	1175.00					1175.00					2350.00
Habitat Conservation											
Objective: Identify critical areas of tiger and prey habitat for management intervention, using GIS and remote sensing, in order to maintain habitat integrity and contiguity											
Forest cover change maps (from 1960's – or earliest available – till present) developed	11765.00										11765.00
	Interpret satellite image and classify vegetation types based on existing LUSS vegetation types to maintain one standard of vegetation classification										

Output	Activities	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Amount in USD												
Maps highlighting critical and potential breaks in connectivity developed	Carry out forest cover change detection over time		7060.00									7060.00
Report on overall habitat status and management prescriptions produced	Develop criteria for defining critical tiger and prey habitat developed, based on information on tiger and prey distribution, usage of habitat, level of threat and others			4705.00								4705.00
Map of critical tiger and prey habitat developed	Identify critical and potential breaks, validate causes for these on the ground, and restore the breaks or remove potential threats				5880.00							5880.00
	Delineate critical tiger and prey habitat, especially in the southern broadleaf belt that should be "closely observed" for upcoming or planned industrial or infrastructure development				7060.00							7060.00
Objective: Identify critical areas of tiger and prey habitat for management intervention, using GIS and remote sensing, in order to maintain habitat integrity and contiguity												

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	Activities	Amount in USD										
A gap analysis report of all policies and legislation related to land use, highlighting loopholes, bottlenecks and conflicting issues with regards to threats to critical tiger and prey habitat compiled	Contract a legal expert to work with NCD to carry out a gap analysis of all relevant existing legislation pertaining to land use that could have a negative impact on critical tiger and prey habitat.				5880.00							5880.00
A mechanism and protocol to consult or inform the review committee on any developmental activities up in critical tiger and prey habitat put in place.	Conduct multisectoral consultation workshops on conflicting land use in order to resolve existing conflicts and prevent future conflicts				3530.001							3530.00
	Appoint a Forest Department representative to the environmental auditing committee				1175.00							1175.00
	Identify land-use conflict zones (development and infrastructure projects) based on surveys and habitat analyses.				2350.00							2350.00

Output	Activities	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Amount in USD												
Human/Wildlife Conflict Management												
Objective: • Determine main causes of livestock depredation by tigers in 3 areas including Punakha Dzongkhag (where livestock depredation was highest in 2004) in order to understand the conflict so that appropriate remedies can be adopted. This study would then be replicated to other sites												
Livestock depredation hotspot map produced	Set up a georeferenced database on livestock depredation and map hotspots		5880.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	20000.00
Report on livestock depredation by tiger that highlights its relatedness to habitat quality, prey abundance, human influences and other factors prepared.	Conduct studies in areas which have highest number of depredation cases by tiger to compare with other tiger areas without any depredation, or where depredation is low.			4705.00						4705.00	4705.00	14115.00
A set of successful interventions to prevent livestock depredation, and mitigate human wildlife conflict tried and tested	Explore appropriate remedial measures such as providing improved breed of cattle (to discourage open grazing in the forest), reinforced corrals to better protect cattle and other livestock, and improved animal				4705.00						5880.00	10585.00

Output	Activities	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Amount in USD												
Objective: Reduce retaliatory killing of tiger and prey species through prevention and mitigation measures as well as incentives												
Report on the analysis of the existing compensation scheme produced	Evaluate current compensation schemes & explore opportunities for improvement.				2350.00							2350.00
A database on livestock information and depredation cases in the country developed	Collation of livestock information from various districts and other institutions		2350.00									2350.00
Various options for preventive and conflict mitigation measures explored and put in place	Explore other opportunities and options to compensation				2350.00							2350.00
Peoples' attitude towards, and acceptance of human wildlife conflict studied	Conduct survey on local people's perception on wildlife damages			2350.00								2350.00
Education and Awareness Program												
Objective: Increase general awareness on the tiger's ecological and cultural significance to various stakeholders and audiences												
Education materials (print, electronic, audio/visual) on ecological and cultural significance of tigers prepared and distributed	Printing of education materials on ecological and cultural significance of tigers in Bhutan	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	47050.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	Activities	Amount in USD										
These materials included by Education Department in school curricula at different levels	Production of 30 minutes video program as well as radio program on the status of tigers in Bhutan, threats to its survival, and long term conservation needs					3530.00				3530.001		7060.00
Education and awareness materials prepared and distributed to the urban and rural public, border entry points, check-posts and other relevant places	Consultation meeting with Education Department, particularly Curriculum Division, to discuss on the inclusion of tigerspecific chapters in the science and environmental studies subjects in lower school curricula			1175.00							1175.00	2350.00
Baseline on people's perception of tiger developed	Discussion with Sherubtse College, Natural Resources Training Institute, Ugyen Wangchuck Institute of Forestry and Environmental Studies and Bhutan Forestry Institute to include tiger-specific chapters in their lesson plans			2350.00							2350.00	4700.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	Activities	Amount in USD										
	Identify network of institutions, nature clubs, schools, and community groups in the urban and rural public, border entry points, checkpoints and other relevant places for distribution of the printed education materials				3530.00				3530.00			7060.00
Regional Cooperation												
Objective: Reduce trans-boundary poaching through bilateral dialogue, legislation and enforcement, as well as explore trans-boundary cooperation for maintaining and improving habitat linkages.												
Protocol and Memorandum of Understanding drawn up and signed between the Royal Government of Bhutan and Government of India	Identify and establish a baseline of hotspots in poaching and wildlife trade activities.	2350.00				2350.00			2350.00		2350.00	9400.00
Illegal poaching and cross border trade across the Indo-Bhutan borders reduced	Carry out a study on the current legislation gaps and protocol developed for the prosecution of international poachers which will be the main content of the MOU		1770.00									1770.00

Output	Activities	Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Amount in USD												
	Initiate dialogue on transboundary conservation issues between India and Bhutan	2350.00					2350.00					4700.00
Human Resource Development												
Objective: Increase the number of adequately trained staff at NCD/DoF												
	Specific training, refresher course, study tours and workshop and conference	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	176500.00
Total		81155.00	82930.00	82920.00	87620.00	80575.00	84105.00	81755.00	87635.00	84105.00	80565.00	833365.00

Cambodia Tiger Action Plan 2011 – 2022

(Provisional Interim 1st Draft, March 2011)



Forestry Administration



Provisional Interim 1st Draft, March 2011

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Tigers & their Conservation in Cambodia

The Tiger in Cambodia: 1954 -1993

During the 1950's, Charles Wharton conducted an ecological study of the Kouprey Bos sauveli in Northern Cambodia, and observed herds of Eld's Deer *Cervus eldii*, Gaur *Bos gaurus*, Banteng *Bos javanicus*, and Wild Water Buffalo *Bubalus bubalis* in such numbers that he compared the area to the game lands of East Africa. Tigers and leopards resided in areas of dense forest and emerged at night to hunt prey in the open forest. (Wharton 1957).

Through the 1960's, Cambodia was an internationally famous big game hunting destination (Engle 1981). A licensed hunter could shoot 14 heads of protected animals during the December-May period, including Bull Asian Elephant, Gaur, Banteng and Wild Water Buffalo. Tigers and Leopard were so common they could be shot year round (Cambodia Ministere De L'Information 1960.)

For example, in 1957 an American trophy hunter traveled to Chhep District in Preah Vihear with French and Cambodian associates to shoot a tiger. Tigers were so common that only five days were planned for this effort. A banteng was shot for bait a day after setting up camp. That night a tiger discovered the banteng and fed. The following night the tiger was shot when it returned to feed on the banteng again (Engle 1981).

Beginning in 1970, over 30 years of civil unrest put an end to sports hunting, and also drastically reduced the number of wild animals in Cambodia. During the period of unrest, various armed forces were based in and moved about the most remote areas. Extensive hunting was conducted for meat and the international trade. Industrial scale logging was carried out.

The beginning of modern countrywide conservation in Cambodia: 1994 -1997

Conservation formally began on 1st November 1994, when King Sihanouk signed a Royal Decree creating 23 protected areas around the country covering 33,000

km². A five-page Tiger Action Plan (TAP) was prepared that year, noting that nothing was being done on the ground due to a lack of trained personnel and funding.

The TAP described a 1994 visit to wildlife markets in Phnom Penh and Poipet on the Thai border (Sabu 1994) that found 18 Tiger skins. Based on estimated turnover reported by the traders of 10 to 16 skins per month, it appeared that 100 to 200 Tigers a year were being exported from Cambodia, since about 1990.

Most of the Tigers were brought in by soldiers posted to remote areas in the Northern Plains and Cardamom Mountains. Skins sold for \$150 to \$1,200, depending on their condition; bones sold for c. \$100/kg. Live Tigers (presumably cubs) were regularly brought to the traders and sold to Thailand for about \$2,500 each.

1st Cambodia-wide survey of Wildlife Trade: 1999

In a 1999 attempt to assess this trade more accurately, a survey of 24 Cambodian wildlife markets and 12 international checkpoints was carried out by Cambodian Wildlife Protection Office (Sun hean 2000) Eight live, wild caught tigers, 36 tiger skins, 5 kg of tiger bone, 6 tiger skulls, 43 tiger canine teeth, more than 50 tiger claws, and 1 tiger penis were observed in trade during the 14-week survey.

Data were obtained on where tiger parts are sold, trade routes, and prices paid. Phnom Penh and Poipet were the largest markets. Tiger skins usually went through Poipet to Thailand for decoration, and Tiger bones and other parts usually went through Phnom Penh to Vietnam & China for medicinal purposes

Initial identification of Cambodia Tiger Conservation Units: 1998 -1999

The first systematic countrywide assessment of status and distribution of Tiger and prey was carried out in 1998 by the Forestry Administration's Wildlife Protection Office, currently Department of Wildlife

and Biodiversity. 153 hunters and 156 district and province officials in 13 forested provinces were interviewed (Weiler et al. 1998 & Nowell et al 1999).

In 1999, the results of the survey were presented at six provincial workshops attended by 209 provincial officials to obtain province-level input on a conservation strategy. The surveys and workshops determined that the best remaining Tiger Conservation Units (TCU) were the Northern Plains, Cardamom Mountains, and Eastern Plains. Three regional offices were established by the Wildlife Protection Office which managed a Tiger and prey monitoring network of community rangers from 2000 to 2005.

The WPO projects were funded by the Taiwan Council of Agriculture, CAT Action Treasury, University of Minnesota, Save the Tiger Fund and US Fish and Wildlife Service Tiger Fund.

Other NGO-supported conservation projects were also developed in all three TCUs during this period and many have continued and evolved to present. Save the Tiger Fund and USFWS provided co-funding to MOE, WWF, WCS, CI, WildAid, Birdlife International and PRC for Tiger-specific projects. From 1997-2010, a total of 15 Save the Tiger Fund Grants and 17 USFWS Tiger Fund Grants supported tiger conservation in Cambodia.

First national consensus estimate of Cambodia Tiger Population: 2004

Several NGOs working on tiger conservation held a meeting in 2004 to review all available tiger data for the Global Tiger Conservation Landscape delineation exercise (Sanderson *et al.* 2006). Tiger records from a range of methodologies including camera traps and field surveys by biologists and community wildlife rangers were analyzed, resulting in an estimated 5 to 20 tigers Eastern Plains TCU, 5 to 20 tigers Cardamoms TCU and 1 to 10 tigers Northern Plains TCU, for an estimated Cambodia total of 11 to 50 tigers in 2004. That assessment is still the basis for the IUCN 2010 CITES Red List estimate of 11 to 50 tigers in Cambodia, with a notation that the total may now be less than 30.

Cambodia joins the Global Tiger Forum: 2004

In October 2004, Cambodia officially joined GTF. In November 2004, a Cambodia Delegation attended the

3rd General Assembly of the Global Tiger Forum in Hanoi, marking the beginning of Cambodia participation in GTF as a full active member.

Revision of Tiger Conservation Units: 2005

In response to the Save the Tiger Fund-led 2005 global Tiger Conservation Landscape (TCL) review and update, the Wildlife Protection Office initiated and supported supplementary analysis of TCUs/TCLs).

A broad consortium of Tiger experts, field biologists, policy-makers, and conservation organizations were gathered together to review all relevant information, which produced a single Cambodia consensus TCL map and document, published as Appendix 6 in the final TCL document (Weiler et al 2006).

Revised TCLs were identified in the Cardamom Mountain Range evergreen forest, Eastern Plains dry forest, and Virachey National Park mountainous evergreen forest (as part of the Southern Annamites Cambodia/Laos/Vietnam Trans-boundary TCL.) These were the only areas in Cambodia with evidence that some Tigers remained at that time.

The survival of Tiger in these landscapes was severely threatened, due primarily to poaching for the international trade, prey hunting and habitat loss. The Northern Plains TCU was not included in the revised TCL identification because there was no confirmed evidence that any Tigers remained after 2003, and extensive land clearing and post-conflict re-settlements had greatly reduced the extent and quality of much of that TCL habitat.

Cambodia Tiger Profile: 2010

In early 2010, MOE, FA, CI, Wildlife Alliance, WWF & WCS were contacted by DWB requesting all confirmed Tiger records from 2005-2009 from all protected forests and protected areas in the Northern Plains, Cardamom Mountains, Eastern Plains, and Virachey landscapes. The data was for updating the Cambodia Tiger Status for the Global Tiger Initiative and a baseline for preparing the Cambodia National Tiger Action Plan.

The resulting *Cambodia Profile* was published in *Avoiding the Unthinkable: What will it cost to Prevent Tigers Becoming Extinct in the Wild?* J. Walston K.U. Karanth, and E.J. Stokes. 2010, prepared for the World Bank GTI by WCS. The purpose of the report is to help both donors and Tiger range states prioritize Tiger

Conservation areas and activities. It was submitted to World Bank in late March. The *Cambodia Profile* concludes that:

- Only a few scattered individual tigers remain in Cambodia, based on the analysis of all confirmed tiger records from all organizations in Cambodia from 2005 – 2010.
- There is no evidence of a resident breeding population anywhere in Cambodia & therefore no Source Site for Tiger recovery.
- The Eastern Plains Landscape is the best Potential Source Site for tiger recovery in Cambodia, through translocation & reintroduction of wild tigers from other sites.

Global Tiger Initiative Cambodia National Consultation, 25 May - 4 June 2010

A. Key points from End of Mission Note

The 25 participants represented MAFF, the Ministries of Environment (MoE), Planning (MoP), Economy and Finance (MEF); the World Bank Cambodia, WCS, WWF, Conservation International, Wildlife Alliance and PRCF (People Resources and Conservation Foundation).

There is significant activity and interest in the GTI process and it is being used to push the debate on tiger conservation in Cambodia. Beyond the mission consultation on the 25th there have been a number of other government-led consultations and meetings, which is partly why the 25th was so well attended.

There is strong government-NGO interaction in Cambodia and it was heartening to see a healthy discussion combining scientific data, objective analysis, and the Real Politik of getting things through the system in the country.

B. Tiger status and Tiger Conservation Landscapes in Cambodia

The *Cambodia Profile* was presented. There was a general discussion of the latest reviews of wild tigers in Cambodia and the group generally agreed on some key facts that were important in order for the process to proceed onto what conservation action was necessary.

The consultation participants reached a consensus that there is no evidence that a resident breeding population of Tigers remains in any Tiger Conservation Landscape (TCL) in Cambodia. Only a few scattered individual Tigers remain, likely less than 10 country wide and less than 5 in the Eastern Plains. However, DNA analysis of carnivore scat located by scent dog surveys was still pending, so no formal population estimate update was prepared.

The Eastern Plains Landscape (EPL) was identified as the best potential source site for eventual tiger re-introduction, which is of sufficient size and quality to support a breeding population embedded in a larger block of habitat that will enable tiger dispersal and repopulation of the larger landscape.

The consultation was a major milestone and significant turning point for Cambodia tiger conservation. The consultation outcomes became the basis for the Cambodia National Tiger Recovery Priorities and the subsequent confirmation of the Eastern Plains as the priority Tiger Recovery Landscape.

International Tiger Forum, St. Petersburg, Russia, November 2010

The Cambodia Delegation consisted of 5 high-level officials from the Ministry of Agriculture, Forestry and Fisheries, Forestry Administration & Department of Wildlife and Biodiversity, the Cambodia Tiger Project International Advisor and the WWF Cambodia Director.

Global Tiger Recovery Program was endorsed in St. Petersburg by the governments of all 13 Tiger Range Countries

Cambodia National Tiger Recovery Priorities, as summarized in the GTRP:

1. Secure at least one inviolate Potential Tiger Source Site, free from habitat conversion and human interference
2. Increase capacity and effectiveness of law enforcement agencies in wildlife and habitat conservation
3. Integrate habitat management into landscape plans

4. Implement consistent tiger and key prey monitoring protocols in Potential Source Sites
5. Strengthen trans-boundary collaboration with neighboring countries to reduce wildlife poaching and cross-border illegal activities.

As the Global Tiger Recovery Program was being endorsed in St. Petersburg by the governments of all 13 Tiger Range Countries, on November 23 in Phnom Penh, Forestry Administration spokesman Thun Sarath announced: (Cambodia Daily, November 24, 2010)

On November 23 in Phnom Penh, Forestry Administration spokesman Thun Sarath announced that: (Cambodia Daily, 24/ 11/ 2010)

- Cambodia plans to establish a protected tiger habitat which will likely be located in the Eastern Plains Region around the Mondulkiri Protected Forest Area
- Cambodia's National Tiger Action Plan will be based on the recovery program presented at St. Petersburg.
- Prime Minister Hun Sen has approved in principle
- The first thing will be to identify the boundary of the protected tiger habitat

Cambodia Tiger Landscapes Stakeholders Consultation, December 2010

Transitioning from NTRP to CTAP

To identify the and map the Tiger Recovery Site, the next step in the process was to convene the Directors, or their designated representative, of all 13 Protected Forests and Protected Areas in the Cardamom Mountains, Northern Plains, Southern Annamite Mountains and Eastern Plains landscapes.

These landscapes represent historic tiger range in Cambodia, and a full review was necessary before confirming a Tiger Recovery Landscape and identifying an inviolate potential Tiger source site within that landscape. The Consultation lasted two full days, with 54 key officials participating (40 from the field & 14 from Phnom Penh HQ).

- Global and Cambodia Tiger status was presented to the group.

- Each landscape unit representative gave a summary presentation on the status of tiger, prey, conservation status and threats.
- The National Tiger Recovery Priority objectives were presented
- The representatives were divided into 3 landscape working groups to develop recommendations for the Cambodia Tiger Action Plan.

Summary of key general conservation points made by field representatives

- Environmental education is important for local communities and for other stakeholders to change their attitudes and behavior regarding conservation and to understand protected forest and protected area benefits for their livelihoods and impacts of their activities.
- Local community livelihood upgrades through activities such as sustainable agriculture, agricultural land improvement and tourism development community are necessary in order to increase income that can help reduce pressure on protected forest and protected area and to contribute to conservation.
- Participatory Land Use Planning (PLUP) and protected forest/protected area boundary demarcation are important to suppress forestland cutting and to reduce conflicts, especially clear boundary demarcation between community land and protected forest/protected area.
- Community organizing is a foundation to ensure sustainable natural resource uses and help to prevent forestland clearing.
- Research, survey and monitoring is important for managing protected forest and nature protected area by helping increasing knowledge, improving data flow and decision making, especially regarding ungulate species density estimates for tiger recovery and presence of tiger present and other key wildlife.
- Law enforcement strengthening and governance has been helping reduce wildlife and forest crimes remarkably through patrolling inside and outside protected forest and nature protected areas and by collaborating with relevant parties and developing local information sharing network.

- Significant challenges are Hydropower dam construction, Mineral exploration, Newcomers, Road improvements, Hunting, Forestland clearing & plantation development.

Landscape Discussion Group results

Cardamom Mountains Landscape

Threats & challenges

- No clear research
- Educating and disseminating tiger conservation
- Cooperation and law enforcement with associated institutions is still limited
- Conservation understanding is limited (especially wildlife and tiger)
- Local people's poverty
- National and international needs
- Development needs
- Lack of human resources, finance and materials

Recommendations on draft of national tiger recovery program

- CTAP should focus on next five years; then review and revise
- Restudy wildlife presence and habitat status thoroughly
- Protect and conserve through limiting access

Northern Plains Landscape

Threats & Challenges

- Insufficient patrol force
- Insufficient means and materials
- Finance
- Human resources
- Limited cooperation
- Newcomers and population growth
- Limited education and dissemination
- Associated institutions (competency); suppressing participation
- Some illegal crime committed by powerful people
- Decrease in habitat (forest crime, agri-industry and mine business)
- Market needs
- Local infrastructure

Recommendations

- CTAP should focus on next five years; then review and revise
- Create special law for conservation area
- Law enforcement officials shall have clear cadre
- Increase ungulate species through breeding prevention
- Held meeting once per 3 or 6 months
- Organize an agreement to prevent wildlife crime and across border forest

Eastern plains & Southern Annamites Landscapes

Threats & Challenges

- Lack of officers, and knowledge is limited
- Many snares and explosives (remain from war)
- Limited participation from local authorities and communities
- Limited education and dissemination, and poverty
- Limited law enforcement equipment
- Forest disturbance by humans
 1. Luxury wood harvest,
 2. Resin tapping,
 3. Wildlife snaring
- Local middlemen active in wildlife trade
- Limited communication with neighboring countries

Recommendations

Source Site

- Map of tiger sanctuary is acknowledged by local and national authorities
- Disseminate from national to local levels

Law enforcement

- Form informant group
- Update MIST to local and national levels

Monitoring

- Train the trainers
- Develop sampling strategy

Trans-boundary

- Encourage active participation by the relevant border competencies

Indochinese Tiger Overview

Sub-species genesis

Based on genetic analysis, Luo *et al.* (2004) identified *P. t. corbetti* (Indochinese Tiger) as the likely ancestral Tiger population, with the radiation into other subspecies taking place 72,000–108,000 years ago.

Of all the Tiger subspecies, *P. t. corbetti* showed the highest genetic diversity in microsatellite alleles, indicating a fairly stable evolutionary history, and alleles found in other subspecies were almost always a subset of those found in *P. t. corbetti*.

Until recently, mainland Southeast Asia tigers in Myanmar, Thailand, Malaysia, Laos, Cambodia & Vietnam were considered as a single subspecies, *Panthera tigris corbetti* (Indochina Tiger)

In 2004, the tigers of Peninsular Malaysia were recognized as a new subspecies, *Panthera tigris jacksoni*, (Malayan Tiger) when a genetic analysis found that they are distinct in mtDNA and microsatellite sequences from tigers of northern Indochina, *P. t. corbetti* (Luo *et al.*, 2004).

Based on DNA, two subspecies are currently provisionally accepted by IUCN on the Cites Red List: *Panthera tigris corbetti* (Northern Indochinese Tiger) and *P. tigris jacksoni* (Southern Indochinese or Malayan tiger). However, some specialists note that there is no morphological basis for this division.

Mazak and Groves (2006) found no clear morphological differences (in cranial measurements or pelage characteristics) between tigers from Peninsular Malaysia and those elsewhere in Indochina, and argue for inclusion in *P. t. corbetti*.

P. t. jacksoni is provisionally accepted by IUCN. The geographic division between *P. t. jacksoni* and *P. t. corbetti* is unclear as tiger populations in northern Malaysia are contiguous with those in southern Thailand (T. Lynam 2008).

On a regional scale, the 2 proposed subspecies are effectively managed as separate conservation units: Malayan Peninsula (south of the Isthmus of Kra) and

the remainder of mainland Southeast Asia (Myanmar, Thailand, Laos, Cambodia & Vietnam).

Dinerstein *et al.* (1997) argued that a taxonomic approach to tiger conservation would seek to conserve only genetic variation, but that an ecological-based approach was needed to account for behavioral, demographic and ecological variation across tiger range. Sanderson *et al.* (2006) grouped tigers by biome (habitat type) and six bioregions that have some congruence with recognized subspecies: Indian sub-continent, Indochina, Peninsular Malaysia, Sumatra, Russian Far East, and China/Korea.

This distinction has important implications for Tiger re-introduction, in that depending on interpretation, the availability of tigers for translocation from and to particular sites could be severely constrained.

(This section based on IUCN 2010 Red List tiger analysis and a 2010 report by Lynam.)

Current Tiger Status in Southeast Asia

A century ago, tigers (*Panthera tigris* Linnaeus, 1758) were so common in parts of Southeast Asia as to be considered pests, and governments sponsored their killing. Habitat loss and fragmentation, market-driven poaching and loss of prey have since led to the disappearance of Indochinese tigers from most their former range.

Despite 15 years of dedicated tiger conservation funding, the future for the subspecies appears grim, unless very focused efforts can be applied to stabilize and recover subpopulations. Evaluating where to place conservation efforts should consider the vulnerability (likelihood of extinction) and irreplaceability. (likelihood that an area contributes uniquely to regional conservation) of tiger subpopulations. (Lynam 2010)

There are only 6 Source Sites (confirmed to have resident breeding populations of tigers) in all of Southeast Asia: 2 in Thailand, 1 in Laos & 3 in Malaysia. There are no proven Source Sites in Myanmar, Vietnam & Cambodia. (Lynam 2010)

Cambodia Wildlife law & enforcement

The Tiger is fully protected by the Cambodia Wildlife Protection Act, 2007. Moreover, the Forestry Law, 2002 prohibits hunting, killing, trading or exporting of

Tiger. Any individual convicted of such an offence can be punished by 5-10 years in prison and confiscation of all evidence. These regulations are enforced in Cambodia, as the following incident demonstrates.



Figure 1 Source sites and potential source sites in the range of the Indochinese tiger.

Map 1. Source Sites and Potential Source Sites in the Range of the Indochinese Tiger

Yor Ngon was interviewed in 1999 by the CAT/WPO Tiger Project and identified as probably the most prolific large mammal hunter in Cambodia. He hunted all over the country and claims to have killed at least 19 tigers, 40 leopards, 30 elephants, 43 bears and more than 500 gaur and banteng in his career. CWRP had informed government officials and NGOs



Map 2. Regional Tiger Trade routes



Map 3. Cambodia Wildlife Trade routes

about his activities in the Eastern Plains, Northern Plains and Cardamom Mountains.

In 2004 he was detained by a WWF/FA team in northeastern Cambodia and signed a no re-offence contract (Lic 2004.), but in March 2005 he was arrested by a WildAid/FA team in the Cardamoms transporting 25 bear jaws and 82 bear paws and claws. The court sentenced him 7 years in prison.

This is believed to have been the first significant jail sentence in Cambodia for a wildlife poacher. Unfortunately the improved law enforcement evolved too late to prevent the crash of Tiger populations in Cambodia.

The National Rapid Wildlife Rescue Team

The Project started in 2001 with Technical and financial support by Wildlife Alliance. The Team is comprised of 4 Forestry Administration Officer & 8 Military Police.

FA officials

- lead operational team
- implement forest law
- court communication
- file cases
- care and release of live wildlife

Military Police

- cooperative force
- ensure team security
- apprehend perpetrators



- help take care of and release live wildlife

Illegal wildlife transportation methods

- by car
- transfer from one car to another
- change car number plate
- use modern cars
- by bus
- by boat across border

Illegal wildlife inventory

- Kept in many houses
- Kept hidden in forest
- Kept underground

Challenges

- Law enforcement is limited with poor people
- In Some cases, prosecutor does not permit an operation
- Border access operation is complicated (geography and situation)
- Several crimes happen at the same time but different places
- Information received from informant is not clear

Conclusions

- Illegal wildlife trading in Cambodia today threatens many wildlife species
- Wildlife crimes have changed from major scale to small one, causing difficulty to follow up, monitor and crackdown



Photo 1. The Rapid Wildlife Rescue Team confiscates a tiger skin from a home in Phnom Penh after receiving a tip. This is the only known confiscation of a tiger skin in Cambodia from 1997 to 2011.

Improvements

- Shall form information exchange system within region; ASEAN WEN
- Facilitate and ensure financial sustainability for monitoring and law enforcement
- Increase national and international cooperation to suppress and crack down on wildlife crimes generally.

Results -2001-2010

Rescued 43,463 individual Live Wildlife

Confiscated 21,062 individual dead wildlife specimens

Confiscated 6,788 kg of wildlife meat, bones & skins

Apprehended 2,171 wildlife traders

Collected \$98,471 in fines

Tiger poaching trend analysis

The photo above is an instructive metaphor for what happened to Cambodia's tigers in the 1990's. The photo below was taken by Uch Seiha, currently a Forestry Administration official, in September 1997 while he was conducting field research for his

university degree. A hunter was driving his motorbike about 10 kilometers from his home at Bor Nork Village, Krakor District, Pursat Province. The area is on the northeastern edge of the Cardamom Mountains landscape. The hunter encountered the tiger and shot several time with an M16 rifle, hitting the tiger once in the head. The tiger charged and fell dead a meter away from the hunter.

The tiger was subsequently sold to a wildlife trader in neighboring Battambang Province for about \$2400. In the nine years since, no Cambodian or foreign researcher has obtained a single photo of a tiger, dead or alive, anywhere in the Cardamom Mountains, despite extensive camera trapping and surveys supported by CAT, FFI, WildAid and CI.

Tiger poaching numbers were obtained primarily from the WPO Community Wildlife Ranger Patrols. The Chart shows a dramatic drop in tiger poaching in every region and countrywide from a total of 85 tigers poached in 1998 to just 2 poached in This large drop in the number of tigers poached annually is likely the result of a final rapid crash in tiger numbers due to years of heavy hunting pressure rather than a significant increase in the effectiveness of conservation measures.

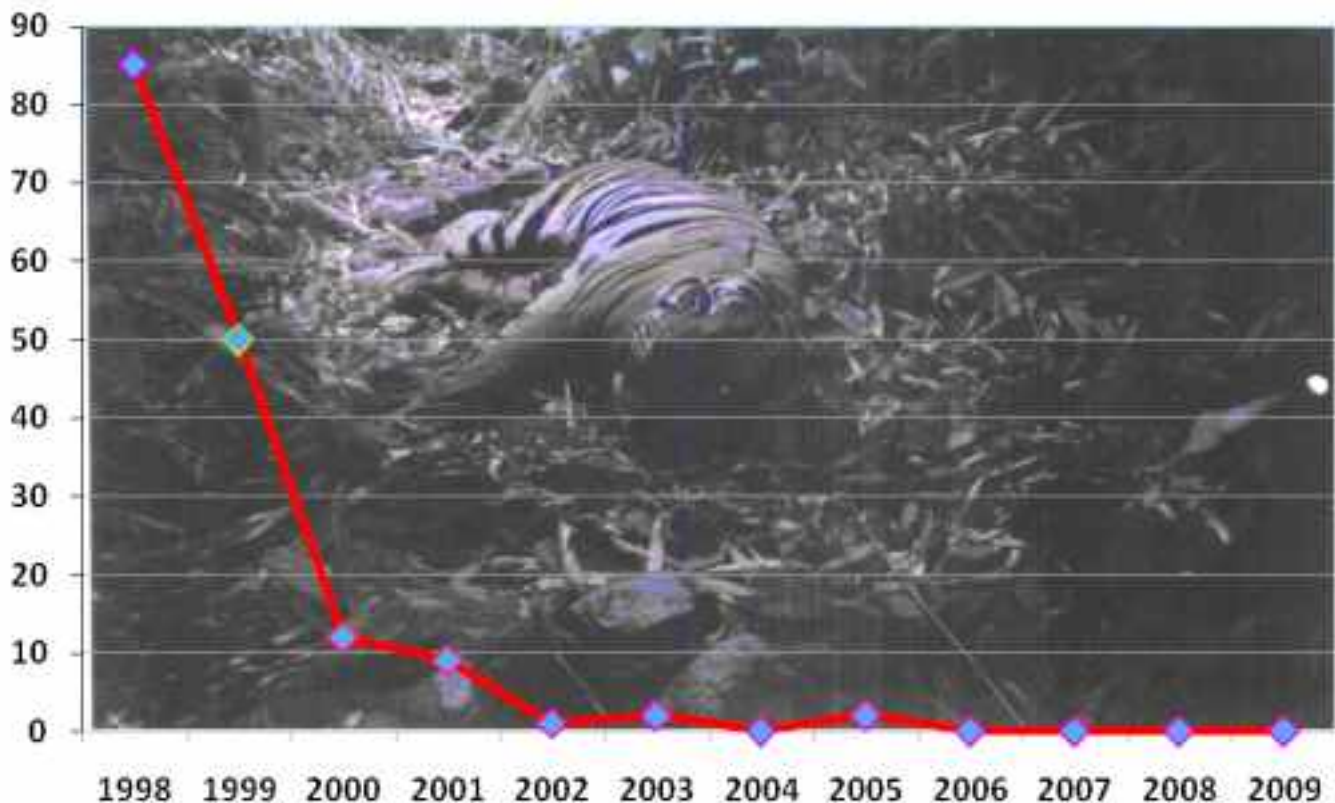
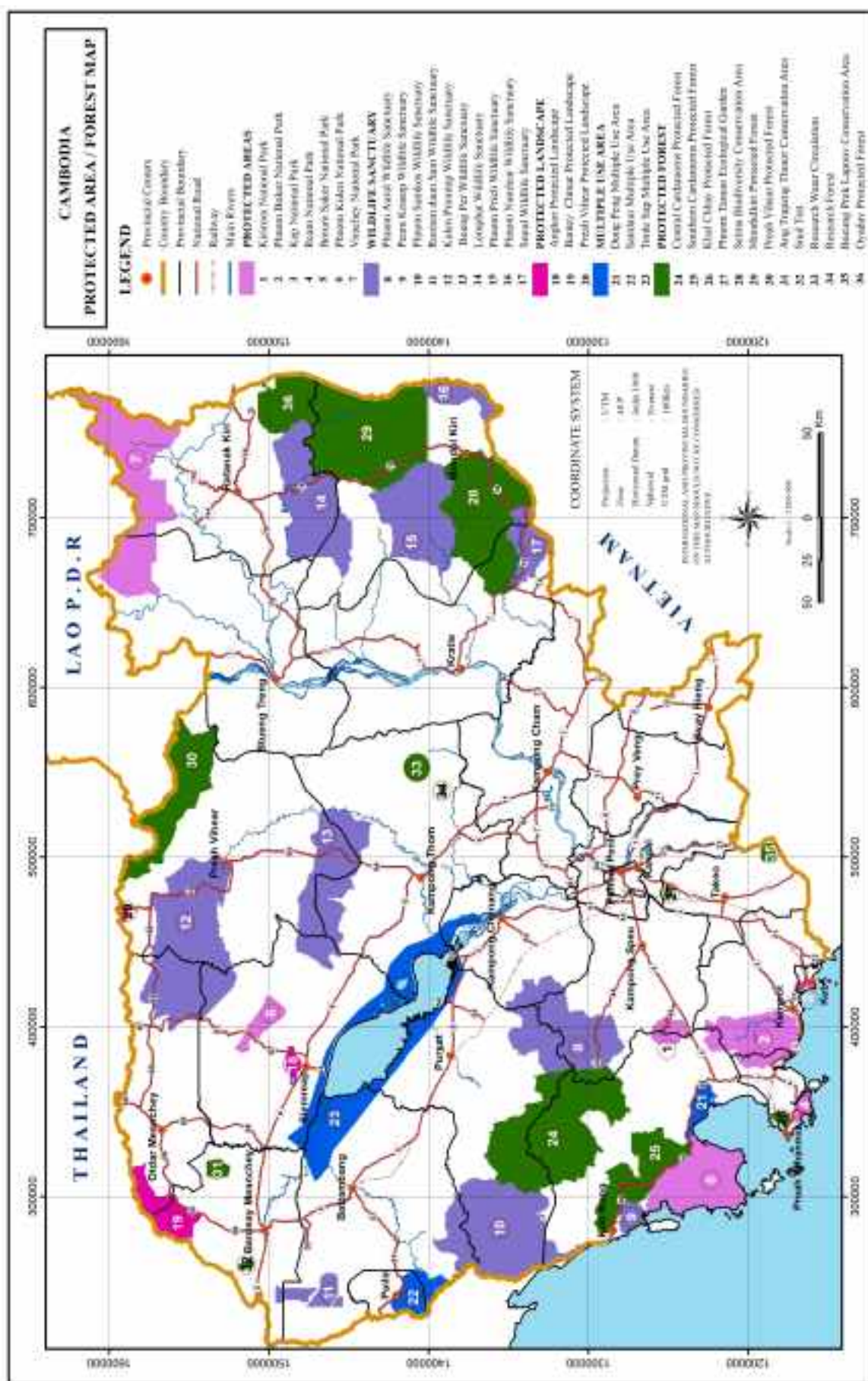


Photo 1. Cambodia Known Tiger Poaching Totals 1997-2010



The explanation for this lies in an analysis of the chart context. There is no formal data on tiger poaching prior to 1998. However, it is likely that the high levels of tiger kills shown for 1998 & 1999 were occurring every year beginning by 1990, which is when a rapid increase in poaching pressure across the species range occurred from Siberia to India as tiger poaching became a worldwide rather than local phenomenon. (Kenney et al. 1995)

Furthermore, in 1989, the Vietnamese army withdrew from Cambodia, opening up vast areas of countryside to uncontrolled hunting. The Vietnamese occupation had established tiger trade links between Cambodia and China, which continued after the occupation.

In *The Long-term Effects of Tiger Poaching on Population Viability*, (Kenney et al. 1995), modeling showed that as poaching continues over time, the probability of population extinction increases sigmoidally. The rapid decrease in number of tigers poached countrywide in Cambodia after 1998 is most likely due to a crash in tiger populations resulting from over a decade of high levels of poaching. Cambodia's remaining low numbers of tigers are relics of this crash and extinction is now imminent.

Summary of 2011 tiger status by landscape

National Parks and Wildlife Sanctuaries are managed by Department of Nature Protection and Wildlife Sanctuaries, General Department for Administration of Nature Conservation and Protection, Ministry of Environment. (DNPWS)

Protected Forests are managed by Department of Wildlife and Biodiversity, Forestry Administration, Ministry of Agriculture, Forests and Fisheries. (DWB)

- **Central Cardamoms PF & Southern Cardamoms PF:** No confirmed Tiger records since 2005.

- **Botum Sokor NP and Phnom Samkos WS:** No confirmed records since 2005.
- **Phnom Aural WS:** Sets of Tiger tracks were measured and photographed in 2008 by the Manager of the Kampong Chhnang Sector of Phnom Aural WS.
- **Bokor National Park:** In 2004, a female Tiger with a missing right front paw from a snare was photographed near the garbage dump. Due to her injury she was unable to capture normal prey.
- **No photo of a Tiger**, dead or alive, has since been obtained since anywhere in the Cardamoms TCL, despite extensive camera trapping by 5 NGOs and 2 Government Ministries.

Northern Plains Landscape (*After the 2005 Tiger Conservation Landscape revision, this geographic landscape was no longer considered a Cambodia TCL.*)

- **Kulen Promtep WS & Preah Vihear PF:** No confirmed records since 2003. Only one camera trap photo ever obtained in the Northern Plains, in Kulen Promtep WS, 2001. Supporting NGO: WCS.

Southern Annamites Cambodia / Laos / Vietnam Transboundary TCL

- **Virachey NP:** 3940 camera trap nights in 2000-2001 produced 3 pictures of one individual Tiger (WWF). Tiger tracks reported by VNP Rangers in two locations in 2006 and one location in 2008. A Border Police Officer reported to VNP Rangers that he saw a Tiger in Veun Sai District in 2008. Supporting NGOs: Conservation International, POH KAO des Tigres et des Hommes, Save Cambodia's Wildlife.

Cardamom Mountains Tiger Conservation Landscape (TCL)

TCL Landscape Unit	Management responsibility	Size (km2)	Supporting NGO
Botum Sokor NP	DNPWS	1,769	WA
Central Cardamoms PF	DWB	4,013	CI
Phnom Aural WS	DNPWS	2,538	None
Phnom Samkos WS	DNPWS	3,338	FFI
Southern Cardamoms PF	DWB	1,442	WA
Bokor NP	DNPWS	1,580	WA
Total km2		11,343	

Eastern Plains Tiger Conservation Landscape

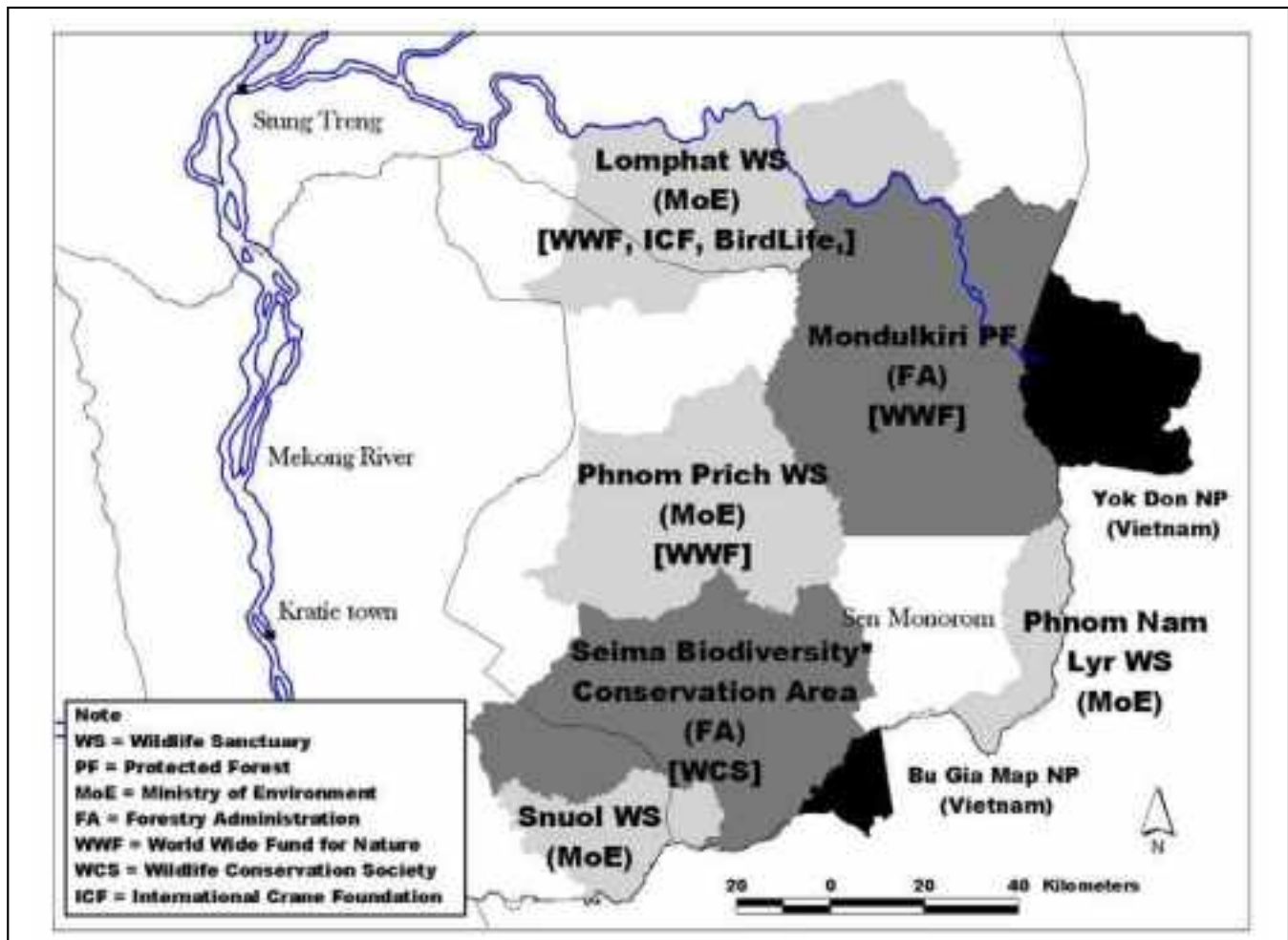
TCL Landscape Unit	Management responsibility	Size (km2)	Supporting NGO
Lomphat WS	DNPWS	2,500	PRC, Birdlife
Mondulkiri PF	DWB	4,300	WWF
Oyadav PF	DWB	1,000	None
Phnom Prich WS	DNPWS	2,220	WWF
Seima PF	DWB	3,050	WCS
Total km2			

- **Lomphat Wildlife Sanctuary:** Photo of Tiger obtained in 2005 in western LWS. Tiger tracks found in western LWS in 2009. Casts made of the tracks (PRC & Freeland). Tiger tracks found west of the boundary of LWS in 2010; measured and photographed.
- **Phnom Prich Wildlife Sanctuary:** No photos ever obtained, despite years of extensive camera trapping continuing to present. Tiger Detection Dog Surveys were conducted in 2009-2010, but only Leopard scat has been identified to date through DNA analysis. Tiger tracks were

measured and photographed by trained rangers in 2010 (WWF).

- **Mondulkiri Protected Forest:** The first Tiger photo taken in the Mondulkiri Protected Forest was obtained in November/December 2005. A second picture of a Tiger in the same area was taken about 10 days later. In 2007, a third Tiger picture was taken in the same general area. None have been obtained in the MPF since, despite extensive and continuing efforts.

Tiger Detection Dog Surveys were conducted in



Map 4. Eastern Plains Tiger Recovery Landscape management units status

2009-2010. 201 Carnivore scat were located and are currently undergoing DNA analysis. (WWF)

1. 13 specimens were initially recorded as possible tiger scat, but DNA analysis has been completed and all are leopard
 2. 178 specimens were initially recorded as probably leopard scat; DNA analysis currently underway
 3. 10 specimens were initially recorded as probable wild dog scat. DNA analysis currently underway.
- **Seima Protected Forest:** Eight camera trap pictures obtained of at least three different Tigers in 2003. None have been obtained since, despite extensive and continuing efforts. Casts of confirmed Tiger tracks were made in 2007. Tiger Detection Dog Surveys were conducted in 2009-2010, but no Tiger scat was found. (WCS).
 - **Oyadav Protected Forest:** No surveys or management for past two years. No tiger records from initial 6-month survey in 2006 and monthly monitoring 2007-2008.

Why Restore Cambodia Tigers?

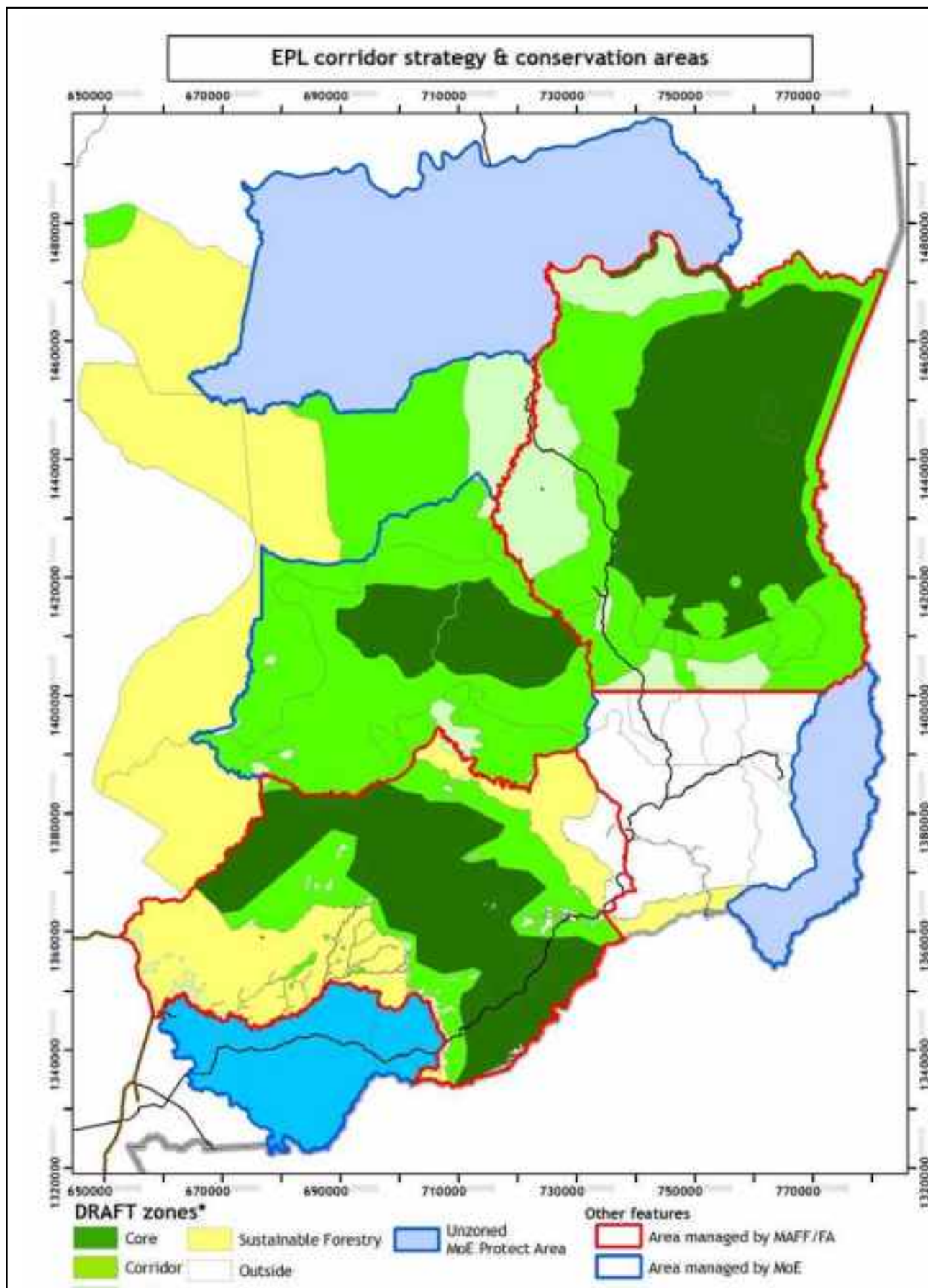
Although Tigers are extremely vulnerable or even extinct in Cambodia's Eastern Plains, the site is irreplaceable for tigers because it represents the only

large (>10 000 km) block of dry forest habitat available in the region, and therefore meets the criteria for conservation efforts because it contributes uniquely to regional conservation of tiger subpopulations. (Lynum 2010) The Eastern Plains were classified as Global Priority in the 2005 TCL revision. A reintroduction program is the only option to recover tigers there. Therefore Cambodia's contribution to the Global Tiger Recovery Program is to restore this landscape.

In conclusion, despite the current dire state of the tiger, the Eastern Plains TCL has the best potential in Indochina for Tiger reintroduction, due to a large area of suitable habitat within in a mosaic of interconnected Tiger permeable protected areas and forests under intensive long-term government management with strong NGO technical and financial support.

Effective on the ground law enforcement and monitoring have been established on the Eastern Plains TCL with strong long-term support by conservation NGOs. Evidence that prey species have stopped declining and are possibly increasing in eastern Cambodia is starting to emerge. The National and Provincial governments are strongly committed to conservation in this region.

Conservation activities should be continued and expanded to lay the groundwork for reintroduction of Tigers.



Map 5. Eastern Plains Tiger Recovery Corridors & core zones

The inviolate Tiger Recovery Source Site is proposed within the core of the Mondulkiri Protected Forest.

Tiger Prey & habitat of the Eastern Plains Landscape photo portfolio



Photo 4. Wild Pigs



Photo 5. Elds deer



Photo 6. Banteng



Photo 8. Scent dog Tiger Survey in MPF



Photo 9. Gaur



Photo 10. Tiger, MPF proposed Tiger Recovery Site, 2005

Further Details of the NTRP/CTAP below will be developed after this 1st draft is reviewed, discussed at the National Stakeholders Workshop, revised, approved and published.

Cambodia Tiger Strategy & Action Plan

Cambodia Vision, Goal & Strategy

Cambodia's long-term goal by 2022 is to restore and conserve at least one defined, delimited and inviolate Tiger Source Site within a well defined Tiger Conservation Landscape that is tiger permeable and can potentially hold at least 50 tigers.

Objective 1

Secure at least one inviolate Potential Tiger Source Site, free from habitat conversion and human interference

Activities

- Identification of suitable source site for eventual re-introduction of wild tigers
- Clear mandate for management of the source site for tiger recovery
- Designation of tiger source site
- Demarcate boundary of inviolate areas for tiger conservation

Outcomes

- Establish potential tiger source site
- Develop management plan for recovery of wild tigers in source site

Objective 2

Increase capacity and effectiveness of law enforcement agencies in wildlife and habitat conservation

Activities

- Recruit and train law enforcement officers in wildlife conservation, conservation ethics, legal statutes, law enforcement & investigation and MIST
- Training for judiciary in legal statutes
- Necessary field equipment and transportation, sufficient budget for maintaining and operational activities

- Adequate management infrastructure (e.g. patrol stations and patrol routes)
- Frequency and efficiency of regular patrols monitor illegal activity within the source site and protected areas in the broader landscape
- Strict monitoring of law enforcement operations using MIST and full integration of monitoring into conservation area management

Outcomes

- Reduced environmental crimes that threaten tiger and tiger prey
- Strengthened enforcement and implementation of national wildlife and forestry legislations to protect tigers and its prey.

Objective 3

Integrating habitat management into landscape plans

Activities:

- Conduct an assessment of suitable tiger habitats in the potential source sites
- If needed create artificial micro-habitat for tiger and its prey species
- Integrate legal designations of tiger source sites through consultation with relevant stakeholders, capacity building, and coordination
- Awareness raising-program for the tiger source site

Outcomes

- Science-based tiger conservation objectives are fully considered and integrated with conservation planning working group and other relevant agencies

Objective 4

Implement consistent tiger and key prey monitoring protocols in Potential Source Site

Activities

- Establish and train tiger research and monitoring teams
- Establish a baseline for tiger and key prey species within the tiger source sites
- Establish Adopt and implement tiger and prey monitoring protocols in the tiger source sites

Outcomes

- Standardized indicators of key prey and tiger recovery provided on regular basis
- Indicators fully integrated into management planning and resource allocation

Objective 5

Strengthen trans-boundary collaboration with neighboring countries to reduce wildlife poaching and cross-border illegal activities

Activities

- Set up collaboration mechanism to combat illegal trans-boundary activities driven by international demand for wildlife products
- Establish and train law enforcement team
- Conduct annual coordination meetings for exchange of experiences on law enforcement patrol activities

Outcomes

- Increased number of anti-poaching patrols along the border
- Increased communication between key agencies in the Cambodia and neighboring countries as well as CITES Interpol and NGOs, concerning the wildlife trade, routes and intelligence

Policy

- Designate an inviolate Potential Tiger Source Site in the Eastern Plains Landscape
- Inter-ministerial cooperation and coordination to ensure sustainable management of land-use across the Eastern Plains Tiger Conservation Landscape.
- Trans-boundary agreement between Cambodia and neighboring countries on combating wildlife crime across the border.
- Review of existing wildlife laws governing

penalties for poaching and trade in species of high commercial value

Capacity

Need to improve technical skills (patrolling, investigation, monitoring, reporting) in enforcement agencies and community to monitor and manage conservation areas and community managed areas.

- Scientific skills, resources and personnel needed within FA, GDANCP, relevant stakeholders, and education system to conduct biological monitoring of tigers and prey.
- Increased operational resources, including infrastructure and transport, for effective patrolling and monitoring.
- Greater awareness of the threats to tiger survival and improved perception of the conservation value of tigers in local communities.

Stakeholders

- Policy makers
- Government agencies at national and provincial level
- Community representatives and organizations,
- Local and international NGOs
- Development agencies and financing institutions

Performance Indicators

- Formal documentation designating Potential Tiger Source Site.
- Number of trained and equipped law enforcement staff dedicated to Source Site and Conservation Landscape.
- Documentation that law enforcement monitoring is fully integrated into management planning.
- Documentation that standardized annual tiger and prey monitoring protocols are implemented.
- Documentation of trans-boundary collaboration in controlling cross-border illegal activities.

Costs

- All major conservation management activities in Cambodia are currently supported by NGOs and/or international donors
- Continued strong financial support from the international community will be essential for restoring Tigers to the country.

- Government agencies have greatly improved their capacity for conservation management, and have initiated preparation of a National Tiger Action Plan
- The government plans to work closely with conservation NGOs and donors to develop long-term costs and sustainable funding of effective Tiger conservation

Financing Options

- International Development Agencies: ADB and JICA implement regional development projects and could facilitate trans-boundary activities of the NTRP.
- GEF: Complimentary to potential GEF-5 biodiversity priority areas and activities.
- International NGOs: Currently supporting FA and GDANCP within the landscape.
- REDD: Sustainable financing opportunities are being investigated in the landscape and have the potential to contribute to conservation area management in the long-term.
- Tourism: Increased revenues from well managed and appropriate tourism development.
- National budget: in kind institutional support from the government.

Transboundary Collaboration

- Collaboration with Thailand, Laos and Vietnam to control Trans-boundary wildlife trade

- Potential Trans-boundary Tiger conservation activities in collaboration with Vietnam for the Cambodia Eastern Plains and Yok Don National Park. and other Vietnam Protected Areas bordering the Cambodia Eastern Plains Tiger Conservation Landscape.
- Encourage and participate in GTI Regional Workshop on Transboundary Tiger Conservation Landscapes.

Strategy for long term restoration of tiger populations in key landscapes

- Evaluation of possible translocation of wild Tigers from Source Sites in other countries
- Consideration of the Tiger Sub-species issue in relation to potential sources of Tigers for translocation
- Evaluation of captive tiger breeding, re-wilding & re-introduction
- Encourage and participate in GTI Regional Workshop on translocation, reintroduction and rehabilitation of tigers

Phnom Tamao Wildlife Rescue Center

- Key role to recovery, save and care wildlife confiscated from perpetrators and from hunting. , Contributes to education, tourism, research, and science.

CHINA TIGER RECOVERY PLAN

2010 - 2022

National Plan for Recovery of Wild Tiger Population

A number of factors that have arisen as a result of historical developments have placed the wild tiger population in China in an extremely endangered state. In response, a series of measures have been taken in the form of laws and regulations, in development of nature reserves, in restoration of habitat, in cracking down poaching and illegal trade to save the wild tiger populations in China. Such efforts have led to a gradual but constant trend of increase in the population of wild tigers, and of the extension and improvement of their habitats in China. Furthermore, China will determinedly continue its efforts to extend and ameliorate various habitats for the wild tiger population, whilst also exploring the reintroduction of captive bred tigers into their original range areas. The state will strengthen management and law enforcement in the field of conservation, and facilitate the spread of information for public education in order to create an optimum environment that will allow for a successful recovery of wild tiger population. This should result in a significant growth of wild tiger populations and large-scale extension of the ameliorated habitats across China by 2022, while biodiversity found in the range areas of wild tigers would receive stricter protection and become much richer as a result of recovery.

1. Basic Information

1.1 Basic Information of the Population of Wild Tigers in China

Four subspecies of tiger are found in China: The Siberian (Amur) tiger (*Panthera Tigris altaica*), South China tiger (*Panthera Tigris amoyensis*), Indo-Chinese tiger (*Panthera Tigris corbetti*) and Bengal tiger (*Panthera Tigris Tigris*). The total sum of the wild individuals of all four subspecies existing in China is estimated to be about 40-50.

For the Amur tiger (*P.T. altaica*), the number of wild individuals has grown from 12-16 by end of the last century to the current population of 18-22. Their range of distribution is currently limited to the mountain areas connecting Jilin and Heilongjiang provinces with Russia and the eastern mountains nearby. For the South China tiger, despite occasional reports of sporadic traces suggesting its presence, there has not been a confirmed expert sighting for more than 20 years in the wild. For the Indo-Chinese tiger, there are

about 11-16 wild individuals living in Xishuangbanna and Huanglianshan Nature Reserve, an area of Yunnan province bordering with Laos and Vietnam. For the Bengal tiger, there are about 8-10 wild individuals living in the forests of southeastern Tibet, bordering India. Given the limited technology and reduced capacity of surveys and monitoring available in the past, more scientific and

reliable methods using more sophisticated technology need to be adopted today in order to create a more accurate picture of both the current population dynamics and the current habitat of wild tigers in China.

1.2 Great Efforts the Chinese Government Has Undertaken to Save Wild Tigers

China is not only a tiger range State, but the tiger has a long history in Chinese culture. Due to its great ecological and cultural significance, the Chinese government has been continuously contributing its great efforts in improvement of laws and regulations, huge investment of substantial financial and personnel resources, enhancement of law enforcement etc. to save the wild tigers from its endangered state, and by now, a series of outcomes have been achieved from the efforts as following:

- 1.2.1 In 1988, the State Council of China approved listing of tiger as the species under national key protection at the first class so as to save and protect them legally.
- 1.2.2 China has established 33 nature reserves and more than 70 conservation management stations in the range area of wild tigers to form a basic network of tiger conservation to undertake patrolling of the habitat and anti-poaching of wild tigers and their prey animals to secure the populations of wild tigers and their habitats.
- 1.2.3. Since 2000, in combination with the national programs for Natural Forest Protection, Recovery of Farmland for Forest, and Wildlife Conservation & Nature Reserve Development, China has been actively facilitating the recovery and amelioration of habitats for wild tiger populations.
- 1.2.4. China has started a pilot trial of governmental compensation for injury of local residents and

their domestic, and property losses caused by wild tigers and their prey animals since 2007. It has greatly facilitated the public understanding and support for the protection of wild tigers from local communities in wild tiger distribution areas, with their legitimate rights being safeguarded.

- 1.2.5. China has been continuously enhancing law enforcement to fight against illegal activities of poaching of wild tigers and smuggling and illegal trading of tiger products including tiger bone and skins, and a number of illegal cases have been arrested with criminals being punished severely. The efforts have effectively resulted in decline of the concerned illegal activities. In December of 2009, the State Forestry Administration of China issued yet another special notification to require further law enforcement efforts in combating smuggling and illegal trade of tiger products, and strengthening regulation and supervision of captive bred tigers as well sealed storage of their carcasses and body parts.
- 1.2.6. China has been vigorously carrying out a series of public awareness and education campaigns on tiger conservation, which has greatly improving public understanding of tiger protection. Now, public support has become important social force for tiger conservation.
- 1.2.7. Since 1993, China has not approved the sale or use of any tiger bone even for medical purposes, enduring huge economic losses to fulfill its international obligations. It is a tremendous contribution for global tiger conservation. Meanwhile, China has implemented a permit system for activities concerning captive breeding of bred tigers while stringent requirements in technology, condition, provenance and other categories has been applied. Also, for the activities concerning captive breeding of tiger, a series of technical tools including written documents, micro-chipping and storage of DNA samples for every individuals are adopted to ensure strict supervision.
- 1.2.8. China has been paying its highlight to international cooperation on tiger conservation and has signed bilateral governmental protocols with India and Russia. It has also conducted a series of collaborative activities in field survey of wild tiger, information exchange, personnel training, law enforcement seminars etc. with other countries and organizations. Now, the collaborative activities have resulted in remarkable achievements.

1.3 Problems Facing China and its Strategy

Careful analysis of the major limiting factors facing the restoration and expansion of the extant wild tiger populations and their habitats in China has revealed the following: 1) Wild tigers live in limited and fragmented areas where they are isolated from each other and have difficulty in accessing other suitable habitat; 2) Poor habitat quality and a severe insufficiency in prey resources; 3) Human activities seriously interfere with the activities of wild tigers and their prey, illegal hunting and snaring still exists, directly threatening wild tigers in particular; 4) Severe genetic problems are faced by extremely small populations as a result of limited effective breeding opportunities leading to inbreeding or no breeding options whatsoever. Furthermore, the fact that wild tigers can harm humans and their domestic livestock, as well as requirements restricting certain activities therefore affecting the livelihood of local communities for the sake of wild tigers protection, will all affect the effectiveness and sustainability of conservation measures.

Given the above problems, a comprehensive study needs to be conducted over the tigers' distribution area to ascertain the current status of the habitat in the surrounding areas as well as the local current livelihood. Systematic engineering measures need to be taken and policy guarantees need to be provided to promote the expansion and improvement in quality of habitat and to reduce interference from human beings. Field patrolling and law enforcement and supervision need to be strengthened to fight against illegal hunting of tigers and other wild animals and to curb smuggling and illegal operations involving tiger products. Continuous and systematic scientific research and monitoring need to be developed to ensure timely understanding of the population dynamics and evaluation of habitat quality, so as to provide a basis for an intensification of efforts to aid conservation and habitat improvement. Methods need to be enhanced for the prevention of damages to humans and domestic stock by wild tigers and a compensation system relating to direct losses needs improving. Further, a pilot area must be established for the re-introduction of South China Tiger in the initial stage. Based on experience gained thereof and relevant study results, the natural release area will be gradually extended to meet the requirements for stable and sustainable living of at least 2-3 wild populations of the subspecies.

Another crucial item requiring attention is that it is only with the understanding and support of local

people for wild tiger populations and habitat conservation that the objectives of conservation can be assured. But successful conservation requires necessary constraints over the methods of production and the way of life of local people to be put in place. It is easy to trigger conflicts between conservation activity and local communities that will directly hinder sustainable conservation. Therefore, while the conservation of wild tigers and their habitat is being strengthened, public education needs to be vigorously developed, and the needs of economic development and livelihood improvement for local residents must be taken into account at the same time. Proactive guidance shall be given to change the methods of production and ways of living that are incompatible with sustainable conservation, support shall be given for exploration into new means of local economic development that are favorable to sustainable conservation. Efforts shall also be made to promote the integration of policies concerning the protection of wild tigers and their habitat with those concerning local economic development and improvements in quality of life, to achieve coordinated and sustainable development.

2. Strategic Goals?2010-2022?

In order to save and facilitate the growth of wild tiger populations of each subspecies in the country, China will take a series of measures including vegetation rehabilitation, establishment of adequate ecological corridors between habitats, intensification of field patrols and monitoring of these conservation areas, exploration of tiger re-introduction, and the introduction of adequate methods of economic development in combination with a national program for protection of natural forest, recovery of farmlands for forests, nature reserve development, etc. It is expected to achieve a significant growth of wild tiger populations together with large-scale extension, and quality optimization of wild tigers habitats being achieved by 2022. Under the umbrella, biodiversity of the areas shall be also conserved much better and the livelihoods for local people shall be improved with the manners for their economic development becoming more tiger-friendly under appropriate guidance and assistance.

3. Priorities and Actions

China will focus on the following areas to promote population growth of wild tigers in the country based on population and habitat information, relevant conservation management, scientific research, law enforcement and supervision currently available.

3.1 Conservation, extension and amelioration of wild tiger habitats, and trial reintroduction.

Based on systematic research and scientific evaluation, measures will be adopted for vegetation rehabilitation, introduction of prey resources and an overall ban on hunting in current wild tiger distribution areas as well as their surrounding areas or in other adequate areas suitable for future connection through ecological corridors. The objectives are to achieve maximum expansion of tiger activity range and a notable improvement in habitat quality, and to achieve genetic exchanges among key isolated population groups through restoration and optimization of the habitat in ecological corridors to ensure the continuous growth of the wild tiger population by 2022. In addition, pilot areas will be established at adequate sites for the re-introduction of captive-bred South China Tiger into the wild so that monitoring and study of the released individuals can be conducted, and preparation can be undertaken for gradual expansion of the natural release area as well as establishment of wild populations of the subspecies.

Action 1: Survey and identify priority areas.

To identify priority areas for wild tiger conservation and restoration in this stage based on survey and subsequent evaluation of the current distribution area and areas planned for extension and natural release.

Main activities in this action consist of:

- To collect information on topography, vegetation, roads and residents in tiger distribution areas and the surrounding areas, develop field surveys and evaluate its biotope if necessary, come up with the extent of habitat and ecological corridors for future extension, and identify action zones for this stage.
- To survey, select and identify re-introduction zones for amoyensis in its historical distribution range.
- To conduct planning for the above zones following legal procedures in order to prevent irreversible damages to the biotope caused by inappropriate construction. The plan will be used to guide and guarantee the implementation of actions through a sequence of steps and stages.
- To establish GIS for action zones of wild tiger conservation and restoration.

Projected outcome: The conservation and restoration range will be identified with legal guarantees through effective planning, and the relevant GIS will provide effective data and information to support conservation actions.

Action 2: Habitat conservation, extension and optimization for wild Siberian (Amur) tigers.

In Jilin and Heilongjiang provinces, a series of measures including vegetation restoration and rehabilitation, overall ban on hunting, necessary and scientific introduction of prey resources, etc will be undertaken in the areas with Siberian tigers living in currently and their future potential range areas and in the corridor areas. It shall result in habitat extension and quality optimization and increase in prey density to satisfy the needs of population growth of Siberian tigers.

Main activities:

- To study and draft technical guidance of habitat restoration for wild population of Siberian tigers.
- To implement an overall ban on hunting in currently existing range areas of wild Siberian tigers and their surrounding areas and ecological corridors; study and draft habitat restoration plans by region and by category.
- To select, in different vegetation areas, one to two locations, for a pilot demonstration of habitat restoration through recovery farmland to forest, change of inappropriate forests and vegetation, maintaining necessary grasslands and introduction of prey resources according to scientific guidelines.
- To extend habitat progressively in project areas based on the successful pilot studies and demonstrations in habitat restoration.
- To explore the necessity and feasibility of reintroducing captive-bred Siberian tigers into the wild.

Projected outcome:

Adequate zones for Siberian tigers will be extended, the density of prey resources will be increased, and fragmented habitat will be improved, therefore better satisfying the needs of a growing population of Siberian tigers, and promoting effective genetic exchanges among isolated species and populations.

Action 3: Trial reintroduction of South China tigers.

Establish initial small-scale experimental areas selected through scientific assessment for the re-introduction of South China Tiger and ensure that such areas are conducive to the natural survival and reproduction of the re-introduced South China Tiger through vegetation revamp, implementation of an overall ban on hunting, and scientific introduction of prey resources. Extend such areas gradually to meet the needs of population growth based on the natural growth of their populations as well as study results.

Activities:

- To study and draft technical and management guideline for the re-establishment and management of trial habitats for reintroduction of South China tiger, and work out the detailed implementation plans to designate the trial areas.
- To undertake recovery of farmland for forests, change inappropriate forests and vegetations, maintain necessary grasslands, and reintroduce prey resources etc. in accordance with the guideline and implementation plan so as to prepare suitable habitats for the natural survival and reproduction of reintroduced South China tigers.
- To develop continuous monitoring and scientific assessment of the reintroduced South China tiger population and its habitat, identify and analyze problems and establish a working direction for next steps.
- To gradually extend the range of the trial areas to meet the natural growth needs of the reintroduced South China tiger populations based on scientific assessment.

Projected outcome: the natural survival, reproduction and sustainable development of reintroduced South China tiger population shall be achieved, and the biodiversity in this zone will be effectively protected and managed, further optimizing biodiversity of this habitat.

Action 4: Habitat conservation, extension and optimization for Wild Indo-Chinese tigers.

In Yunnan province, to achieve large scale extension and quality optimization of the habitats for wild Indo-Chinese tigers in priority areas including current distribution areas, their surrounding areas and

ecological corridors through changing inappropriate forests and vegetation, overall ban on hunting and necessary and scientific introduction of prey resources which will increase prey density etc.. It is expected to improve the capacity of the areas for the growth of the wild population of the subspecies.

Activities:

- To study and draft technical guidance of habitat restoration and management for wild Indo-Chinese tigers.
- To implement an overall ban on hunting in identified project areas including current distribution zones, the surrounding areas and ecological corridors of the tigers, study and draft habitat restoration plans by region and by category.
- To select, in different vegetation areas, one to two locations, for pilot demonstrations of habitat restoration through farmland returning to forestry, monoculture forestry rehabilitation, adequate grass cover maintenance in forested land and scientific introduction of prey resources.
- To extend habitat recovery progressively in project areas based on successful pilot studies and demonstrations.
- To explore the necessity and feasibility of releasing captive-bred Indo-Chinese tigers into the wild.

Projected outcome: the areas suitable for wild Indo-Chinese tigers will be extended, the density of prey resources increased, and fragmented habitat improved, to better satisfy the needs of a growing population of the wild individuals.

Action 5: Habitat conservation, extension and optimization for Bengal tigers.

In Xizang, the future efforts will focus on quality improvement of the habitats and enhancement of patrolling and monitoring in the areas. When necessary, ecological corridors should be established and necessary vegetation restoration and introduction of prey resources should be undertaken scientifically to increase prey density to meet needs of a growing population of the tigers.

Activities:

- To study and draft technical guidance for habitats restoration and management of wild Bengal tigers.
- To implement an overall ban on hunting in

identified project areas including current distribution range, the surrounding areas and ecological corridors of the tigers; study and draft habitat restoration plans by region and by category.

- To select, in different vegetation areas, one to two locations, for pilot demonstrations of habitat restoration through farmland recovery to forests, inappropriate forests and vegetation revamping, necessary grass cover maintenance and scientific introduction of prey resources.
- To extend habitat amelioration progressively in project areas based on the successful pilot demonstrations.

Projected outcome: suitable habitat areas for wild Bengal tigers will be extended and in good linkage, density of prey resources increased to better satisfy the needs of a growing population of wild Bengal tigers.

3.2 Capacity building of conservation and monitoring units of wild tiger population and their habitats.

Efforts to strengthen the conservation and monitoring of tigers' population and habitat in wild tiger activity areas shall be made in the following aspects: intensify capacity building in management agencies in nature reserves and relevant conservation and monitoring agencies; improve infrastructure and replenish equipment; develop staff training with advanced technology; enhance quality of conservation and management staff; set up and perfect rules and regulations; and further promote standardized field patrol and monitoring. All these efforts are in line with the objective of ensuring the implementation of an overall ban on hunting to effectively prevent poaching and other human behaviors damaging tiger habitat, and to understand the population dynamics and habitat variation on timely basis in order to provide a scientific basis for an evaluation of conservation effectiveness and decision making for relevant conservation policies. The scope of Natural Reserves will be adjusted and a series of newly established conservation monitoring stations will be added in conservation 'blind zones' to achieve effective overall conservation measures and monitoring in wild tiger activity areas.

Action 6: Increase conservation and monitoring stations in range areas of wild tiger populations.

Study the distribution of existing conservation and

monitoring stations in priority areas for wild tiger conservation and restoration, add conservation and monitoring stations in blank areas, identify the area of responsibility, establish a coordination system, and achieve overall conservation and monitoring in the priority areas.

Activities:

- To study and analyze the institutional arrangement in existing monitoring agencies involved in wild tiger conservation and action zones, and identify blind zones in conservation monitoring.
- To add new conservation monitoring agencies in blind zones.
- To adjust the scope of the existing natural reserves based on actual situation and scientific assessment & according to legal procedures when necessary.
- To divide areas of responsibility in wild tiger conservation and action zones, to identify areas of responsibility for each conservation monitoring agency to ensure that all action areas are covered.

Projected outcome: achieve overall improvements in conservation policy outcomes through monitoring in all wild tiger conservation and restoration action areas, with clearly defined responsibilities for each area.

Action 7: Capacity improvement for conservation and monitoring of wild tiger populations and their habitats.

Enhance the capacity of conservation monitoring agencies in the dynamic monitoring of wild tiger populations and habitat, in anti-poaching and coordination with local residents through perfecting regulations and systems, in improving facilities and equipment, and in increasing staff numbers and intensifying staff training.

Main activities:

- To allocate working staff and expand conservation monitoring management teams based on scope of responsibilities and degrees of difficulties of assignment.
- To improve working facilities in monitoring agencies, providing necessary equipment or renewing existing equipment available to working staff and make every attempt to introduce high-tech equipment for conservation monitoring.
- To study and draft conservation monitoring guidelines for wild tiger populations and its habitat to aid monitoring agencies in monitoring process according to a uniform plan.
- To organize professional training for monitoring staff.
- To set up coordination mechanisms among monitoring agencies through the establishment of regulations and systems, such as meeting systems, information notification systems, and joint action systems so as to ensure an overall and coordinated development on monitoring wild tiger populations and their habitat, anti-poaching, and joint community management.
- To assess conservation management results regularly to improve target-oriented monitoring measures and enhance efficiency.

Projected outcome: a more standardized and a more effective development of conservation monitoring of wild tiger populations and their habitat, a more timely and accurate understanding of the tigers' population and habitat dynamics, and more effective measures to stop anti-poaching and habitat destruction behavior.

3.3 Coordination of wild tiger conservation with local society and economic development.

In order to obtain their understanding and support, close attention must be paid to the needs of local communities concerning social and economic development and to guide them in a way compatible with wild tiger protection. In this regard, the key activities to be developed are: First, set up special funds for compensation of damages to humans, animals and crops caused by wild tigers so as to recognize the legal rights and interests of the local residents. Second, strengthen awareness campaigns to enhance awareness of tiger protection among local residents and disseminate risk-prevention knowledge by guiding them to develop ways of production and living conducive to tiger conservation. This can be achieved by means of establishing poster boards, signboards, information booklets and community education dissemination campaigns. Third, to effectively prevent and reduce damages to humans, animals and crops caused by tigers and their prey by placing scattered households in a more concentrated development, and by building fences and isolation ditches in areas frequently experiencing conflict with

tigers and their prey. Fourth, study and explore the ways of livelihood and methods of production favorable to wild tiger and its habitat conservation, and extend such approaches through a system of pilots and demonstrations, micro-subsidies, technical guidance, and establishment of special funds so as to promote harmony of coordinated and sustainable development of local societies and economies with tiger conservation.

Action 8: Compensation for the injury to human and property losses caused by wild tigers and their prey.

Through the establishment of earmarked funds, clear standards and procedures of compensation, strengthened supervision and inspections to ensure that the damages to humans, livestock and crops of local residents caused by tigers and their prey are rationally compensated, their legal rights and interests are suitably safeguarded, and human-tiger conflicts are alleviated.

Main activities:

- for compensation of losses to humans, livestock and crops caused by tigers and their prey, study and draft criteria and procedures for receiving compensation to ensure that local residents can successfully claim for any relevant losses they suffer.
- To establish special funds, study and draft utilization management and supervision methods of the funds, thus ensuring that relevant compensations are cashed on time.
- To regular and irregular checking over the use of funds, survey local residents over their attitudes towards compensation.

Projected outcome: strive to obtain the public's basic satisfaction over compensation schemes, maintain their understanding of and support for tiger conservation, prevent any mood shift of local residents unfavorable to tiger conservation.

Action 9: Active prevention of injury to humans and property losses from tigers and their prey.

Popularize personal safety knowledge among local residents; guide them in changing inappropriate behaviors and habitats through relocation of scattered households and establishment of prevention facilities so as to reduce frequency of loss to humans, livestock and crops caused by tigers and their prey.

- To popularize personal safety and conflict-prevention knowledge through despoiling warningsigns, distributing education booklets and developing awareness and educational activities.
- To reduce the interference of human activities with those of wild tigers, their prey and habitat through the gradual concentration of settlements, replacing scattered households situated in areas with frequent tiger activity or in key ecological corridors.
- To take active prevention measures to avoid tiger attacks on people and livestock in more populated areas through establishing fences and isolation belts etc.
- To guide local residents to change their habit activities of raising free-range poultry and domestic animals in the forests to avoid tigers attack at most level.

Projected outcome: incidents of damage caused to humans and livestock by tigers and their prey will gradually decrease, losses reduced, interference of human activities with wild tigers, their prey and habitat alleviated progressively.

Action 10: Demonstrate economic development models favorable to wild tiger conservation based successful pilot trials.

Survey, study and evaluate the methods of production and livelihood favorable to tiger conservation; extend such models step by step; provide guidance for coordinated and sustainable development of local community economies in harmony with the tiger and its habitat conservation through pilot schemes and demonstration; and obtain wider understanding, support and participation of local communities in conservation.

Activities:

- To conduct systematic surveys on methods of production and livelihood in local communities; assess impacts of various methods of production and livelihood on tigers, their preys and habitat; identify those economic behaviors incompatible with conservation that need to be altered.
- To study, with the cooperation of local communities, alternatives to current methods of economic development unfavorable to tiger conservation; to encourage sections of the local population to adopt pilot schemes and initiatives through micro-subsidies and technical guidance based on scientific assessment.

- To conduct timely evaluations of economic benefits and conservation effectiveness of the pilot schemes and gradually extend economic development alternatives that are effective, marketable and favorable to tiger conservation through a combination of demonstrations and subsidies.
- To integrate a supporting reward and punishment system with methods conducive to the elimination of behaviors unfavorable to tiger conservation; and achieve the coordinated and sustainable development of tiger conservation and livelihood improvement of local residents.

Projected outcome: the original methods of economic development practiced by local residents unfavorable to wild tigers conservation will be progressively altered; the economic activities favorable to conservation will gradually be extended; both improvements in conservation and in the livelihood of local residents are achieved; the willingness of the local residents to aid conservation will be further strengthened and local residents will become a major social force in the conservation of wild tigers.

3.4 Enhancement of law enforcement against poaching, smuggling and illegal trade of tiger products

In order to effectively curb poaching of tiger preys, smuggling and illegal trade of tiger products, law enforcement investigation, hotlines for public reporting illegal activities and international information exchanges must be adopted. This will provide a better understanding of the situation in key areas, key ports, border areas, markets and collection and distribution sites which are prone to smuggling and illegal sales of tiger products. For regional law enforcement agencies, efforts will be made to strengthen staff training and replenish equipment and detection devices so as to improve mechanisms that ensure more effective field patrols, creation of responsibility systems and vigorous law enforcement. All these will aid the effectiveness with which these law agencies can operate. Based on local circumstances, ad hoc joint inspections by law enforcement agencies and special crack-down operations will be conducted to implement a powerful policy of shock and awe. Besides this, a wide-ranging awareness and educational campaign will be developed to guide the public on voluntary resistance to illegal operations involving tiger products. A public reporting hotline will be established to encourage the public in the timely reporting of information on

criminal activities such as smuggling and illegal operations involving tiger products. The public can, in this manner, play a pro-active role in law enforcement on wildlife protection, thereby increasing the strength and effectiveness with which law enforcement can function.

Action 11: Strengthen capacity building in enforcement agencies.

Collect information on poaching, smuggling and illegal trade of tiger products through various channels; identify key areas, key ports, border areas, marketing and distribution centers; strengthen the training of law enforcement agency staff of the above mentioned authorities; replenish enforcement equipment and detection devices; improve the enforcement system so as to enhance enforcement effectiveness and curb illegal activities.

Activities:

- To determine through in-depth analysis the key areas, key ports, border areas, markets, collection and distribution sites for smuggling and illegal trade of tiger products through collecting information reported by public; and conduct active surveys and analysis of the market to assess trend and directions in smuggled products.
- To increase the collection of anti-smuggling intelligence, and deploy control mechanisms to avert risks, to improve the capacity to investigate and to solve smuggling cases involving tiger products. Crack down severely on criminal gangs smuggling tiger products through investigation methods such as detailed surveillance of the delivery chains of illegal tiger products, from the source of the poaching to the end buyer.
- To coordinate law enforcement agencies to replenish and improve target-oriented equipment and detection devices in their agencies in the areas mentioned above.
 - To strengthen staff training and conduct law enforcement seminars in the above mentioned enforcement agencies to promote their awareness of responsibility on law enforcement as well as improve professional capacity.
- To establish an effective coordination mechanism to form joint forces of enforcement through the formulation of a patrol system, information notification system, joint conference system and accountability system etc.
- In areas where the situation is critical, multi-agency joint enforcement inspections and special

crack-downs will be conducted; results of the investigation and treatment of illegal cases will be published in timely manner to form a strong campaign of shock and awe which will effectively curb criminal activities such as smuggling and illegal operations involving tiger products.

Projected outcome: enforcement capacity against smuggling and illegal operations involving tiger products will be strengthened; enforcement effectiveness will be increased with efficient curbing of the momentum on smuggling and illegal operations involving tiger products.

Action 12: Wide-spread media and education campaigns on tiger conservation.

Further raise public awareness of tiger conservation through newspapers and magazines, radio and TV broadcasting as well as special topic media campaigns; popularize laws and regulations on conservation; advocate public on voluntary resistance towards smuggling and operations involving illegal tiger products; and advocate active reporting by members of the public on illegal activities to provide strong support for conservation law enforcement.

Activities:

- To explain to the public the damage inflicted upon wild tiger populations as a result of smuggling and illegal operations involving tiger products; to publicize related rules and regulations to strengthen the public's awareness of conservation through newspapers, magazines, radio and TV broadcasting.
- To conduct target-oriented awareness and educational campaigns through deploying information boards, warning signs and the organization of special topic awareness campaigns in key ports, border areas, markets, collection and distribution sites thus encouraging the public to take the initiative in giving up illegal activities such as the purchase of tiger products.
- To establish reporting phone lines; set up a reward and punishment system; and encourage the public to report on illegal activities.
- To widely disseminate information from important cases to facilitate the public understanding of the legal consequences of illegal activities, so as to achieve a more complete public education.

Projected outcome: public awareness will be significantly raised, encouraging volunteered

resistance to illegal operations involving tiger products and the use of such tiger products. The public will be more cooperative in reporting any illegal activities.

3.5 Extension of international cooperation and exchange on tiger conservation

A common understanding amongst tiger countries and international societies relating to tiger protection has been formed, and exchanges in knowledge and resources have strengthened the global campaign to save all wild tigers. The key for next step is to transform this common understanding formed amongst all sides into direct and joint action, especially in certain crucial areas, which are needed among the relevant international parties. China will proactively promote the mechanisms for coordination and cooperation among conservation management agencies and law enforcement units on both sides of its border, allowing rapid and effective information exchange, striving for joint monitoring activities in tiger range border areas and improving law enforcement effectiveness in border trading zones and ports through rapid exchange of law enforcement information; Communication and information exchange with concerned organizations including WCO, CITES, and Interpol should be strengthened. Various ways including international seminars, training courses and friend nature reserves etc. will be also adopted to increase exchange of wild tiger conservation expertise and technology accumulated from respective experiences in order to improve conservation and management on all sides.

Action 13: Improve mechanisms for more effective international cooperation on tiger conservation

Promote the implementation of more effective international cooperation mechanisms based on current international cooperation framework for wild tiger conservation, so as to achieve more effective exchanges of technical experience, information sharing and coordinated action.

Activities:

- To strengthen communications between tiger countries through international seminars and mutual visits; to understand the concerns from different parties, exchange and share technology and experiences in tiger conservation, in anti-smuggling and anti-illegal trade operations involving tiger projects; and analyze issues facing global wild tiger conservation and explore the directions in which joint efforts must move.

- To promote the establishment of information exchanges between and cooperation amongst grass-roots conservation agencies in tiger distribution areas in border zones.
- To promote the exchange of information and cooperation among grass-roots law enforcement agencies in border areas and ports.
- To strengthen communication and information exchange with concerned international organizations including WCO, CITES, and Interpol etc. to help and guide actual law enforcement actions, and to improve capacity of local law enforcement units by introduction of advanced technologies and experience through the channels.

Projected outcome: achieve a multi-level, multi-format system for international information exchange and cooperation on wild tiger conservation, deepen mutual understanding and support amongst tiger range countries so as to enhance conservation effectiveness together.

4. Policy Framework

4.1 Existing Policies

4.1.1 Years of efforts have led to the establishment of relevant laws and regulatory frameworks for tiger conservation management in China. All tigers are under national key protection at first class - which not only clearly specifies the conservation of their habitat and natural reserves, but also clearly states that all activities relating to the hunting, domestication and reproduction of tigers without permit, the sale, procurement, transportation, and smuggling of tigers and tiger products, are criminal. Those engaged in poaching, the illegal killing or illegal purchase, sale or transportation of tigers and tiger products, will be sentenced to no less than 10 years imprisonment in addition to fines and the confiscation of personal property. Those serious activities engaged in smuggling tiger products can receive a sentence of imprisonment for life, and their personal property will be confiscated. Further, given the status of global population of both wild tigers and captive-bred bred tigers, the State Council of China issued general orders in 1993 to fully ban the use of tiger bones in medicine or trade. This is a huge contribution to global wild tiger conservation.

4.1.2 A conservation network has been established consisting of natural reserves and grass-roots conservation management stations in wild tiger distribution areas. Programs such as natural forestry conservation and farmland returning to forestry are implemented; nature reserves have been established and wildlife conservation measures such as the restoration of prey populations, compensation for injuries and damages to humans, domestic animals and crops, strengthened patrol in tiger habitat and capacity building etc. have been taken. All these efforts have led to obvious achievements in wild tiger habitat optimization and population growth.

4.1.3 Multiple-department, multiple-level and multiple-link wildlife law enforcement system and coordination mechanisms are already established in China consisting of departments such as forestry, public security, industry & commerce administrations and customs etc. Capacity building is continuously strengthened through the replenishment of equipment, information exchanges, staff training and improvement of established systems. Tiger related cases are listed as priority enforcement areas, and regular & irregular inspections as well as special actions are developed playing an active role in investigations into and the treatment of smuggling and illegal operations involving tiger products.

4.1.4 Chinese law explicitly requires: "when construction projects impact adversely on the environment of animals under state or local key protection regulations, the construction operator must submit environmental impact studies. The environmental protection agencies shall obtain comments from wildlife management departments of comparable administration levels during approval process." This provides a regulatory guarantee against unsuitable construction projects in the distribution areas of wild tigers.

4.1.5 Captive breeding of tigers is under strict supervision in China. A Permit system is in operation for the domestication and reproduction of tigers. A permit holder is required to establish and maintain strict management archives and a family tree system for each individual tiger. Particularly since 2007, microchip, gene samples and management information systems that can be searched via the internet have been adopted in

China, and the supervision of captive breeding agencies and individual tigers can be achieved through MIS.

4.2 Improvement Needed for Wild Tiger Protection Policy

To enhance conservation of wild tigers and their habitat, China needs to improve its current policy of wild tiger conservation in the following aspects: 1) any conservation plan for wild tigers and their habitat needs to be examined and approved according to legal procedures before becoming legally binding; 2) the systems relating to conservation management of wild tigers need to be further improved at the grass root level in the following aspects: field patrols, monitoring and evaluation, accountability and inter-departmental coordination; 3) the following need to be further elaborated and clarified to better combat smuggling and illegal operations involving tiger products: a market patrol system, an accountability system, a public reporting reward system, an inter-departmental coordination and joint action system etc.

5. Capacity constraints

China is a developing country, thus a lot of constraints in tiger conservation and the capacity to fight smuggling and illegal operations involving tiger products exist due to a previous long-term insufficiency in investment. The constraints mainly include:

- Limited application of advanced technology: the primary methods hereto used for field patrol and monitoring in most of the areas, as well as equipment and facilities are still, at best, primitive.
- Poor conservation management: technical guidance or working manuals for standardized patrol and monitoring are not even supplied in many places.
- Understaffing and poor quality of staff is relatively common.
- Severe shortages in support capacity to guide local communities to change their means of production and livelihood unfavorable to conservation.

6. Stakeholders

The stakeholders mainly include: central to local management authorities in charge of wildlife & plant

conservation and natural reserves, public security authorities, industry and commerce agencies, customs bureaus, financial departments, local communities, traditional industries such as traditional Chinese medicine, research institutes, non-governmental conservation organizations, financial aid organizations, judicial organs, and media, etc.

7. Program Indicators

The following indicators will be employed to evaluate the outcomes:

The change in wild tiger population numbers, the expansion of tiger activity areas, variance of biotope found in the habitat, change in prey density, an increased occurrence of prosecution in cases involving law breaking relating to tigers or their habitat, improvements in the livelihood of local residents, establishment of monitoring stations and staffing for conservation management, and a change in threatening factors.

For the different priorities, different indicators will be employed to evaluate their results from the actions.

7.1 Conservation, extension and amelioration of wild tiger habitats

Evaluation indicators include: the number of GIS in wild tiger habitats, a change in wild tiger numbers, expansion of tiger activity boundaries, status of habitat rehabilitation demonstrations, change in prey density, tiger activities in ecological corridors, etc.

7.2 Capacity building of conservation and monitoring units of wild tiger populations and their habitats.

Evaluation indicators include: number of monitoring stations and range of their responsibilities, number of working staff, improvements in equipment and facilities, formulation and renewal of technical guidance and management manuals and relevant systems of patrol and monitoring, number and effectiveness of field patrols and monitoring, rate of occurrence of tiger-related criminal cases, and capture of illegal snares, etc.

7.3 Coordination of wild tiger conservation with local society and economic development.

Evaluation indicators include: injuries to humans and

domestic animals by wild tigers and their prey, crop losses, frequency of compensation distribution and amounts awarded, number of warning and awareness sign boards as well as the rationality of their locations, deployment of preventive measures against damages to humans, domestic stock and crops from tigers and their prey, understanding and application of personal safety knowledge among local residents, number of pilots and demonstrations applying methods of economic development favorable to tiger conservation, as well as annual income increases in pilot and demonstration households, a numerical increase of such demonstration households, an increased amount of supporting funds made available, a reduction of economic behavior unfavorable to tiger conservation, and etc.

7.4 Enhancement of law enforcement against smuggling and illegal trade of tiger products

Evaluation indicators include: the number of agencies and staff in key enforcement areas, an improvement in equipment and facilities, the formulation and renewal of different systems, the volume of training given to professional staff, records of market patrols and case investigations and treatment, the establishment of crime reporting hotlines and volume of reports, the investigation and treatment of reported cases, the number of joint inspections and special actions, the number of discovered illegal cases and their relevant treatment, etc.

7.5 Extension of international cooperation and exchange on tiger conservation

Evaluation indicators consist: the number of additional and/or renewed agreements or memorandums on international cooperation at all levels, the number of meetings, training sessions, mutual visits and participants at all levels, information exchange via different channels, the application and outcome of advanced international technology or management experiences, and etc.

8. Budget and Funding Sources

To ensure the implementation of the Actions mentioned above, huge amounts of funds are needed. A specific budget needs to be calculated according to the planning done in the different distribution areas of wild tigers.

Funds will be raised through the following channels based on the need for conservation actions:

- China central government and local government will provide necessary investment in combination with national programs for protection of natural forests and wildlife conservation & nature reserve development during the ecological construction of "12th five-year plan".
- Potential domestic and foreign financial aid.

INDIA TIGER ACTION PLAN

(XII PLAN PERIOD 2012-13 to 2017-18)



1. Tiger conservation

1.1 The Central Government, through the Ministry of Environment and Forests provides technical guidance and financial support to various State Government, inter alia, for tiger conservation.

1.2 The State Government are responsible day-to-day management and implementing the policies and plans relating to wildlife conservation

2. Background

2.1 "Project Tiger", now ongoing as a Centrally Sponsored Scheme, was launched by the Government of India in 1973 in nine reserves of different States (Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Uttar Pradesh and West Bengal) over an area of approximately 14,000 sq. km. Since then, the project coverage has expanded considerably to 46 tiger reserves (TR), encompassing an area of around 68518.8 sq.km. in 18 tiger States with 38632.18 sq.km. of notified core/ critical tiger habitats and 29886.62 sq.km. of buffer / peripheral areas in 18 tiger States. This amounts to 2.06% of the country's geographical area. The total core/critical tiger habitat of 46 tiger reserves amount to 5.6% of the country's forest cover. There are 668 protected areas in the country (September, 2012), out of which 46 have been designated as core/critical tiger habitats (6%).

The in-principle approval has been accorded by the National Tiger Conservation Authority for creation of two new tiger reserves, and the sites are: Ratapani (Madhya Pradesh) and Sunabeda (Odisha). Final approval has been accorded to Kudremukh (Karnataka), Rajaji (Uttarakhand) and Bor (Maharashtra) for declaring as a tiger reserve. The State Governments have been advised to send proposals for declaring the following areas as tiger reserves: (i) Suhelwa (Uttar Pradesh), (ii) Guru Ghasidas National Park (Chhattisgarh), (iii) Mhadei Sanctuary (Goa), (iv) Srivilliputhur Grizzled Giant Squirrel / Megamalai Wildlife Sanctuaries / Varushanadu Valley (Tamil Nadu) and (v) Dibang Wildlife Sanctuary (Arunachal Pradesh).

2.2 Due to ongoing conservation efforts under the Project in designated tiger reserves, India has the maximum number of tigers along with its source areas amongst the 13 tiger range countries in the world. Project Tiger has put the endangered tiger on an assured path of recovery, as revealed in the country level assessment of tiger, co-predators, prey and habitat. The recent (2010) findings in this context indicate a poor status of tiger population in areas outside tiger reserves and protected areas. The tiger population, by and large, in tiger reserves and protected areas of such States are viable, while requiring ongoing conservation efforts.

2.3 Project Tiger has a holistic, ecosystem approach. Its core-buffer strategy, protection and development initiatives gave a new perspective to the concept of wildlife management in our country and is a "role model" for in-situ conservation.

3. Present status of tiger, co-predators, prey and habitat

3.1 The second countrywide assessment of the status of tigers, co-predators and their prey was released in March, 2011. This assessment of 2010 is the second such countrywide assessment using the refined methodology as recommended by the Tiger Task Force. The findings indicate a countrywide 20% increase in the number of in the year 2010 with an estimated number of 1706 (1520-1909). In the year 2006 estimated number of tigers was 1411 (1165-1657). A decline of 12.6% in tiger occupancy from connecting habitats has also been reported. This has occurred in peripheral and dispersal areas having low densities outside tiger reserves and tiger source populations.

3.2 The increase in the number of tigers is due to the fact that tiger populations in Uttarakhand, Tamil Nadu, Maharashtra and Karnataka have shown an increase in tiger density. The inclusion of Sunderbans, some portions of North East and parts of Maharashtra have also contributed to the increase.

3.3 Tiger occurrence and density were dependent on availability of habitats that were remote, with minimal human disturbance and having a high availability of large wild prey (chital, sambar, gaur, and wild pig).

3.4 Tiger occupied forests in India were classified following landscape complexes:

- (a) Shivalik Hills and the Gangetic Plain,
- (b) Central India
- (c) Eastern Ghats,
- (d) Western Ghats,
- (e) North-Eastern Hills and Brahmaputra Plains, and
- (f) Sunderbans.

3.4.1 In Shivalik- hills and Gangetic Plain Landscape tigers occupied 6712 km² of forested habitats with an estimated population of 353 (320 to 388) in five separate populations.

3.4.2 Central Indian Landscape (inclusive of Nagarjunasagar Srisailem of the Eastern Ghats) tiger presence was reported from 39,017 km² with an estimated population of 601 (518 to 685) distributed in 20 tiger populations with a few other sporadic occurrences.

3.4.3 Western Ghats Landscape was 29,607 km² and registered a decline of about 11.5% compared to that of 2006. The current tiger population was estimated at 534

(500 to 568) registering a rise of about 32 % since 2006.

3.4.4 Tiger occupancy of 4,900 km² and population numbers between 118 to 178 tigers should be considered as minimal for the North East since systematic coverage of the entire landscape was not done.

3.4.5 Population estimation of the Sundarbans tigers was done with a combination of camera trapping and satellite telemetry. A tiger density of 4.3 (se 0.3) tigers per 100 km² was estimated. The total population for the Indian Sundarbans was estimated to be between 64 to 90 tigers.

3.5 Currently, Nagarhole-Bandipur-Mudumalai-Wayanad-Moyar-Segur, Corbett, Sundarbans (India and Bangladesh) and Kaziranga-KarbiAnglong have the required number of tiger for long term survival without immigration. The remaining tiger populations require habitat connectivity for genetic and demographic viability.

3.6. Comparative status of tiger (2006 and 2010) [Table 1]

3.7. The Tiger Occupies Landscape Complex, the tiger reserves in India and the proposed / recommended Tiger Reserves in India has been shown in Map 1, Map 2 and Map 3.

4. Management Effectiveness Evaluation of Tiger Reserves

4.1 Independent assessment of tiger reserves based on International Union for Conservation of Nature criteria, as adapted to our conditions, was done for the first time in 2005-2006 for 28 tiger reserves.

This assessment was peer reviewed by International Union for Conservation of Nature experts. Both assessment as well as peer review reports were placed before the both the houses of in the Parliament. .

4.2 The second round of independent assessment based on refined criteria has been done in 2010-2011 for 39 tiger reserves. This is also based on globally used framework, as adapted to our conditions. In all, five independent teams conducted the evaluation using 30 indicators. The framework consisted of 6 elements: context, planning, inputs, process, outputs and outcomes.

4.3 The 39 tiger reserves were grouped in landscape clusters as followed in country level tiger estimation. An additional category comprising of tigers in 'red corridor' (areas affected by left wing extremism) was also included.

The outcome of the evaluation is as below:

Rating	Number of Tiger Reserves	Percentage
Very Good	15	38
Good	12	31
Satisfactory	8	21
Poor	4	10
Total	39	100

4.4 The Management Effectiveness Evaluation ratings of 2010-2011 and 2005-2006 have been compared for 28 tiger reserves, which were part of 2005-2006 evaluation. The 'very good' rating increased by 4%, the 'good' rating increased by 3%, 'satisfactory' rating decreased by 7%, while there is a status quo for the 'poor' rating [Table 2-Table 5 (c)].

5. General reasons for tiger decline in areas outside tiger reserves

The reasons for tiger decline in areas outside tiger reserves and protected areas are as below:

(i) Degradation of forest status outside Protected Areas / Tiger Reserves owing to:

- (a) human pressure;
- (b) livestock pressure; and
- (c) ecologically unsustainable land uses.

(ii) Fragmentation leading to loss of gene flow from source populations.

(iii) Loss of forest quality in terms of prey biomass.

(iv) Tiger deaths due to man-animal conflict.

(v) Tiger deaths due to poaching.

(vi) Loss of reproduction owing to disturbance on account of heavily used infrastructure like highways, etc.

(vii) Lack of adequate protection in outside areas.

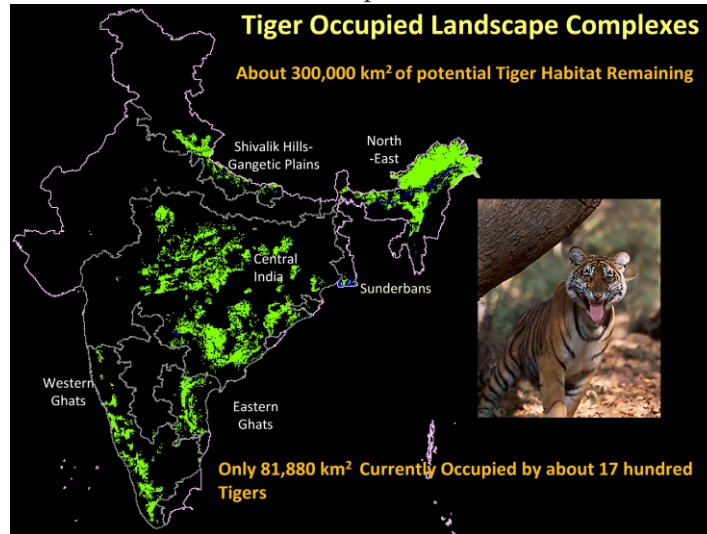
(viii) Insurgency or law and order problems.

6. Present approach to tiger conservation

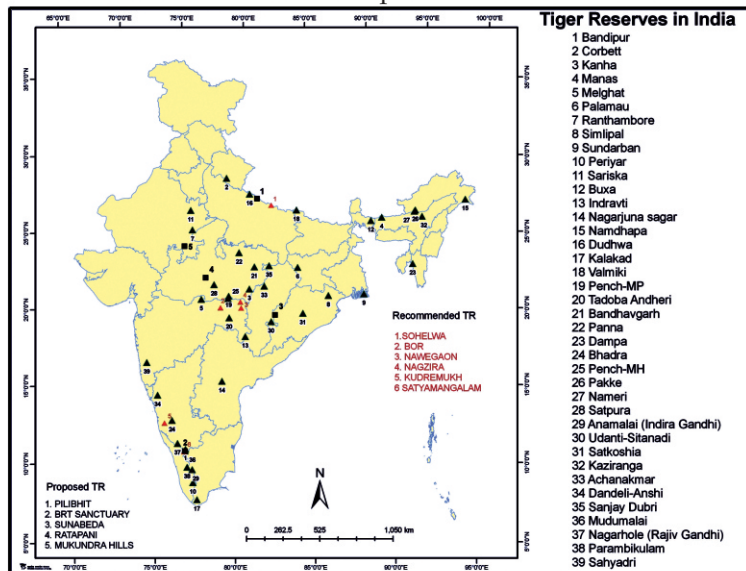
Owing to habitat fragmentation on account of ecologically unsustainable land uses, biotic pressure and poaching, the following approach is imperative.

6.1 Consolidating and strengthening the "source" population of tiger and its prey in tiger reserves, protected areas and tiger bearing forests.

Map 1



Map 2



Map 3

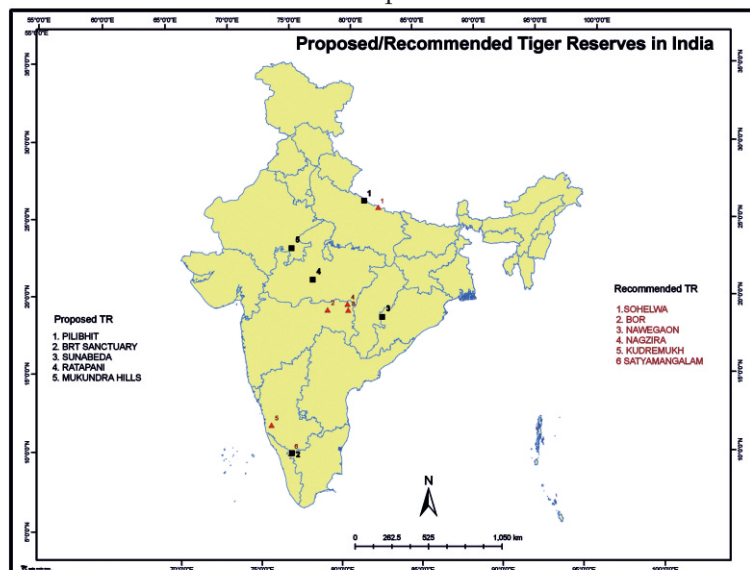


Table 1: Comparative status of tiger (2006 and 2010)

Landscape complex	Tiger estimation 2006			Tiger estimation 2010		
	Statistical Lower limit	Population estimate	Statistical Upper limit	Statistical Lower limit	Population estimate	Statistical Upper limit
Shivalik-Gangetic plains	259	297	335	320	353	388
Central Indian & Eastern ghats	486	601	718	518	601	685
Western ghats	336	402	487	500	534	568
Northeastern hills and Brahmaputra flood plains	84	100	118	118	148	178
Sunderbans	Not assessed	Not assessed	Not assessed	64	70	90
Total	1165	1411	1657	1520	1706	1909

Table-2: Management Effectiveness Evaluation Score (% age) of Landscape Clusters (2010-11)

Cluster Number	Cluster Name	States	No. of Tiger Reserves	Mean Management Effectiveness Evaluation Score%	Management Effectiveness Evaluation Score Range%
(1)	(2)	(3)	(4)	(5)	(6)
I	Shivalik- Gangetic Plain Landscape Complex and Central Indian Landscape Complex and Eastern Ghats Landscape Complex	Uttar Pradesh, Uttarakhand, Rajasthan, Maharashtra	8	64	56-73
II	Central Indian Landscape Complex and Eastern Ghats Landscape Complex	Madhya Pradesh	6	79	56-88
III	Shivalik-Gangetic Plain Landscape Complex and Central Indian Landscape Complex and Eastern Ghats Landscape Complex	Bihar, Chhattisgarh, Odisha, Andhra Pradesh, Jharkhand	8	42	33-63
IV	Western Ghats Landscape Complex	Karnataka, Kerala, Tamil Nadu	9	75	63-80
V	North East Hills and Brahmaputra Flood Plains and Sunderbans	Arunachal Pradesh, Assam, Mizoram, West Bengal	8	66	56-77
	TOTAL		39	65	33-88

Table-3 (a): Category-wise outcome of MEE Process (2010-11)

S. No.	Category	Name of Tiger Reserve
1.	Very Good	Annamalai, Bandhavgarh, Bandipur, Bhadra, Dandeli-Anshi, Kalakad-Mundanthurai, Kanha, Kaziranga, Mudumalai, Parambikulam, Pench (Madhya Pradesh), Periyar, Satpura, Sundarbans
2.	Good	Buxa, Corbett, Dampa, Dudhwa, Manas, Melghat, Nagarole, Pakke, Pench (Maharashtra), Ranthambhore, Tadoba-Andhari
3.	Satisfactory	Achanakmar, Nameri, Namdapha, Sanjay, Sayadari, Valmiki
4.	Poor	Satkosia

Table-3 (b): Category-wise outcome of MEE Process (2010-11) of Tiger Reserves falling in the 'Red Corridor'

S. No.	Category	Name of Tiger Reserve
1.	Very Good	---
2.	Good	Nagarjunasagar-Srisailem
3.	Satisfactory	Similipal
4.	Poor	Indravati, Palamau, Udanti-Sitanadi

Table-3 (c): Category-wise outcome of MEE Process (2010-11) of Tiger Reserves, which had recently lost all tigers

S. No.	Category	Name of Tiger Reserve
1.	Very Good	Panna
2.	Good	---
3.	Satisfactory	Saarska
4.	Poor	---

Summary of MEE Process of Tiger Reserves

Rating	Number of Tiger Reserves	Percentage
Very Good	15	38
Good	12	31
Satisfactory	8	21
Poor	4	10
TOTAL	39	

Table-4: Comparison of MEE Rating of Tiger Reserves in 2005-06 and 2010-11

Category	2005-06	%	2010-11	%
Very Good	09	32	10	36
Good	10	36	11	39
Satisfactory	07	25	05	18
Poor	02	07	02	07
TOTAL	28		28	

Table-5 (a): Performance of Headline Indicators (Top Ten)

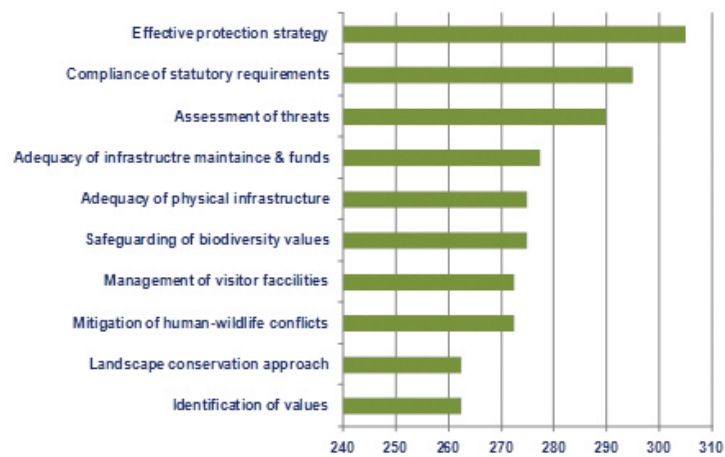


Table-5 (b): Performance of Headline Indicators (Middle Ten)



Table-5 (c): Performance of Headline Indicators (Bottom Ten)



This involves the following active managerial interventions, namely:

- (i) Protection, antipoaching operations / intelligence networking;
- (ii) Strengthening of infrastructure within tiger reserves;
- (iii) Creation of inviolate space through relocation;
- (iv) Capacity building of frontline staff, local people and officers and strengthening of training centres and training in related fields, including enforcement, intelligence networking, tourism activities, etc.

6.2 Managing the “source-sink dynamics” by restoring habitat connectivity.

This involves the following managerial intervention, namely:

- (i) actively providing incentives to local people for the eco-system services and corridor values provided by them by not degrading the forest (payment for eco-system services);
- (ii) incentives to local people for taking up plantations and protecting natural root stocks besides preventing free grazing;
- (iii) encouraging stall feeding of cattle and fostering marketing of dairy products;
- (iv) providing subsidized gas connection to local people for reducing their dependency on forest towards fuel wood collection.

6.3 Importance of a buffer zone vis-à-vis the tiger land tenure dynamics.

6.3.1 Tiger is a territorial animal, which advertises its presence in an area and maintains a territory. It is a well known fact that partial overlaps of resident male territories in an area do occur. However, the degree of overlap increases lethal internecine combats. Several female territories do occur in an overlapping manner within the territory of a male tiger. The tiger land tenure dynamics ensures presence of prime adults in habitat which act as source populations, periodically replacing old males by young adults from nearby forest areas (Plate 1).

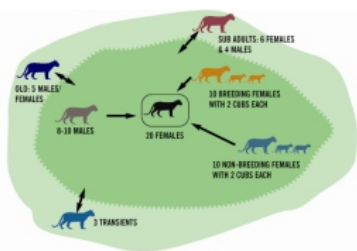


Plate 1: Tiger Land Tenure Dynamics. Minimum population of tigers in breeding age needed for maintaining a viable population (80-100 tigers), which require an inviolate space of 800-1200 square kilometres

6.3.2 The ongoing study and analysis of available research data on tiger ecology indicate, that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of 80-100 tigers (in and around core areas) require an inviolate space of 800 -1200 sq km. Tiger being an “umbrella species”, this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area or habitat. Therefore, buffer areas with forest connectivity are imperative for tiger dynamics, since such areas foster sub adults, young adults, transients and old members of the population. The young adults periodically replace the resident ageing males and females from the source population area.

6.3.3 The buffer area, absorbs the “shock” of poaching pressure on populations of tiger and other wild animals. In case of severe habitat depletion in buffer areas, the source population would get targeted and eventually decimate.

6.4 Value of Corridors.

6.4.1 Isolated populations of wild animals face the risk of extinction owing to insularization. Habitat fragmentation adversely affects wildlife due to decreased opportunity available for wild animal movement from different habitats. This in turn prevents gene flow in the landscape. The equilibrium theory of island biogeography predicts greater species richness in large wildlife areas or in smaller areas connected by habitat corridors owing to increased movements of wild animals. Such connecting habitats, apart from facilitating animal movements also act as refuge for spill over populations from the core areas. They may also act as smaller “source” by facilitating breeding and movement of native wildlife populations to colonize adjoining habitats. Natural linear features like rivers or mountain ranges may act as boundaries for wildlife populations. However, disturbance of corridors on account of human interventions (highways, canals, industries, roads, railway tracks, transmission lines) is deleterious to wildlife.

6.4.2 “Source” populations are those which produce a surplus of animals which are potential colonizers. On the other hand, “Sinks” are those populations in which deaths exceed births, and their persistence depends on regular influx of immigrants (Plate 2).

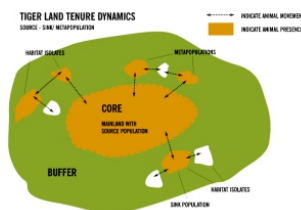


Plate 2: Tiger Land Tenure Dynamics

6.4.3 Patches of suitable habitats in the landscape may support wildlife populations (local populations), which may be separated from one another on account of various disturbance factors. Collectively, such patches of local populations are known as “regional populations”. This general situation of sub divided populations interacting with one another in a landscape to supplement new genes through movement, is known as a “meta population”. In the context of tiger land tenure dynamics, the core-buffer areas conform to the “island-mainland” or “coresatellite” form of meta population model. The core area of a tiger reserve provides a source of colonizers for the surrounding local populations of different sizes and varying degrees of isolation. The core area may not readily experience extinction owing to the protection inputs for maintaining its inviolate nature. However, the surrounding isolated patches in the buffer area may suffer from local extinction if wildlife concerns are not mainstreamed in the area. Therefore, a meta population management approach is required for the buffer zone as well as corridors to facilitate:

- (a) supplementing declining local tiger populations;
- (b) facilitating re-colonization in habitat patches through restorative management;
- (c) providing opportunity to tiger for colonizing new areas through patches of habitats (stepping stones) between isolated populations (Plate 3).

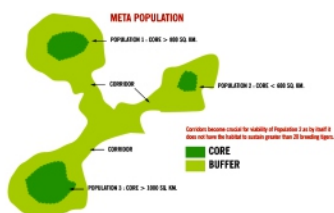


Plate 3: Meta population dynamics. Corridors become crucial for maintaining viability of Population 2 as by itself it does not have the habitat to sustain greater than 20 breeding tigers

6.5 Mainstreaming tiger and wildlife concerns in the landscape through smart practices with other sectors to prevent and address man-tiger conflicts.--involvement of different sectors, such as: forestry, agriculture, welfare activities through the district Collector sector, tourism, fisheries, tea-coffee estates, road and rail transport, industry, mining, thermal power plants, irrigation projects, temple tourism and communication projects operating in the landscape will be instrumental in effective addressing of man-tiger conflict and helpful in mainstreaming tiger and wildlife concerns.



Plate 4: Production Sectors in a Tiger Landscape

7. Milestone Initiatives taken for strengthening tiger conservation.

Several milestone initiatives have been taken in the last few years to strengthen tiger conservation in the country. The certain recommendations of the Tiger Task Force constituted by the National Board for Wildlife have been implemented. These initiatives, inter alia, include the following:

Legal steps

7.1. Amendment of the Wild Life (Protection) Act, 1972 in 2006 to provide enabling provisions for constituting the National Tiger Conservation Authority and the Tiger and Other Endangered Species Crime Control Bureau.

7.2. Enhancement of punishment for offence in relation to the core area of a tiger reserve or where the offence relate to hunting in the tiger reserves or altering the boundaries of tiger reserves, etc.

Administrative steps

7.3. Strengthening of antipoaching activities, including special strategy for monsoon patrolling, by providing funding support to tiger reserve States, as proposed by them, for deployment of antipoaching squads involving ex-army personnel or home guards, apart from workforce comprising of local people, in addition to strengthening of communication and wireless facilities.

7.4. Constitution of the National Tiger Conservation Authority with effect from the 4th September, 2006, for strengthening tiger conservation by, inter alia, ensuring normative standards in tiger reserve management, preparation of reserve specific tiger conservation plan, laying down annual audit report before Parliament, constituting State level Steering Committees under the Chairmanship of Chief Ministers and establishment of Tiger Conservation Foundation.

7.5. Constitution of a multidisciplinary Tiger and Other Endangered Species Crime Control Bureau (Wildlife Crime Control Bureau) with effect from the 6th June, 2007 to effectively control illegal trade in wildlife.

7.6. The in-principle approval has been accorded by the National Tiger Conservation Authority for creation of two new tiger reserves, and the sites are: Ratapani (Madhya Pradesh) and Sunabeda (Odisha). Final approval has been accorded to Kudremukh (Karnataka), Rajaji (Uttarakhand) and Bor (Maharashtra) for declaring as a tiger reserve. The State Governments have been advised to send proposals for declaring the following areas as tiger reserves: (i) Suhelwa (Uttar Pradesh), (ii) Guru Ghasidas National Park (Chhattisgarh), (iii) Mhadei Sanctuary (Goa), (iv) Srivilliputhur Grizzled

Squirrel / Megamalai Wildlife Sanctuaries / Varushanadu Valley (Tamil Nadu) and Dibang Wildlife Sanctuary (Arunachal Pradesh).

7.7. The revised Project Tiger guidelines have been issued to State Governments for strengthening tiger conservation, which apart from ongoing activities, inter alia, include financial support to States for enhanced village relocation or rehabilitation package for people living in core or critical tiger habitats (from Rs. 1 lakh per family to Rs. 10 lakhs per family), rehabilitation or resettlement of communities involved in traditional hunting, mainstreaming livelihood and wildlife concerns in forests outside tiger reserves and fostering corridor conservation through restorative strategy to arrest habitat fragmentation.

7.8. A scientific methodology for estimating tiger (including co-predators, prey animals and assessment of habitat status) has been evolved and mainstreamed. The findings of this estimation and assessment are benchmarks for future tiger conservation strategy.

7.9. The 18 tiger States have notified the core/critical tiger habitat (38632.18 sq. km.), and the buffer/peripheral area (29886.62 sq.km.) of all the 46 tiger reserves in the country, under section 38V of the Wild Life (Protection) Act, 1972, as amended in 2006.

Financial steps

7.10. Financial and technical help is provided to the State Governments under various Centrally Sponsored Schemes, such as Project Tiger and Integrated Development of Wildlife Habitats for enhancing the capacity and infrastructure of the State Governments for providing effective protection to wild animals.

International Cooperation

7.11. India has a bilateral understanding with Nepal on controlling trans-boundary illegal trade in wildlife and conservation, apart from a protocol on tiger conservation with China.

7.12. A protocol has been signed in September, 2011 with Bangladesh for conservation of the Royal Bengal Tiger of the Sunderban.

7.13. A sub-group on tiger and leopard conservation has been constituted for cooperation with the Russian Federation.

7.14. A Global Tiger Forum of Tiger Range Countries has been created for addressing international issues related to tiger conservation.

7.15. During the 14th meeting of the Conference of

Parties to CITES, which was held from 3rd to 15th June, 2007 at

The Hague, India introduced a resolution along with China, Nepal and the Russian Federation, with direction to Parties with operations breeding tigers on a commercial scale, for restricting such captive populations to a level supportive only to conserving wild tigers. The resolution was adopted as a decision with minor amendments. Further, India made an intervention appealing to China to phase out tiger farming and eliminate stockpiles of Asian big cats body parts and derivatives. The importance of continuing the ban on trade of body parts of tigers was emphasised.

7.16. Based on India's strong intervention during the 62nd meeting of the Standing Committee of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) at Geneva from 23-27 July, 2012, the Convention on International Trade in Endangered Species of Wild Fauna and Flora Secretariat has issued a notification No. 2012/054 dated the 3rd September, 2012 to Parties to fully implement Decision 14.69 and report to the Secretariat by 25 September, 2012 (Progress made on restricting captive breeding operations of tigers etc.).

7.17. As a part of active management to rebuild Sariska and Panna Tiger Reserves where tigers have become locally extinct, reintroduction of tigers and tigresses have been done. The successful reintroduction of wild tigers in Sariska is a unique exercise and is the first of its kind in the world. A reintroduced tigress has recently littered and two cubs have also been camera trapped. The tiger reintroduction initiative at Panna (MP) has also been very successful and reintroduced tigers are breeding.

7.18. Special advisories issued for in-situ build up of prey base and tiger population through active management in tiger reserves having low population status of tiger and its prey.

Creation of Special Tiger Protection Force (STPF)

7.19. The policy initiatives announced by the Finance Minister in his Budget Speech of the 29th February, 2008, inter alia, contains action points relating to tiger protection. Based on the one time grant of Rs. 50.00 crore provided to the National Tiger Conservation Authority (NTCA) for raising, arming and deploying a Special Tiger Protection Force (STPF), the proposal for the said force has been approved by the competent authority for 13 tiger reserves. The States of Karnataka, Maharashtra and Odisha have already created and deployed the STPF.

7.20. In collaboration with TRAFFIC-INDIA, an online tiger crime data base has been launched, and Generic Guidelines for preparation of reserve specific Security

Plan has been evolved.

Recent initiatives

7.21. Implementing a tripartite Memorandum of Understanding (MOU) with tiger States, linked to fund flows for effective implementation of tiger conservation initiatives.

7.22. Special crack teams sent to tiger reserves affected by left wing extremism and low population status of tiger and its prey.

7.23. Chief Ministers of States having tiger reserves affected by left wing extremism and low population status of tiger and its prey addressed for taking special initiatives.

7.24. Steps taken for modernizing the infrastructure and field protection, besides launching 'Monitoring system for Tigers' Intensive Protection and Ecological Status (M-STrIPES)' for effective field patrolling and monitoring.

7.25. Steps taken for involvement of Non-Governmental Experts in the ongoing all India tiger estimation.

7.26. Initiatives taken for improving the field delivery through capacity building of field officials, apart from providing incentives.

7.27. The second round of country level tiger status assessment completed in 2010, with the findings indicating an increase with a tiger population estimate of 1706, lower and upper limits being 1520 and 1909 respectively, as compared to the last country level estimation of 2006, with an estimate of 1411, lower and upper limits being 1165 and 1657, respectively. At present, India has the maximum number of tigers and its source areas amongst the 13 tiger range countries in the world, owing to its long history of conserving the species through Project Tiger (2.06% of country's geographical area spread out in 46 tiger reserves in 18 States).

7.28. A report on Management Effectiveness Evaluation (MEE) of Tiger Reserves was released on 28th July, 2011, containing the second round of independent assessment based on refined criteria done in 2010-11 for 39 tiger reserves. Out of 39 tiger reserves, 15 were rated as 'very good', 12 as 'good', 8 as 'satisfactory' and 4 as 'poor'.

7.29. Providing special assistance for mitigation of human-tiger conflicts in problematic areas.

7.30. Regional Offices of the National Tiger Conservation Authority are operational at Nagpur, Bengaluru and Guwahati.

7.31. A 'Standard Operating Procedure' for dealing with tiger deaths has been issued, based on advisories of Project Tiger / National Tiger Conservation Authority, with inputs from Wildlife Crime Control Bureau, State officials and experts, fine tuned to meet the present challenges.

7.32. A 'Standard Operating Procedure' for dealing with straying tigers in human dominated landscape has been issued.

7.33. A 'Standard Operating Procedure' for disposing tiger/leopard carcass/body parts has been issued.

7.34. The Revised Cost Estimates for Project Tiger was approved on 11.8.2011 for an upward revision of the cost estimates for the ongoing Centrally Sponsored Scheme of Project Tiger during the XIth Plan period from 650 crore to Rs. 1216.86 crore of central assistance to support States in village relocation from core areas of tiger reserves. Several new components were added to the Project, viz.:

- (i) Change in the funding pattern in respect of North Eastern States (90:10)
- (ii) Raising compensation for man-animal conflict to Rs. 2 lakhs
- (iii) Acquisition of private land for making the core/critical tiger habitat inviolate
- (iv) Establishment of Tiger Safari, interpretation/awareness centres under the existing component of 'co-existence agenda in buffer/fringe areas', and management of such centres through the respective Panchayati Raj Institutions
- (v) Re-introduction of Cheetah

7.35. Launching of Phase-IV tiger reserve level, continuous monitoring of tigers using camera traps and building up data on photo captures of individual tigers.

7.36. Launching the creation of a national repository of camera trap photo IDs of individual tigers.

7.37. In-principle approval for use of CAMPA funds towards village relocation from core areas.

7.38. Completion of e-surveillance project in Corbett.

7.39. Comprehensive guidelines under section 38O 1 (c) of the Wildlife (Protection) Act, 1972 issued for Project Tiger and Tourism in Tiger Reserves on 15th October, 2012.

7.40. Under active management, permission accorded for translocation of wilded / straying tigers / tigresses from

high to low density reserves within States.

7.41. A bilateral arrangement has been recently formalized with Bangladesh on tiger conservation. Our delegations are interacting with Nepal and China within the framework of existing bilateral arrangements. A sub-group on tiger/leopard conservation has been constituted for cooperation with the Russian Federation, which has met recently.

7.42. Field level workshops for capacity building of field officers to deal with straying tigers have been organized at Tadoba and Dudhwa Tiger Reserves (2013).

7.43. NTCA teams sent for field appraisal of tiger deaths, Project Tiger implementation etc.

7.44. Process underway for providing enabling provisions in the Wildlife (Protection) Act, 1972, to strengthen our implementation of the CITES and towards enhancement of penalties for contravention of provisions of the Act.

7.45. Kawal (Telangana), Sathyamangalam (Tamil Nadu), Mukandra Hills (Rajasthan), Nawegaon-Nagzira (Maharashtra), Nagarjunasagar Srisailem (Telangana) and Pilibhit (Uttar Pradesh) have been notified by the State Governments as Tiger Reserve.

7.46. The next round (2014) of country level status assessment of tiger, co-predators, prey and habitat, using the refined methodology, in collaboration with tiger States and the Wildlife Institute of India has been initiated.

7.47. The next round (2014) of Independent Management Effectiveness Evaluation of Tiger Reserves has been initiated.

7.48. Economic Valuation of some tiger reserves initiated in collaboration with the Indian Institute of Forest Management.

7.49. Trial of Unmanned Aerial Vehicle for monitoring done in the Panna Tiger Reserve (Madhya Pradesh), in collaboration with the Wildlife Institute of India.

7.50. Assessment of Status, Density and Change in Forest Cover in and around tiger reserves of the Shivalik Gangetic Plain Landscape initiated in collaboration with the Forest Survey of India.

8. Thrust areas for the XII Plan period

8.1. Stepping up protection by supporting the States for raising, arming and deploying the Special Tiger Protection Force (so far, the STPF has been constituted only in Karnataka for Nagarhole; funding support has

been provided to Uttar Pradesh, Uttarakhand and Rajasthan where process of constituting the same is ongoing. Funding has also been provided to Odisha for STPF constitution at Similipal Tiger Reserve).

8.2. Need for enhanced funding support to States for voluntary village relocation from core areas to provide inviolate space for tigers (800-1200 sq.km.) for a viable population (CCEA process ongoing).

8.3. Strengthening infrastructure and habitat management.

8.4. Use of information technology in wildlife crime prevention.

8.5. Capacity building of field personnel.

8.6. Addressing man-wildlife conflicts to prevent revenge killings.

8.7. Addressing the issue of livelihood dependency in the fringes of core/critical tiger habitats by supporting the States for managing the buffer/peripheral areas of tiger reserves as a multiple use zone through village level participatory planning for ecodevelopment with reciprocal commitments (out of 46 tiger reserves 45 have notified buffer area). The details of core and critical tiger habitats and buffer and peripheral areas notified by tiger reserves are at Appendix-A.

8.8. Launching Phase-IV tiger reserve level continuous monitoring with capacity building.

8.9. Active management involving translocation of tiger to suitable low density tiger habitats within a landscape.

8.10. Supporting field oriented research work.

8.11. Strengthening the Regional Offices of the NTCA at Nagpur, Guwahati and Bengaluru (AIGs posted at Nagpur and Bengaluru Regional Offices; IGFs are required to be posted in the 3 Regional Offices, besides an AIG at Guwahati).

8.12. Declaring and consolidating new tiger reserves (2 have been given in-principle approval, and for another 5, the States have been advised, besides final approval has been accorded to Kudremukh (Karnataka), Rajaji (Uttarakhand) and Bor (Maharashtra) for declaring as a tiger reserve.

8.13. Fostering awareness / supporting reserve specific communication strategy to elicit public support for tiger conservation with the active involvement of Panchayati Raj institutions.

9. Field strategies with sub-activities

9.1 Stepping up protection: (antipoaching squad/Tiger Protection Force deployment)

The antipoaching operations in tiger reserves are site specific. However, the following activities, inter alia, form part of the protection strategy in tiger reserves, namely:

- (a) Raising, arming and deployment of Special Tiger Protection Force.
- (b) Use of information technology in wildlife crime prevention.
- (c) Launching M-STriPES for field patrolling.
- (d) Deployment of antipoaching squads.
- (e) Establishing and maintenance of existing patrolling camps/chowkis and deployment of camp labourers for patrolling.
- (f) Organising vehicular patrolling by constituting squads (Tiger Protection Force), comprising of field staff, labourers and police/SAF/ex-army personnel, with wireless handset and paraphernalia for apprehending offenders, apart from prescribing a patrolling calendar for the squad.
- (g) Establishing and maintenance of wireless network.
- (h) Organising surprise raids jointly with the local police in railway stations, local trains, bus-stops, buses, catchers and cafeteria.
- (i) Ensuring special site-specific protection measures, during monsoon as 'Operation Monsoon' – considering the terrain and accessibility of Protected Areas.
- (j) Deployment of ex-army personnel / home guards.
- (k) Deployment of local work force for patrolling, surveillance of water holes, manning barriers.
- (l) Procurement of arms and ammunition.
- (m) Procurement/maintenance of elephant squads.
- (n) Rewards to informers.
- (o) Legal support for defending court cases.
- (p) Procurement of vehicles, boats.
- (q) Procurement field gear, night vision device.

9.2. Deciding inviolate spaces for wildlife and relocation of villagers from core or critical tiger habitats in Tiger Reserves within a timeframe and settlement of rights.

9.2.1. The Wild Life (Protection) Act, 1972, as well as the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, require that rights of people (Scheduled Tribes and other traditional forest dwellers) recognized in forest areas within core and critical tiger or wildlife habitats of tiger reserves or protected areas may be modified and resettled for providing inviolate spaces to tiger/wild animals. This requires payment of compensation (rights settlement in addition to the relocation package offered under the Centrally Sponsored Scheme at present). Chapter IV of the Wild Life (Protection) Act, 1972 (section 24)

provides for acquisition of rights in or over the land declared by the State Government under section 18 (for constituting a Sanctuary) or section 35 (for constituting a National Park). Sub-section (2) of section 24 of the Wild Life (Protection) Act, 1972 authorizes the Collector to acquire such land or rights. Therefore, payment of compensation for the immovable property of people forms part of modifying or settling their rights which is a statutory requirement.

9.2.2. The ongoing study and the analysis of the available research data on tiger ecology indicate that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of 80-100 tigers (in and around core) require an inviolate space of 800-1200 sq. km. Tiger being an “umbrella species”, this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area and habitat. Thus, it becomes an ecological imperative to keep the core areas of tiger reserves inviolate for the survival of source populations of tiger and other wild animals.

9.2.3. The proposed package has following two options:

- (a) Option I – Payment of the entire package amount (Rs. 10 lakhs per family) to the family in case the family opts so, without involving any rehabilitation or relocation process by the Forest Department.
- (b) Option II – Carrying out relocation or rehabilitation of village from protected area or tiger reserve by the Forest Department.

9.3. Strengthening of infrastructure within Tiger Reserves.

The following activities, inter alia, would form part of reinforcing the infrastructure of Tiger Reserves (including support to new tiger reserves), namely:

- (a) Civil Works (staff quarters, family hostels, office improvement, patrolling camp, house keeping buildings, museum, culverts).
- (b) Maintenance, creation and upgradation of road network.
- (c) Maintenance and creation of wireless tower.
- (d) Maintenance and creation of fire watch tower.
- (e) Maintenance and creation of bridges, dams, anicuts.
- (f) Maintenance, creation of firelines and firebreaks.
- (g) Maintenance and creation of earthen ponds.
- (h) Procurement, maintenance of vehicles (Gypsy, Jeep, Truck, Tractor).
- (i) Habitat improvement works.
- (j) Procurement of hardware, software and Geographical Information System (GIS).
- (k) Procurement of compass, range finder, Global Positioning System (GPS), camera traps.

- (l) Procurement of satellite imageries for management planning.
- (m) Map digitization facility for management planning.

9.4. Habitat improvement and water development.--

These, inter alia, may include, weed eradication, removal of gregarious plant growth from grasslands, grass improvement, water retention structures and the like. These initiatives would increase the forage and browse values of the habitat for wild animals.

9.5. Addressing man-animal conflict (ensuring uniform, timely compensation for human deaths due to wild animals, livestock depredation by carnivores, crop depredation by wild ungulates) (compensation for crop loss is a new component):

This would involve-

- (a) payment of compensation for cattle lifting, death of human beings and crop depredation due to wild animals.
- (b) creation of crop protection structures.
- © procurement and deployment of traps, cages to catch problematic animals.
- (d) procurement of tranquilizing equipments, rescue vehicles and drugs.

9.6. Co-existence agenda in buffer or fringe areas.

The fringe areas around tiger reserve have corridor value, and their ecological sustainability is important to prevent the area from becoming ecological sinks on account of over use of resources and unwise land use. This calls for delineation of buffer zone around a tiger reserve to incorporate such fringe areas so that it can fulfill the following objectives, namely:--

- (a) providing ecologically viable livelihood options to local stakeholders for reducing their dependency on forests.
- (b) conserving the forest area through restorative inputs involving local people for providing habitat supplement to wild animals moving out of core areas.

9.7. Rehabilitation of traditional hunting tribes living around tiger reserves.

There is an urgent need to launch a rehabilitation and development programme for the denotified tribes and tribes involved in traditional hunting, living around tiger reserves and tiger corridors. The following denotified tribes and communities are involved in traditional hunting of wild animals : Behelias, Ambalgars, Badaks, Mongias, Bavariyas, Monglias, Pardhi, Boyas, Kaikads, Karwal Nat, Nirshikaris, Picharis, Valayaras, Yenadis, Chakma, Mizo, Bru, Solung and Nyishi. While this list is

not exhaustive, around 5,000 such families are required to be taken up under a welfare programme (forming part of NTCA initiatives) during the Plan period. The rehabilitation and welfare package should be evolved in a site specific, consultative manner with livelihood options, to include : wages for such people towards their deployment in foot patrolling for protecting wildlife, providing agricultural land with irrigation, basic health care, housing and related community welfare inputs and basic education facilities. The experience gained in the past for settling denotified tribes by the salvation army is required to be considered dispassionately while structuring the programme.

9.8. Research and field equipments.

The All India tiger estimation using the new methodology approved by the Tiger Task Force has resulted in a permanent monitoring protocol for the field units. The Phase-IV tiger reserve level would be launched to monitor the source populations of tiger. Further, assistance would be provided for fostering field oriented research and to equip the staff with facilities like Global Positioning System (GPS), camera traps, night vision, range finder and related accessories including hardware and software.

9.9. Staff development and capacity building.

This would involve-

- (a) capacity building and training.
- (b) providing project allowance and special incentives.
- (c) Specialized training in the use of Geographical Information System (GIS), antipoaching operations.
- (d) Specialized training in jurisprudence and wildlife forensics.
- (e) Study tours for appraisal of good practices in other reserves.
- (f) Dissemination workshops.
- (g) Specialized training in park interpretation.
- (h) Specialized training in management planning.

9.9.2 The above inputs are extremely important for enhancing the skill of field staff. Several instances of poaching occur for want of specialized training in crime detection and related skills.

9.10. Mainstreaming wildlife concerns in tiger bearing forests and fostering corridor conservation through restorative strategy involving locals to arrest fragmentation of habitats.

This would involve-

- (a) Redressing man-animal conflict.
- (b) Capturing problematic and aberrant wild animals.
- (c) Monitoring of wild animals.

- (d) Antipoaching operations.
- (e) Habitat improvement measures.

9.11. Safeguards and Retrofitting measures in the interest of wildlife conservation.

Several tiger reserves are affected on account of heavily used infrastructure like roads, railway tracks etc. The high tension electric lines passing through many reserves cause mortality of wild animals due to electrocution by poachers. In the interest of wild animals several safeguards as well as retrofitting measures may be required, which would be supported on a site-specific basis.

9.12. Providing basic infrastructure.-- The expenditure for consultancy, field visits by expert teams, all India tiger estimation and continuous monitoring of tigers (Phase-IV), support for monitoring tigers outside tiger reserves through National Tiger Conservation Authority grant, developing a National Repository of Camera Trap Photo Database of tiger, strengthening of National Tiger Conservation Authority at the Center and Regional Offices, besides establishing a monitoring lab.

9.13. Independent monitoring and evaluation of tiger reserves.

The second round of independent monitoring has been completed using globally accepted indicators. This would be further refined and continued.

9.14. Establishment and development of new tiger reserves.

'Project Tiger' has a holistic ecosystem approach. Though the focus is on the flagship species 'tiger', the project strives to maintain the stability of ecosystem by fostering other trophic levels in the food chain. This is essential to ensure an ecologically viable population of tiger, which is at the 'apex' of the ecological food chain. The community pressures on forests are ever on the increase in developing countries and India is no exception. As a sequel, the tiger habitat has become fragile and weak at several places, warranting a focused conservation approach. Our protected areas and tiger reserves are analogous to "islands" in an ocean of the other-use patterns. Empirical evidences from 'island biogeography' indicate that "isolated" reserves lose their species rapidly owing to 'ecological insularization'. Further, apart from fragmentation, the situation is aggravated by degraded forest cover owing to biotic pressure, dislocated prey – predator ratio, absence of effective measures to ensure the desired level of protection and lack of eco developmental initiatives for the fringe dwelling stake holders to reduce their dependency on forest resources. Since 'Project Tiger' would go a long way in redressing the above situation,

the Steering Committee of Project Tiger in its meeting held on the 23rd January, 2003 recommended inclusion of new tiger reserve areas so as to increase the total area of 'Project Tiger.'

9.15. Provision of Project Allowance to staff of Project Tiger.

The tiger States would be supported (100%) for Project Allowance to staff of tiger reserves.

9.16. Staff welfare activities.

Staff welfare inputs like residential accommodation for the children of frontline staff in nearby towns and villages, supply of kerosene, medicine, field kit, mosquito net, torch and the like would be supported.

9.17. Fostering Tourism/ Ecotourism in tiger reserves.

'Tourism' in the context of Tiger Reserves is contemplated as "ecotourism", which needs to be ecologically sustainable nature-tourism. This is emerging as an important component of tourism industry. It is distinct from 'mass tourism', having sustainable, equitable, community based effort for improving the living standards of local, host communities living on the fringes of tiger reserves. Ecotourism is proposed to be fostered under Project Tiger to benefit the host community in accordance with tiger reserve specific Tourism Plan forming part of the Tiger Conservation Plan, subject to regulation as per carrying capacity, with a focus on buffer areas. Since, tourism has been happening in areas of national parks and wildlife sanctuaries which are now designated as core and critical tiger habitat, regulated low impact tourism (visitation) would be allowed in such areas subject to site specific carrying capacity. However, no new tourism infrastructure should be permitted in such core and critical tiger habitats. Further, the buffer forest areas should also be developed as wildlife habitats with the active involvement of local people living in such areas. This would provide extended habitat to tiger population for its life cycle dynamics, besides benefitting local people from ecotourism activities in such areas while reducing the resource dependency of people on core and critical tiger habitats and human-tiger interface conflicts. The opportunities for stakeholders would include management of low cost accommodation for tourists, providing guide services, providing sale outlets, managing excursions, organizing ethnic dances and the like.

10. Local livelihood under Project Tiger

In all, approximately 24 lakh mandays are generated annually with 50% central assistance amounting to around Rs. 24 crores (excluding matching 50% share

given by States) under 'Project Tiger'.

Many local tribes constitute such local workforce (besides non-tribals), such as Baigas, Gonds in Madhya Pradesh, Gonds in Maharashtra, Chenchus in Andhra Pradesh, Sholigas in Karnataka, Gujjars in Uttarakhand and Irulas in Tamil Nadu to name a few. The deployment of such local tribals has been fostered and encouraged in the last two years.

11. Details of funding allocation under Project Tiger since inception over various Plan periods. –

Project Tiger is an ongoing Centrally Sponsored Scheme of the Ministry of Environment and Forests, launched in 1973. Over the years, the project coverage has expanded considerably.

The provisions made in the Five Year Plans for the project since beginning are as below:

Five year Plan	Rs. in lakhs
IV Plan (only 1973-74)	253
V Plan (1974-75 to 1978-79)	387.25
Rolling Plan (1979-80)	63.90
VI Plan (1980-81 to 1984-85)	494.86
VII Plan	1475.42
1990-92	700.98
1991-93	549.81
VIII Plan	3890.09
IX Plan	7500.00
X Plan	15000
XI Plan	79219.96
Total	109284.8 or 1092.85 crores

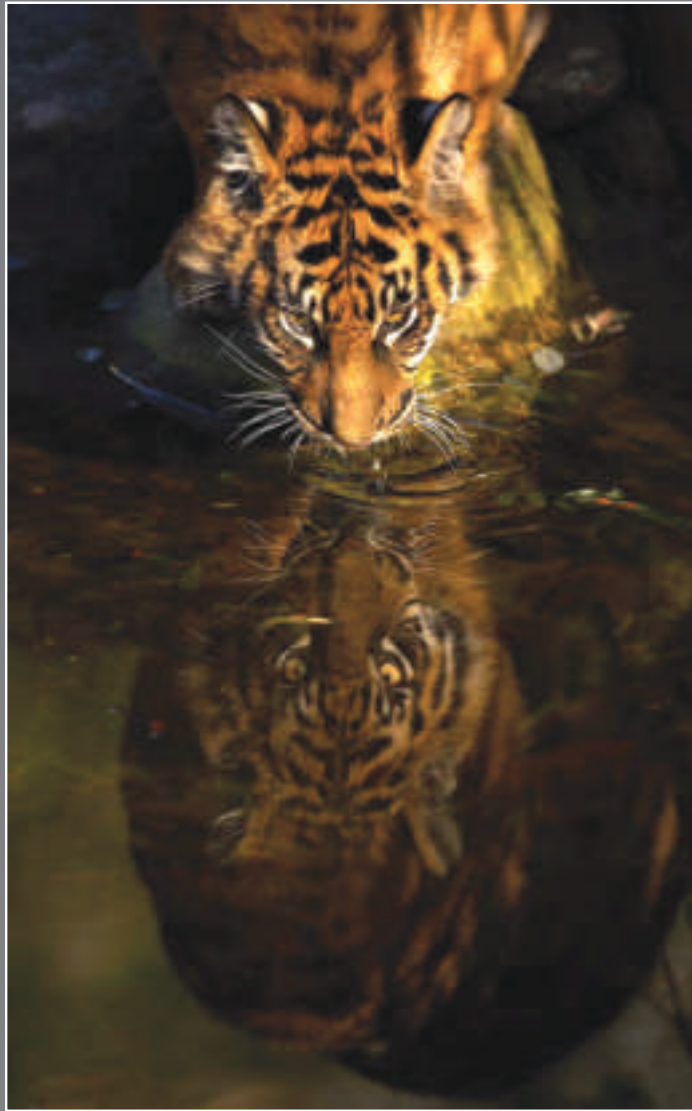
Appendix-A

List of Core and Buffer areas of Tiger Reserves in India, notified under the Wildlife (Protection) Act, 1972, as amended in 2006 (as on 28.07.2014)

Sl. No.	Name of Tiger Reserve	State	Area of the core / critical tiger habitat (In Sq. Kms.)	Area of the buffer / peripheral (In Sq. Kms.)	Total area (In Sq. Kms.)
1	Bandipur	Karnataka	872.24	584.06	1456.3
2	Corbett	Uttarakhand	821.99	466.32	1288.31
	Amangarh (buffer of Corbett TR)	Uttar Pradesh	-	80.60	80.60
3	Kanha	Madhya Pradesh	917.43	1134.361	2051.791
4	Manas	Assam	840.04	2310.88	3150.92
5	Meighat	Maharashtra	1500.49	1268.03	2768.52
6	Palamau	Jharkhand	414.08	715.85	1129.93
7	Ranthambore	Rajasthan	1113.364	297.9265	1411.291
8	Simlipal	Odisha	1194.75	1555.25	2750.00
9	Sunderbans	West Bengal	1699.62	885.27	2584.89
10	Periyar	Kerala	881.00	44.00	925.00
11	Sariska	Rajasthan	881.1124	332.23	1213.342
12	Buxa	West Bengal	390.5813	367.3225	757.9038
13	Indravati	Chhattisgarh	1258.37	1540.70	2799.07
14	Namdapha	Arunachal Pradesh	1807.82	245.00	2052.82
15	Dudhwa	Uttar Pradesh	1093.79	1107.9848	2201.7748
16	Kalakad-Mundanthurai	Tamil Nadu	895.00	706.542	1601.542
17	Valmiki	Bihar	598.45	300.93	899.38
18	Pench	Madhya Pradesh	411.33	768.30225	1179.63225
19	Tadoba-Andhari	Maharashtra	625.82	1101.7711	1727.5911
20	Bandhavgarh	Madhya Pradesh	716.903	820.03509	1536.938
21	Panna	Madhya Pradesh	576.13	1002.42	1578.55
22	Dampa	Mizoram	500.00	488.00	988.00
23	Bhadra	Karnataka	492.46	571.83	1064.29
24	Pench	Maharashtra	257.26	483.96	741.22
25	Pakke	Arunachal Pradesh	683.45	515.00	1198.45
26	Nameri	Assam	200.00	144.00	344.00
27	Satpura	Madhya Pradesh	1339.264	794.04397	2133.30797
28	Anamalai	Tamil Nadu	958.59	521.28	1479.87
29	Udanti-Sitanadi	Chattisgarh	851.09	991.45	1842.54
30	Satkosia	Odisha	523.61	440.26	963.87
31	Kaziranga	Assam	625.58	548.00	1173.58
32	Achanakmar	Chattisgarh	626.195	287.822	914.017
33	Dandeli-Anshi	Karnataka	814.884	282.63	1097.514
34	Sanjay-Dubri	Madhya Pradesh	812.571	861.931	1674.502
35	Mudumalai	Tamil Nadu	321.00	367.59	688.59
36	Nagarahole	Karnataka	643.35	562.41	1205.76
37	Parambikulam	Kerala	390.89	252.772	643.662
38	Sahyadri	Maharashtra	600.12	565.45	1165.57
39	Biligiri Ranganatha Temple	Karnataka	359.10	215.72	574.82
40	Kawal	Telangana	893.23	1125.89	2019.12
41	Sathyamangalam	Tamil Nadu	793.49	614.91	1408.40
42	Mukandra Hills	Rajasthan	417.17	342.82	759.99
43	Nawegaon-Nagzira	Maharashtra	653.674	-	653.674
44	Nagarjunsagar Srisailem (part)*	Andhra Pradesh	2595.72*	700.59*	3296.31*
45	Nagarjunsagar Srisailem (part)*	Telangana	2166.37*	445.02*	2611.39*
46	Pilibhit	Uttar Pradesh	602.7980	127.4518	730.2498
	TOTAL		38632.18	29886.62	68518.8

*Revised area details are awaited from the State Governments concerned after reorganization.

CONSERVATION STRATEGY AND
ACTION PLAN FOR THE SUMATRAN TIGER
(*PANTHERA TIGRIS SUMATRAE*)
INDONESIA 2007 - 2017



Ministry of Forestry
2007

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FRONT COVER PHOTOGRAPH

Harald Loeffler/Eye-of-the-Tiger.com

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Picture 4: WCS-IP

Picture 5: WWF (left), WCS-IP (right above and below)

Picture 6: FFI (left), WCS-IP (right above and below)

Picture 7: BKSDA NAD/FFI

Government of the Province:



MAIN SPONSORS:
(Coat of Arms)





MINISTER OF FORESTRY
THE REPUBLIC OF INDONESIA

REGULATION OF MINISTER OF FORESTRY

No.: P.42/Menhut-II/2007

On

CONSERVATION STRATEGY AND ACTION PLAN FOR THE SUMATRAN TIGER

(*Panthera tigris sumatrae*) 2007-2017

MINISTER OF FORESTRY

Having considered :

- a. that to advance the conservation of the Sumatran tiger (*Panthera tigris sumatrae*) in its habitat, it is deemed necessary to have a conservation strategy and action plan that includes priorities, an integrated management approach and involves all parties and stakeholders;
- b. that for the conservation of the tiger as specified in item a, it is deemed necessary to have a strategy and action plan;
- c. that based on aforementioned items a and b, it is deemed necessary to enact a Regulation of the Minister of Forestry on the strategy and action plan for conservation of the Sumatran tiger (*Panthera tigris sumatrae*) of 2007 - 2017;

In view of :

1. Law No. 5 of 1990 on the Conservation of Natural Resources and their Ecosystems;
2. Law No. 5 of 1997 on Environmental Management;
3. Law No. 41 of 1999 on Forestry as amended by Law No. 19 of 2004 on the Enactment of Government Regulation in lieu of Law No. 1 of 2004 on the Amendment to Law No. 41 of 1999 on Forestry;
4. Law No. 32 of 2004 on Local Government;
5. Government Regulation No. 68 of 1998 on Wildlife Reserve Areas and Natural Conservation Areas;
6. Government Regulation No. 7 of 1999 on Preserved Plants and Animals;
7. Government Regulation No. 8 of 1999 on the Use of Wild Animals and Plants;
8. Presidential Decree No. 187/M of 2004 as amended by Presidential Decree No. 8/M of 2004 on the Composition of the Unity Indonesia Cabinet;
9. Decree of Minister of Forestry No. 355/Kpts-II/2003 on the Identification

- of Wild Animal and Plant Specimens;
10. Decree of Minister of Forestry No. 447/Kpts-II/2003 on the Administration of Collecting, Catching and Distribution of Wild Animal and Plant Specimens;
11. Regulation of Minister of Forestry No. P.13/Menhut-II/2005 as has been amended several times, the most recently by Regulation of Minister of Forestry No. P.17/Menhut-II/2007 on the Organization and Working Procedures of the Ministry of Forestry;

DECIDE:

- To enact : THE MINISTER OF FORESTRY'S REGULATION ON THE STRATEGY AND ACTION PLAN FOR CONSERVATION OF THE SUMATRAN TIGER (*Panthera tigris sumatrae*) 2007-2017.
- FIRSTLY : To endorse and enact the strategy and action plan for the conservation of the Sumatran tiger 2007-2017, as described in the appendix integrated into this regulation.
- SECONDLY : The strategy as specified in the FIRST decision is a framework for certain conservation programs and activities of the Sumatran tiger that are endorsed based on this regulation, and will serve a guidelines/ guidance for the conservation of the Sumatran tiger.
- THIRDLY : The documents of the Strategy and Action Plan for the conservation of The Sumatran tiger 2007-2017 contain the Strategy and Action Plan, and are subject to evaluation and update every 5 (five) years.
- FOURTHLY : This regulation takes effect as of the enactment date.

Enacted in : Jakarta
On: 24th October 2007

Duly copied

Head of the Bureau of Law and
(Signed & Sealed)

MINISTER OF FORESTRY, Organization,
(Signed)

SUPARNO
NIP. 080068472

H. MS KABAN

C.c.:

1. The State Minister of Environment;
2. All Governors in Indonesia;
3. The Secretary General of Ministry of Forestry;
4. The Inspector General of Ministry of Forestry;
5. The Director Generals/Chairmen of Agencies within Ministry of Forestry;
6. The Chairman of the Indonesian Institute of Science;
7. The Deputy of Natural Science – the Indonesian Institute of Science;
8. The Head of Biology Research Center of the Indonesian Institute of Science;
9. The Heads of Technical Implementing Offices within the Directorate General of PHKA throughout Indonesia.

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LIST OF ABBREVIATIONS

ASEAN WEN	: Association of Southeast Asian Nations – Wildlife Law Enforcement Network
BAPEDALDA	: Badan Pengendalian Dampak Lingkungan (Regional Environment Impact Management Agency)
BAPPEDA	: Badan Perencanaan dan Pembangunan Daerah (Regional Development Planning Board)
BAPPENAS	: Badan Perencanaan dan Pembangunan Nasional (National Development Planning Agency)
BKSDA	: Balai Konservasi Sumber Daya Alam (Natural Resources Conservation Bureau)
CI	: Conservation International
CITES	: Convention on International Trade in Endangered Species of Wild Fauna and Flora
DICE	: Durrell Institute of Conservation and Ecology, University of Kent at Canterbury, UK
DNS	: Debt for Nature Swap
FFI	: Flora and Fauna International
FKKHS	: Forum Komunikasi Konservasi Harimau Sumatera (Communication Forum for the Sumatran tiger Conservation)
HPH	: Hak Pengusahaan Hutan (Natural Forest Concessions)
HTI	: Hutan Tanaman Industri (Industrial Forest Area)
IUCN	: International Union for the Conservation of Nature and Natural Resources / World Conservation Union
KKH	: Konservasi Keanekaragaman Hayati (Biodiversity Conservation, Name of a directorate within PHKA)
LIPI	: Lembaga Ilmu Pengetahuan Indonesia (Indonesian Science Agency)
LSM	: Lembaga Swadaya Masyarakat (Non Government Organization)
PHKA	: Perlindungan Hutan dan Konservasi Alam (Forest Protection and Natural Conservation, Name of a directorate general within Ministry of Forestry)
POLRI	: Kepolisian Negara Republik Indonesia (Indonesian Police Force)
SECP	: Sumatran Elephant Conservation Project
SM	: Suaka Margasatwa (Wildlife Reserve)
SOP	: Standard Operating Procedure
SPU	: Species Protection Unit
STTCP	: The Sumatran tiger Trust Conservation Programme
TCL	: Tiger Conservation Landscape
TNB	: Taman Nasional Berbak (Berkak National Park)
TNBBS	: Taman Nasional Bukit Barisan Selatan (South Bukit Barisan National Park)
TNBD	: Taman Nasional Bukit Duabelas (Bukit Duabelas National Park)
TNBG	: Taman Nasional Batang Gadis (Batang Gadis National Park)
TNGL	: Taman Nasional Gunung Leuser (Gunung Leuser National Park)
TNKS	: Taman Nasional Kerinci Seblat (Kerinci Seblat National Park)
TNS	: Taman Nasional Sembilang (Sembilang National Park)
TNTN	: Taman Nasional Tesso Nilo (Tesso Nilo National Park)
TNWK	: Taman Nasional Way Kambas (Way Kambas National Park)
TRAFFIC	: Wildlife Trade Monitoring Network
UPT	: Unit Pelaksana Teknis (Technical Executive Unit)
WCS-IP	: Wildlife Conservation Society - Indonesia Program
WWF	: Word Wildlife Fund
YLI	: Yayasan Leuser International (The International Leuser Foundation)
YPKHS	: Yayasan Penyelamatan dan Konservasi Harimau Sumatera (The Sumatran tiger Preservation and Conservation Foundation)
ZSL	: Zoological Society of London

FOREWORD

The Sumatran tiger (*Panthera tigris sumatrae*) is a rare animal found only in Sumatra. This animal, posed at the top of the ecological pyramid of Sumatra's forests, has been protected by the Indonesian government and categorized by IUCN (The International Union for the Conservation of Nature and Natural Resources / The World Conservation Union) as an endangered species. Further, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) prohibits trading and hunting of this animal.

The Indonesian government and other parties within and outside Indonesia have engaged in a long-standing effort to conserve the Sumatran tiger. However, the effort has been less than effective, mostly because it has not been coordinated with Sumatra's economic development. Currently there are only 300 Sumatran tigers spread over forests that have been fragmented due to logging and forest conversion.

The Sumatran tiger is a valued part of Indonesia's existing natural resources heritage. It is the last remaining tiger subspecies in Indonesia. The Bali tiger (*Panthera tigris balica*) and Javan tiger (*Panthera tigris sondaica*) have become extinct, and exist only as part of the history of Indonesian wild animals. Therefore, conservation of The Sumatran tiger is crucial and I welcome the establishment of the Strategy and Action Plan for Conservation of the Sumatran tiger 2007-2017.

I hope that the strategy and action plan contained in this document serve as guidelines for protecting the Sumatran tiger and a reference for concordant development to conserve this animal and its habitat in Sumatra. It is a challenge for economic development and wildlife conservation to co-exist harmoniously. But it is expected that all parties involved in the development of Sumatra, including the central government, the provincial government, the district government as well as national and local private enterprises, make their commitment to carrying out conservation of the Sumatran tiger as outlined in this document.

Finally, I express my gratitude to all parties who actively involved themselves to prepare this document. Hopefully, God Almighty will bless our efforts in implementing the Strategy and Action Plan for Conservation of the Sumatran tiger 2007-2017 for our mutual benefit.

Minister of Forestry
(Signed)
H. MS Kaban

ACKNOWLEDGMENT

We welcome the Strategy and Action Plan for the Conservation of the Sumatran tiger 2007-2017. This document signifies the concern, efforts and cooperation of relevant parties to conserve the endangered The Sumatran tiger. Serious conservation measures are critically required now, to avoid the extinction of this animal in the near future.

This plan was mutually prepared by several relevant parties. Therefore, it is expected that this document serves as a reference for conservation of the Sumatran tiger in its habitat. All parties, including the central government, provincial governments, district governments, and private sector, are expected to synchronize all initiatives and plans, in order to reach an optimal achievement to conserve the Sumatran tiger.

It is expected that all agents actively involved in the efforts to conserve the Sumatran tiger can uphold their commitment as specified in the aims and objectives herein, especially the decision about the conservation of habitat of this rare animal. It is expected that, by 2017, the population of the Sumatran tiger will have recovered and will be in accord with the economic development of Sumatra regions.

Finally, on behalf of the Directorate General of Forest Protection and Nature Conservation and the Ministry of Forestry of the Republic of Indonesia, we hereby express our gratitude for all contributions to the preparation of this document made by the Local Government of Nanggroe Aceh Darussalam Province, Jambi Province, South Sumatra Province, Bengkulu Province, Riau Province, and Non-Governmental Organizations such as Wildlife Conservation Society - Indonesia Program, World Wildlife Fund Indonesia, Zoological Society of London, Flora & Fauna International, Yayasan Pelestarian dan Konservasi Harimau Sumatra, Taman Safari Indonesia, and businesses such as ConocoPhillips, Sinarmas Forestry, the Indonesian Forest Entrepreneurs Association, the Indonesian Palm Oil Entrepreneur Federation, Roundtable on Sustainable Palm Oil and Riau Pulp. Similar thanks go out to the Government of West Sumatra Province for hosting the National Workshop for the Conservation of The Sumatran tiger, Sumatran Elephant and Kalimantan Elephant on August 29 - 31, 2007.

We also express our gratitude and appreciation to the national and international speakers, donors and Aksenta as the facilitator for group discussions I, II and the national workshop in West Sumatra, and to all parties that helped prepare this document. Hopefully, this document will bring maximum benefits for all of us.

Director General of Forest Protection and Nature Conservation, Acting Executive,

I Made Subadia G.

1. INTRODUCTION

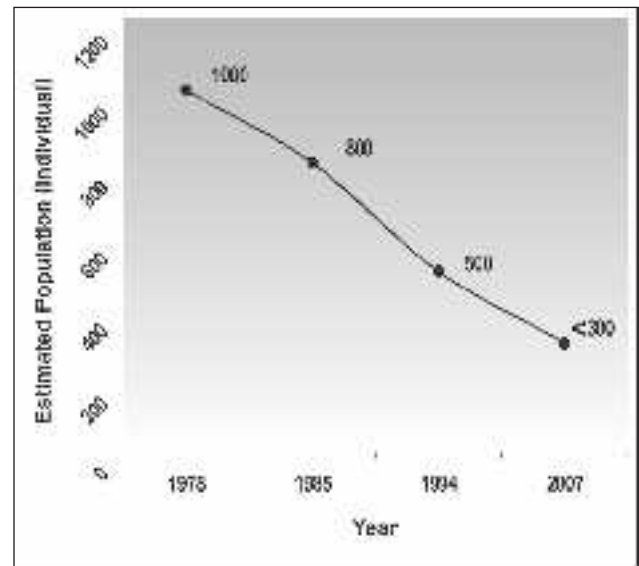
1.1. BACKGROUND

Indonesia once boasted three of eight tiger subspecies in the world. Two of those subspecies, the Javan tiger (*Panthera tigris sondaica*) and the Bali tiger (*Panthera tigris balica*) were declared extinct in the 1940s and 1980s respectively (Seidensticker etc. 1999). Only the Sumatran tiger remains, living in fragmented and isolated habitats exclusively on the island of Sumatra. Measuring the smallest among all existing tiger subspecies (Kitchener 1999), the male Sumatran tiger is 240 centimeters long in average from head to tail and weighs 120 kilograms, whereas the female is 220 centimeters long head to tail, weighing 90 kilograms. (Picture 1; Save the Tiger Fund 2007).

The Sumatran tiger has been categorized as critically endangered by IUCN since 1996 (Cat Specialist Group 2002). In 1992, the tiger population was recorded at just 400, scattered throughout five national parks (Gunung Leuser, Kerinci Seblat, Way Kambas, Berbak and South Bukit Barisan) and two wildlife reserves (Kerumutan and Rimbang), while 100 tigers were said to roam elsewhere outside the seven conservation areas (PHPA 1994). That number is expected to continue decreasing (Picture 2; The Workshop on Tiger and Elephant 2007). The most up-to-date population estimate was based on a survey of conservation areas only.



Picture 1. A Sumatran tiger caught by hidden camera in Riau Province



In 8 out of at least 18 areas where the Sumatran tiger is found several organizations estimated a minimum population of 250 mature individuals. The remaining 10 areas have not been surveyed (Table 1). As each agency used different survey approaches, the conclusion requires careful consideration and cannot simply be compared to the 1992 estimation.

Increasing human encroachment into tiger habitats is the major threat to the Sumatran tiger, especially as humans continue to use forests for economic development purposes such as agriculture and mining, as well as for other infrastructure development as a result of settlement and transmigration. Besides causing habitat fragmentation, such activities often lead to conflict between humans and tigers, resulting in victims on both sides, and finally driving the tiger from its habitat. Human poverty and high overseas demand of illegal tiger body parts such as pelts, bones, teeth and meat has increased illegal hunting and trading of tiger body parts and derivative products. To save the Sumatran tiger from extinction, in 1994 the Indonesian government and other concerned parties issued the first action plan for the conservation of the Sumatran tiger. Action plan recommendations were to:

- Develop a management strategy to conserve the Sumatran tiger population;
- Preserve and protect the existing the Sumatran tiger population in its natural

habitat;

- Institute breeding initiatives to help the tiger population recover in its natural habitat;
- Develop a working network to support Sumatran tiger conservation in Indonesia.

To implement the action plan, the government increased measures to preserve and manage the Sumatran tiger in selected wildlife reserves such as Gunung Leuser National Park (TNGL), Kerinci Seblat National Park (TNKS), South Bukit Barisan National Park (TNBBS), Way Kambas National Park (TNWK), Tesso Nilo National Park (TNTN), Sembilang National Park (TNS) and Batang Gadis National Park (TNBG)

In response to Sumatra's rapid development during the last decade, the government, in cooperation with concerned parties, agreed to revise the 1994 Action Plan for the Conservation of Indonesian Tiger.

1.2. VISION, OBJECTIVE AND TARGETS

1.2.1. Vision

Conserve the Sumatran tiger while fostering harmonious tiger coexistence with development activities on Sumatra island.

1.2.2. Objective

To provide direction for the development and conservation management of the Sumatran tiger, especially in areas adjoined to Sumatran tiger habitat.

1.2.3. Targets

- At the very least, a stable population and landscape of the Sumatran tiger maintained until 2017.
- Public support for the conservation of the Sumatran tiger conservation and its landscapes increased.

Table 1. The Tiger Conservation Landscape in Sumatra, most recent survey data for the period of 1998-2007

TIGER CONSERVATION LANDSCAPE ^a											
ESTIMATED POPULATION											
No.	Landscape	Location Code on Map	Priority	Size	Size of Habitat	Size of Habitat to TCL	Location for Survey on Population	Size of Area (ha.)	Estimated Population	Estimated Density (/100km ²)	Source
1	Kerinci Seblat	5	I	2,816,200	1,965,300	69.79	Kerinci Seblat NP	1,399,320	136	0.05 - 11.25	Linkie 2005
2	Bukit Tiga Puluh	7	I	710,600	541,700	76.23	Bukit Tiga Puluh	144,223	n/a ^b	n/a	ZSL Indonesia 2007
3	Kuala Kampar - Kerumutan	9	II	983,500	489,500	49.77	Kerumutan	n/a	n/a	1.27 - 5.5	WWF, PHKA, VA Tech (Sunarto et al.)
4	Bukit Balai Rejang Selatan	4	II	388,400	267,000	68.74	Bukit Balai Rejang Selatan Forest Complex	388,400	n/a ^b	n/a	WCSIP 2007
5	South of Bukit Barisan Selatan	3	III	210,700	111,500	52.92	Bukit Barisan Selatan NP	365,000	40-43	1.6	O'Brien et al. 2003
6	West of Rimbo Panti Batang Gadis	11	III	148,600	88,900	59.83	Batang Gadis NP	108,000	18-62	1.1 - 3.9	Wibisono et al. 2007
7	East of Rimbo Panti Batang Gadis	12	III	289,000	171,300	59.27	n/a	n/a	n/a	n/a	
8	Tesso Nilo	8	III	233,200	112,100	48.07	Tesso Nilo Forest Complex	233,200	n/a	0.64 - 1.4	WWF, PHKA, VA Tech (Sunarto et al. 2006)
9	Bukit Rimbang Baling	6	III	439,500	229,800	52.29	Rimbang Baling Landscape	n/a	n/a	0.92 - 4.03	WWF, PHKA, VA Tech (Sunarto et al. 2006)
10	Berbak	10	IV	254,300	160,400	63.08	Berbak NP	162,700	n/a	n/a	
11	Leuser Ecosystem	14	IV	2,231,900	1,600,000	71.69	Gunung Leuser NP	1,094,692	n/a ^b	n/a	WCSIP 2007
12	Sibolga	18	IV	129,200	85,600	66.25	n/a	n/a	n/a	n/a	
13							Bukit Duabelas NP	60,500	1 _c	n/a	ZSL Indonesia 2007
14							Way Kambas NP	125,621	36	1.6 - 4.3	Franklin et al. 1999
15							Dangku NR	21,752	3 _c	n/a	ZSL Indonesia 2007
16							Ulu Masen Ecosystem	750,000	n/a ^b	n/a	WCSIP 2007
17							Meranti river- Kapas river Forest Complex	67,000	2 _c	n/a	ZSL Indonesia 2006, 2007
18							Senepis - Buluhala	106,000	21 - 42	2 - 4	Wells 2007

^a Sanderson 2006

^b Tiger existence was found, but estimation on the population not conducted yet

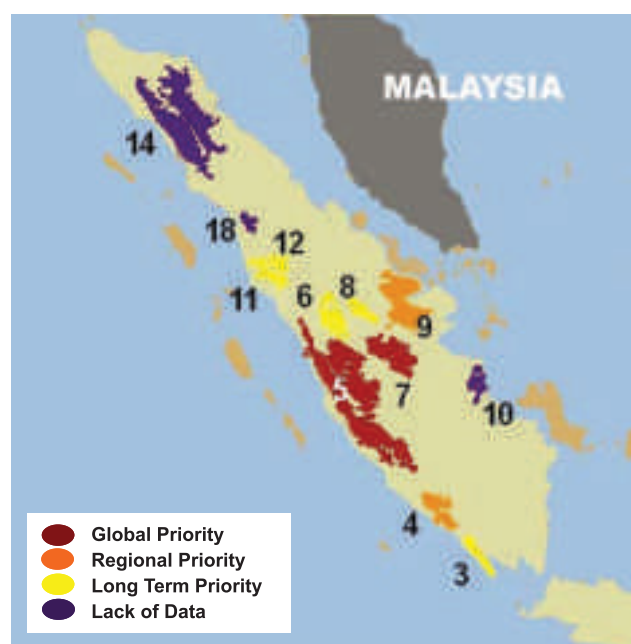
^c Estimated population is a minimum number of individual species identified through hidden camera
n/a data is non existing

2. CURRENT SITUATION

2.1. IN-SITU

2.1.1. Population and Distribution

The most up-to-date analysis on the global status of the Sumatran tiger designated 12 tiger conservation landscapes in Sumatra. While only two of those landscapes are categorized as a global priority – namely Kerinci Seblat Landscape and Bukit Tigapuluh Landscape – two others rank as a regional priority, namely: Bukit Balai Rejang Selatan and Kuala Kampar – Kerumutan (Picture 3; Box 1; Sanderson etc. 2006). According to recent studies, Sumatran tiger populations currently exist in at least 18 conservation areas and in both protected forests and production forests that are physically separate from one another (see Table 1). Based on the population trend described above, the Sumatran tiger population is decreasing over years (see Picture 2). Without an effective management intervention, Indonesia's last remaining tiger subspecies will be extinct in the near future. Picture 3. Tiger conservation landscapes that critically need conservation management priority (Sanderson etc. 2006).



Picture 3. Tiger conservation landscapes that critically need conservation management priority (Sanderson etc. 2006).

The Indonesian government in cooperation with national and international NGOs (Table 2) has conducted studies and management initiatives to save the Sumatran tiger. NGO contributions have helped significantly in conducting censuses as well as offering guidance to communities whose proximity to tiger habitat has resulted in conflicts between humans and tigers. **Table 2. The Sumatran tiger Conservation Areas and Organization Partners**

No.	Location	Organization
1	TN Bukit Barisan Selatan	WCS
2	TN Way Kambas	STTCP
3	Bukit Balai Rejang Selatan	WCS
4	TN Kerinci Seblat	FFI/DICE
5	Riau (Lansekap Tesso Nilo Bukit Tigapuluh)	WWF
6	Senepis - Buluhala	YPKHS
7	Jambi (PT. Asiatic Persada)	ZSL
8	Sumatera Barat	Universitas Andalas
9	TN Bntag Gadis	CI, WCS
10	Ekosistem Leuser	WCS, YLI

2.1.2. Habitat and Prey

Similar to other tiger subspecies, the Sumatran tiger is adaptive to a wide range of environments as long as sufficient prey and water is available (Schaller 1967; Sunquist 1981; Seidensticker *et al.* 1999), and as long as there are no potential threats. In Sumatra, the tiger can be found in areas ranging from the lowland rain forest to mountainous areas, from zero to 3,000 meters above sea level. Tigers are found in several types of habitat such as primary forests, secondary forest, coastal forests, peat swamp forests, logging forests,

(*Cervus unicolor*) and wild boar (*Sus scrofa*) (Wibisono 2006). Occasionally, the Sumatran Tiger also hunts various alternative prey, such as kijang (barking deer / *Muntiacus muntjac*), kancil (mouse deer / *Tragulus sp.*), trenggiling (pangolin / *Manis javanica*), beruang madu (sunbear (*Helarctos malayanus*)) and kuau raja (great argus / *Argusianus argus*). The Bengal Tiger (*Panthera tigris bengalis*) in Nepal is known to take prey every 5-6 days. After taking prey the tiger normally remains in the prey area for 1-4 days, beginning its next hunt an average of 3 days later. (Seidensticker 1976). In India, the Bengal

Box 1. Tiger Conservation Landscape

Like all endangered wildlife, tigers need balanced human protection as well as appropriate management. They need protection from being hunted, access to sufficient prey and ample hunting territory. There are two approaches to ensure the conservation of tigers in their natural environment. Firstly, the protection of several tiger populations by creating several isolated conservation areas away from human activities. However, studies reveal that as apex predators, tigers require an extensive range of territory. Thus, it is difficult for tigers to coexist with humans, especially in heavily populated areas. A recent study in one wildlife reserve in India revealed that simply protecting tigers in several isolated areas is not sufficient (Dinerstein et al. 2006).

Secondly, an appropriate tiger conservation landscape should integrate tiger population core areas with natural corridors to enable tigers to roam freely from one core protected area to another. This approach requires full support from humans living in the surrounding area. A successful example of tiger population conservation is the Terai Arc Landscape Project in Nepal and South West India, an area recognized as having the highest human population density in South Asia. The Tiger conservation activities in the area implement a landscape concept which integrates core sites using corridors. The success of the project has encouraged the development of ecosystem services and improved the economy and welfare of the local people. The successful experience in the last ten years of conservation efforts in the region proves that wildlife conservation in the future will depend highly on spatial planning and ecological zoning which include development, human settlements, wildlife core areas, buffer zones and corridors as an integrated landscape to support the harmonious coexistence of humans and wildlife (Dinerstein et al. 2006).

Tiger eats an average of 50 ungulates per annum (Karanth et al. 2004). A female tiger regularly consumes 5-6 kilograms of meat per day (Sunquist 1981) and is well able to kill a barking deer weighing 20 kilograms every 3 days or a deer weighing up to 200 kilograms every several weeks (Sunquist et al. 1999).

A study in Malaysia confirmed that a female Indochina Tiger (*Panthera tigris corbetti*) consumes 1,613 – 2,041 kilograms annually, while the male consumes 1,936 (2004). The biomass of tiger prey in Asia is no more than 500 kilograms per square kilometer (Seidensticker 1986). Known primary prey of the Sumatran Tiger include wild boar, deer and forest goat which weigh 32, 134, 21 and 120 kilograms respectively, on average (Karanth & Sunquist 1992). However, studies show that tigers prefer prey weighing approximately 107 – 114 kilograms (Bachi et al. 2003; Carbone et al. 1999).

2.1.3. Range Area and Density

A study conducted by Franklin et al. (1999) revealed that the home range of an adult female Sumatran tiger range between 40 – 70 square kilometers, while Griffith (1994 in Tilson et al. 1994) suggests that the home range of an adult male of Sumatran tiger varies from around 180 km² at 100 – 600 meters asl. (above sea level), 274 km² at 600 – 1,700 meters asl., and 380 km² at over 1,700 meters



asl. The home range of an adult male tiger can be twice as wide as the female (Franklin et al. 1999).

The home range is largely determined by prey availability. For example, a study

Table 3. Number of Sumatran tigers in National Conservation Institutions (Tumbelaka 2007)

No.	Location	Male	Female	Tootal	Note
1	KB (Zoo Park Raguram	13	10	23	August-06
2	Taman Safari (Safari Park)	11	25	38	2 not identified yet
3	Indonesia, Cisarua				their sexes, 13-Apr-07
4	Taman Safari Indonesia, Prigen		2	2	13-Apr-07
5	KB Bandung	9	3	12	August-06
6	KB Gembira Loka-Yoga	4	4	8	August-06
7	KB Semarang	1	1	2	August-06
8	KB Solo	2	5	7	August-06
9	KB Surabaya	3	14	17	August-06
10	KB Medan			5	5 not identified yet
11	KB Pematang Siantar	3	6	9	their sexes, August-06
12	KB Bukittinggi	1	1	2	August-06
13	KB Jambi	1	1	2	August-06
Total		48	72	127	

conducted by Santiapillai and Ramono (1985) estimates that the average density of Sumatran tiger may reach 1 adult individual/100 km² in highland forests, increasing to 3 adult individuals per 100 km² in the lowland forests. Other studies suggest that the average density of Sumatran tiger in highland forests is 1.1 adult individuals/100 km² (Borner 1978) sharply increasing to between 2.3 – 3 adult individuals/100km² in lowland forests (Nash & Nash 1985). Griffith (1994) suggests that there may be less prey at higher elevation, accounting for why a larger area is required to sustain a smaller tiger population.

2.2. EX-SITU

The Indonesian government only permits capture of the Sumatran tiger for raising and captive-breeding purposes by ex-situ conservation agencies, such as zoos and safari parks in Indonesia and overseas. In 2007, 127 Sumatran tigers were held in ex-situ conservation agencies in Indonesia (Table 3). Meanwhile some 244 Sumatran tigers were borrowed by or exchanged with other ex-situ conservation agencies overseas, as shown in Table 4. The ex-situ Sumatran tiger population is meant to preserve selective breeding stock for the worst case scenario, should the species become extinct in its natural habitat.

2.3. THREATS

2.3.1. Deforestation and Degradation

Deforestation and forest degradation in Sumatra are

Table 4. Number of Sumatran tigers in International Conservation Institutions (Tumbelaka 2007)

No.	Region	Number			Total
		Male	Female		
1	Africa	1	0	1	1
2	Sout America	1	0	1	1
3	USA	25	36	27	63
4	Asia	6	5	8	13
5	Austraila	10	14	9	23
6	Europe	47	48	48	69
7	Canada	1	1	1	2
8	New Zeland	3	2	4	6
9	Circus	5	20	19	39
Total		99	126	118	244

Edited by Ligaya Tumbelaka from Muller (1999-2006)

significant threats to the conservation of biodiversity on the island, especially that of large mammals requiring a wide ranging area such as the tiger (Picture 5). Wide swaths of forest have been cleared at an alarming rate over the last decade, shrinking and fragmenting the Sumatran tiger habitat into small pockets that are isolated from one another. Holmes (2003) estimates that almost 6,700,000 hectares of covered forest have been cleared in Sumatra between 1985 and 1997 (see Table 5). Meanwhile from 2000 to 2005, the Ministry of Forestry estimates that deforestation has claimed 1,345,500 hectares on Sumatra, at an annual average of 269,100 hectares.



Picture 5. Slashed and burned forest; settlements in TNTN and Bukit Balai Rejang Selatan areas.

Table 5. Estimate of lowland forest cover in Sumatra in 1985 – 1997 (Holmes 2003)

Estimate of Forest Cover in 1990 (ha)	Forest Cover in 1995 (ha)	Forest Cover in 1997 (ha)	Estimate of Deforestation in 1985 - 1997 (ha)	Estimate of Deforestation in 1985 - 1997 (%)
16,000,000	5,559,700	2,168,300	3,391,400	61

2.3.2. Hunting and Trading

Illegal hunting is a significant threat to the existence and conservation of the Sumatran tiger (Picture 6) affecting not only the tiger, but also its prey. Illegal tiger hunting probably began in the early 1990s, in order to supply the black market with natural tiger body parts, especially its hide and bones. The tiger and its products are traded for several reasons. There is a strong market for tiger products in Asian traditional medicine for their perceived supernatural powers. In addition, tigers are traded for use as pets and status symbols (TRAFFIC SEA 2007; Table 6). Over 3,990 kilograms of Sumatran tiger bones were exported illegally from Indonesia to South Korea between 1970 and 1993 (Mills & Jackson 1994; Box 2). The price of tiger bones generally increases over time. In addition, as Picture 7 illustrates, tiger bone prices tend to increase on the international market when supply is down. In the South Korean market, tiger bone was sold at US \$ 26 per kilogram in 1973, and US \$ 238 per kilogram in 1992 (Mills & Jackson 1994). Historically, the hide and pelt are the most precious parts of a tiger. One mature Sumatran tiger pelt was valued at 150 – 350 gulden in the 1930s (Treep 1973) compared to more than US \$ 2,000 in 2002 (Sheppard & Magnus 2004). Meanwhile profit for trading in other parts of the tiger reached US \$ 1,000 in the 1970s, and more

Table 6. Investigation of trading in Sumatran tiger parts in 22 big cities on Sumatra (TRAFFIC SEA 2007, unpubl.).

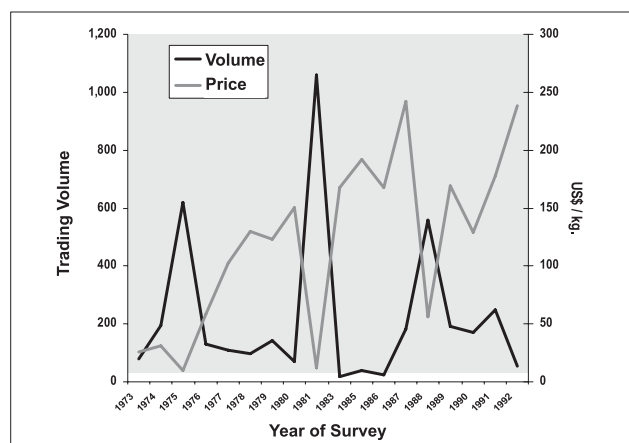
Items	2002	2006
Claw	175 +	43
Tooth	102 +	84
Beard	80 +	2
Complete pelt	24 +	1
Cut of pelt	20	37
Bone	8	32 kg
Offset	5	0

(+ equals more than)



Picture 6. Evidence of Sumatran tiger hide and bones in TNGL; a TNKS officer holds a Sumatran tiger pelt.

than tripled that amount by 2002. Studies estimate 253 tigers were removed from their natural habitat between 1998 – 2002 (Borner 1978; Table 7; Sheppard & Magnus 2004).



Picture 7. Comparison of tiger body part volume and price per kilogram exported from Sumatra to South Korea from 1978 to 1992 (reconstruction by Mills & Jackson 1993).

2.3.3. Conflict

Rapid human population growth and economic development within and around Sumatran tiger habitat limits the animal's ability to roam freely and in turn has increased human-tiger conflicts. In recent years, human-tiger conflicts have become the primary threat to Sumatran tiger conservation efforts (Picture 8). Records show that 48, 36 and 34 conflicts occurred in West Sumatra, Riau and Aceh respectively from 1978 to 1997 (Box 3). During that period, 146 persons were killed, 30 persons were injured and 870 cattle were killed in tiger confrontations (Nyhus and Tilson 2004).

Furthermore, records show that 40 persons were killed between 2000 and 2004 (PHKA). A study by TRAFFIC in 2002 found that at least 35 Sumatran tigers were killed in human-tiger conflict from 1998 to 2002.

Box 2. Poaching and Illegal Trading

Poaching is a real threat that directly decreases wildlife populations. Illegal hunters often use traps with ropes or cables, pitfalls, poison and firearms to trap wild game such as bear (highly prized in Asian traditional medicine) and ungulates, common tiger prey. This sometimes results in unintentionally trapping and killing tigers. Paradoxically, though tigers serve a natural role in controlling pests such as wild boar, the tigers themselves are occasionally killed by traps set around agricultural areas to reduce those pests.

Based on data provided by the South Korea Customs Office, the TRAFFIC Species in Danger Report noted that 8,981 kilograms of tiger bones were smuggled into South Korea from 1970 to 1993, among them 3,994 kilograms, or 44%, from Indonesia. It is ironic that at least 2,619 kilograms were smuggled after Indonesia ratified the CITES convention in 1979. Other data shows that Indonesia exported tiger bones to Taiwan in 1984 and imported tiger-content medicines from China in 1991 and 1992 (Mills & Jackson 1994).

In 2002, TRAFFIC surveyed 484 souvenir shops, gold and precious stone dealers, practitioners of Asian traditional medicine and bird shops in 24 large and small cities in 8 provinces in Sumatra, finding that tiger products are traded in all but 7 of the 24 cities. TRAFFIC conducted another survey in 2006, this time in only 22 large and small cities in 7 provinces in Sumatra except Nanggore Aceh Darussalam. The survey confirmed that tiger body parts are still openly traded throughout the region, in all but 9 of the 22 surveyed cities and towns.

Table 7. Estimated number of total individual Sumatran tigers removed from their natural habitat in eight provinces in Sumatra from 1998 to 2002 (Sheppard & Magnus 2004).

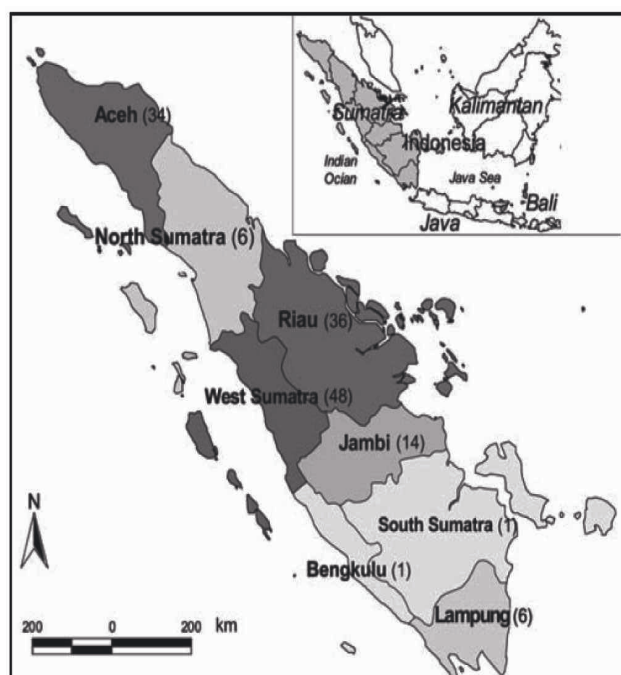
Province	1998	1999	2000	2001	2002	TotalAverageSource
North Sumatra	1	1	4	n/a	n/a	62.4FFI-SECP 2002,
Aceh	n/a	2	2	1	n/a	51TRAFFIC 2002
Riau	19	17	9	12	10	6713.4FFI-SECP 2002,
						TRAFFIC 2002
West Sumatra	2	14	35	12	3	6513WWW 2002 STCP 2003
Jambi	2	9	1	5	22	397.8FFI 2001, FFI 2003
South Sumatra	2	4	1	2	n/a	91.8FFI 2002, WWF 2002
Lampung	19	8	12	6	12	5711.4WWW 2002
Bengkulu	n/a	2	1	n/a	1	40.8WWW 2002, WCS 2003
Total	45	57	65	38	48	253*51FFI 2002

Box 3. Human-Tiger Conflict in Sumatra

In general, human-tiger conflict on Sumatra follows three scenarios. In the first scenario, human and tiger activities do not significantly overlap and potential conflict is low. In this scenario there are clear borders between human and tiger activities; tigers do not have to venture out of the forest and human access into that forest is very limited. In interviews with inhabitants of 20 villages in TNWK, at least six persons were killed in human-tiger confrontations over more than forty years, from 1953 to 1996. Although the forest area borders on 27 villages with 590,000 inhabitants and the tiger population density is relatively high, human and tiger habitats are clearly divided by a river bordering almost two thirds of the park boundary. The second scenario produces more conflict, as humans have more resources, while those resources are also required to adequately support the tigers. As a result, human and tiger activities overlap relatively often, resulting in more potential human-tiger conflict. This scenario is commonly found in protection forests where conservation activities are low, and also in agroforestry areas and multiple-use forest areas, where the density of both humans and tiger prey is high. In the third scenario, isolated human settlements have developed in the heart of forest with high tiger density. The rapid growth of transmigration settlements, roads and plantations in primary forests at the end of the 1970s and the early 1980s throughout Sumatra has increased human-tiger conflict on the island. Three provinces suffered from fatal tiger attacks during the period, namely West Sumatra, Riau and Aceh (respectively 46.8%, 52.5 and 63.7% attacks ending in fatalities). These three provinces also have the lowest rate of deforestation compared to other provinces in Sumatra (Whitten 1987, Collins *et al.* 1991). However, as the level of human-tiger conflict is quite high due to accelerated destruction of forest habitats, these three conflict scenarios call for further examination (Unofficial translation from Nyhus & Tilson 2004).



Picture 8. Sumatran tiger killed in human-tiger conflict in Aceh.



2.3.4. Poverty

Sumatran people whose livelihoods depend on forest resources often hunt and eat tiger prey, which provides an animal protein source used to meet subsistence basic needs. However, due to poverty and limited employment opportunities some Sumatrans have turned to hunting wildlife to sell in local markets for increased economic gain rather than simply to meet subsistence needs. According to 2006 Statistic Bureau records, families living in Sumatra forests earn about Rp. 300,000 – Rp. 400,000 per month, an amount lower than the monthly minimum labor wage in each province in Indonesia.

Hunting tiger prey profoundly decreases the possibility for conservation of the Sumatran tiger, since the tigers' survival largely depends upon the availability of sufficient prey. Surprisingly, it is possible to openly and freely hunt tiger prey on Sumatra without provoking serious concern on the part of the authorities or the Sumatran tiger conservation activists. The situation worsens as local people continue to exhibit low awareness or knowledge of the importance of conserving natural resources for their own lives in the long run. Many people living in or near the forests engage in illegal logging and deforestation for agriculture purposes, even though such activities not only cause destruction and fragmentation of the Sumatran tiger habitat but lower the quality of the forest ecosystem.

3. EXPECTED CONDITIONS, RECOMMENDATIONS AND ACTION PLANS

Based on discussions during the preparation of the Strategy and Action Plan for the Conservation of The Sumatran tiger, in general there are 5 expected conditions to be achieved in the next 10 years (2008 – 2017) including recommendations and actions to be carried in order to reach the expected conditions. The summary of targets is presented in Table 8.

3.1. THROUGHOUT SUMATRA, WITH THE SUPPORT OF THE RELEVANT PARTIES, SUMATRAN TIGER LANDSCAPES AND THE POPULATIONS THEY SUPPORT CAN BE RECOVERED, MAINTAINED OR EXPANDED.

The increasing need to convert land to forestry and non-forestry development throughout Sumatra is another effect of the rapid economic growth and human population in this area and has initiated most human wildlife conflicts including human-tiger conflicts. The situation worsens as forest residents demonstrate little awareness and concern about the importance of wildlife conservation, and local law enforcement on the matter is undeniably weak, particularly in the case of the Sumatran tiger. In addition to conservation areas, the Sumatran tiger is found in other areas such as conversion forests or production forests within the Industrial Forest Area (HTI) areas and Natural Forest Concessions (HPH) areas. The most recent study indicates that the Sumatran tiger populations living outside of conservation forests are relatively large but these tigers are not under protection of forest police, and will face greater threats from hunting activities and possibly more human-tiger conflict.

3.1.1. Recommendation

- Strengthen anti-poaching and illegal trade laws and increase the capacity of Ministry of Forestry and relevant law enforcement authorities to enforce laws against Sumatran tiger hunting and illegal trade.
- Develop the infrastructure aimed at preventing hunting and trading of the Sumatran tiger in order to improve the Ministry of Forestry's capacity to reduce the rate of the Sumatran tiger

population decrease.

- Develop and increase connectivity of the Sumatran tiger's main habitats by creating corridors that expand the range area of the Sumatran tiger, and advance the legal status of such areas.
- Develop a long term monitoring program to be updated every three years that includes the Sumatran tiger's population status and ecology, habitat availability and the prevalence of threats facing the species both inside and outside of conservation areas throughout Sumatra.
- Develop range of conflict mitigation and management techniques that is acceptable to all stakeholders, including relocation, translocation and choosing areas for release into natural wild habitats.
- Develop and use tiger population restocking and translocation techniques to conserve the genetic diversity of Sumatran tiger populations located in critical habitats, in order to avoid the loss of genetic variation caused by genetic drift and inbreeding.
- Develop tiger shelters managed by communities, Non Government Organizations (NGO) and land owners to protect tiger populations living outside conservation areas.

3.1.2. Action Plan

- Perform surveys tiger conservation landscapes throughout Sumatra every three years to assess the status and distribution of the Sumatran tiger populations they contain. Employ an agreed common methodology for all of these surveys.
- Identify, research and monitor Sumatran tiger population, distribution, range area and habitat carrying capacity for tiger and prey outside tiger conservation areas, especially in forestry industry and mining concessions. Perform this activity periodically to evaluate how effectively the conservation management infrastructure is working. This activity will provide

inputs for the conservation priority for the Tiger Conservation Landscape (TCL) document.

- Identify and choose at least two sanctuaries that represent two types of Sumatran tiger habitats. These natural wildlife sanctuaries shall be developed to accommodate and receive live tigers that have been confiscated as a result of illegal possession, conflict or illegal hunting. This will prevent mature wild tigers from being delivered to ex-situ conservation agencies.
- Improve cooperation with POLRI and LIPI forensic laboratories in investigatory activities and/or in support of legal actions regarding protected species, wildlife, crime, and especially with respect to the Sumatran tiger.
- Improve the habitat protection and connectivity of the Sumatran tiger populations living outside conservation forests via: 1) the central government issuing protection status to a relatively large area that has high conservation value for the Sumatran tiger; 2) the local government issuing special protection status to a relatively narrow but essential area, or 3) land lease/purchase.
- Establish and replicate Species Protection Unit (SPU) teams in each Sumatran province, regency, and municipality where Sumatran tigers occur. The SPU members include Forest Police, LSM and community members. In addition, police liaison officers from every province and regency throughout Sumatra will be required.
- Establish a commission for illegal trading at the central government level that can be activated at any time whenever required to investigate and follow up special law enforcement operations that cannot be handled by the local authorities, especially large-scale trading syndicates and national distributors, buyers and exporters.
- Establish an ad-hoc conflict solution task force at the provincial level to assist and facilitate human-tiger conflict mitigation, especially in areas with high historically

human-tiger conflict history (Jambi, Riau, West Sumatra, Nanggroe Aceh Darussalam).

3.2. Infrastructure Established And The Ministry Of Forestry's Capacity To Monitor And Evaluate The Conservation Of The Sumatran Tiger And Its Prey Increased.

The most intensive studies of population status and threats facing Sumatran large mammals are carried out mostly in conservation areas, with less attentions given to other land uses outside of these areas. With only partial and incomprehensive information available on the status and threats facing Sumatran large mammals, the capacity of government, conservation activists and donors to evaluate conservation intervention effects and manage decisions is weak. It is crucial that the government have adequate capacity to thoroughly evaluate the outcome of conservation efforts so that it can effectively meet its obligation to conserve resources.

However, capacity to provide comprehensive information on population status and threat level to large mammals throughout Sumatra is not currently available. Technical and institutional capacities are inconsistent; human and financial resources are unevenly distributed; conservation priorities vary among the Sumatran tiger conservation activists. It will therefore be necessary to synchronize our technical and financial resources and also our priorities.

3.2.1. Recommendation

- Improve capacity and strengthen the infrastructure local management authorities to monitor the population status and distribution of the Sumatran tiger in their region.
- Develop infrastructure and capacity by organizing training modules and an exchange program between tiger conservation teams. These mechanisms shall be managed by each conservation agency, NGO and community group.
- Develop an integrated center of information on the status of the Sumatran tiger that is accessible to all Sumatran tiger

conservation communities. The information center shall be managed by PHKA and will provide updated information on the status of Sumatran tiger conservation in a timeseries database.

- Prepare Sumatran tiger conservation management plans for each of the Sumatran tiger landscapes based on the national conservation strategy and action plan.

3.2.2. Action Plan

- Develop standardized survey methodological design and protocols for surveys of the Sumatran tiger and prey species populations and distribution. The protocol should include guidelines for survey design, basic data collection and data reporting.
- Map the concession areas and comprehensively review the status of the Sumatran tiger population occupying them as well as the corresponding ecological factors in order to identify possible areas of connectivity vital for conservation of the Sumatran tiger. Then, decide on the priority areas of Sumatran tiger conservation outside the concession areas.
- Develop a map of Sumatran tigers and large mammals that will be updated every three years, based on periodic surveys on the populations, their distribution and availability of habitats for tigers and other large mammals on Sumatra. The map shall serve as a national living document to evaluate conservation intervention performance.
- Perform periodic technical trainings on Sumatran tiger conservation and monitoring methods, comparison studies for PHKA officers in the Technical Executive Units (UPT), and provide apprentice programs in international conservation agencies and exchange/comparison studies for officers within UPTs. The training programs may be assigned to international agencies and other competent organizations.
- Improve staff capacity of PHKA and relevant institutions through special and integrated training/education programs, especially related to investigation methods, identification of wild animals and their body parts, as well as strategies for capture, patrol and the handling of legal cases.
- Establish a standard operating procedure (SOP) at the national level that investigates and provides intelligence in accordance with legal standards that follow the standards of the police department.
- Prepare and disseminate conflict mitigation protocols to each regency/municipality, conduct trainings in human-tiger conflict mitigation techniques for UPT PHKA officers and other relevant institutions, and develop conflict mitigation infrastructure in each UPT PHKA with a history of high human-tiger conflict.
- Establish protocols of best management practices for tiger conservation specifically designed for major industrial land uses, such as oil palm, Industrial Forest Areas, Natural Forest Concessions, oil and gas, and coffee and rubber.
- Develop training modules for Sumatran tiger conservation and conduct periodic trainings and exchanges between Sumatran tiger conservation practitioners from Sumatra's conservation organizations.
- Conduct a workshop and establish a national database that monitors the status and distribution of the Sumatran tiger and its prey. The database shall be online and realtime and will also accommodate an offline database.

3.3. Sumatran Tiger Management Outside Conservation Areas Reinforced With Support From Relevant Parties In Order To Encourage The Conservation Of The Sumatran Tiger And Its Habitat At Both Regional And National Levels

In general, many regional governments, communities, and forestry and mining concession holders share the opinion that conservation areas and wildlife hinder economic development and business opportunities. Conversely, many conservation activists are concerned that business-oriented regional policies cause the destruction of forests and the loss of natural diversity. In this era of democratization and decentralization, conservation and

development must strive to strike a win-win balance. Sumatran tiger conservation should accommodate stakeholder aspirations in order to exist in accord with development agendas, especially at the regional level.

3.3.1. Recommendation

- Develop mutual visions and missions and encourage stakeholders to align strategies and action plans for Sumatran tiger conservation with the regional development plan, especially in relation to forestry and non-forestry industry practices.
- Establish regional partnerships and encourage active participation of forestry and non-forestry businesses in the management of Sumatran tiger populations, especially in concession areas that overlap with tiger habitats.
- Develop intersectoral cooperation at the national level along with inter-regional involvement from Government and larger enterprises that operate in Sumatra in order to help conserve the Sumatran tiger.

3.3.2. Action Plan

- Establish common visions, missions and interests among Sumatran tiger conservation activists, regional governments and concession holders, particularly in the forestry and agricultural sectors.
- Perform workshops on Sumatran tiger conservation management and prepare action plans at the regional level. The purpose of the workshops is to translate and integrate the strategic plan into the regional development agendas and vice versa. The workshops can be assigned to operating agencies in relevant regions.
- Develop partnership programs for Sumatran tiger conservation among businesses, government, NGOs, and academic institutions at regional levels and provide appropriate supervision by regional steering committees .
- Reinforce the regulation framework and

applicable laws through: 1) strengthening regulation reinforcement and law enforcement for certain industries, 2) integrating the Sumatran tiger conservation into the national development planning (BAPPENAS), 3) integrating conservation of the Sumatran tiger into regional development planning (BAPPEDA) and 4) integrating the ecological aspects of Sumatran tiger conservation into the criteria of environment impact analysis (BAPEDALDA).

- Strengthen law enforcement outside conservation areas through improving BKSDA efficiency as the single authority responsible for Sumatran tiger conservation in these areas. It may also be beneficial to involve industry security forces in some instances.

3.4. Working Network And Communication Infrastructure Established; Community Groups Committed To The Conservation Of The Sumatran Tiger Established

Since the issuance of the Indonesian Tiger Strategic and Action Plan in 1994, various organizations have worked on their own or jointly to save the Sumatran tiger. However, these groups have not been as effective as they could have been as they lacked an integrated vision and did not have guidelines to maximize the impact of their outputs. Further consolidation and coordination is required to achieve our conservation objectives.

Limited national financial resources pose a common obstacle to wildlife conservation, especially that of the Sumatran tiger. International support, both financial and technical, is definitely required to conserve the Sumatran tiger.

3.4.1. Recommendation

- Develop a powerful communication and partnership network, both at national and international levels that is able to improve cooperation in the exchange of information and the empowerment of local and national groups striving to conserve the Sumatran tiger.
- Develop an integrated and effective

surveillance mechanism that involves the regional government, PHKA, businesses and the community in order to track the performance of forestry and nonforestry industries in their exploitation and management of concession areas that overlap with Sumatran tiger habitats.

- Develop a sustainable funding mechanism to support short term and long term priority activities for Sumatran tiger conservation.
- Develop integrated, sustainable, and measurable education and community awareness programs.

3.4.2. Action Plan

- Establish a Communication Forum for Sumatran tiger Conservation (FKKHS), or Cats Specialist Group Indonesia. The forum shall act for and represent the Sumatran tiger conservation community in Indonesia and develop regional and international networks. Membership will include experts and tiger observers in Indonesia and overseas. The Forum shall cooperate with and provide recommendations to the Ministry of Forestry to ensure high quality, appropriate implementation of conservation strategies and action plans.
- Establish a Consortium for the Conservation of The Sumatran tiger. The Consortium shall cooperate with FKKHS to develop a funding mechanism and fund raising at national and international levels to support a long term the Sumatran tiger conservation program.
- Campaign for tiger conservation in all provinces in Sumatra and other regions, including Java and Bali, particularly with respect to law enforcement. Disseminate relevant laws and regulations on wildlife to the regional government apparatus, and law enforcement apparatus such as the courts, police, attorney's offices, quarantine, customs offices and the Indonesian National Armed Forces.
- Develop an effective and comprehensive education and awareness program. Conservation program field executives shall have the skill to train and interact with communities to translate the tiger conservation strategies.
- Establish a watch dog supervisory body of Sumatran tiger conservation in industry areas that functions, in general, to:
 - 1) identify and publicize industries that violate laws and regulations; and
 - 2) identify and publicize industries that promote environment friendly practices and actively participate in the Sumatran tiger conservation partnership.
- Establish independent funding to ensure the sustainability of regular forest patrols and rapid reaction units for conflict response by including the operational expenses in the government budget. The funding could be sourced from the private sector or from alternative funding mechanisms such as avoided deforestation schemes and/or via DNS.
- Develop international collaborations to stop transnational trade of wildlife, body parts and derivative products, especially aimed at intelligence sector, law enforcement campaigns and operations that involve PHKA, Interpol, ASEAN WEN and national and international NGOs.

3.5. A Useful And Sustainable Ex-situ Conservation Program Established In Accord With In-situ Sumatran Tiger Preservation Efforts

Tigers that attack humans and livestock are killed or captured and taken to zoos nearby without consideration for how such a response impacts the Sumatran tiger population in the wild. In addition, exsitu conservation policies made in the past are not adequate to resolve the problems of in-situ conservation that we face today. One of the strategic issues is that stakeholders do not adhere to the ex-situ conservation action plan as stipulated in the Strategy and Action Plan for Sumatran Tiger Conservation 1994 (Tilson et al. 1994) and the Indonesian Sumatran Tiger Masterplan (Darjadi et al. 1998). On the other hand, the breeding programs at institutions dealing with exsitu conservation can be said to be quite successful. To date, there are approximately 371 Sumatran tigers in captivity both domestically and abroad. One problem conservationists face today is the absence of policies that specifically regulate the use of breeding results for the recovery of Sumatran

tigers in the wild. In addition, there is a lack of communication among activists of ex-situ conservation. Furthermore, management of breeding techniques and treatment of tigers in many institutions that specialize in ex-situ conservation are still inadequate.

3.5.1.Recommendations

Align the action plan of ex-situ conservation as stipulated in the Strategy and Action Plan for Sumatran Tiger Conservation 1994 (Tilson *et al.* 1994) and the Indonesian Sumatran Tiger Masterplan (Darjadi *et al.* 1998) documents with the updated Strategy and Action Plan for Sumatran Tiger Conservation 2007-2017.

3.5.2. Action Plan

- Review and revise the action plan of exsitu conservation as stipulated in the Strategy and Action Plan for Sumatran Tiger Conservation 1994 (Tilson *et al.* 1994) and Indonesian Sumatran Tiger Masterplan

(Darjadi *et al.* 1998) with the updated Strategy and Action Plan for Sumatran Tiger Conservation 2007 to 2017

- Implement the revised action plan of conservation ex-situ as stipulated in the Strategy document and Action Plan for Sumatran Tiger Conservation 1994 (Tilson *et al.* 1994) and Indonesian Sumatran tiger Masterplan, (Darjadi *et al.* 1998) in all institutions specializing in ex-situ conservation of the Sumatran tiger.
- Seek funding and technical management support, especially in the conservation institutions which do not meet minimum standards yet.
- Scientifically assess possibilities for the implementation of conservation loan/ breeding loan, and reintroduction programs.

Table 8. Stages of evaluation of the expected results of action plan.

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
3.1. Sumatran tiger population and all of its landscapes in Sumatra are recovered and can be maintained with the support of all stakeholders.	Biological and ecological population size of Sumatran tiger is in ideal number and its habitat and roaming areas are not reduced, but possibly even increased.	<ul style="list-style-type: none"> - Population and distribution of Sumatran tigers across its landscapes in Sumatra are identified and mapped accurately. - Two special protection areas for Sumatran tiger (sanctuaries) are identified. - Memorandum of cooperation with the forensic laboratory of LIPI and police. - At least two SPUs (Special Protection Unit) are formed in the main habitat of Sumatran tigers. - Commissions on anti-illegal wildlife trade are formed and work effectively. - The task force of human - Sumatran tiger conflict mitigation is formed and supported by adequate infrastructure. 	<ul style="list-style-type: none"> - Population and distribution of Sumatran tigers across its landscapes in Sumatra are identified, accurately mapped and updated. - Cooperation on forensic with LIPI and Police operates effectively. - Strengthen the protection of Sumatran tiger habitat and corridors connecting its landscapes and ecological functions and get full support from stakeholders. - Two Species Protection Units (SPU) are newly formed in the main habitat of Sumatran tiger and work effectively with support from stakeholders. - Commission on anti-illegal wildlife trade works effectively. - Task force on Conflict mitigation works effectively. 	<ul style="list-style-type: none"> - Population and distribution of Sumatran tigers across its landscapes in Sumatra are identified, accurately mapped and updated. - The Sumatran tiger population and all of its landscapes in Sumatra are recovered and can be maintained and increased with support of all stakeholders. - Cooperation on forensics with LIPI and Police run effectively. - Strengthen the protection of Sumatran tiger habitat and connectivity areas having high conservation value that connect main areas for Sumatran tiger conservation. - Two new SPUs formed in all Sumatran tiger habitats. - Commissions on anti-illegal wildlife trade are formed and work effectively. - Task force on Conflict mitigation works effectively.

Table 8. Continuation...

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
3.2. Infrastructure is built and capacity for the Forestry Department to monitor and evaluate Sumatran tiger species conservation efforts is increased.	Forestry Department and its partners are able to conduct performance monitoring of Sumatran tiger conservation effectively.	<ul style="list-style-type: none"> - Document of standardized survey methods and protocol on population survey and distribution of Sumatran tigers are available and used by stakeholders. - Map of adjacent or overlapping forest concession and non-forest areas with Sumatran tiger landscapes is available in adequate scale and used by stakeholders. - Atlas of Sumatran tigers and their preys is available in adequate scale and in the form of spatial and non-spatial database and can be accessed online. - Document of training modules on Sumatran tiger conservation is available and used effectively in three provinces in Sumatra. - Capacity building program on Sumatran tiger conservation for PHKA staff and partners is established and run effectively. - Document of SOP on investigation and intelligence of violations or illegal use of Sumatran tiger is available and in use. - Protocol of human-tiger conflict mitigation is socialized and used effectively throughout all districts in Sumatra where Sumatran tigers live. 	<ul style="list-style-type: none"> - Map of adjacent or overlapping forest concession and non-forest areas with Sumatran tiger landscapes is available in adequate scale and used by stakeholders. - Atlas of Sumatran tiger and its prey as well as online database work effectively and are updated regularly to improve the effectiveness of law enforcement efforts. - Capacity building program on Sumatran tiger conservation for PHKA staff and partners works effectively. - Protocol on best management practices is implemented by industries. - Document of training modules on Sumatran tiger conservation is available and used effectively in six provinces in Sumatra. - Document of protocol on Sumatran tiger breeding program is available and used effectively by ex-situ conservation institutions. 	<ul style="list-style-type: none"> - Map of adjacent or overlapping forest concession and non-forest areas with Sumatran tiger landscapes is available in adequate scale and used by stakeholders. - Atlas of Sumatran tiger and its prey as well as online database work effectively and are updated regularly to improve the effectiveness of law enforcement efforts. - Capacity building program on Sumatran tiger conservation for PHKA staff and partners work effectively. - Protocol on best management practices is implemented by industries. - Document of training modules on Sumatran Tiger conservation is available and used effectively in all provinces in Sumatra. - Document of protocol on Sumatran tiger breeding program is available and used effectively by ex-situ conservation institutions.

Table 8. Continuation...

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
		<ul style="list-style-type: none"> - Documents of protocol on best management practices for each type of industry is available. - Document of protocol on Sumatran tiger breeding program is available and used effectively by ex-situ conservation institutions. 		
3.3. There is strengthened Sumatran tiger management outside conservation areas and involvement of parties to support Sumatran tiger conservation and its habitat both at regional and national levels.	Sumatran tiger conservation outside conservation areas receives full support from all stakeholders.	<ul style="list-style-type: none"> - Sumatran tiger conservation agenda is integrated into the regional development agenda in three provinces in Sumatra. - Partnership program on Sumatran tiger conservation in its landscapes both in forest concession and non-forestry areas is established in three provinces in Sumatra. - The parties responsible for the Sumatran tiger population outside conservation areas work effectively. 	<ul style="list-style-type: none"> - Sumatran tiger conservation agenda is integrated into the regional development agenda in at least three provinces in Sumatra. - Partnership program on Sumatran tiger conservation in its landscapes both in forest concession and non-forestry areas is established in six provinces in Sumatra. - The parties responsible for the Sumatran tiger population outside conservation areas work effectively. 	<ul style="list-style-type: none"> - Sumatran tiger conservation agenda is integrated into the regional development agenda in at least eight provinces in Sumatra. - Partnership program on Sumatran tiger conservation in its landscapes both in forest concession and non-forestry areas is established in eight provinces in Sumatra. - The parties responsible for the Sumatran tiger population outside conservation areas work effectively.
3.4. Network and communication infrastructure as well as community groups concerned about and responsible for the sustainability of Sumatran tiger are established.	Indonesian Sumatran tiger conservation community runs well and is affiliated with the global tiger conservation network.	<ul style="list-style-type: none"> - Sumatran tiger Conservation Communication Forum (FKKHS) and Sumatran tiger national network are established as effective partners of the government. - The Sumatran tiger conservation consortium is established and functioning. - The Sumatran tiger conservation, education and community awareness program is implemented and socialized. 	<ul style="list-style-type: none"> - FKHHS functions properly and becomes an effective government partner. - The Sumatran tiger conservation, education and community awareness program is implemented and socialized. - Sumatran tiger conservation supervisory agencies in industrial estates work effectively. - Tiger fundraising starts to work. 	<ul style="list-style-type: none"> - FKHHS functions properly and becomes an effective government partner. - The Sumatran tiger conservation, education and community awareness program is implemented and socialized. - Sumatran tiger conservation supervisory agencies in industrial estates work effectively.

Table 8. Continuation...

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
3.5. An effective ex-situ Sumatran tiger conservation program is established and supportive to the in-situ conservation programs.	Ex-situ Sumatran tiger conservation program effectively supports in-situ conservation program.	<ul style="list-style-type: none"> - Sumatran tiger conservation supervisory agencies in industrial estates are established and operational. - Eradication of cross country illegal trade on Sumatran tiger by PHKA has the full support of parties. 	<ul style="list-style-type: none"> - Efforts to eradicate illegal trade in Sumatran tiger products run effectively and have the support of stakeholders. 	<ul style="list-style-type: none"> - Sumatran tiger conservation fund accumulates as a trust fund and is used efficiently and effectively. - Efforts to eradicate illegal trade in Sumatran tiger products run effectively and have the support of stakeholders.
		<ul style="list-style-type: none"> - Revise the action plan and master plan of ex-situ Sumatran tiger conservation. - Protocol on ex-situ conservation program is carried out by 50% conservation institutions owning Sumatran tiger. - Study is produced on reintroducing the Sumatran tiger to existing habitat. 	<ul style="list-style-type: none"> - Protocol on ex-situ conservation program is carried out by all conservation institutions owning Sumatran tiger. - The scientific study on conservation / breeding loan scheme is available and Sumatran tiger reintroduction begins. 	<ul style="list-style-type: none"> - Protocol on ex-situ conservation program is carried out by all conservation institutions owning Sumatran tiger. - Conservation / breeding loan scheme develops (based on the study) and Sumatran tiger reintroduction can be carried out effectively.

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Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

NATIONAL TIGER ACTION PLAN FOR LAO PDR 2010 - 2020



Ministry of Agriculture and Forestry
Department of Forestry
Division of Forest Resource Conservation
Government of Lao PDR

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Citation:

Department of Forestry,
Division of Forest Resource Conservation. 2010.
National Tiger Action Plan for Lao PDR.
Vientiane, Lao PDR.

Cover Photograph:

Tiger photo captured by infra-red camera trap in
the Nam Et-Phou Louy National Protected Area, Houaphan Province
in March 2003 (© NEPL NPA/WCS-Lao PDR).

National Tiger Action Plan for Lao PDR 2010-2020

Division of Forest Resource Conservation
Department of Forestry
Ministry of Agriculture and Forestry
Government of Lao PDR

In collaboration with the

Wildlife Conservation Society – Lao PDR

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LIST OF ACRONYMS

CBD	-	Convention on Biodiversity
CITES	-	Convention on International Trade in Endangered Species
CTD	-	Camera trap day
DAFO	-	District Agriculture and Forestry Office
DAP	-	Dong Ampham NPA
DHS	-	Dong Huasao NPA
DKT	-	Dong Khanthung
DPV	-	Dong Phouvieng NPA
GOL	-	Government of Lao PDR
HNN	-	Hin Nam Nor NPA
IP	-	Independent photos
KML	-	Khammuoan Limestone NPA
LLV	-	Lavin-Laveung PPA
LNTA	-	Lao National Tourism Administration
NEPL	-	Nam Et-Phou Loeuy NPA
NHA	-	Nam Ha NPA
NKD	-	Nam Kading NPA
NKG	-	Nam Kong PPA
NKN	-	Nam Kan NPA
NNT	-	Nakai-Nam Theun NPA
NPA	-	National Protected Area
NPU	-	Nam Phoun (Poui) NPA
NXM	-	Nam Xam NPA
PAFO	-	Provincial Agriculture and Forestry Office
PCV	-	Phou Chomvoy PPA
PDD	-	Phou Dendin NPA
PKK	-	Phou Khao Khouay NPA
PKT PNPA	-	Phou Kathong Proposed NPA
PPA	-	Provincial Protected Area
PPN	-	Phou Phanang NPA
PXH	-	Phou Xanghe NPA
PXT	-	Phou Xiengthong NPA
TCL	-	Tiger Conservation Landscape
TPZ	-	Totally protected zone
XBN	-	Xe Bangnouan NPA
XKP	-	Xe Khamphor
XPN	-	Xe Pian NPA
XSP	-	Xe Sap NPA

GLOSSARY OF TERMS

Totally Protected Zone (TPZ). Core breeding area for tigers and other wildlife where human activity is prohibited

Controlled Use Zone (or Managed Zone). Area where sustainable use of natural resources by local communities for subsistence is allowed

Corridor. Habitat connectivity within and between protected areas that allow movement or dispersal of tigers and prey within/between TCLs

Convention on Trade of Endangered Species (CITES). An international agreement between governments to ensure that international trade in specimens of wild plants and animals does not threaten their survival

Convention on Biological Diversity (CBD). An international treaty to sustain the diversity of life on Earth

MIST (Monitoring Enforcement System). A database tool used to track effectiveness of law enforcement efforts, threats, and trend of illegal activities .

Category 1 Species (2007 Wildlife Law). Species that are considered to be rare, highly threatened to extinction, high economic value, significant to socioeconomic development, environment protection, scientific research. Hunting is totally prohibited.

Category 2 Species (2007 Wildlife Law). Species that are significant to socio-economic development, environment protection, local livelihood and scientific research. Hunting outside the TPZ for subsistence is occasionally allowed, but not for trade.

Category 3 Species (2007 Wildlife Law). Species that are common in nature and have a high reproductive rate. They are also highly significant to socioeconomic development, environmental protection, and scientific research. Hunting for subsistence is occasionally allowed, but not for trade.

Tiger prey. Any wild species, often ungulates, that are hunted by tigers for food

National Protected Area (NPA). National Conservation Forest set aside for the purpose of conserving the nature, preserving fauna and flora, forest ecosystem and other valuable sites of natural, historical, cultural, tourism, environmental, educational and scientific importance.

Provincial Protected Area (PPA). Provincial Conservation Forest set aside for the purpose of conserving the nature, preserving fauna and flora, forest ecosystem and other valuable sites of natural, historical, cultural, tourism, environmental, educational and scientific importance.

Priority Source Site. An area embedded within a Tiger Conservation Landscape (TCL) that currently has confirmed or likely reports of tiger in a designated protected area, which also has the potential to serve as a Totally Protected Zone (TPZ) within a designated Protected Area

Tiger Conservation Landscape: area where there is sufficient habitat for at least five tigers and where tigers have been confirmed for the last 10 years

LIST OF CONTRIBUTING AGENCIES

- CITES Scientific Authority, Science and Technology Agency, Prime Minister's Office
- Department of Customs, Ministry of Finance
- Department of Forest Inspection, MAF
- Department of Livestock and Fisheries, MAF
- Department of Planning and Investment, Ministry of Planning and Investment
- Department of Planning, MAF
- Division of Forest Resources Conservation, Department of Forestry, MAF
- Faculty of Forestry, National University
- Faculty of Science, National University
- Forest Inventory, Department of Forestry, MAF
- Houaphan Provincial Agriculture and Forestry Office (PAFO)
- International Union for Conservation of Nature – Lao PDR Country Program (IUCN Lao PDR)
- Lao Biodiversity Association
- Luang Prabang Provincial Agriculture and Forestry Office (PAFO)
- Ministry of Agriculture and Forestry (MAF)
- Muang ThongTiger Farm
- National Protected Areas - 23 representatives
- Phou Bia Mining Company
- The Wildlife Conservation Society-Lao Program (WCS-Lao PDR)
- The World Bank – Lao PDR
- Viengkham District Agriculture and Forestry Office (DAFO), Luang Prabang province
- Viengthong District Agriculture and Forestry Office (DAFO), Houaphan province
- World Wide Fund for Nature- Lao PDR Program (WWF-Laos)

MINISTER'S MESSAGE

Lao's People Democratic Republic (hereafter Lao PDR), is rich in natural resources. Most notable is that much of the land is still covered by forest – which we literally describe as “green gold”. Given its distinctive location at the heart of Indochina, the country contains a wide variety of habitats that support a diversity of fauna and flora, and some of them are rare and endemic to Lao PDR.

The tiger is one of the ecologically important species found in the forest ecosystem of Lao PDR. In the past, tigers were widely distributed in forests throughout the country, and their presence served as an indicator of healthy forests with abundant wildlife populations. Today, tigers across Lao PDR are endangered and on the brink of extinction due to several factors, but the most serious of these are poaching and habitat loss. The potential loss of tiger populations in Lao PDR is an ominous signal that Lao biodiversity, including the nation's forests and wildlife, is also in decline and in danger of being lost.

Can we imagine what a shame it would be if our forests no longer contain tigers? Isn't this the same as if our rivers no longer contain fish?. At first, we may think the simple answers to these questions are that the forest is dispensable, although we also know that thousands of Lao citizens have depended upon on these forests for centuries. Therefore, we, in this generation, need to act now to not let the stripes - that are so powerful, magnificent, and valuable to the forest ecosystem of Lao PDR - become extinct. In national development strategies, the government of Lao PDR emphasizes that the maintenance of healthy and productive forest ecosystems and the sustainable use of natural resources are key to achieving the nation's goals for sustainable economic growth and poverty eradication, and to raise the country out from its least-developed nation status by 2020. These principles are based on the fact that more than 80% of nation's citizens still live in rural areas and depend on biological resources for daily subsistence.

It is a great honor for the government of Lao PDR to work together with all citizens and organizations, including government agencies, the private sector, NGOs, scientists, and local communities to save an endangered species, and also to support management for sustainable use of natural resources to secure the future of the country through sustainable development. Along with this National Tiger Action Plan (NTAP), other important instruments that are already in place to support the NTAP include the national Wildlife Law, the Forestry Law, and several national strategies, including the Biodiversity Strategy and Action Plan, and the Forest Strategy to 2020. However, these instruments mean nothing if they are not implemented effectively. Thus, support and cooperation from all agencies is essential if we are to be successful. The government of Lao PDR is committed to the goal of securing wild tigers and their habitat for future generations. With the development of this National Tiger Action Plan we have taken the first step, and by working together we will achieve our goal for the benefit of our future generations.

Minister of Agriculture and Forestry

MESSAGE FROM THE DIRECTOR OF THE DEPARTMENT OF FORESTRY

Tiger, a flagship of the Asian forest ecosystem, is facing an extremely high risk of extinction in the wild. The global population has currently dropped below 3,500 individuals and occupies only 7% of their historical range. There is a growing concern among conservation communities as well as governments that tigers will be gone within the next few years. In response, the global communities, including Lao PDR, have worked together hand in hand to identify appropriate measures to address the problems, and establish targets to increase tiger numbers. If a powerful and magnificent animal like tiger becomes extinct in the wild, nobody knows what will be happen to this world. However, what we do know at present is that the world is now facing more frequent and extreme natural disasters due to climate change.

Over the past decades, the government of Lao PDR has taken important steps to conserve forests, wildlife and aquatic animals, which is treated as a national property because they provide a wide range of options for national economic activities and growth as well as local livelihoods. In 1993, the National Protected Area (NPA) system was legally established through the Prime Minister's degree No. 164, and there are 21 designated NPAs with a total area of 3.31 million ha, covering 14% of the country's total land area. Other protected areas include 57 provincial protected areas with an area of 932,000 ha (4% of total land area), and 144 district protected areas with an area of 500,000 ha (2% of total land area). This is considered as one of best protected area systems in Asia. After establishment of the NPA system, a series of regulations regarding wildlife protection and PA management were issued to guide how protected areas should be administered. In 2006, the government issued the first Forestry Law, followed by Wildlife Law in 2008. Moreover, the country is a signatory to several international treaties, most notable is the Convention on Biodiversity in 1996, and the Convention on International Trade of Endangered Species (CITES) in 2004.

The National Tiger Action Plan was developed in line with the national strategies for biodiversity and forestry to 2020, emphasizing protection of wildlife and its habitat, particularly tigers, and maintenance of connectivity amongst forest patches throughout the country. The Department of Forestry is a leading government agency with the mandate to ensure that forest resources and biodiversity are managed sustainably and contribute substantially to national development. I, director of the Forestry Department, call for support from all Lao citizens, to work together to ensure that all objectives and measurements identified in this plan are implemented successfully.

Director of Forestry Department

PREFACE

The Division of Forest Resources Conservation is a leading government agency, directly responsible for cooperation and coordination with concerned agencies to secure the management of national protected areas and conservation of aquatic animals and wildlife throughout the country. The tiger is a critically endangered species and legally designated in the list of Category I protected species in the National Wildlife Law. It is a top priority species in need of urgent conservation because it plays a key role in the natural forest ecosystem that contributes significantly to sustainable social, economic, and environmental benefits.

The National Tiger Action Plan was developed according to national principles outlined in the National Biodiversity Strategy to 2020, National Forestry Strategy to 2020, and National Growth and Poverty Eradication Strategy in order to identify appropriate management interventions that support integrated conservation and development to meet national development goals. The Plan was developed in consultation with various stakeholders including both national and local agencies as well as international NGOs who have worked in Lao PDR for many years. All the data on tigers was compiled from the field and interviews using internationally accepted approaches to use as baseline data for designing management objectives. All management interventions in this plan represent inputs or ideas of Lao people in association with national policies. I believe the National Tiger Action Plan will become an important tool to provide guidelines in conserving wildlife and its habitat, particularly tiger populations, and this plan will be successful if we continue working together to ensure that all activities are implemented.

Buaphan Phanthavong
Director of Division of Forest Resources Conservation
Department of Forestry

ACKNOWLEDGMENTS

We would like to express our sincere thanks to all participants of the National Tiger Action Plan workshop, held in the Department of Forestry from November 31st to December 1st 2010, for their active participation in a series of discussions and for sharing their experience and comments. Outputs from this workshop were compiled and led to development of the National Tiger Action Plan for Lao PDR.

This Tiger Action Plan was made possible by the generous financial support of the Global Tiger Initiative, World Bank, and other in-kind support from the Department of Forestry, Division of Forest Resource Conservation, and the Wildlife Conservation Society-Lao Program. Permission for holding the Tiger Action Plan workshop was granted by the Ministry of Agriculture and Forestry.

Many thanks to those who took part in the facilitation and compilation of the results of discussions held during the workshop, including staff from WCS-Lao PDR and DFRC. Logistic preparation for the workshop was coordinated by staff of the Division of Forest Resource Conservation.

Data on the current status of tigers across the country was compiled from standardized interviews with several wildlife conservation workers including NPA staff, foresters in District Agriculture and Forestry offices, and international NGO staff who are currently involved in field activities in various NPAs. Many thanks to all involved for sharing their knowledge and experience, and for their valuable time to answer our questions by phone.

EXECUTIVE SUMMARY

Within the last 100 years, tigers have rapidly declined in numbers and distribution across their range. Less than 3,500 animals now live in the wild, and occupy only 7% of their historical range across Asia²⁴. Tigers remain today in small isolated and fragmented patches of forest across 14 range countries. However, those small and isolated populations that survive at present are continually declining due to direct killing for their body parts, depletion of prey due to overhunting, persecution by angry farmers, and habitat loss and fragmentation.

In Lao PDR, tigers once occurred in most forested areas across the country, but today tigers have disappeared from most places of the country due to the direct killing of tigers, unsustainable over-harvesting of their prey, and loss of habitat. In the last five years, tigers have only been confirmed by camera trap photos and genetic analysis of scats from one location in the country, the Nam Et-Phou Louey National Protected Area, while the persistence of tigers in other parts of the country is provisional from reports of animal signs but the certainty of tiger presence remains unknown.

Despite this decline, the country still contains extensive habitat in several tiger conservation landscapes that could potentially harbor abundant prey populations, which could support viable tiger populations. Unfortunately, the status of the tiger and their prey populations in most of those landscapes remains uncertain. The paucity of information may be due to the fact that tigers have received little conservation attention in the past due to a lack of national capacity and financial support to monitor and manage tiger populations. However, the existing data compiled from field surveys during 1990s, recent research and monitoring in a few national protected areas and anecdotal reports from others suggest that wild tigers may still occur in many parts of Lao PDR, but at very low numbers.

Tigers are adaptable to a wide range of habitats. They can live wherever there is sufficient prey. So, despite the low abundance of tigers in the country at the present time, there are enormous opportunities to make the recovery and conservation of wild tiger populations possible in the Lao PDR. This recovery is possible because; i) the current human population is relatively low (22 people/km²) compared to neighboring tiger range countries, ii) over 47% of land is forested, of which 14% is established as 21 national protected areas that may serve as core source populations for tigers in the wider landscape, iii) major prey species still exist in most NPAs and landscapes, and iv) there are national policies that promote integration between biodiversity conservation and sustainable development, as well as the dissemination of national laws addressing wildlife protection.

At least eight Tiger Conservation Landscapes (TCLs) were identified throughout the country, and classified into four different classes. Class 1 TCLs have habitat to support at least 100 tigers, evidence of breeding, minimal-moderate levels of threat, and conservation measures are in place. The Class 1 TCLs cover a total area of 45,976 km², one is in the north east (25,978km²) and another is in the far-south of Laos (19,997 km²). Class 2 TCLs have sufficient habitat for 50 tigers, moderate levels of threat, and a basis for conservation that needs to be improved. A central TCL covers 36,318 km², and approximately 2,527 km² in the farsouthwest of the country. Two other classes of TCLs, Class 3 and Potential, have habitat to support some tigers, but have moderate-high levels of threats, and minimal conservation investment. Together, these TCLs cover approximately 40,460 km².

The primary objective of this National Tiger Action Plan (TAP) is to establish a focused strategy that lays out specific actions to be taken over the next 10 years (2010-2020) toward an overarching vision of securing healthy functioning forest ecosystems where viable tiger populations thrive forever. The overall goal for this plan is to elevate the existing tiger numbers to the level of viable breeding populations at source site, Nam Et-Phou Louey NPA, ensure connectivity between all TCLs, and obtain baseline data on tiger populations for all TCLs in Lao PDR by 2020. The plan was developed in line with existing national policies and legislative structure relevant to wildlife conservation. This framework includes the National Growth and Poverty Eradication Strategy, the National Forest Strategy, National Biodiversity Strategy and Action Plan, and the National Socio-Economic Development Plan, and National Wildlife Law of Lao PDR

The plan identifies seven objectives necessary toward achieving the goal, these include;

1. Increase public awareness and support for the recovery and conservation of wild tigers and their habitats
2. Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.
3. Increase and make effective the enforcement of national regulations and international conventions to stop killing of tigers and to regulate illegal harvest and trade of tiger prey.
4. Increase national cross-sectoral cooperation for the recovery and conservation of wild tigers and their habitats
5. Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries
6. Monitor and reduce human-tiger conflict in tiger conservation landscapes
7. Strengthen Protected Area organization, capacity and sustainable financing to effectively implement management activities to reduce threats to tigers and prey at priority source sites in Class 1 and 2 tiger conservation landscapes

The plan describes in detail the actions to be taken at different administrative levels in order to achieve each objective. At priority source sites, actions will mainly aim at reducing direct and indirect threats at sites that harbor tiger populations. At the landscape level, activities will aim at reducing threats occurring beyond the boundary of priority source site (i.e. protected area), which are spread across the landscape. At the national level, actions will focus on national policy or legislation, institutional capacity building, cross-sectoral cooperation and coordination, as well as technical and financial support. The success of this Tiger Action Plan will be possible with cooperation and involvement of all concerned stakeholders and agencies.

This plan will be implemented using an adaptive management approach, where monitoring is used to measure the impact of the interventions on the status of wild tigers, their prey and the threats they face. This approach allows lessons to be learned, and new knowledge and methods to adapt the design and implementation of interventions based on monitoring results. The success of this plan will be assessed by monitoring a measurable indicator of our conservation target, which is tiger occupancy across landscapes and the tiger population size or density in priority areas. The indicator of success will be assessed using sound science-based approaches. For example, capture-recapture analysis using tiger photos from camera traps or fecal DNA from tiger scat. In addition, tiger prey occupancy will be also used to determine the distribution and proportion of the habitat that is occupied prey species. An increase in the measurable indicator of tiger and prey abundance and distribution indicates the efficacy of conservation actions. To measure the achievement and effectiveness of conservation actions towards the objectives, we will use MIST (Management Information System) to evaluate if the conservation actions being implemented are effective at reducing key threats to wild tigers, their prey and habitats.

PART 1

STATUS OF TIGERS AND THEIR CONSERVATION IN LAO PDR

1. TIGER NATURAL HISTORY AND SIGNIFICANCE

1.1 Why conserve tigers?

Tiger is the largest mammalian predator in Asian tropical ecological systems. In their role as top predator, tigers serve as a flagship of Lao ecosystems. The presence of viable populations of top predators is indicative of the integrity of entire ecosystem; if lost it may generate the disruption of food web that affects the structure of ecological community^{1,2}. This means when tigers are removed, prey populations can explode leading to the decline of plant communities on which many species depend. Therefore, protection of the tiger symbolizes the protection of the nation's forest and biodiversity that is important to human well-being in the forms of "ecological services" provided by a healthy ecosystem.

Biodiversity, in addition to providing for food, fuel, shelter, medicine and livelihoods, provides the critical 'ecosystem services' on which socioeconomic development depends. These services include air and water purification, soil conservation, disease control, and reduced vulnerability to natural disasters such as floods, droughts, landslides and pest epidemics³. Biodiversity loss exacerbates poverty, and likewise, poverty is a major threat to biodiversity. So poverty reduction will only be achieved with the maintenance of the nation's biodiversity.

Unfortunately, tigers are in rapid decline throughout the forests of Laos; to reverse the declining trend of tigers is an obligation of Lao citizens. The Law on Aquatics and Wildlife states clearly that tigers are protected so hunting and trading in tigers/tiger parts is banned. As a signatory to the international Convention on International Trade in Endangered Species (CITES), the government of Lao PDR is committed to work with the international community to prevent the illegal trade of tigers.

1.2 Status of tigers at global, regional and national level

Tigers (*Panthera tigris*), once widely distributed across Asia, today have rapidly declined in number

and distribution (Figure 1). They are listed globally as "critically endangered" throughout their range⁴. They are restricted to small and isolated remnant forest patches covering only 7% of their historical range and their population status is uncertain across this distributional range (Figure 2). Of the eight tiger subspecies, three of them have been driven to extinction. They include the Caspian (*P.t. virgata*), the Bali (*P.t. balica*), and the Javan (*P.t. sondaica*). The Indochinese tiger (*P.t. corbetti*), was once widely distributed across Indochina, namely Laos, Vietnam, Cambodia, Thailand, Malaysia and Myanmar. The most well-known factors driving the decline of the current tiger population worldwide include direct poaching of tigers for commercial trade, depletion of prey due to over-hunting by humans, and habitat loss and fragmentation resulting from human land-use practices, and tigerhuman conflict.

1.3 Natural history

1.3.1 Description

Tiger is the world's largest cat and is a specialized predator that preys on ungulates – any animal with hooves such as bovids (wild cattle), deer, pigs and serow. Tigers have black stripes with the background coloration of reddish orange to reddish ochre and white under parts. The pelage of tropical tigers seems to be darker than those that occur in temperate habitat. The largest adult tigers weighing up to 300 kg are recorded in Far East Russia with the smallest adult tigers weighing about 140 kg in peninsular Malaysia and Indonesia. Tigers are greatly adaptable to a wide range of habitat types, even in altered landscape. The only prerequisites for survival of tigers are sufficient prey, plant cover, and water. Tigers live wherever there is an adequate supply of prey, and preferably large prey species^{7,8}.

1.3.2 Reproductive capability

A tigress comes into heat at intervals of around 3 to 9 weeks, and is receptive for about 3 to 6 days within that period. Gestation is short, only 103 days, and a litter usually has a range of 2 to 5 cubs. In nature, a tigress produces a new litter only after her young have

A Summary of Habitat and Population Trends

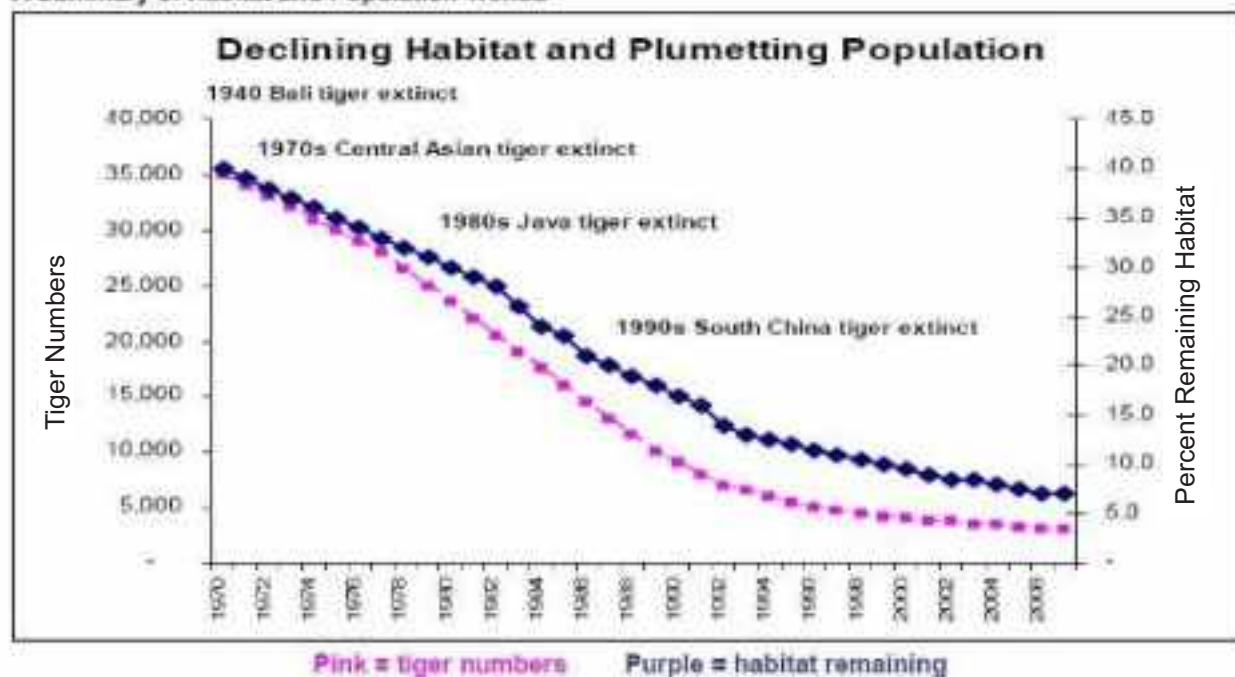


Figure 1. Trend in population status of tigers and habitat throughout its range (Source: Damania et al. 2008, www.wds.worldbank.org)

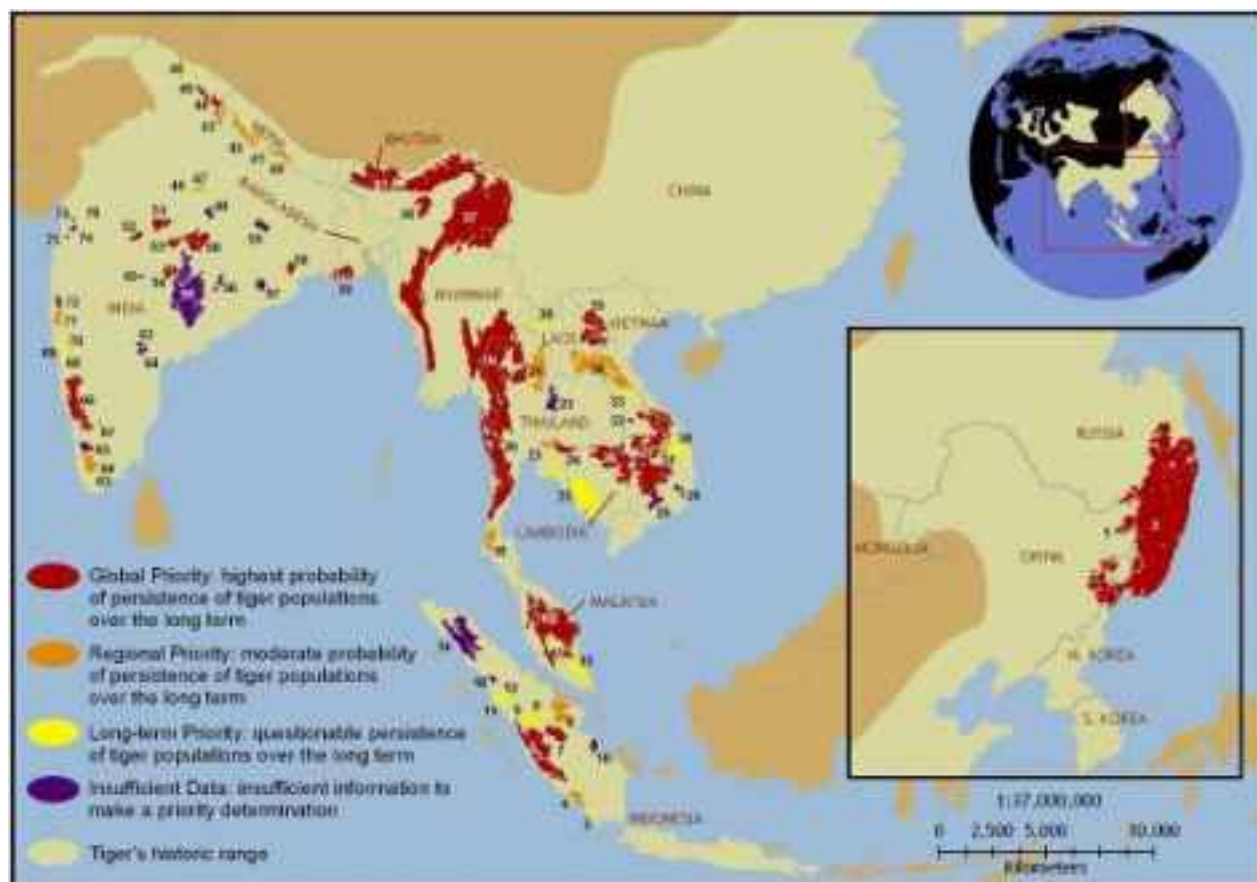


Figure 2. Map showing historical and current geographical distribution of tigers, and priority areas for tiger conservation. (Source: Dinerstein et al. 2006, www.savethetigerfund.org)

all dispersed, usually after 18-20 months. However, if a litter was lost after birth, the interval between litters is only 7-8 months. Females breed relatively early at about 3 years of age, whereas males breed at about 4 years of age. Reproductive lifespan is about 6 years for females and only 3 years for males in nature. Based on their high fecundity, tigers are able to recover rapidly from substantial losses in many places as long as the habitat and prey population remain intact⁹.

1.3.3 Feeding ecology

Tigers are a top predator in the ecosystem so almost any terrestrial vertebrates are potential prey for this animal. However, in order to survive and reproduce tigers need large prey to meet their energetic requirements¹⁰. Large ungulates, such as cervids (deer), make up nearly 75% of the biomass contribution to tiger diets in most parts of tiger range⁹. So, the depletion of large prey species is a critical threat to the long-term persistence of tigers¹⁰. A tigress consumes 5-6 kg of meat per day on average, which translates to 1,760 to 2,112 kg per year. If a mother with cubs, it would need 50% more food⁹. So to survive, an individual tiger needs to feed on a deer-sized prey approximately every week, consuming about 50 animals per year (Figure 3). Tigers crop about 10% of available prey base, which generally corresponds to the rate at which the prey population grows. Therefore, a total prey population of 500 deer-sized animals is needed to produce the 50 deer that a single tiger must consume annually to survive 12 (Figure 3).

In Laos, large prey (i.e. bovids and cervids) have been heavily hunted; muntjac and wild pig are now probably the key prey¹³. In the present situation, tigers are likely approaching to a hypothetical 'muntjac-only scenario', where small prey (<25kg) make up the majority of the tiger diet (Sunquist 1999). If this is the case, a tigress needs to kill one 20-kg muntjac every 2-3 days or 183-365 muntjacs/year. If feeding on wild pig only, an average male (120kg) and female (100kg), a tiger would consume annually at least 87 and 104 wild pigs respectively. Thus, the muntjac and wild pig population at a site would need to be several times larger than this to produce sufficient prey for a single individual tiger.

Figure 3. Tiger needs to feed on a deer-sized prey approximately every week, consuming about 50 animals per year. Tigers crop about 10% of available prey base, which generally correspond to the rate at which the prey population grows. Therefore, a prey population of 500 deer-sized animals is needed to support a single tiger (Source: Karanth and Nichols 2002)



1.3.4 Home range and territory

Tigers are solitary outside of the mating season, and when young are fully dependent on their mothers¹⁴. In order to meet their requisites or ecological requirements (i.e. food, water, and cover) tigers roam a large area that encompasses a wide range of habitat types or ecosystems. A male's home range is greater than the female, overlapping with several female territories (Figure 4). However, the size of territories or home range of tigers varies greatly with prey density. For example, a typical home range size for resident breeding females in prime areas in Nepal and India ranges in size from 10 to 15 km² where they support prey densities of around 25-50 ungulates per km² ^{14,15}, whereas in the Russian Far East that supports prey densities less than 5 ungulates per km², female tigers have territories that range in size from 200 to 400 km² ¹⁶.

Tigers move around within their home ranges for three main reasons; hunting, maintaining social communication with other tigers and avoiding the enemy they fear – i.e. man. Daily movement distance varies considerably with prey abundance. If prey is abundant, they move over short distances as probabilities of encountering prey are high. For example, in Chitawan National Park in Nepal, tigers move only 2-11 km as prey densities are high with 68 ungulates/km² ^{15,17}. If prey is scarce, tigers may travel for several kilometers. This is likely the case for tigers in much of Laos today. In these cases, tigers may travel far beyond the protected area boundaries, which can lead to tiger-human conflict, mainly due to

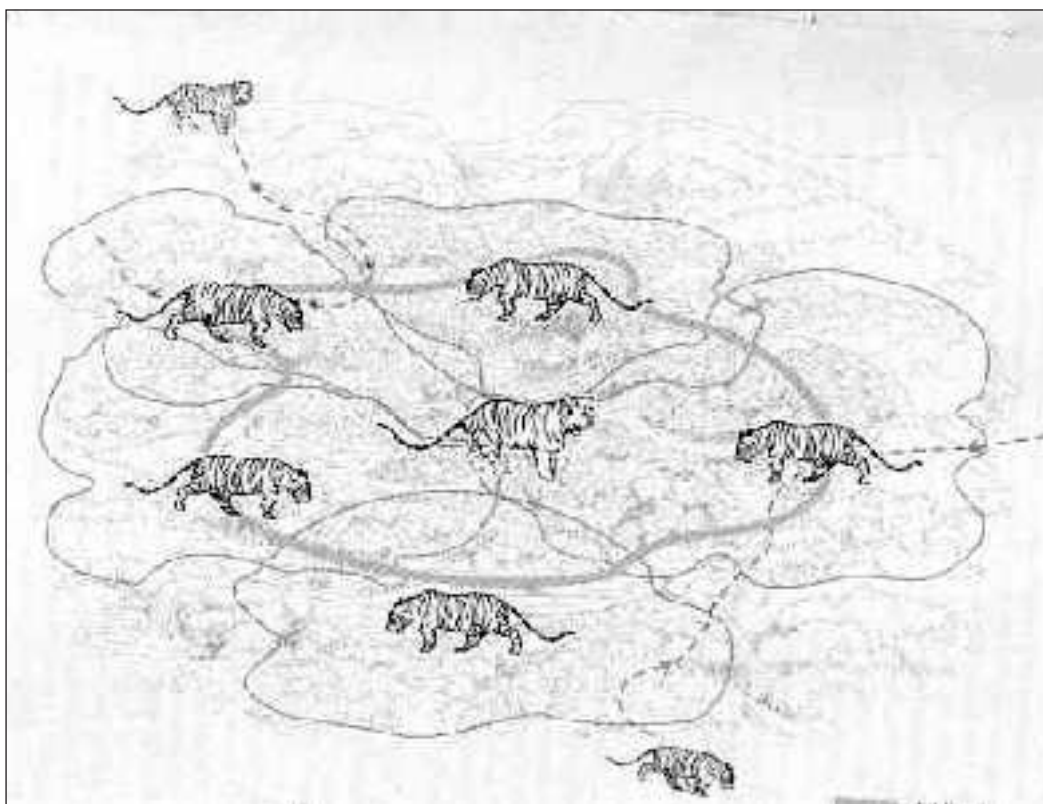


Figure 4. A male's home range is greater than the female, overlapping with several female territories (Source: Karanth and Nichols 2002).

tiger depredation of livestock or direct confrontation with humans¹⁸. If problems occur, tigers are often killed by humans in a revenge of loss of their property.

1.3.5 Population density and prey

Prey abundance is a critical determinant of tiger numbers. Tiger population densities are strongly correlated with prey densities. For example, in Kaziranga National Park in India with high prey densities of 68 animals per km², and associated biomass of 5,200 kg per km², tiger density is 17 tigers per 100 km²¹⁹. At Sikhote Alin Zapovednik Reserve in Russia where ungulate biomass is lower than 500 kg per km², tiger density is less than 1 tiger per 100 km². The situation in Russia is similar to tropical habitats such as Lao PDR where large prey has been heavily hunted out. For example, in Malaysia tiger density ranged from 1.1 to 1.9 tigers/km² with the estimated prey biomass of 270 to 430 kg/km²²⁰. In the Nam Et-Phou Louey National Protected Area in Laos, the estimated density of tigers was 0.2 to 0.7 tigers/100 km² and the crude estimate of prey was about 3.25 ungulates/km², of which muntjac and wild pig were the most common while detections of sambar and gaur were much lower¹³.

2. TRENDS IN TIGER DISTRIBUTION AND POPULATIONS IN LAO PDR

2.1 Past records (to 2005)

2.1.1 Sources of data and methods for past records

Historical records of tigers before 2005 were mainly derived from existing reports for the following periods of time:

1988-1993. Salter 1993²¹ analyzed village questionnaire data on wildlife distribution gathered between 1988-1993.

1932-1998. Duckworth and Hedges 1998²² assessed the status of tigers in Laos by reviewing five sources of data, which included published papers from 1932 to 1998, wildlife survey reports, reports of other surveys, media articles and personal communication.

1991-1998. Duckworth, Khounboline and Salter 1999²³ provided a baseline on the status of tigers in Laos by summarizing data compiled from field surveys for large mammals for periods exceeding a

week during 1991-1998 in 32 different areas of the country.

2003-2004. Johnson, Vongkhamheng et al., 2006¹³ used camera traps set in five 100 km² sampling blocks across NEPL NPA from 2003 to 2004. Each 100 km² sampling block divided into 25 4-km² grid cells, in which a pair of cameras was placed to photograph both sides of individual tigers in optimal locations. Cameras were mounted on trees at 45 cm and set to operate for 24 hours per day and left in the forest for over 30 days. The software program "CAPTURE" was used to generate tiger density estimate as tigers could be identified to individual tigers by their distinct stripes. As prey could not be identified to individuals by their markings, index of prey abundance was used, i.e. number of photos per 100 camera trap days (CTD). CTD was calculated from the time the camera was mounted until the date of the final photo for a total effort of 3,588 total CTD.

1995-2005. Dinerstein et al. 2006⁶ delineated tiger conservation landscapes based on tiger records from 1995-2005, current forest cover, and human influence.

2.1.2 Results from past records (see Appendix 4 showing locations of NPAs in Lao PDR)

1988-1993. Salter²¹ reported tigers present in 87% of interviews (n=328) spread across 18 NPAs of Laos.

1932-1998. Duckworth and Hedges²² mapped 64 tiger records spread over the country, of which only 21 were confirmed records based on sightings or remains of tigers. Based on tiger data and habitat availability

they suggested only five areas that showed particular potential for harboring viable tiger populations. These areas were:

- i) Northern Laos including three non-contiguous areas: Nam Et-Phou Louey NPAs, Nam Kan NPA and Nam Phoun NPA
- ii) Central Laos in the Nam Theun basin including the contiguous area between Nakai-Nam Theun (including Nakai Plateau), Nam Kading, Khammouan Limestone and Hin Namno NPAs.
- iii) Southern Laos including the contiguous area on the slopes of the Bolaven Plateau between Xe Pian, Dong Hua Sao and Don Ampham NPAs, Xe Khampho and Nam Kong PPAs and the Xe Kong basin.

1991-1998. Duckworth et al. (1999) ²³ reported tiger as present in 18 of 32 areas surveyed during 1991-1998, however it was thought that their population densities were at low numbers. These areas were:

- i) Northern Laos from five of the 11 areas surveyed, which were Nam Et-Phou Louey, Nam Ha, Nam Phoun, and Nam Theun Extension
- ii) Central Laos from five of the seven areas surveyed, which were Nakai-Nam Theun including Nakai Plateau and the Nam Theun Corridor, Hin Nam Nor and Phou Xang He, and
- iii) Southern Laos from eight of the 14 areas surveyed, which were Xe Bang Nouan, Dakchung Plateau, Phou Xieng Thong, Don Ampham, Nam Kong, Dong Huasao, Xe Pian and Dong Khanthung.

Provisional records were noted for another six areas including Nam Xam, Phou Khao Khoay and Nam Kading NPAs in northern Laos and Xe Sap, Phou Khathong and Bolaven Plateau in southern Laos.

2003-2004. The camera trap surveys in NEPL NPA ¹³ found that the NPA supported a small viable tiger population with an estimated density of 0.2 to 0.7 tigers per 100 km² and a population estimate ranging from a minimum of 7 to as many as 23 tigers in the sampled area. An index of prey abundance ranged from 0.08 independent photos (IP) per 100 CTD for gaur, 0.25 IP per 100 CTD for sambar, 0.27 IP per 100 CTD for serow, 0.40 IP per 100 CTD for wild pig, and 2.77 IP per 100 CTD for muntjacs.

1995-2005. Dinerstein et al. (2006) ⁶ mapped approximately 175 tiger point locations recorded from 1995-2005 in Laos, which included no records of evidence of breeding (see map Appendix 1).

From these records combined with recent land cover and human influence data, the following areas of priority for tiger conservation and surveys in Laos were identified:

Class 1 Landscapes(1)(see maps Appendices 2 and 4):

(TCL#35) Northeastern Laos including areas within and adjoining the Nam Et-Phou Louey and Nam Xam NPAs, and extending into northern Vietnam.

⁽¹⁾ Class 1 landscapes have habitat to support at least 100 tigers, evidence of breeding, minimal/moderate levels of threat, and conservation measures are in place.²⁴

(TCL#27) Southern Laos including the areas within and adjoining Dong Huasao, Xe Piene, Dong Amphan, Xe Sap and Dong Phouvieng NPAs and the Xe Khampho, Bolvan Southwest and Phou Khathong PPAs. This area adjoins contiguous habitat in central Vietnam and northeastern Cambodia.

Class 2 Landscapes(2) (see maps Appendices 2 and 4):

(TCL#34) Central Laos in the Nam Theun basin including the areas within and adjoining Nakai-Nam Theun, Nam Kading, and Phou Khao Khouay, Khammuoan Limestone NPAs and Phou Chom Voy PPA and the Nam Chouan and Nam Ngeum Watershed Management Areas.

(TCL#26) Dong Khanthung PPA with adjoining areas in northern Cambodia and southwestern Thailand.

Class 3 and Potential Landscapes(3) (see maps Appendices 2,3 and 4)

(TCL#33) Areas within and adjoining Hin Nam Nor NPA

- Also areas west of Phou Xang He NPA including the following PPAs: Phou Sor to the northwest, Xenoy-Xaba to the northeast, and Laving-Laveung to the east.

(TCL#36) Areas within and adjoining the Nam Ha and Nam Kan NPAs Areas within and adjoining Nam Phoun and Phou Phanang NPAs Areas within Phou Den Din NPA Areas within and adjoining Xe Bangnouan and Phou Xiengthong NPAs

2.2 Current records (2005-present)

2.2.1 Sources of data for current records

Current records of tigers in Lao PDR, after 2005, are compiled from two sources:

I) Results of field research projects and,

⁽²⁾ Class 2 landscapes have sufficient habitat for 50 tigers, moderate levels of threat, and a basis for conservation that needs to be improved.²⁴

⁽³⁾ Class 3 landscapes have habitat to support some tigers, but with moderate-high levels of threat, and minimal conservation investment. In this document, potential landscapes include both “survey priority landscapes” that are large areas of potential habitat under low human impact

where tiger status is unknown (or that have not been surveyed since 1995) and “restoration landscapes” that are similarly large areas of potential habitat under low human impact but where survey efforts since 1995 have not revealed evidence of tigers.²⁴

- ii) Standardized interviews conducted in September 2009 with local wildlife conservation workers including protected area staff, foresters, and/or NGO staff who have worked or have experience in particular areas for at least two years. Pre-prepared data forms were faxed or e-mailed to those concerned people and then followed up by phone calls. The data form included questions about the evidence of:

- tiger signs/sightings with a detailed description of the evidence, location and date,
- tiger human conflict with a description of the human killing or type of livestock killed, description of the evidence for each case, and date,
- threats to tigers including direct killing and date, presence of hunting of prey or habitat loss and description.
- The likelihood that reports represented actual tiger presence were ranked as follows:

Confirmed: tigers were photographed by camera traps or identified by DNA analysis of scats.

Likely: report of tiger killed; track width equal to or greater than 10cm or pad width equal to or greater than 7.5cm.

Possible: report of depredation of adult buffalo or a human killed Uncertain: report of tracks less than 10cm wide or pad less than 7.5cm wide; report of a tiger sighting; report of other signs or depredation of a cow.

2.2.2 Current records: methods and results

Class 1 Landscapes (see map Appendix 4)

(TCL#35) *Nam Et-Phou Louey* - 25,978 km²

Camera trapping for tigers and prey was conducted from 2004-2006 in 300 km² of the NPA13 followed by camera trapping for tigers over 800 km² of the NPA from 2006-2007 (WCS unpublished data). A total of eight individual tigers were detected with camera traps in NEPL NPA from 2003- 2007.

From 2006 to present, DNA extraction from large carnivore scats has been used to estimate a minimum number of tigers in the NPA. Nine individual tigers have been detected from analysis of 124 scats from 2006-2009. One tiger was seen in the NPA by enforcement staff in July 2009. From January-June 2008, prey occupancy surveys were conducted in the NPA core zone⁴⁹. The 2600 km² area was divided into 3.25 km² sub-grids based on biological information on home range of large ungulates. Teams walked approximately 3-6 km within each sub-grid to record presence/absence of ungulate signs every 300 meters. The survey found an estimated prey abundance of 3.25 ungulates per km² in the core zone, of which muntjac and wild pig were the most common, with much less detection of serow, sambar and gaur.

From January – June 2009, standardized surveys of local experts across 100-300km² grids and modern occupancy modeling was used to estimate the current occurrence and distribution of tigers and prey in a 30,000 km² landscape around the NEPL NPA (C. Vongkhamheng, unpublished data). The survey recorded reports of tiger presence within the past year in 70% of the grids across the 30,000 km² landscape. Most detections occurred inside and adjoining NPAs (NEPL and NXM). Habitat occupancy estimates ranged from 70% for gaur (SE = 0.05), 96% for Sambar deer (SE = 0.02) and up to 100% occupancy for muntjac, wild pig and serow. The probability of occurrence for muntjac, wild pig, and serow were more widely distributed than for gaur and sambar across the landscape.

(TCL#27) Southern Laos - 19,996 km²

Questionnaire surveys for tigers and prey were conducted in 35 villages across Xe Pian NPA using grid-based sampling approach, by dividing the NPA into 14-300km² grid cells²⁵. Approximately 70% of the 14 grid cells surveyed were reportedly occupied by tigers in the past five years. Of those, 25% of respondents (n=105) reported sightings of tigers, and 53% of respondents reported signs of tigers.

Tracks (13x14 cm) were reported in Dong Huasao on November 2006 and January 2007 (Table 1). Tracks (13x15 cm) were reported from July 2007 in the vicinity of Ban Angor. Tracks and scrapes were found in Phoulan (UTM 691786 1765413) and at Houy Kata (UTM 688826 1766165), Ta Oy district in Xe Sap NPA. Tracks of an adult tiger with cubs were reported in Dong Ampham NPA near Xekhaman hydropower on 7 September 2009 and another report from Huay Chingling in April 2009 (Table 1).

Class 2 Landscapes (see map Appendix 4)

(TCL#34) Central Laos – 36,317 km²

Nam Kading NPA: From 2007-2009, ground dwelling mammals were monitored at a total of 200 camera trap points at a spacing of one camera point per 2 km² across 400 km² of the 1,600 km² NK NPA for a total effort of 6,357 camera trap days. The surveys detected no tigers (WCS / IEWMP; in prep.). Although large cat tracks are reported by NPA staff, it remains uncertain if these are from tiger. Prey including gaur, sambar, serow, wild pig and muntjac were recorded by camera traps but overall abundance is low.

Nakai-Nam Theun NPA: From 2006-2008, ground dwelling mammals were monitored at a total of 300 camera trap points at a spacing of one camera point per 2 km² across 600 km² (three blocks of 200 km² each) in the 3,532 km² NNT NPA for a total effort of 11,870 camera trap days^{32, 48}. The cameras recorded no tigers and a relatively low level of large prey.

Khammouane Limestone NPA: Tracks (10x11 cm) and cattle depredation by tiger were recorded on 3 August, 2006 by NPA staff (Table 1).

Nam Ngeum watershed management area: Tracks of tiger were reported from southern Xiengkhuang province, at Phoun, Xaisomboun and Thathom districts in 2009 during the NEPL NPA landscape survey (J. Vongkhamheng pers. com.)

(TCL#26) Dong Khanthung – 2,526 km²

No reports have been received from this area since 2005.

Class 3 Landscapes (see map Appendix 4)

(TCL#33) Areas within and adjoining Hin Nam Nor NPA – 7,477 km²

Tracks (10x12 cm) and a buffalo carcass suspected of being killed by tiger were found on 25 August 2009 in the vicinity of Ban Nong Buao or near Phou Chuang (17o30'09" N 105o54'33" E) (Table 1). The area is located in the corridor between Hin Nam Nor and Nakai Nam Theun NPAs. Also a track (13x15 cm) was reported by NPA staff on 7 September 2009 in the vicinity of Ban Napao.

Areas west and north of Phou Xanghe NPA including Dong Phousor and Xenoi-Xeba, and Lavin-Laveun: Tracks (~11x12 cm) were recorded on May 2005 in the

vicinity of Ban Doune, and a buffalo kill was reported during the dry season of 2007 in Phou Xenghe NPA (Table 1). Other reports of tracks were received from Lavin-Laveun PPA in 2009 near Xepone district

(TCL#36) Areas within and adjoining the Nam Ha and Nam Kan NPAs – 7,315 km²

Nam Ha NPA: Felid tracks were encountered by NPA staff, one (9x10 cm) on 16 August 2009 in the vicinity of Ban Nam Muay, Sing district, and another (10x11 cm) was reported in August 2008 in the vicinity of Ban Hatlieng, Luang Namtha district. Two cows were reportedly killed by tiger in these two villages in June 2007 and October 2008, respectively (Table 1). One large buffalo was reportedly killed by tiger in 2007 near UTM755787, 2306957 in Luang Namtha district.

Nam Kan NPA: Tracks (10x11 cm) were found on 14 February 2007 by NPA staff in the vicinity of Ban Toop Phouvieng district (Table 1). Other recent reports of large cat tracks are from Chomasy, Nam Laem, Nam Touk, Nam Lin (Table 1).

Potential Landscapes (see map Appendix 4)

(TCL #32) Areas within and adjoining the Xe Bang Nouan and Phou Xiangthong NPAs – 6,948 km²

Tracks (12x13 cm) were recorded on June 2007 in the vicinity of Ban Naxan and Nalan, Vapi district, Saravan province (Table 1). A buffalo and a cow were reportedly killed by tiger on December 2008. Tracks (11x12 cm) were recorded at Phou Xiangthong NPA on June 2007. A report of tiger depredation of a buffalo and cow in the vicinity of Ban Thongphathongxai, Khong district, Saravan province occurred in December 2008.

Areas within and adjoining Nam Phoun and Phou Phanang NPAs – 14,139 km²

Tracks (11x12 cm) were recorded on 27 September 2008 in Navan village, Phieng district (Table 1). Also, a buffalo and cow were reportedly killed by tiger in the same area in the same year. No tigers are reported at present in Phou Phanang NPA.

Areas within Phou Den Din NPA – 4,581 km²

Tracks (10x11 cm) were recorded on 1 June 2008 in the vicinity of Ban Hath Hin (Table 1).

2.3 Trends in tigers across Laos

Although tigers reportedly still occur in several landscapes at present, since 2005 tigers are confirmed from only one protected area (NEPL NPA) with likely evidence of their presence reported from thirteen other protected areas (Table 1). In the remaining areas, the presence of tiger is uncertain or absent. Given this information, tiger abundance appears to be declining throughout Laos and they may now be extirpated in some areas based on the following evidence:

Rarity of sightings of tigers in the forest. Out of 35 interviews with people working in landscapes in Laos, there were only 8 reports of sightings of tigers since 2005.

Rarity of camera-trap photos of tigers in key areas surveyed since 2005. In Nakai Nam Theun NPA where sightings of tigers were once regularly reported by field workers during 1990s²³, no tigers have been photographed since 2006 despite extensive camera trap surveys (11,870 CTD). Likewise, in Nam Et-Phou Louey NPA, camera trap surveys for tigers over a three-year period from 2005- 2007 photographed only four different individuals over 5,979 CTD of survey effort (WCS unpublished survey data).

Although tigers are protected by law, direct poaching of tigers has reportedly occurred in several protected areas throughout Laos since 2003 (Table 2). The number of tigers reported killed, as shown in Table 2, are only those that local authorities have strong evidence of. The number of actual kills across the country is uncertain. This is a concern given that scientific studies show clearly that a small population of about 30 individual tigers may become extinct within 15 years with only a 2% kill rate a year. Only a larger population of over 70 tigers could potentially sustain a loss of 10% a year or more⁵. So, based on the known number of tiger killed in each NPA or landscape, and if the trend still continues, it appears that tigers in Laos are presently vulnerable to extirpation.

3. THREATS TO TIGERS IN LAO PDR

3.1 Direct killing of tigers

3.1.1 Poaching of tigers for trade

Although tigers are a legally protected species in Laos, they are poached with a variety of methods including snares, poison, and explosives across Laos. This is because of the high demand for tiger parts in

Table 1. Reports of tigers since 2005 from protected areas across Laos based on photographs (PHO) or DNA analysis of scat samples (DNA) or from interviews (n=35) reporting observations or reports of tracks (TG, TL) or other sign (SN), sightings (RS), evidence of large livestock depredation (BD, CD), of tigers killed (TK) or humans killed (HK).

No	TCL	Name of Protected Area	2005 to present2 (level of confidence)					Sources
			Prior to 2005 ¹	Confirmed	Likely	Possible	Uncertain	
I.		Class 1 Landscapes						
1.	35	Nam Et-Phou Louey NPA	X	PHO,DNA	TK,TG	BD	TL,RS,SN,CD	NPA staff/WCS staff, camera traps, scat DNA
2.	35	Nam Xam NPA	?	-	TK	-	-	NPA staff/village survey
3	27	Dong Phouvieng NPA		-	-	-	-	NPA staff
4	27	Xe Sap NPA	?	-	TK	-	SN,CD	NPA staff, IUCN staff
5	27	Dong Huasao NPA	X	-	TG	BD	CD	NPA staff, village reports
6	27	Dong Ampham NPA	X	-	TG	HK	RS	NPA staff/WWF staff
7	27	Xe Piane NPA	X	-	-	-	TL,RS,SN	NPA staff/WWF report
8	27	Nam Kong PPA	X	-	-	-	SN	IUCN staff
9	27	HHW/Xe Khamphor		-	-	-	SN	IUCN staff
10	27	Dak Cheung plateau	X	-	-	-	-	
11	27	Phou Kathong PNBCA	?	-	-	-	-	
II.		Class 2 Landscapes						
12	34	Phou Khao Khouay NPA	?	-	-	-	-	NPA staff
13	34	Nam Kading NPA	?	-	-	-	TL,SN	NPA staff/camera traps
14	34	Nakai-Nam Theun NPA	X	-	TG	BD	RS,SN	NPA staff/camera traps
15	34	Khammouan Limestone \NPA	?	-	-	-	TL,SN	NPA staff
16	34	Phou Chomvoy PPA		-	-	-	-	
17	34	Upper Nam Ngem		-	-	-	SN	WCS staff

No	TCL	Name of Protected Area	2005 to present ² (level of confidence)					Sources
			Prior to 2005 ¹	Confirmed	Likely	Possible	Uncertain	
		Watershed						
18	34	Upper Nam Chouan Watershed		-	-	-	SN	WCS staff
19	34	Special Zone (Xaysomboun)		-	-	-	SN	WCS staff
20	26	Dong Khanthoung	X	-	-	-	-	
III.		Class 3 Landscapes						
21	36	Nam Ha NPA	X	-	TK,TG	BD	RS,CD	NPA staff
22	36	Nam Kan NPA	X	-	TK,TG	BD, HK	CD	NPA/DAFO staff
23	33	Hin Nam Nor NPA	X	-	TG	BD	RS	NPA /IUCN staff
24	33	Phou Xanghe NPA	X	-	TG	BD	TL,SN	NPA staff
25	33	Lavin-Laveun PPA		-	-	-	SN	Outhai (pers. com)
IV.		Potential Landscapes						
26	32	Xe Bangnouan NPA	X	-	TG,TK	BD	CD	NPA staff
27	32	Phou Xiengthong NPA	X	-	TG	BD	CD	NPA staff
28	-	Nam Phoun (Poui) NPA	X	-	TG,TK	BD	TL,CD	NPA, DAFO staff
29	-	Phou Phanang NPA	?	-	-	-	-	NPA staff
30	-	Phou Dendin NPA	?	-	TK	-	TL,CD	NPA staff

¹Records prior to 2005 from Duckworth & Hedges (1998): ? - tiger presence based on provisional report, x - tiger presence based on signs, sighting

²Degree of confidence of tiger report from 2005 to present:

Confirmed: tigers were photographed by camera traps(PHO) or identified by DNA analysis of scats(DNA)

Likely: report of tiger killed(TK); tracks >10 cm wide or pad >7.5 cm wide(TG)

Possible: report of depredation of adult buffalo(BD) or a human killed (HK)

Uncertain: reports of cat tracks <10cm wide, pad <7.5cm wide(TL); report of sighting(RS); report of signs(SN) or cow depredation(CD)

Table 2. Reports of tiger poaching from NPAs since 2003.

No	NPAs	# tiger killed	Date(s)	Source
1	Phou Den Din	2	Apr-06/July-07	NPA staff
2	Nam Ha	3	Dec-05/Apr-07	NPA staff
3	Nam Et-Phou Louey	17	Jan-03 to Oct-09	NPA staff
4	Nam Xam	1	Mar-08	NPA staff
5	Nam Phui	1	9-May-05	DAFO of Phieng district
6	Xe Bang Nouan	1	Dec-08	DAFO of Khong district
7	Xe Sap	1	Dec-08	DAFO of Ta Oy district
8	Nam Kan	2	Jun-05/Nov-05	NPA staff

international markets for traditional medicines associated with the weak protected area management in Laos. The current estimated price of a tiger ranges from US\$ 10,000 up to US\$ 70,000 5,28. In NEPL, tiger bones sold for up to US\$ 11,528 in 2004¹³. Tiger parts, such as skins, teeth, bones and others, were one of the most-traded wildlife items in recorded in Lao PDR during the 1990s²⁶.

Since 2003, poaching of tigers for trade is reported in several NPAs (Table 2). For example, more than 15 tigers have been killed since 2003 in Nam Et-Phou Louey, two tigers were reportedly killed near Bor Keo-Luang Nam Tha provincial boundary in June 2005, two were killed in Nam Ha NPA on October 2007, and one tiger killed in Nam Xam in April 2008.

A tiger farm was established in Laos in 2002, with the first 20 breeding individuals originating from Taiwan. Now, the farmer claims there are 254 individual tigers in the farm and they will be ready for export in the near future²⁷. Although the direct impacts of this tiger farm on wild tigers in Laos is uncertain, the potential threat to wild tigers caused by tiger farms is very high. It is well-known worldwide that the legalizing trade in farmed tiger products allows smugglers to exploit the loophole and take opportunities to sell wild tiger products. This problem occurs because there is no way to distinguish between parts of tigers from the farm and those from the wild, which makes law enforcement difficult.

From an economic perspective, the price of a wild tiger ranges from US\$10,000 to US\$70,000 in international markets²⁸, and approximately US\$11,528 on local markets in northern Laos¹³. The high price is because customers perceive wild products to be more effective than the farmed ones

and thus prefer the wild products over the farmed²⁹. In a simple cost analysis of wild versus farmed tigers parts, the cost of raising a tiger to adulthood in captivity is at least US\$ 4,000 (range from US\$ 4000 to US\$ 10,000) and as little as US\$15-25 for a bullet to poach a wild tiger. Despite the cost of transportation and an occasional loss due to confiscation by authorities, it is a lucrative trade. This discrepancy provides substantial economic incentive for poachers and smugglers to undercut farmers in any legal markets despite the risks associated with being caught and penalized³⁰. In short, tiger farms don't support wild tiger conservation even though farmers often claim that farms are a solution to wild tiger conservation arguing that the legally-supplied captive-bred tiger parts and products in markets would undercut the illegal supply from tiger poachers. Some argue that tiger farmers have no interest in wild tiger conservation. If wild tigers do go extinct, farm investors stand to gain an economic advantage as they can control the supply of tiger parts for the global market³⁰.

3.1.2 Killing of tigers as the result of human-tiger conflict

Livestock depredation. Killing of tigers in revenge due to livestock loss has been recorded in many rural areas throughout Laos. About 43.8% of village interviews across Laos during 1988 to 1993 (n=317) reported livestock depredation by tigers, but the proportion of reports truly referring to tigers is unclear²³. For example, one tiger was shot in Phou Khoun on the Luangphrabang/Vientiane province border in December 1998. Another was shot in Nam Et-Phou Louey on 18 December 1997 with the permission from Viengthong district authorities.

Of particular concern at the present time, given the high price of tiger parts and the associated negative attitude of humans toward tigers, is that when livestock are killed and tigers are suspected, tigers are targeted by the villagers, resulting in opportunistic killing of more tigers rather than taking revenge. For example, in the Nam Et-Phou Louey NPA, a systematic investigation of human-tiger conflict from 2003-2004 found that tiger poaching was closely tied to cattle grazing with farmers opportunistically using livestock to bait tigers more so than retaliation for livestock attacks¹³. Contrary to previous predictions that livestock loss was a widespread problem, the study found depredation affected only 12% of NPA villages and a small fraction of the total herd. Given the opportunity to report attacks in return for possible compensation, farmers lagged in both reporting and removing livestock to villages. NEPL farmers were willing to accept livestock loss and encouraged grazing in tiger habitat as it provided opportunities for tiger poaching to offset livestock loss, which was driven by the increasing lucrative trade in tiger bones.

Man-eating. Although tigers have had a bad reputation as man-eaters in many parts of Laos, very few cases have been reported across the country in recent years. For instance, there are only two cases reported prior to 2005²³ and another other two cases reported after 2005 (WCS unpubl. data). Actually, humans are not the primary or preferred food source for tigers. The occurrence of a human attack is usually in self-defense or protecting their infants, and those man-eaters are usually old, sick or injured⁸. If an incidence occurs, tigers are typically killed in revenge. An example of a recent incident occurred in August 2005 in Meung district, Bokeo province is the following report: "It started when a group of three men went fishing near Hua Nam Kha village. They heard a wild pig screaming and went to investigate, and saw it was a tiger. The tiger ran off when it saw the men. One of the men had a gun, so the other two waited while one man went after it with the intention to shoot it. He didn't come back and it was getting dark. They went back to the village and led a big search party next morning with many people. They found his gun and then him. All that was left was the head and one leg. There were two sets of paw prints, one animal bigger than the other. They carried the bits back to the temple in Meung township."

3.2 Prey depletion

Hunting of ungulates (i.e. gaur, sambar, serow, wild pig and muntjac) for subsistence has long been practiced by rural residents in Laos. However, the

picture began to change when the government of Laos introduced the "new economic mechanism (NEM)" during the late 1980s. Since the opening of free markets and the associated increase in the prices of wildlife on both domestic and international markets, hunting of wildlife for subsistence has become more commercially oriented. Various parts of ungulates including horns, antlers, gall bladders, meat and others were commonly traded domestically, and with Thailand, China, and Vietnam^{31,26}. In recent years, wild meats are still sold in markets and restaurants in several townships across the country despite the fact that it contradicts the National Law on Aquatics and Wildlife.

The decline of ungulate populations in Laos is clearly evident from results of research in protected areas. For example, in Nam Et-Phou Louey NPA, a 2008 study found an ungulate abundance index of approximately 3.25 animals/km² ⁴⁹. Large prey (>100kg) are extremely low at only 0.02 and 0.31 animal/km² for gaur and sambar, respectively, whereas muntjac and wild pig are more abundant at 1.38 and 1.36 animals/km², respectively (C. Vongkhamheng, unpublished data). The results suggest that wild pig and muntjac are probably the principle prey available for tigers in Laos at the present time. Similarly, in Nakai Nam Theun and Nam Kading, the large prey abundance is very low and only muntjac and wild pig are found in moderate abundance³².

3.3 Habitat loss and fragmentation

In Lao PDR, habitat loss and fragmentation is a less urgent threat to tigers than the two major threats of tiger poaching and prey depletion. This is based on the fact that Laos still has over 40% of suitable forest cover and a low human population of about 22 people/km² at present as compared to neighboring countries (263 people/km² for Vietnam, 128 people/km² for Thailand, 80 people/km² for Cambodia).

However, given the current trend of rapidly increasing human population and associated increases in rates of resource use, habitat loss and fragmentation will become a much more serious problem in the near future if there is poor land-use planning and management. This is because almost two thirds of country is geographically mountainous. Flat land suitable for permanent agricultural fields is found only in Mekong valley on the western side of the country and over 75% of the population is living in rural areas. Forest clearance for shifting cultivation by subsistence farmers is widespread in the upland areas.

Moreover, logging (legal and illegal), cash crop plantations along with the rapid increase in mining and hydropower development as well as transportation corridors across the country is contributing to habitat loss and fragmentation. Land use planning is needed to assure that appropriate habitat with sufficient protection is maintained to allow tigers to safely move within and between tiger conservation landscapes. If corridors are not maintained to connect source populations of tiger, the result will be smaller isolated populations that are genetically depauperate and face an even higher likelihood of human-tiger conflict. This will ultimately lead to extirpation of tigers from these fragments and threaten the long-term survival of tigers across Laos.

4. LEGISLATIVE PROTECTION OF TIGERS IN LAO PDR

The Lao PDR's Constitution (1991) states that "all organizations and citizens must protect the environment and the natural resources including: land, underground minerals, forests, fauna, water sources and the atmosphere" (Article 17)⁴⁵. Legislative protection of tigers has long been taken into account by the government's decrees and

regulations addressing tiger conservation (Table 3). More recently, the law on aquatic and terrestrial wildlife states that tigers and their larger prey species (gaur, banteng, sambar, serow) are listed as protected⁴⁴. On the 3rd of April, 2007 the Prime Minister also signed an urgent agreement No. 25/PM, to increase effectiveness of forest management throughout the country. This agreement states how the nation's economic development is linked to the country's environmental status. Additionally, Lao is a signatory to several international conventions that support tiger conservation. These conventions enable the government to address problems affecting tiger conservation beyond the national jurisdiction, including the Convention on Biological Diversity (1994) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora since 2004⁴³.

5. OPPORTUNITIES AND CONSTRAINTS FOR TIGER CONSERVATION IN LAO PDR

5.1 Opportunities for tiger conservation

Given the high resilience of tigers in the environment

Table 3. Principle legal instruments addressing tiger protection in Lao PDR.

Legal instruments	Key provision
National Legal Framework	
Decree of the Council of Ministers No. 185/CCM, in relation to the Prohibition of Wildlife trade, 21 October 1986	Prohibits export of all wildlife
Decree of the Council of Ministers No. 47/CCM, on the State Tax System, 26 June 1989	<ul style="list-style-type: none"> - Lists types of natural resources, including various species of wildlife, aquatic animals and parts thereof and their associated resource tax rates and special fees; 67 species or species group of wildlife are listed - Subsistence level users of natural resources are exempted from resource taxes - 1996 New Tax Law does not mention natural resource tax
Decree of the Council of Ministers No. 118/CCM, on the Management and Protection of Aquatic Animals, Wildlife and on Hunting, and Fishing, 5 October 1989	<ul style="list-style-type: none"> - Defines wildlife as state property with mandate to MAF to manage it (including through awareness programs) and local people to use it pursuant to regulation. - Allows import/export of wildlife with special authorization - Prohibits hunting and breeding of protected or endangered species, except where human life is endangered - Prohibit hunting by means of mass destruction (explosives, poisons, etc.)
Decree of the Prime Minister No.	- Established national protected areas and states

Legal instruments	Key provision
164, 29 October 1993.	<p>that hunting and fishing inside them is illegal</p> <ul style="list-style-type: none"> - Explosives, chemicals, poisons and other substances harmful to wildlife are banned in NPAs - Measures (warn, fine) for anyone who disobeys the decree, confiscates illegal items
<p>Order 54/MAF on the Customary Right and the Use of Forest Resources, 7 March 1996; followed by recommendations 377/MAF on the Customary Use of Forest Resources</p>	<ul style="list-style-type: none"> - Secures legal rights for local people to use forest resources for subsistence, including hunting and fishing of non-protected species - Customary rights may be recognized by signed agreement or by law, and local people shall be compensated for loss of customary means of livelihood
<p>Decree 1074 of the Ministry of Agriculture and Forestry, 11 September 1996</p>	<ul style="list-style-type: none"> - Prohibits wildlife trade - Prohibits hunting of protected species including tiger and “such as Asian elephant, Banteng, Saola, Douc Langur, etc.” - Prohibit hunting during a breeding season, and by dangerous methods, and/or by the use of weapons in NPAs and towns - Bans wildlife trade, except for research and conservation - Bans exporting wildlife used for food - Responsibility for PAFO to co-ordinate with other agencies to collect and register weapons used for hunting
<p>Forestry Law, October 1996 and updated 24 December 2007.</p>	<ul style="list-style-type: none"> - Grants state ownership of and authority to manage wildlife - Prohibits possession of wildlife without permission - Mandates state to define two categories of protected wildlife - Prohibits hunting during a breeding season and/or by means of mass destruction - Prohibits hunting of and trade in prohibited species, with certain exceptions - States that all guns and hunting equipment must be registered with certificates - Article 46, Part 5, establishes by law Wildlife Day on 13th July annually - Zoning NPAs to core (totally protected), managed (controlled use), and corridor zones
<p>MAF Regulation No 0360 (2003) on management of NPAs, Aquatic Animals and Wildlife</p>	<ul style="list-style-type: none"> - Provides guidelines on establishment and zoning of NPAs - Defines restricted activities on aquatic animals and wildlife - States duties of state agencies and funding support
<p>Provincial and District regulation on management of PA, Wildlife, and Aquatic Animals (e.g. NEPL NPA Regulation 2008)</p>	<ul style="list-style-type: none"> - Zoning of NPA into core, managed, and corridor zones and specify clearly activities in those areas - Prohibit hunting of all wildlife and aquatic animals in the core zone - prohibit trade in wildlife - Guns must be registered with special licenses
<p>Wildlife and Aquatics Law, 24</p>	<ul style="list-style-type: none"> - Update lists of protected (Category 1) and

Legal instruments	Key provision
December 2007	managed (Category 2 and Category 3) species with tiger and large prey listed as Category 1 species that cannot be harvested anywhere in the country at any time. - State activities, management, and development on wildlife and aquatic animals
Prime Minister' agreement No.25/PM regarding forest management, 3 rd April, 2007	- Assigned at least 15 staff in each NPA - Provide basic equipment and financial support for NPA management
International Commitments and Obligations	
United Nations Convention on Biodiversity (signed in 1996)	<ul style="list-style-type: none"> - Requires State Parties to prepare Biodiversity Strategies and Action Plan. - Laos has agreed; • To develop a national strategy for conservation and sustainable use of the nation's biological diversity • To develop regulatory provisions for protecting threatened species and populations • To integrate conservation and sustainable use of biological resources into national decisionmaking • To conduct an Environment Assessment (EA) of proposed development projects with a view to minimize harmful effects • To take measures for an equitable sharing of the results of research and development in genetic resources
ASEAN Agreement on the Conservation of Nature and Natural Resources (1985)	<ul style="list-style-type: none"> - Parties have agreed on development planning, the sustainable use of species, conservation of genetic diversity, endangered species, forest resources, soil, water, air and processes of environmental degradation and pollution. - Promotes joint and individual state action for the conservation of the natural resources in the ASEAN region.
Convention on International Trade in the Endangered Species of Fauna and Flora (signed in 2004).	- Provides international umbrella for management and control of trade in endangered fauna and flora. Tiger is listed as CITES Appendix 1 species for which all international trade is prohibited.

(adaptable to a wide range of habitat types, climates, and prey base) plus high fecundity (reproduction), there are several opportunities that allow for rapid recovery of tigers in Lao PDR even though tiger populations are at very low numbers at the present time.

Low human population

Laos has a low human population density (22 persons per km²) as compared with other tiger range states in Indochina (263 people/km² for Vietnam, 128 people/km² for Thailand, 80 people/km² in Cambodia). Tigers require large home ranges to meet their ecological needs so availability of adequate space results in low human-tiger conflict.

High forest cover

The country has over 40% forest cover, which provides large extensive habitat that could support viable populations of tigers and prey.

Well developed protected area system

There are 21 established national protected areas, covering 14% of the country's land area, as well as provincial protected areas that can serve as core habitat for source populations of tigers and prey in tiger conservation landscapes.

Existence of key prey

Ungulates such as gaur, sambar deer, serow, wild pig, and muntjacs persist in most NPAs. Although ungulate population densities throughout the country are relatively low at present, protection of large prey from all hunting and of small prey from hunting for trade, which is illegal, will allow ungulate populations to rebound relatively quickly as habitat and other required resources (i.e. food) are still available.

The role of tigers in economic development and environmental protection

As a top predator, the existence of a viable population of tiger indicates a healthy ecosystem, which is important to human well-being in forms of “ecological services”, food, medicine, and shelter provided by a healthy ecosystem. Economically, tourism is one of the fastest growing industries in the country, contributing substantially to the overall growth of the national economy of Laos. Ecotourism development is a government priority⁵⁰ and there are initiatives underway in some protected areas (e.g., Nam Ha, Xe Pian, Nam Et-Phou Louey and Nam Kading NPAs) that could provide incentives for protection of wild tigers and their habitats.

Good legislation.

Law on aquatics and wildlife is already promulgated, providing important guidelines in management and conservation of wildlife in the country. Tigers and key large prey (gaur, sambar, and serow) are listed as Category 1 -protected species⁴⁴. In addition, Laos as a signatory to the CITES, agreed to prevent any trade in endangered species, which includes tiger.

Public attractiveness/support.

As they are perceived as powerful and charismatic, tigers are used for selling several commercial products such as Lao beer, water, Tiger beer as well as ecotourism products (e.g. Tiger Trails). Gaining support from these companies to ensure the survival of tigers in the wild may be possible.

5.2 Current constraints for tiger conservation

Beside opportunities, there are several important issues that we need to address to achieve our conservation goal for tigers; they include:

Lack of baseline data on tigers and prey

There is a lack of information on the population status and distribution of tigers and prey in existing TCLs and particularly in most provincial and national protected areas that could serve as source populations for tigers and prey. The paucity of this data makes conservation planning difficult.

Weak law enforcement

The policy, laws and regulations governing tiger and prey are sufficient. However, weak law enforcement and poor management of protected areas results in tiger poaching and illegal hunting of prey for the domestic and international wildlife trade.

A high demand for tiger parts in the international market

The demand for traditional Chinese medicine is driving poaching of tigers for trade. Cross-border cooperation to tackle this problem is urgently needed. A high demand for prey in domestic and international markets encourages illegal poaching of prey by local villagers to support the trade.

Limited human resources and financial support

Although there are 21 established national protected areas across the country and several more provincial protected areas, very few of these are currently being managed and are dependent on financial support from international organizations. The currently estimated level of support for the protected area system (national and provincial protected areas) is only \$US0.09/hectare. It is estimated that at least eleven times that amount (\$US1.00/hectare) is needed to achieve a minimum level of management in Lao's protected areas. As a result of limited financial support, all protected areas are understaffed and many of the staff lack training in the skills required to effectively manage the protected area and to recover and conserve wild tigers and their habitats.

Lack of cooperation and coordination among government agencies.

Weak law enforcement is mainly the result of a lack of cooperation and coordination among enforcement agencies including foresters, police, military, commercial and custom officers, and justice. In addition, although national sustainable development strategy shows clear links between biodiversity and poverty reduction, unplanned development activities

undermine biodiversity conservation, for example, building roads through NPAs, land concessions for cash crop plantations in NPAs, etc. They take little regard to the value of environmental protection and protected areas in economic development.

Weak understanding of linkages between poverty reduction, economic development goals and the status of the environment.

Although the government of Lao PDR considers the environment as an important component of socio-economic development⁴⁵ and recognizes that poverty and biodiversity are intimately linked, most funding however is allocated to development of infrastructure and other social sectors with little regard to the future consequences of the impacts on the environment. High priority is given to development activities such as road construction, hydropower, mining and plantation development, without serious consideration of real costs to the environment. It may be that the conceptual link between biodiversity and development is misunderstood by several high level decision makers who play key roles in planning and investment.

6. STATUS OF TIGER RESEARCH AND CONSERVATION ACTIVITIES IN LAO PDR

6.1 Past research and conservation (prior to 2000)

Research and monitoring

There was no specific research or monitoring of tigers in Lao PDR before 2000. Most records of tigers in Laos come from village questionnaires and general wildlife surveys during a period of 1990s (see more details in Section 2.1). For example, Salter (1993) conducted village interviews in all 18 established national protected areas across Laos between 1988 and 1993, provided baseline data on tiger occurrence and major threats to tigers. From 1992 – 1998, preliminary wildlife surveys conducted in most NPAs and some PNPAs provided confirmed data on tiger presence based on sightings, signs and local reports.

Conservation

During 1980s, tigers and other species were largely protected throughout the forest of Laos because the country was closed to international markets and the human population was low. During the 1990s, tigers may have benefited by legal establishment of 21 national protected areas, and by national decrees and

laws addressing management of several species including tigers (see section 4). Also, during this time period, management initiatives took place in several NPAs for a few years, with technical and financial support provided by a range of international organizations in up to 19 of the 21 national protected areas⁴⁶. After these projects ended, those NPAs that received financial support from government continued some conservation activities such as enforcement but a lack of monitoring systems made it difficult to assess conservation progress or success.

6.2 Current research and conservation (2000 to present)

6.2.1 Research and monitoring

Nam Et-Phou Louey NPA (2003-present)

From 2003-2004, the first systematic study on tigers and prey in the country was made by WCS-Lao Program in NEPL NPA, using camera traps. Following the first results, WCS-Lao has worked with the NEPL NPA\ management unit to initiate conservation interventions to ensure a protection for tigers and prey populations in the NPA, and to continue monitoring of tigers and prey. In 2008, an occupancy survey was conducted to assess tiger prey populations including gaur, sambar, serow, wild pig and muntjac in the NPA. Additional studies are focused on tiger diet to determine what prey are key to tiger survival in NEPL NPA and estimate a minimum number of tigers based on DNA extraction from large carnivore scats.

Nakai-Nam Theun NPA (2005-present)

In 2005, the WCS-Lao Program assisted the Watershed Management and Protection Authority (WMPA) to establish a wildlife monitoring program in the NT2 watershed including the NNT NPA³². The objective of the wildlife monitoring program is to provide a baseline for monitoring change in key wildlife populations (including tigers and prey) in the watershed as a result of management. A project from 2005-2007 was implemented to develop capacity within the NT2-WMPA and its monitoring staff and teams so that the protocols, data collection and analyses can be done within the WMPA.

Monitoring is focused on a subset of key species of wildlife in the watershed that are exploited by hunting for domestic consumption, internal trade and unregulated export. The aim of the monitoring program is to detect improvement (positive changes)

in wildlife populations exploited by hunting as a result of WMPA interventions to control wildlife harvest. The protocol for monitoring large terrestrial vertebrates (including tigers and prey) employs camera traps over 800 km² of the NNT NPA with one-200 km² sampling block surveyed annually. Since 2007, the WMPA has continued to implement this monitoring program with annual reports on the status of wildlife populations in the NPA⁴⁸.

Nam Kading NPA (2007-present)

In 2006, the WCS-Lao Program assisted the NKD NPA to establish a wildlife monitoring program⁴⁷. The objective of the wildlife monitoring program is to detect change in the abundance of key species of wildlife (including tigers and prey) as a result of management. A project from 2007-2009 was implemented to develop capacity within the NKD NPA to implement the monitoring protocols, data collection and analyses. The protocol for monitoring large terrestrial vertebrates (including tigers and prey) employs camera traps over 400 km² of the NNT NPA with one-200 km² sampling block surveyed annually.

Xe Piane NPA and Dong Hua Sao (2007-present)

Since 2007, WWF-Laos has provided financial support to conduct preliminary tiger field surveys in these two NPAs²⁵.

6.2.2 Conservation

Nam Et-Phou Louey NPA (2000-present)

The NEPL NPA has been under active management since 2000 with ongoing international technical and financial support, first from IUCN until 2002, followed by WCS from 2003 to the present. In NEPL NPA, the goal is to increase tigers by 50% from 2005-2015 and the prey to support this increase³³. Since 2004, WCS-Lao has worked with the NEPL NPA management unit to provide technical and financial support for the NPA Management unit to implement conservation interventions to reach this goal by ensuring the protection of tigers and prey populations in the NPA. The principle management activities include:

Enforcement: the NPA has set up patrol substations in the forest (consisting of 6-7 rangers per substation) to conduct patrols over the 3,000 km² core zone, and 4 mobile teams of 3-4 officers to control illegal trade of wildlife to markets.

Outreach and land use planning: the NPA conducts public education and outreach in villages inside/outside NPA to build better understanding for local communities about NPA's regulations, the role of wildlife linked to local livelihoods, land use zoning and demarcating the boundaries of NPA's managed and core zones.

Livestock management to reduce tiger-human conflict: the NPA works with farmers to monitor incidents of carnivore depredation of livestock and assist farmers to relocate livestock grazing areas from the core zone to the village area. The NPA also coordinates with livestock development sectors to improve livestock husbandry techniques that maximize productivity without causing human-tiger conflict.

Ecotourism linked to wildlife protection: following a feasibility study of ecotourism in NEPL NPA⁴², a business plan was developed to analyze the potential to generate economic benefits for NPA management and local communities. The plan is now being implemented to develop ecotourism products that are designed to improve local livelihoods, support NPA management, and provide incentives for the recovery and protection of wild tigers and their habitat.

Nakai-Nam Theun NPA (2005-present)

The Watershed Management and Protection Authority has implemented conservation interventions in the NNT NPA since 2005, primarily funded by a contribution from the Nam Theun 2 power company of US\$ 1 million per annum. The goal is to maintain biodiversity in NNT NPA and reservoir. The management activities include:

Enforcement: NPA staff conduct patrols in Nam Theun reservoir, work with village conservation units to conduct forest patrols to reduce poaching of wildlife in the NPA. They work and coordinate with enforcement agencies to respond to reports of illegal activities and set up check points to stop trade in wildlife.

Outreach: the WMPA conducts public education activities for villages inside and outside the NPA to increase public understanding and support.

Land-use planning: the WMPA has conducted land allocation for villages inside the NPA, and set up village conservation unit to guard their designated areas. NPA core zones and managed zone are being established and will be complete by 2011.

Village micro-development: the WMPA provides financial and technical supports to villages inside and adjoining the NPA and reservoir in horticulture and livestock development.

Ecotourism: the NPA has conducted preliminary studies in ecotourism potential in NNT and the reservoir and has completed a strategy for ecotourism development.

Nam Kading NPA (2005-present)

In the NKD NPA, the stated goal is to increase the tiger population by 20% from 2005-2010⁵¹. Since 2005, WCS-Lao has worked with the NKD NPA management unit to provide technical and financial support for the NPA Management unit to implement undertake landscape level planning to design and implement conservation interventions to ensure protection for landscape species (including tigers and prey) in the NPA. The management activities include:

Enforcement: foot-patrols are conducted to reduce poaching of wildlife in the NPA. The NPA works with enforcement agencies to respond to wildlife crimes in townships, along roads, and other key checkpoints.

Outreach and land use planning: the NPA has an extensive conservation education and outreach program that conducts public education in villages

inside and adjoining the NPAs, and in schools. This includes land use zoning and demarcating the boundaries of NPA's managed and core zones.

Village non-timber forest management: the NPA provides technical support to villages inside and adjoining the NPA to manage for sustainable offtake of non-timber forest projects.

Research and Training Center: the NPA has established the Tad Vanfong Training Center on the Nam Kading River to support scientific research and ecotourism in the NPA.

Xe Piang NPA (2000-present)

From 1998 to 2002, the FOMACOP project developed an NPA management plan, supported enforcement and outreach activities, village microdevelopment such as banks of rice and buffalo, and ecotourism. After the project ended, the government continued to support enforcement activities including checkpoints, mobile patrolling team to respond to wildlife crimes along the roads and target villages. Since 2007, WWF-Lao PDR has provided financial support to develop ecotourism products and conduct occasional enforcement foot-patrols. An expansion of tiger research and conservation activities is planned for this NPA and others in southern Laos (TCL#27).

PART 2

TIGER ACTION PLAN

1. INTRODUCTION

Tigers once occurred widely in most forested areas across Lao PDR, but today they have disappeared from many places of the country due to the direct killing of tigers, unsustainable over-harvesting of their prey, and loss of habitat. Since 2005, tigers have only been confirmed by camera trap photos and genetic analysis of scat from one location in the country, the Nam Et-Phou Louey NPA, while the persistence of tigers in other parts of the country is provisional from reports of animal signs but the certainty of tiger presence remains unknown (see Table 1). If the current threats carry on and the downward trend of the tiger population continues, tigers will disappear from forest ecosystem of Lao PDR within the next few years and in the interim, shrink to the point of “ecological extinction” – where their numbers are too few to play their role as a top predator in the ecosystem. This would represent not only a significant loss for Lao PDR but for all of Indochina, where Lao PDR represents the greatest hope for tiger recovery, and for the Asia, where less than 3,500 tigers remain in the wild today⁵⁴.

This Tiger Action Plan aims to provide basic guidelines for all stakeholders at multiple levels ranging from policy makers to field practitioners to secure the future for the Indochinese tiger in Lao PDR. The Action Plan describes a focused conservation strategy that lays out detailed actions needed for the next 10 years (2010-2020) to overcome the major threats that are driving tiger population decline. The overall goal is to elevate the existing tiger numbers to the level of viable breeding populations in the most promising Tiger Conservation Landscapes (TCLs) and maintain connectivity within/between all TCLs throughout the country (see map in Appendix 4).

The Tiger Action Plan was developed within the Lao government’s existing framework for environmental and biodiversity conservation, and national social and economic development. This framework includes the National Growth and Poverty Eradication Strategy³⁵, the National Forest Strategy⁵⁵, National Biodiversity Strategy and Action Plan⁵⁶, and the National Socio-Economic Development Plan⁵⁷. The overall principles in these national strategies provide basic

guidelines for identifying the priorities that need to be addressed. The Tiger Action Plan is in line with these national policies in that, (i) it promotes maintenance/increase in forest cover and connectivity of those fragmented forests for better protection of national environment and biodiversity, upon which national economic development depends; (ii) assists the government to address poverty eradication by providing economic incentives for local development through sustainable use of biological resources; and (iii) assists the Lao government to implement obligations made as signatories to international conventions including Biological Diversity (CBD), International Trade in Endangered Species (CITES), and Climate Change (UNFCCC) and as members of international initiatives such as the ASEAN Wildlife Enforcement Network (ASAEN-WEN).

The Tiger Action Plan was drafted by participants in the National Tiger Action Plan Workshop in December 2009 (see list in Appendix 5). After reviewing the Status of Tigers and their Conservation in Lao PDR⁵⁸ (Part 1 of this document), the participants worked in TCL groups to identify and discuss the following components of the Action Plan (see agenda in Appendix 6):

Vision - a short inspirational statement describing the desired future state of tigers in Lao PDR over the long term (>50 years), including the desired range and abundance of the species, its ecological role and its relationship with humans.

Goal - a short specific statement describing the desired state of tigers in Lao PDR by 2020, including the desired range and abundance of the species.

Direct threats – these are human activities that physically result in undesirable changes in tiger abundance, distribution, movement, and quality and extent of their habitat. Indirect threats –these are the factors that are thought to be leading to the direct threats.

Interventions –these are actions taken to achieve the objective to reduce direct or indirect threats to wild tigers, their prey, and their habitat.

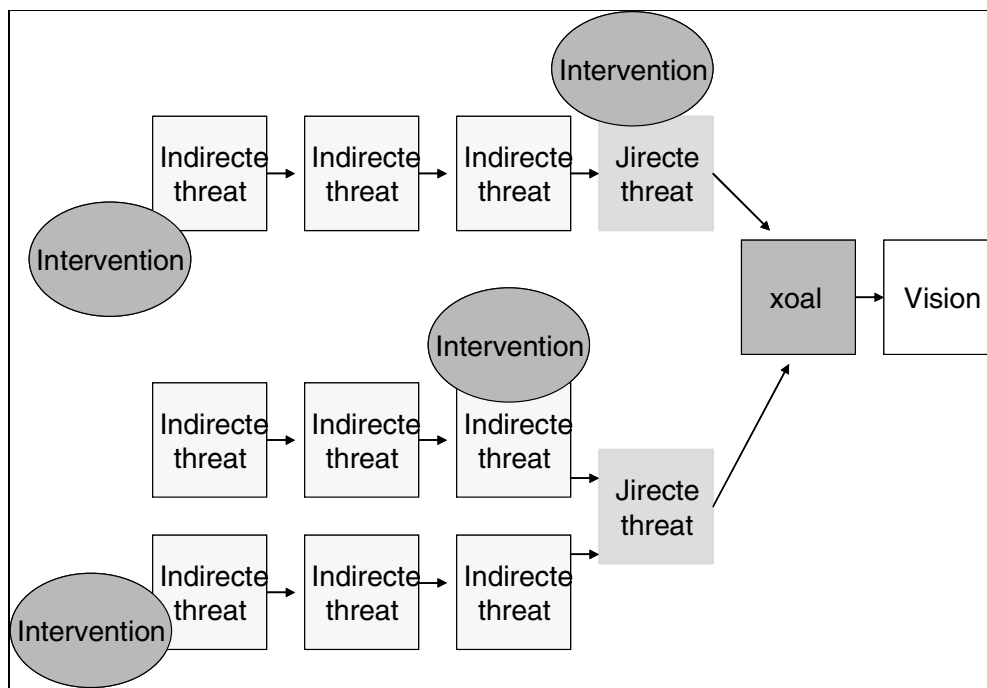


Figure 5 shows the components of a conceptual model illustrating how the causal chains of threats are contributing to the decline of tigers, tiger prey and their habitats. Interventions are management actions selected to reduce threats and reverse the decline.

Objectives - are broad statements describing the desired outcomes of the Action Plan to reduce the indirect and direct threats to reach the goal.

Through the course of the workshop, participants systematically compiled these components to produce a “conceptual model” (Figures 5,6 and 8) to serve as a visual representation of what the participants collectively thought were the key factors – direct and indirect - that were leading to undesirable impacts on wild tigers and their prey in Lao PDR. Based on the model, participants then identified the priority actions that they feel are needed from 2010-2020 to reduce the threats to wild tigers and their prey to be able to achieve the goal and vision of this Action Plan (Figure 7).

2. VISION

A Lao PDR with large functioning forest ecosystems where tigers thrive forever, which provides sustainable social, economic and environmental benefits to the people of Lao PDR

Lao PDR has a rich biodiversity, harbors several species of fauna and flora that are of global and regional conservation significance. There are at least 8,000 species of flowering plants, 100 species of large

mammals, and over 700 species of birds, 90 known species of bats, and 500 species of fish. Alongside the rich biodiversity, Lao PDR is also home to dozens of indigenous tribes and cultures, with 47 ethnic minorities and over 230 spoken languages. Over 80% of the population lives in rural areas and relies heavily on the forest resources and wildlife for their subsistence. Biodiversity offers the people of Lao PDR a wide range of options for sustainable economic activities and for human welfare. Hydropower, ecotourism, non-timber forest products, wildlife, wood products contribute significantly to the country’s economy. For this reason, the government of Lao PDR emphasizes that maintenance of healthy and productive forest ecosystems, and the sustainable use of natural resources are key to achieving the government’s development goals for sustainable economic growth and poverty eradication.

Currently, over 41% of land is forested, of which 13% is declared as national protected areas where the objective is to protect natural areas of flora and fauna, and maintain ecological stability and watershed functions. In this way, the national protected area system can serve as core habitat for the long-term survival of tigers. The existing forest cover across the country is the most important habitat to tigers, encompassing approximately 99,612 km² and

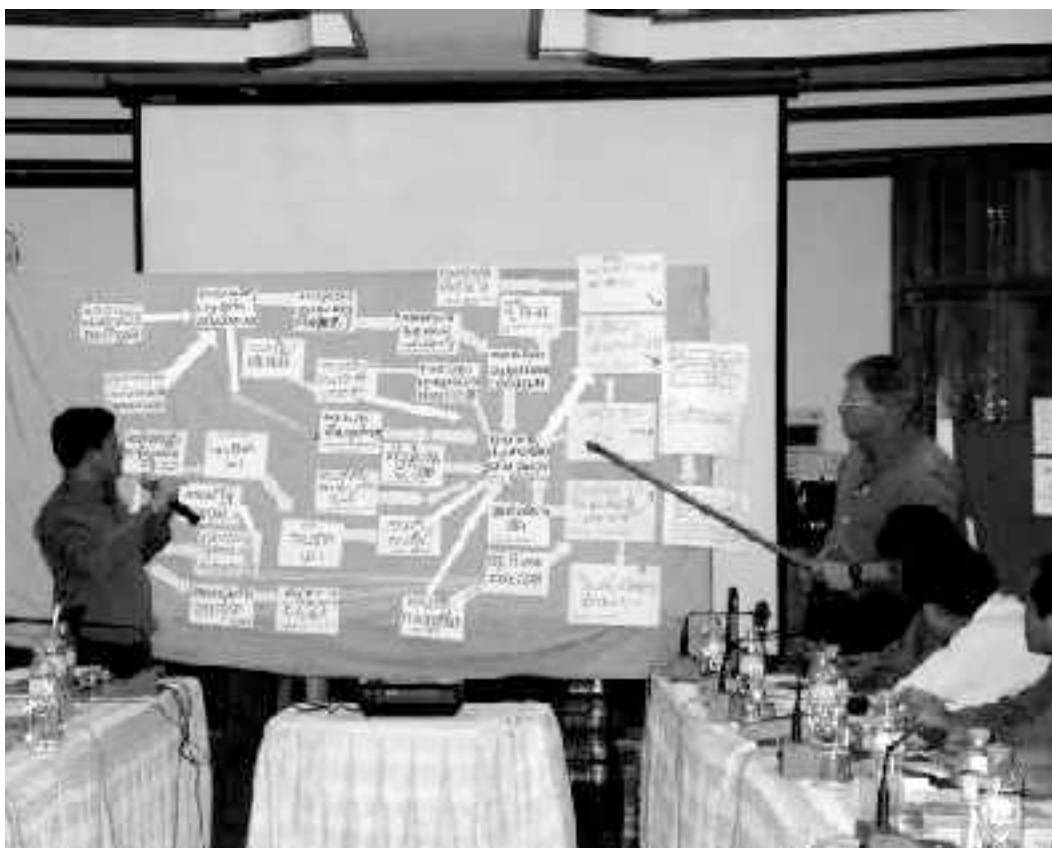


Figure 6. Workshop participants assemble the components of a conceptual model illustrating how the causal chains of threats are contributing to the decline of tigers, tiger prey and their habitats.



Figure 7. Workshop participants working in landscape groups to design the interventions - management actions -to reduce threats and reverse the decline of wild tigers, their prey and habitats in their respective landscape.

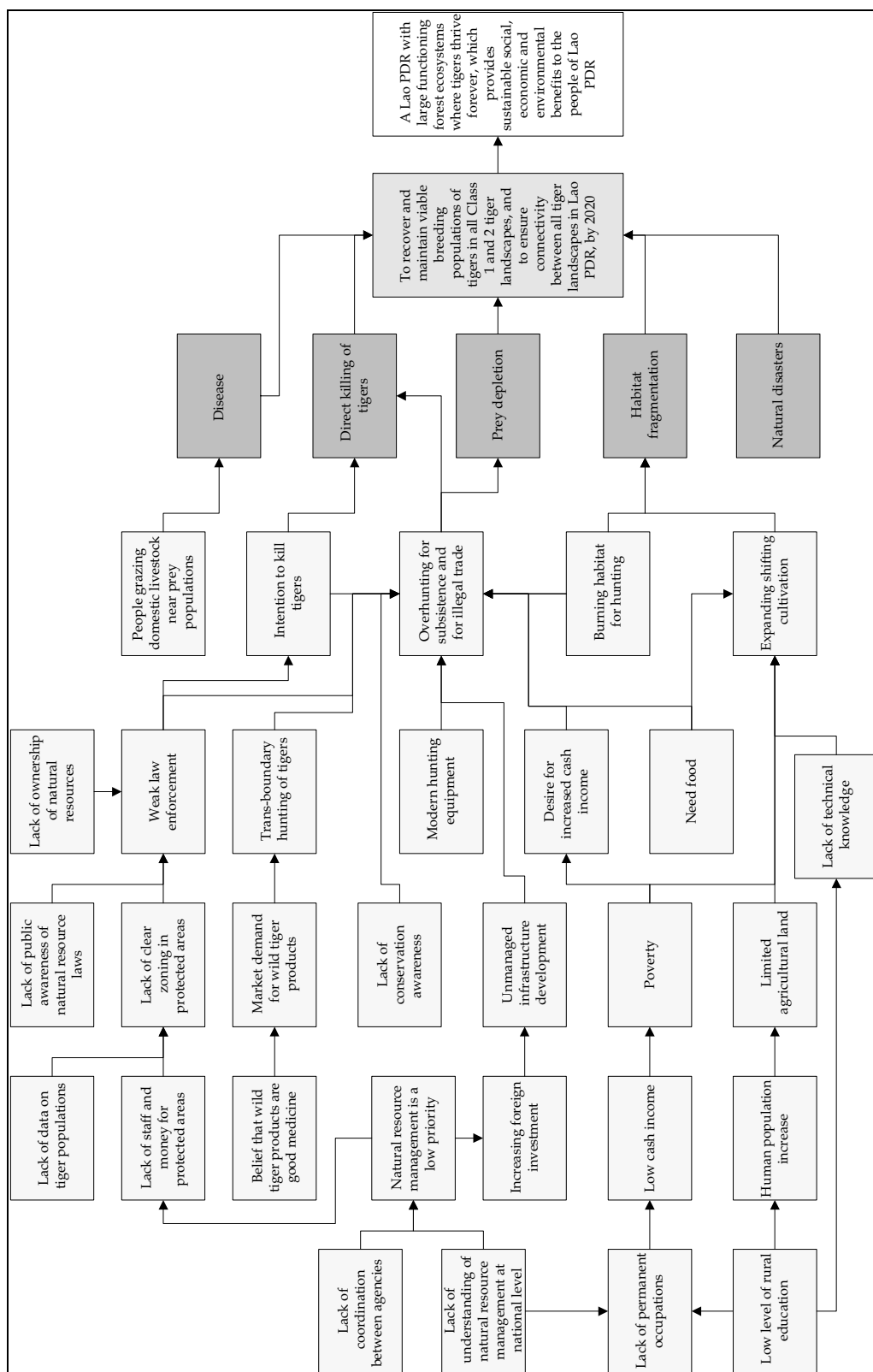


Figure 8. The conceptual model assembled by workshop participants illustrates the causal chains of threats believed to be contributing to the decline of tigers, their prey and habitats in Lao PDR. From left to right, indirect threats are shown in yellow, leading to direct threats (green), which need to be reduced to reach the goal (blue) and ultimately, the vision (white).

classified into different levels of conservation significance for tigers (see Part 1, Section 2 and Appendix 4). Tigers are a conservation-dependent species. They require an adequate prey base, sufficient land area, and protection from killing. In order for tigers to survive, all their basic needs need to be taken into account. As top predator, tiger plays a role as an icon of the Lao forest ecosystem such that the protection of tigers symbolizes the protection of all national forest and biodiversity, which will provide benefits, in the forms of direct and indirect services provided by healthy ecosystem, to enhance the quality of life and health of the people of Lao PDR.

Policy statement and guiding principles

The overall goal of the Lao PDR development strategy is to ensure the balance in economic development, social/cultural development, and the conservation of natural resources. All of the objectives and actions needed to address the existing threats to tigers in Lao PDR, which are included in this Tiger Action Plan are based on the underlying principles of the National Biodiversity Strategy and Action Plan⁵⁶, National Forest Strategy⁵⁵, National Growth and Poverty Eradication Strategy³⁵, national legislation, and international conventions (Part 1, Section 4). The principles of this framework that are adopted for guidance include:

- i. Biodiversity is a national heritage and must be used in a sustainable manner today to be conserved for future generations.
- ii. The national development process must reflect ecological, economic, social, cultural and spiritual values of the local people.

- iii. The sustainable use of biodiversity is a key element of livelihood strategies.
- iv. The knowledge, innovations and practices of local people should be respected and their use and maintenance of biodiversity carried out with the support and involvement of their people.
- v. Biodiversity is best conserved in-situ⁴.
- vi. The conservation and sustainable use of biodiversity resources require co-operation at all levels, namely local, national, regional and global and also a sharing of knowledge, costs and benefits.
- vii. The formulation and implementation of policies and the establishment of a legal framework are necessary as effective measures against biodiversity depletion.
- viii. Education and the raising of public awareness are essential in ensuring the conservation and sustainable use of biodiversity resources. In line with a range of government policies (Table 4), the Tiger Action Plan seeks to address the following urgent issues from 2010-2020:
 1. Protect threatened species and habitat (e.g. wild tigers and their prey)
 2. Strengthen the development and management of national protected areas.
 3. Maintain healthy and productive forests through conservation, protection and sustainable use.
 3. Improve local livelihoods through sustainable use of biological resources.
 4. Improve and develop laws and regulations, securing their effective enforcement.
 5. Enhance education and public awareness on the significance of biodiversity and the importance of its conservation

Table 4. National policy statements regarding to natural resource management and sustainable development

Policy	Policy statements
NEPES ^[1]	Economic growth must be based on sound management of natural resources and enhanced social and cultural development
NBSAP ^[2]	Maintain the diverse biodiversity as one key to poverty alleviation and protect the current asset base of the poor as support to the implementation of the government's priority programs
NSEDP ^[3]	The rich natural resources of the Lao PDR play a vital role in the country's socio-economic development. It is therefore important that they are protected and exploited in a sustainable manner.
NFS ^[4]	The objective of National Protected Areas/Biodiversity Conservation areas is to protect natural areas for conservation

⁴ "In-situ" is defined as in its original natural habitat (e.g. not in captive-bred facilities).

	of flora and fauna, maintenance of ecological stability and watershed functions, and to preserve historically, aesthetically, culturally or scientifically valuable sites. Objectives should be achieved through local participatory management benefiting NPA residents.
NESAP ^[5]	To sustainably utilize natural resources and protect and conserve the environment to ensure the sustainable development of the country while reducing poverty and enhancing the quality of life and health of Lao People
WL Law ^[6]	The tiger is the protected species in Category 1; hunting of tiger, trading, and keeping of tiger parts is prohibited. Violation of this law will be seriously punished.

- [1] National Growth and Poverty Eradication Strategy 2004
[2] National Biodiversity Strategy to 2020 and Action Plan to 2010
[3] National Socio-Economic Development Plan
[4] National Forestry Strategy to the Year 2020.
[5] National Ecotourism Strategy and Action Plan 2005-2010
[6] Wildlife Law 07; 24 December 2007.

Table 5. Scale-dependent geographic specific goals and costing

		Temporal (2010-2020)	
Spatial		2010-2015	2016-2020
	Tigers confirmed (NEPL)	<p>Increase tiger numbers by 50%, and sufficient prey to support this increase, in 3,000 km² TPZ by 2020.</p> <p>Cost¹: Minimum of US\$ 1.8 million for reoccurring operating costs per annum in addition to a one-off minimum investment of US\$ 4.7 million for infrastructure and equipment</p>	<p>Manage to increase tiger and prey populations to viable levels in the TPZ and secure movement corridors to ensure a source for reintroductions to other priority source sites</p> <p>Cost: Minimum of US\$1.8 million for reoccurring operating costs per annum</p>
Priority source sites	Tigers likely in Class 1 and 2 landscapes (Nam Xam, Xe Sap, Dong Ampham, Dong Huasao, Xe Pian, Nakai-Nam Theun)	<p>Confirm the occurrence of tigers at the site; manage to stabilize prey populations</p> <p>Cost²: Minimum of US\$640,000 for baseline field surveys including landscape questionnaire survey and camera trapping at source sites.</p> <p>¹, Minimum of US\$3.3 million for reoccurring operating cost per annum in addition to infrastructure investment</p>	<p>At sites where tigers were confirmed present, identify and secure TPZ for tiger breeding habitats and movement corridors;</p> <p>At sites where tigers were absent, manage site to reduce threats, stabilize prey populations and enhance connectivity with sites where tigers are confirmed present</p> <p>Cost: Minimum of US\$3.3 million per annum for reoccurring operating costs.</p>

3. GOAL

To increase size of breeding population of tigers at source site, Nam Et-Phou Louey, ensure connectivity between all tiger landscapes, and obtain baseline data on tiger populations for all TCLs in Lao PDR, by 2020.

The remaining tigers in Lao PDR appear scattered across various Tiger Conservation Landscapes (see map in Appendix 4 and Table 1), but they are at low numbers. At present, tigers are only confirmed in the Nam Et-Phou Louey NPA whereas their presence in other places remains provisional. Thus, in order to ensure long-term survival and conservation of tigers in Lao PDR, we need to elevate existing tiger numbers to secure a viable breeding population in sites where tigers are confirmed to, while also working to confirm the occurrence of tiger in other potential sites, particularly in all Class 1 and Class 2 TCLs. Where tigers are confirmed in these other potential sites, immediate action must be taken to reduce threats to allow tigers to increase to the level of a viable breeding population. For the purpose of this Plan, a viable population is defined as a minimum of 25 breeding tiger females in each confirmed source site as a viable population capable of sufficient reproduction to maintain the population over time¹¹.

Given the existing data on tiger population status, we therefore developed site specific goals that vary in terms of their implementation in space and time (Table 5). The national goal is further broken into two spatial scales including priority source sites and landscapes, and two temporal scales including a period between 2010-2015, and 2016-2020. For the purpose of this Plan, priority source sites are defined as areas embedded within a TCL that currently have confirmed or likely reports of tiger in a designated protected area (Table 1), which also have the potential to serve as a Totally Protected Zone (TPZ) within a designated Protected Area following the guidelines of the National Forestry Law⁵⁰ for maintaining a viable source population of tigers (e.g., the NEPL NPA has an estimated population of 7-23 tigers within the NPA TPZ¹³).

4. THREATS

At the national Tiger Action Plan workshop, the participants identified five direct threats and numerous underlying factors (indirect threats) that they felt are contributing to the decline of tigers, their prey and their habitat (Figure 8). The direct threats

included direct poaching of tigers, depletion of prey, habitat loss and fragmentation, and to a lesser degree, wildlife disease and natural disasters.

Direct killing of tigers is attributed largely to, (i) killing tigers with an intent to make money, and (ii) killing tigers in revenge for livestock loss, which can be associated with farmers using livestock to lure tigers in to poach them. The key factors driving these illegal activities are believed to be the high demand and price for tiger parts on the international market because people believe tiger parts will cure illnesses through traditional medical practices. Low income villagers are encouraged to engage with traders given a desire for cash income that is lacking because rural people often have a low level of education and thus find it difficult to obtain permanent employment. However, overall it was felt that weak law enforcement was at the root of all of the direct threats. Weak enforcement is thought to stem from poor land-use planning and management of protected areas, which is the result of inadequate staff and financial support for management. The paucity of support for protected area management was attributed to an inequality in national government investment in biodiversity conservation and socio-economic development, despite the fact that national strategies clearly state that poverty and biodiversity are intimately linked (see Table 4). This inequality was thought to stem from a lack of clarity at the national planning and investment level about the conceptual linkages between biodiversity conservation and economic development.

Depletion of prey is attributed to over-hunting of large prey species for both subsistence and for trade. The many factors contributing to overhunting were identified as:

- i) Weak law enforcement associated with poor land use planning or poor management of protected areas because of a shortage of funding and staff, which is the result of limited integration of biodiversity conservation with national economic development. As a result, participants felt that funding is allocated to development of infrastructure and other social sectors with little support for biodiversity conservation. The weak understanding of the conceptual link between biodiversity conservation and economic development at the national planning and investment level was thought to be rooted in weak coordination and cooperation between the various sectors of relevant government agencies;
- ii) A lack of public awareness about biodiversity conservation, particularly among rural

Tiger Conservation Landscapes	Tigers likely in Class 3 or Potential landscapes (Nam Khan, Nam Ha, Hin Nam Nor, Phou Xanghe, Xe Bangnouan, Phou Xiengthong, Nam Phoun, Phou Dendin)	<p>Confirm occurrence of tigers and prey populations</p> <p>Cost2: Minimum of US\$640,000 for baseline field surveys including landscape questionnaire survey and camera trapping at source sites.</p>	<p>At sites where tigers were confirmed present, identify and secure TPZ for tiger breeding habitats and movement corridors;</p> <p>At sites where tigers were absent, manage site to reduce threats, stabilize prey populations and enhance connectivity with sites where tigers are confirmed present</p> <p>Cost: Minimum of US\$3.3 million per annum for reoccurring operating costs.</p>
	Class 1 (TCL#35)	<p>Expand breeding populations inside the tiger landscape</p> <p>Cost3: Minimum of US\$100,000 per annum for operating cost</p>	<p>Enhance zones of connectivity within and between this and other landscapes.</p> <p>Cost: Minimum of US\$100,000 per annum for operating cost</p>
	Class 1 & 2 (TCL#27,34,26)	<p>Manage to reduce threats to recover source tiger populations</p> <p>Cost3: Minimum of US\$100,000 per annum for reoccurring operation costs</p>	<p>Enhance zones of connectivity within and between Class 1 and Class 2 landscapes.</p> <p>Cost: Minimum of US\$100,000 per annum for reoccurring operation costs.</p>
	Class 3 (TCL#33,#36)	<p>Manage to reduce threats to recover source tiger populations</p> <p>Cost3: Minimum of US\$100,000 per annum for reoccurring operation costs.</p>	<p>Enhance connectivity to Class 1 and 2 landscapes</p> <p>Cost: Minimum of US\$100,000 per annum for reoccurring operation costs.</p>
	Potential landscapes	<p>Identify any unprotected breeding tiger populations remaining in Laos</p> <p>Cost3: Minimum of US\$100,000 per annum for reoccurring operation costs.</p>	<p>Enhance their connectivity to existing tiger landscapes</p> <p>Cost: Minimum of US\$100,000 per annum for reoccurring operation costs.</p>

Notes:

¹ Estimate of minimum annual reoccurring operating costs at US\$ 300 per square kilometer or US\$ 3 per hectare. This includes support for law enforcement, public outreach, ongoing tiger and prey monitoring, land-use planning, boundary demarcation, and protected area office management

² Estimate of baseline monitoring costs based on US\$45 per square kilometer to conduct camera trap baseline survey, and US\$3 per square kilometre to conduct baseline landscape questionnaire occupancy survey.

³ Estimated minimum needed to support reoccurring operating costs for activities at landscape level (including district and provincial level activities such as law enforcement to stop illegal wildlife trade and habitat loss, inter-sectoral coordination, workshops, and training).

communities, is leading to violations of the law and little understanding or support for conservation;

- iii) Increased access to forested areas is resulting from poorly planned infrastructure development projects that do not include safeguards to limit the impact of the development on the environment, which in turn contributes to unregulated illegal hunting of wildlife for trade along these unmanaged access routes;
- iv) Modern weapons allow rural people to hunt tiger prey species more effectively, which is contributing to a more rapid decline in prey populations than in the past;
- v) The growing need for cash income associated with a high demand and price of wild meat encourages rural villagers to hunt more ungulates for trade rather than for subsistence.
- vi) The need for food encourages rural people to hunt for wild meat to supplement household food consumption, which alone may be sustainable but when coupled with illegal trade of wild meat is surely unsustainable;
- vii) As a result of the high demand and price of prey parts at international markets, driven by beliefs in the value of traditional medicine, there is also cross-border hunting by people from neighboring countries. The problem occurs in several TCLs along the country's international boundaries, such as in Phou Dendin and Nakai Nam Theun NPAs.

Habitat loss and degradation is attributed largely to shifting cultivation and burning of forest for game hunting. The factors behind these problems are:

- i) The demand for food or for income from cash crops results in clearance and burning of land for growing staples (e.g., rice, corn, cassava) and sometimes burning of the forest for hunting ungulates for subsistence consumption or for trade;
- ii) The limited availability of agricultural land given the country's mountainous terrain, which is further complicated by increasing human population in rural areas, due to a lack of birth control and education, which results in people encroaching into tiger habitat;
- iii) The lack of technical skills by rural farmers, which can result in improper use of chemicals causing negative impacts on the environment as well as low agricultural productivity such that more land is cleared to meet the growing demands for food and cash;
- iv) Unmanaged infrastructure projects without

environmental safeguards were identified as contributing to habitat loss and fragmentation.

Disease was identified as a cause of decline in tiger prey in cases where infectious diseases are transmitted from domestic animals to wild ungulates where livestock grazing areas in close proximity to wildlife inside protected areas.

Natural disasters were identified as a factor contributing to the loss and fragmentation of tiger habitat, especially in areas of intense shifting cultivation, which in turn was attributed to a lack of technical skills and limited land for agricultural production.

5. OBJECTIVES AND INTERVENTIONS

In order to reduce the threats outlined in the previous section and achieve the goal, "to recover and maintain viable breeding populations of tigers in all Class 1 and 2 Tiger Landscapes, and to ensure connectivity between all tiger landscapes in Lao PDR, by 2020", several objectives and interventions are identified in this Plan. For each objective to be achieved, specific actions must be taken at different administrative levels, ranging from priority sites, to landscapes, and at the national level, to address the indirect and direct threats that are leading to the decline to wild tigers, their prey and habitats (see Table 6). At priority sites, actions will focus on reducing the threats that occur within the protected areas that harbor source tiger populations. Examples of these types of threats include direct poaching of tigers and prey, controlling the hunting of Categories 2 and 3 managed prey species (muntjac and wild pig) and encroachment into tiger habitat inside a protected area TPZ. At the landscape level, key actions focus largely on threats that occur beyond protected areas at the district or provincial level. Examples of these threats include wildlife trade, habitat loss and unmanaged infrastructure development. At the national level, the major actions focus on issues that occur beyond the landscapes at both national and international levels. Examples of these threats are lack of institutional capacity, legislation, financial and technical support, and international cooperation to address the problems facing wild tigers, their prey and habitats.

In this section, we describe the seven major objectives of the Tiger Action Plan. In Table 6, each objective is broken down into specific interventions at priority sites, at landscapes and at the national level. For each intervention, agencies responsible for implementation are identified, as well as indicators

and a means of verification to identify if the intervention has been completed.

Objective 1: Increase public awareness and support for the recovery and conservation of wild tigers and their habitats

If tiger conservation is to be successful or not depends on public support and involvement. So, it is crucial to raise public understanding of how tiger conservation may benefit the citizens of Lao PDR, what is the legislation relevant to tiger conservation, and how the public must engage in tiger conservation. Over the last decades, methods for implementing outreach and education activities have advanced considerably, such as formal education, social marketing campaigns, conflict mitigation, and natural resource planning. At the present time, national capacity to design and deliver public outreach programs specific to the conservation of wild tigers and prey is limited. Only three protected areas (NNT, NK and NEPL) have outreach units that are actively engaged in design and delivery of programs to increase public awareness and support for the conservation of wildlife; only the NEPL outreach unit is focused on land use planning and management issues specifically related to wild tigers and their prey.

Our target groups include a wide range of people, which includes local villagers who live nearby the priority sites or within the TCLs, officials at all levels of government, and the private sectors. To achieve this objective, activities at priority sites will focus on;

- (i) building PA staff capacity to design, deliver and evaluate outreach activities,
- (ii) support outreach activities in target villages inside/nearby protected areas to disseminate PA regulations, to inform villagers on land-use zoning and demarcation, resolving human-wildlife conflict, the role of local involvement in conservation and resource management.

At landscapes, outreach and education activities will focus on building knowledge and support in villages outside PA to increase their understanding about national laws controlling wildlife crime and the consequences of engaging in wildlife crime, and how increased wildlife populations will benefit people.

At the national level, the outreach activities will aim at building knowledge and support for within/among government sectors about national laws, and tiger significance in sustainable economic development and environment protection. Of particular importance, tiger conservation needs to be integrated into national socio-economic planning and investment.

Objective 2: Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.

In compliance with the national forestry law, land-use zoning will include demarcation of,

- (i) TPZs – that are core breeding areas where human activity is prohibited,
- (ii) Managed Zones (MZs) – that are areas where sustainable use of natural resources by local communities for subsistence is allowed, and
- (iii) corridors – habitat connectivity within and between protected areas that allow movement or dispersal of tigers and prey within/between TCLs.

The law states that all hunting is prohibited in the TPZ whereas harvest of tigers and large prey (e.g. gaur, banteng, sambar and serow) is illegal throughout the country. At the present time, only two protected areas (NEPL and NKD) within two of the priority landscapes have demarcated and are protecting TPZs, while one other (NNT) is in the process of demarcating TPZs. So, we need to extend this activity to other NPAs as well as across TCLs in order to strengthen the effectiveness of our conservation interventions, particularly law enforcement.

To achieve this objective, activities at the priority site and landscape level will first focus on collection of baseline data on status of wild tigers and prey, and their habitat as well as socio-economic information on villages in PAs and TCLs. The baseline results will be used along with national policies and national economic development plans to guide land-use zoning that will accommodate both biodiversity conservation and socio-economic development. At the national level, activities must ensure that land-use planning in TCLs is integrated into national socio-economic development and investment strategies. At core breeding sites, no infrastructure development will be permitted.

Objective 3: Increase and make effective the enforcement of national regulations and international conventions to stop killing of tigers and to regulate illegal harvest and trade of tiger prey.

It is evident that traditional hunting for subsistence has been replaced by commercial hunting, causing severe decline in wildlife populations including tigers. If the current trend continues, they may disappear from the forest ecosystem of Lao PDR within a decade. The major factors behind this

problem are mainly weak law enforcement and poor management of protected areas. Therefore, building capacity within and between enforcement agencies, and providing supports for “on the ground” action is necessary to tackle these illegal activities.

The 2007 Wildlife Law provides good guidelines for the management of wildlife resources, including the control of wildlife crime. The law allows for sustainable harvest of category II (muntjac) and category III (wild pig) species in areas outside TPZs and corridors for family consumption only, but not for trade. Tigers and other large ungulates (e.g. gaur, sambar, banteng, serow), that are Category 1 species, are totally protected from hunting. Hunting of these Category I species for both subsistence and trade is prohibited, and any violation of these regulations will result in a severe penalty, ranging from a fine to jail.

To achieve this objective, implementation will take place at multiple levels. At the priority sites, attempts will focus on building capacity and support for PA staff and local district/provincial enforcement agencies to conduct regular routine and responsive patrols in the tiger core breeding sites to stop poaching of tigers and prey. At the landscape level, attempts will focus on building capacity and support for district/provincial enforcement agencies to stop wildlife trade in markets, restaurants, along roads and at international border checkpoints. At national level, attempts will aim at strengthening the institutional capacity of enforcement agencies, such as Department of Forest Investigation (DOFI), CITES Management and Scientific Authorities and other concerned agencies such as police and custom offices, to enforce the existing laws and strengthen international cooperation to stop cross-border wildlife crime

Objective 4: Increase national cross-sectoral cooperation for the recovery and conservation of wild tigers and their habitats

The National Biodiversity Strategy of Lao PDR emphasizes that conservation and sustainable use of biodiversity resources require co-operation at all levels of government and within Lao society. Therefore, for all management interventions proposed in this Tiger Action Plan to be achieved will require cooperation among all government agencies. Therefore, to achieve this objective, a priority will be to strengthen the capacity of staff to coordinate cross-sectoral actions. A series of meetings/workshops will be held at various levels, namely village, district, province, and national, to increase support and participation in the decisionmaking process.

At the priority sites, activities will focus on strengthening cooperation and coordination among district and provincial government sectors to be aware of and support conservation interventions on the ground (e.g. law enforcement, outreach, land-use planning, etc.), and to ensure that all socio-economic development plans are in compliance with PA regulations. At the landscape level, attempts will focus more on strengthening cooperation between government sectors within/between provinces to ensure connectivity between PAs within a landscape, proper land-use planning and increased local support. At the national level, activities will aim at strengthening cooperation and coordination within and among ministries in order to ensure that conservation of tigers and prey is integrated into national development planning and investment. Of particular concern, no concessions or infrastructure development will be permitted in the core breeding sites for tigers.

Objective 5: Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries.

As a signatory to CITES, Lao PDR agrees that any trade in tigers and other endangered species is banned. However, illegal trade in tigers due to the high demand for their body parts for traditional medicine still exists. This is a major cause for the decline of wild tiger populations across tiger range countries, particularly in Lao PDR. Geographically, Lao PDR is located in the heart of Indochina, a landlocked country sharing borders with Thailand and Myanmar to the west, China to the north, Vietnam to the east and Cambodia to the south. Given this setting, strengthening international cooperation with neighbors is critical to control cross-border wildlife trade. Lao PDR has already signed international conventions, including CITES, and is a member of ASEAN-WEN for a number of years and has agreed to control illegal wildlife trade. In order for this objective to be achieved, activities at the priority sites will focus on strengthening cooperation and coordination among local enforcement agencies to stop illegal cross-border wildlife trade along international borders. NPAs also need to work cooperatively with other relevant agencies to develop “Village Development Fund” that may come from sale of NTFPs, park services, ecotourism, and other national/international supports for livelihood improvement. This may demonstrate villagers how tiger conservation is significant to local livelihood and their involvement in conservation. At the national level, attempts will focus on building national capacity for all enforcement sectors to strictly control illegal cross-border wildlife trades at international

checkpoints, and work cooperatively with international enforcement network such as ASEAN-WEN to increase effectiveness of law enforcement.

Objective 6: Monitor and reduce human-tiger conflict in tiger conservation landscapes.

Human-tiger conflict due to tiger depredation of livestock and sometime direct confrontation with humans is a major cause of tiger decline in many tiger range countries. As a top predator, the tiger's requirements may overlap with those of human populations (e.g. diet, land tenure). The conflict generally occurs more commonly inside and around protected areas where cultivation and grazing areas are located inside/nearby the protected area. However, the problem becomes exacerbated if natural prey populations have declined and natural habitats are invaded by human for settlement and agriculture.

In Lao PDR, national protected areas are categorized as multiple-use, IUCN Category VI protected areas, where people are allowed to live within the protected area. Under these circumstances, human-wildlife conflict is possible.

For example, in NEPL NPA, even though tiger numbers are relatively low at present, tiger depredation of livestock is reported by villagers, but the certainty of those reports is not always known. Therefore, it is important to utilize a systematic method to better understand the problem and find ways how to reduce human-tiger conflict. At the priority sites, activities will focus on building capacity for protected area staff to systematically respond to and investigate carnivore-human conflict reports and maintain a carnivore-human conflict database. Also, protected area staff will work with and support farmers to ensure "tiger friendly" livestock management practices, and ensure that those farmers are being trained on technical skills in livestock husbandry. At landscape and national levels, activities will focus on supporting PA regulation, providing technical guidelines to PA staff and farmers, and ensure application of a standardized protocol for all tiger priority sites.

Objective 7: Strengthen PA organization, capacity and sustainable financing to effectively implement management activities to reduce threats to tigers and prey at priority source sites in Class 1 and 2 tiger conservation landscapes.

Following up from Prime Minister' agreement No. 25/PM, dated on 3rd April, 2007, the Provincial NPA Management Unit (PPAMU) was newly established in each province throughout Lao PDR. The mandate of PPAMU is to strengthen PA management in each province in order to protect and conserve forest,

wildlife, and watershed resources. In addition, this agreement has emphasized that each NPA must be assigned at least 15 government staff, provided sufficient equipment, vehicles and financial support to implement management interventions.

Up to now, only two protected areas (NEPL and NK) in two Tiger Conservation Landscapes have management plans designed to reduce threats specific to the conservation of wild tigers and prey. A site-specific management plan is urgently needed for each priority site or landscape. The plan should set the goal and objectives clearly, lay out all key threats to tigers, their prey, and their habitats and all key interventions that tackle those problems. Due to inadequate financial support, only a few of the 21 NPAs throughout Lao PDR with technical and financial assistance from international organizations or industry are under proper management at the present time, namely NEPL, NKD, NNT. A sustainable financing mechanism in each priority site or tiger landscape is needed to secure long-term financial support.

To achieve this objective, activities will aim at building staff capacity of PPAMU at priority sites or landscapes to

- i) identify and rank threats to wild tigers and prey,
- ii) design management activities that will reduce the greatest threats, and
- iii) implement site-specific plans for conservation of wild tigers and prey. Technical training provided to NPA or PPAMU staff need to include;
 - a) principles of tiger ecology and conservation and of wildlife management,
 - b) how to integrate wildlife management with rural livelihoods and development,
 - c) group leadership, communication and coordination skills, as well as conflict resolution for mitigating resource disputes and stakeholder disagreements,
 - d) tools for financial and administrative management of TCLs, including budgeting, fundraising, and reporting.

In addition, at each site attempts should focus on creating an "NPA Management Fund", which generated revenue from ecotourism, fines, research fees, and gifts to support the management. This may be an option for long-term sustainable financing mechanism for each priority site or landscape. At national level, attempts should ensure that national funding is allocated to NPA management, and to work together with international partners to consider REDD project sites as an option for sustainable long-term financing for NPA management in tiger landscapes.

Table 6. Scale-dependent implementation of interventions.

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 1: Increase public awareness and support for the recovery and conservation of wild tigers and their habitats							
Tiger Source Sites	Intervention 1.1. Establish and train protected area outreach units to design, deliver and evaluate the effectiveness of outreach activities.	NPA	PAFO, DAFO	Number of NPA outreach staff trained	Roster of trained NPA staff		
	Intervention 1.2. Compile and disseminate national laws, PA regulations and zoning to source site communities and authorities.	NPA	PAFO, DAFO	Awareness program and materials	Report on awareness materials and their distribution.	X	
	Intervention 1.3. Develop and ratify village contracts that ensure compliance with laws and regulations to protect tigers and sustainably manage the use of tiger prey species and habitats.	NPA	PAFO, DAFO, Law agency	Number of villages contracted	Published reports listing completed village contracts	X	
Tiger Landscapes	Intervention 1.4. Disseminate national laws and PA regulations that protect tigers and sustainably manage their prey and habitats to communities and authorities across Class 1 and Class 2 TCLs.	NPA, DAFO	PAFO, Media agencies	Awareness programs implemented, and materials	Media pick up; Report on awareness materials and their distribution.	X	X
National	Intervention 1.5. Conduct outreach activities to raise awareness of national agencies and authorities of the importance of wild tigers and their conservation.	DFRC	MAF, Media agencies	Awareness programs	Media pick up, meetings, published reports on awareness materials and their distribution	X	X

Table 6. Scale-dependent implementation of interventions.

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 2: Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.							
Tiger Source Sites	Intervention 2.1. Increase knowledge on the status of tigers and prey in NPAs using scientific sound methods	NPAs	DAFO, PAFO	Completion of rigorous science-based field surveys	Published technical reports	X	
	Intervention 2.2. Compile land use and socioeconomic data to inform the demarcation of PA zones.	NPAs	PAFO, DAFO	Completion of rigorous science-based field surveys	Published technical reports	X	
	Intervention 2.3. Identify and demarcate PA boundaries of source sites.	NPAs	PAFO, DAFO	Boundary demarcation signs, maps	Published technical reports with boundary maps	X	
	Intervention 2.4. Following the 2007 National Forestry Law, within PAs identify and demarcate large areas, at least 1,500 km ² in size, of TPZs, and corridors between TPZs.	NPAs	PAFO, DAFO, LMU	Land use map showing PA TPZ	Published technical reports with PA and TPZ maps	X	
	Intervention 2.5. Conduct village land-use planning and allocation in PA controlled use zones to ensure public compliance with NPA zoning.	NPAs,	PAFO, DAFO, LMU, village	Village meetings, regulations	Official village land use planning agreements and maps	X	
Landscape	Intervention 2.6. Identify and demarcate protected corridors of habitat connectivity to facilitate dispersal of tigers between source sites within TCLs and between TCLs.	NPAs	PAFO, DAFO, LMU, village	Established corridors	Published technical reports with corridor maps	X	X
	Intervention 2.7. Conduct village land-use planning and allocation outside of PA boundaries to ensure compliance with PA zoning and corridors within TCLs.	NPAs	PAFO, DAFO, LMU, village	Number of villages with land use maps	Official village land use planning agreements and maps	X	

Table 6. Scale-dependent implementation of interventions.

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 2: Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.							
National	Intervention 2.8. Approve PA management plans to ensure crosssectoral compliance with PA TPZs and corridors.	DFRC	DOF, MAF	Approved management plans	Number of PA management plans completed and approved	X	
	Intervention 2.9. Manage land concessions and infrastructure development in TCLs to comply with PA management plans and zoning.	DOF	MAF, DCPI, MI, MEM, MT	Infrastructure and concession management plans that comply with PA regulations	Infrastructure and concession management plans endorsed and regulated.	X	
Objective 3: Increase and make effective the enforcement of national regulations and international conventions to stop killing of tigers and to regulate illegal harvest and trade of tiger prey.							
Tiger Source Sites	Intervention 3.1. Establish, train, and coordinate a multisectoral law enforcement team to effectively implement PA regulations, CITES and CBD international conventions at source sites.	NPA	DAFO, PAFO, Military, police, justice, custom, provincial and district government	Number of staff trained and actively serving on this task	Reports on enforcement of PA regulations and international conventions.	X	
	Intervention 3.2. Develop and implement PA protection strategies that identify threats to wild tigers and prey at source sites and target enforcement activities to reduce threats.	NPA	PAFO, DOF, DOFI	Level of threats and enforcement	Reports on the results of threat and enforcement monitoring	X	
	Intervention 3.3. Establish and support effective foot patrols within PA TPZs and corridors to stop illegal poaching of tigers and prey.	NPA	PAFO, DOF, DOFI, DAFO, military, police, custom,	Foot patrol effort and level of illegal poaching	Reports on the results of threat and enforcement monitoring	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Landscape	Intervention 3.4. Build village informant networks to support enforcement to stop illegal poaching of tigers and prey at source sites	DFRC	DAFO, police, military, custom	Informant reports that lead to wildlife seizures	Reports on the results of threat and enforcement monitoring	X	X
	Intervention 3.5. Install PA law enforcement monitoring systems (e.g. MIST) to systematically monitor, evaluate and adapt law enforcement activities.	DOF	DFRC, WCS	Installation of MIST	Reports on the results of threat and enforcement monitoring	X	
	Intervention 3.6. Following the 2007 Wildlife Law, manage for the sustainable harvest of Category 2 and 3 tiger prey in areas outside of PA TPZs and corridors.	NPA	DAFO, PAFO, Military, Police, Custom, Commerce	Sustainability of the harvest of tiger prey	Off take monitoring; abundance of tiger prey	X	X
	Intervention 3.7. Strengthen and coordinate between enforcement agencies at district and provincial levels to stop illegal trafficking of tigers, prey and other wildlife along roads and at restaurants and markets.	NPA	DAFO, PAFO, Provincial/district gov, Customs, Police, Commerce	Level of illegal trafficking and enforcement	Reports on the results of threat and enforcement monitoring	X	X
National	Intervention 3.8. Strengthen national capacity and international cooperation at border crossings to adhere to CITES and stop illegal cross-border trade in tiger parts and tiger prey.	DFRC	NPA, PAFO, DOF, MAF, Custom, Commerce, Police	Number of staff trained and actively serving on this task	Reports on enforcement at border crossings	X	X
	Intervention 3.9. Strengthen the capacity and increase effectiveness of the CITES Management and Scientific Authorities to regulate trafficking of tigers and their prey.	DOFI	DOF, MAF	Workshops; number of staff trained and actively serving on this task	Manuals, reports on staff trained and regulation activities.	X	X

Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Intervention 3.10. Closely monitor and regulate facilities that hold captive tigers and prey to assure compliance with CITES regulations and national wildlife laws.	DOFI	DOF, MAF	Level of monitoring and regulation	Published reports on monitoring, regulation and compliance.	X	X
Objective 4: Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries.						
Tiger Source Sites	Intervention 4.1. Increase coordination between national government authorities at source sites and nearby border enforcement agencies to monitor and reduce the illegal cross-border trade of tigers and prey.	NPA	DAFO, PAFO, Custom, Police, Commerce	Level of threats and enforcement	Reports on the results of threat and enforcement monitoring, media pick up	X
	Intervention 4.2. Raise the awareness of customs authorities and other relevant border enforcement agencies of the CITES, related national wildlife legislation and regulations, the nature of tiger and prey trade regionally, and how to identify, confiscate and handle illegally traded tigers and prey.	DFRC	PAFO, DOFI, DOF, MAP	Number of staff trained and actively serving on this task	Reports on training and enforcement at border crossings	X
	Intervention 4.3. Convene relevant border enforcement agencies to develop strategies for trans-boundary collaboration to control the illegal trade of tigers and prey between Laos and neighboring countries.	DOFI	DOF, Custom, Police, Commerce	Workshops	Published workshop reports and resulting strategies	X
Landscape						

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
	Intervention 4.4. Increase collaboration between national officials responsible for tiger conservation with the ASEAN Wildlife Enforcement Network, TRAFFIC and CITES to strengthen, and monitor change in, the enforcement capacity and effectiveness of customs authorities and other relevant border enforcement agencies to reduce illegal trafficking of tigers and prey.	DOFI	DOF-DFRC, MAO, Custom, Police, Commerce	Workshops, enforcement capacity, wildlife seizures	Reports from enforcement and trade monitoring, media pick up	X	
Objective 5: Increase national cross-sectoral cooperation for the recovery and conservation of wild tigers and their habitats							
Tiger Source Sites	Intervention 5.1. Convene regular forums within and between all government sectors at the district and provincial level to raise awareness, compliance with and support for national and PA regulations and zoning to reduce threats to wild tigers, prey and their habitat at source sites.	NPAs	DAFO, PAFO, Military, Police, Custom, Health, Infrastructure, Commerce	Meetings; awareness and compliance with regulations and zoning	Meeting minutes, reports on levels of awareness, compliance and support.	X	X
	Intervention 5.2. Increase coordination between PAs and provincial tourism offices to assure that ecotourism activities at tiger source sites generate financial support for PA management and communities resulting in incentives for the conservation of wild tigers and their habitats.	NPAs	DAFO, PAFO, Provincial/district gov., Tourism	Financial support from tourism for conservation of tigers	Reports on distribution of tourism revenue in PAs	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Landscape	Intervention 5.3. Work in partnership with concerned agencies and other development sectors to develop “Village Development Fund” in target villages.	NPAs	DAFO, PAFO, Forest Development Fund, Tourism	# of set-up funds and cash in each village	Participation in conservation, reports, media pick up	X	X
	Intervention 5.4. Assign a multidisciplinary team to systematically assess large-scale land concessions and infrastructure development projects to minimize the impact on wild tigers and their habitats at source sites in the landscape.	PAFO	PAFO, DOF, Provincial/ national LMU/ Planning & Investment	Land use maps and regulations to minimize impact	Published regulations and maps	X	X
	Intervention 5.5. Create and convene a forum for regular dialog within and among all government ministries to integrate awareness and conservation of wild tigers and their habitats into national planning and investment.	DOF-DFRC	MAF, Other sectors	National meetings, national planning and investment plans that consider wild tigers and habitat	Published plans, media pick up	X	X
National	Intervention 5.6. Increase national, provincial and district capacity to coordinate crosssectoral management for conservation and recovery of wild tigers and their habitats.	DOF-DFRC	MAP, Other sectors	Workshops. Cross-sectoral management plans	Workshop reports, cross-sectoral plans, media pick up	X	
	Intervention 5.7. Increase government and private sector support in the ecotourism industry for the conservation and recovery of wild tigers and their habitats.	DOF-DFRC	Tourism-government and private sectors, Media agencies	Level of support from tourism for conservation of wild tigers	Reports on tourism support for tiger conservation	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 4: Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries.							
Tiger Priority Sites	Intervention 6.1. Train and equip all PA field staff to systematically respond to and investigate carnivore-human conflict reports and to maintain a carnivore-human conflict database.	NPAs	DAFO, PAFO	Workshops number of staff trained and actively engaged on this task, database	Report on results of human-carnivore conflict monitoring and response	X	X
	Intervention 6.2. Regulate livestock management in PA controlled use zones to ensure livestock are attended by day and corralled at night.	NPAs	DAFO, PAFO	Livestock raising techniques	Maps of grazing areas	X	X
	Intervention 6.3. Train and support farmers to implement "tiger-friendly" livestock management practices at tiger source sites.	NPAs	DAFO, PAFO	Training workshops; management practices	Reports, manuals	X	X
	Intervention 6.4. Support livelihood alternatives for farmers to reduce hunting pressure on wild ungulates	NPAs	DAFO, PAFO, Forest Development Fund, INGOs, Development sectors				
	Intervention 6.5. Develop and promote agricultural techniques in tiger conservation landscapes that increase productivity while reducing human-tiger conflict and loss of tiger habitat.	NPAs	DAFO, PAFO	Training workshops; level of conflict and habitat loss	Reports on workshops and results of conflict and habitat monitoring	X	X
Landscape & national							

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 7: Strengthen PA organization, capacity and sustainable financing to effectively implement management activities to reduce threats to tigers and prey at priority source sites in Class 1 and 2 tiger conservation landscapes.							
Tiger Priority sites and Landscapes	Intervention 7.1. Strengthen the capacity and organization of provincial PA management units at source sites to i) identify and rank threats to wild tigers and prey, ii) design management activities that will reduce the greatest threats, and iii) implement site-specific plans for conservation of wild tigers and prey.	NPAs	PAFO, DOF	Strategic planning workshops, site-specific plans	Site-specific plans	X	X
	Intervention 7.2. Train provincial PA offices and PA management units at priority sites in: principles of tiger ecology and conservation and of wildlife management, how to integrate wildlife management with rural livelihoods and development, group leadership, communication and coordination skills, conflict resolution for resource disputes and stakeholder disagreements, tools for financial and administrative management of TCLs, budgeting, fundraising, and reporting	NPAs	PAFO, DOF	Staff trained, level of capacity	Published reports on staff trained and capacity	X	X
	Intervention 7.3. Establish PA Management Fund from fines, ecotourism and research fees, and gifts to support site management.	NPAs	DAFO, PAFO, Provincial/district authorities, Energy & Mining, Forest Development fund	PA Management Fund	Published reports on establishment and management of fund	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
National	Intervention 7.4. Secure financial support for source sites to implement Prime Minister's agreement No. 25/PM, dated 3rd Apr 2007, including of recruitment of staff, building of facilities, and equipment procurement for PA management.	MAF	DOF, Forest Development fund	Government funding for PA management	PA annual reports	X	X
	Intervention 7.5. Increase government and private sector support from large-scale infrastructure projects for the conservation and recovery of wild tigers and their habitats at source sites.	DOF	MAF, INGOs, Forest Development Fund	Financial support, development plans	Published reports	X	X
	Intervention 7.6. Investigate the feasibility of long-term support for priority site management from international initiatives such as REDD (Reducing Emissions from Deforestation and Forest Degradation).	DOF	MAP, INGOs,	Research programs to investigate long-term support	Published feasibility studies	X	X

6. IMPLEMENTATION OF THE ACTION PLAN

6.1. Adaptive Management

A successful Tiger Action Plan should broadly speaking apply the following adaptive management steps (Figure 9):

Define the Context: The Plan defines where we want to work and what we want to conserve, also identifying the most important threats and where they occur within the landscape of interest. Developing a conceptual model for the Plan is a useful tool for determining what actions to take to address the threats to reach the goal.

Design Approach and Measures of Success: In the Plan, we strategically identify our interventions so we are confident that they will help abate the most critical threats, while putting in place a process for measuring the effectiveness of our conservation actions by monitoring indicators through various means of verification (Table 6), and using this information to guide our decisions.

Implement Actions and Measure Effectiveness: Following the Plan, we develop and implement interventions taking account the available resources and capacity. We collect and analyze the data to assess how well the interventions are being implemented, to what degree the threats are being successfully mitigated and whether wild tigers, their prey and habitats are doing as well as we hoped.

Review Progress and Revise Approach: Based on the monitoring results, we adapt the interventions and refine the monitoring design to achieve the goal and vision of the Plan.

6.2. Accountability

All participants working to stabilize and recover tiger populations in Lao PDR as described in the goal and objectives of this Plan will be held accountable for their actions by their peers and superiors. Lines of reporting should reflect the existing structure of different teams responsible for implementing interventions. At priority sites, teams of staff working on various activities, ranging from management, enforcement, to outreach and tiger and prey

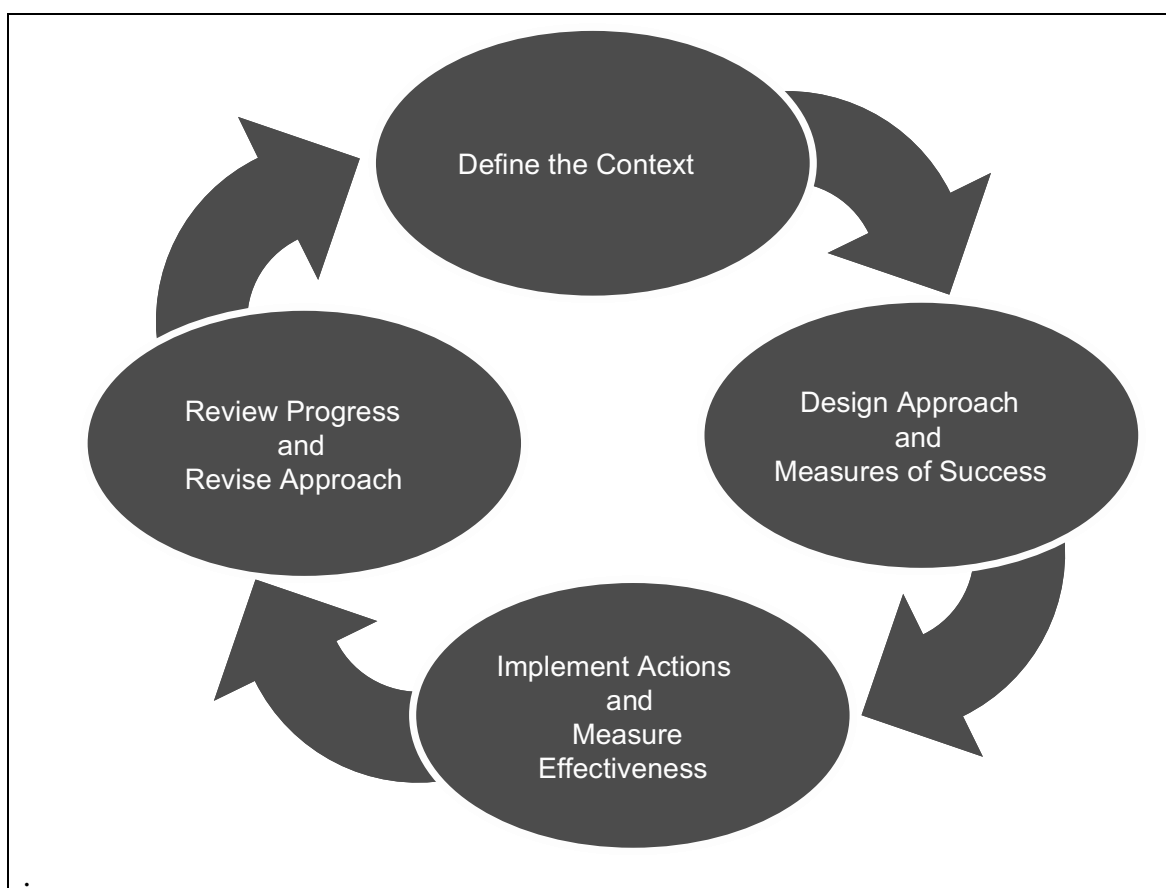


Figure 9: The adaptive management cycle 59

monitoring are needed. Progress reports shared between the entire team is critical. This allows each team leader to report on their progress and difficulties in attaining their objectives to the entire management team. Having team members report to and be accountable in this manner can help create a truly high performance team.

At the landscape level, administrative authorities such as DAFOs, PAFOs and PPMUs are directly responsible for cooperation and coordination with concerned agencies at both central and local levels to implement the activities on the ground. They are accountable to one another by the binding pledge to work together towards the unified vision and goals of this Plan, and monitor movement towards accomplishment of those goals.

At national level, this Plan is developed in parallel to various national policies, which contribute to achieving national development goal and commitment to international community through multilateral environmental agreements. Central government agencies like MAF, DOF, and DFRC are directly responsible for cooperation and coordination with central concerned agencies, and other international bodies. They need to ensure that government funding is appropriately allocated to PA management and work together with implementing agencies to ensure they link their budget, annual performance measures to the goal and objectives of this Plan. For example, this would include linking annual performance measures of progress towards reducing the threat of poaching on wild tigers.

6.3. Monitoring Mechanism

Monitoring will track progress over time towards achieving the goals and objectives laid out in this Plan. Monitoring is a crucial component of good conservation management. It allows us to assess whether or not threats are decreasing, and if tiger and prey populations and their habitat are increasing or remaining stable. Through monitoring we can test our assumptions as to whether our interventions actually lead to what we want to achieve, or are if they wasted effort. Monitoring tracks changes over time and this distinguishes it from a survey, which estimates conditions at a single point in time. Instead, monitoring uses survey results at many instances in time.

Looking at the components of our conceptual model (Figure 5), ideally we should monitor all of the following to get the most information about the effectiveness of our actions: the interventions, the threats and the conservation targets-which are wild

tigers, prey and their habitat. We should monitor our interventions to make sure that they are being implemented as we planned. For example, are trained forest guards patrolling in the Totally Protected Zone of the NPA? Since our interventions are chosen to reduce the levels of threats to tigers, prey and their habitat, we should also monitor our success in reducing threats to assess whether or not our interventions were worthwhile. For example, is there a reduction in the number of metal snares in the area being patrolled? Lastly, we look at the status of tigers, prey and their habitat that form our conservation targets to see whether they improve when our interventions are implemented successfully, and threats are reduced. For example, are tiger numbers increasing as a result of the reduction of snares?

The improved state of wild tigers is the ultimate indicator of success of this plan and knowing what that state of tigers is gives us the greatest level of confidence that we might be doing the right thing, yet this is usually the most difficult monitoring to do, costs the most, and may have longer lag-times (see Figure 9). If we monitor the intervention results and threat reductions as proxies for our progress there are definite tradeoffs. The time frame to seeing results and the costs of monitoring decline as we move from directly monitoring changes in tigers, prey and their habitats, to monitoring reduction in threats, to monitoring whether or not our interventions were implemented as planned. However, using these proxies that change within a shorter time frame also lowers our level of confidence in whether the information informs us meaningfully about our actual conservation success to recover and maintain viable tiger populations at our source sites and landscapes.

Monitoring the conservation target: wild tigers and their prey Wild tigers are the primary beneficiary of this plan so the success of any conservation action will be reflected in their population status (e.g. distribution and abundance) and dynamics. The indicator of success is measured in tiger occupancy across landscapes and population sizes or densities in priority areas. At landscape level, the occupancy survey will determine the distribution of and the proportion of existing habitats occupied by not only wild tigers but also all key prey mammals that can be detected by signs. In priority areas, such as NEPL NPA, where tiger presence has been confirmed, absolute population abundance will be determined using intensive-camera trapping surveys. With improved protection of tigers, their prey, and their habitats, in those priority sites, we expect to see increase in tiger abundance in those priority sites and occupancy of the landscape by 2020. A monitoring system in place nationwide, will follow this basic

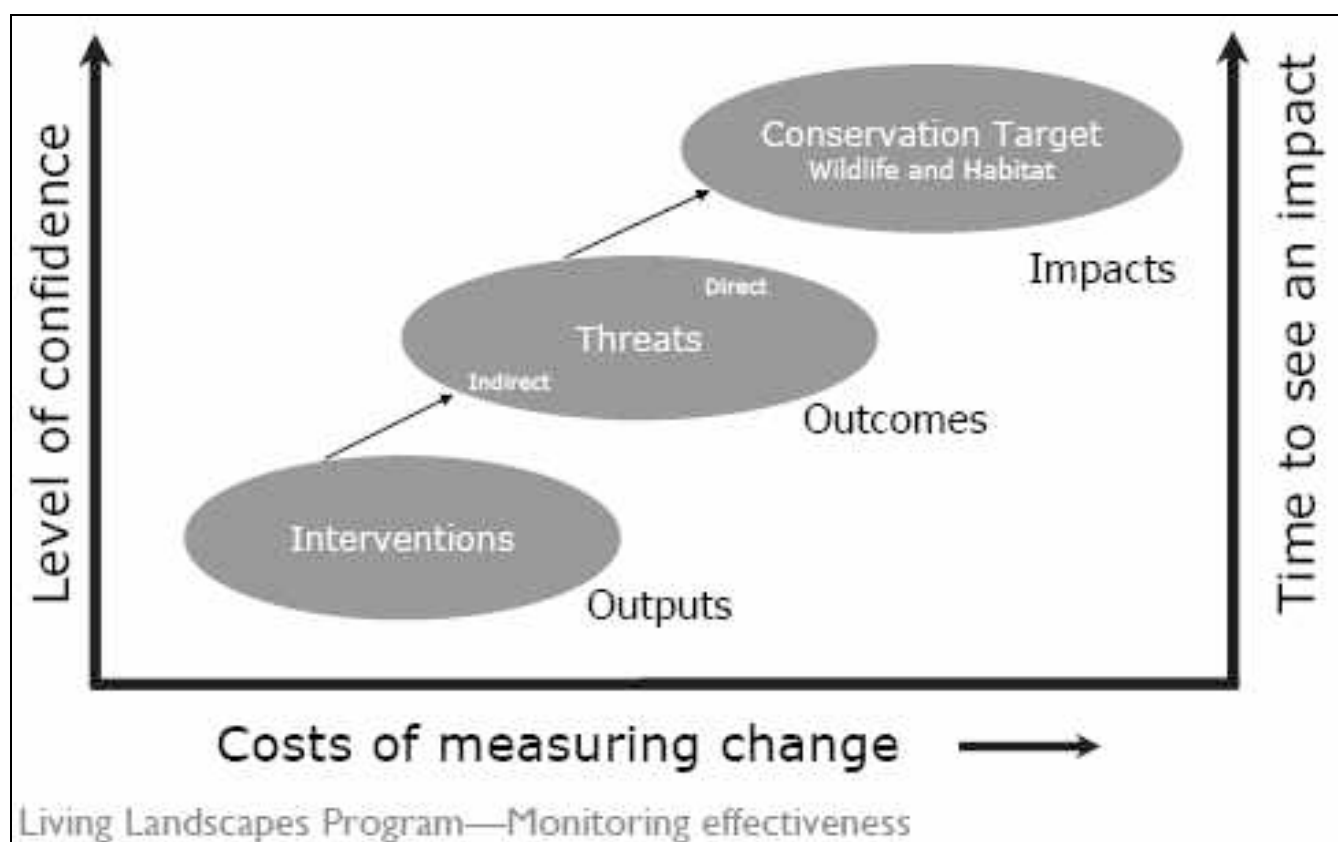


Figure 9: The relationship between confidence, cost and time to results for the different conceptual model components that could be monitored over time. Monitoring interventions, threats or conservation targets is frequently referred to measuring our outputs, outcomes and impacts, respectively. (Source: Wilkie et al., 2006).

sampling framework using standardized internationally accepted scientific methods to measure change in the status of wild tigers and their prey over time.

6.4. Monitoring wild tigers and prey at priority sites

- i) Intensive camera trapping survey to obtain a tiger population estimate

The most reliable way of assessing tiger population recovery at a priority site is to directly measure tiger densities (number of tigers/100 km²) in the area of interest. This can be accomplished through capture-recapture analysis using camera trapping or fecal DNA from tiger scats. To do such a survey, it is critical to engage in sound survey designs and analyses by collaborating with experienced scientists who can advise the process to assure that funding is well spent to get the information desired. Some useful guidelines for designing tiger surveys are laid out by Karanth and Nichols (2002, 2010). They emphasize that it is critical that the area surveyed is large enough to capture as many individual

tigers as possible and that sufficient effort is employed to increase the probability of detecting tigers if they are present. In Laos, where tiger densities are extremely low, the effort required to detect tigers is considerable (a minimum of 500 camera trap days per 100 square kilometers surveyed) and, ultimately, expensive. Monitoring should be conducted at regular intervals to measure how tiger abundance is changing over time as a result of your interventions.

- ii) Occupancy surveys to obtain a prey population estimate Ideally it is desirable to be able to estimate prey densities using line transect distance sampling methods. However, because of the rarity of sightings of animals in the forests of Laos due probably to low number of animals, wariness of human presence, and the rugged mountainous terrain found in many areas the direct count of animals using distance sampling is impractical. This method requires numerous sightings of prey species, which is not yet feasible at most locations in the Laos. Instead a repeated sign-based presence/absence survey that is conceptually similar to a capture-recapture scheme developed by McKenzie (2002) is likely

possible to assess the population dynamics of ungulates. The method is based on a model and likelihood-based approach in estimating rates of sites being occupied by species of interest when detection probabilities are less than one. At the present time, the occupancy survey is the most reliable way to monitor change in large ungulate populations at source sites in Laos based on encounter rates of prey signs (tracks and dung) derived from field surveys conducted in an occupancy modeling and estimation framework⁶⁴. Given the estimated ratio of tigers to prey (1 tiger for every 500 large ungulates) the abundance of ungulates can also be used to indirectly estimate the potential carrying capacity for tigers of a site⁶⁵.

Monitoring threats and interventions

In this Plan, Table 6 outlines key objectives and interventions for achieving the goal of recovering wild tigers, their prey and habitats in Laos. For each intervention, indicators and a means of verification are suggested for determining if your intervention was successfully completed to achieve the objective. Depending on the threats and interventions present at each site, this Plan identifies appropriate monitoring activities to assist managers to evaluate if the interventions being implemented are effective at reducing key threats to tigers, prey and their habitat at the site.

In addition to the indicators shown in Table 6, this Plan also recommends that law enforcement monitoring be conducted at priority sites to provide regular information about the status of threats to tigers, prey and their habitat at sites (e.g., hunting, logging, shifting cultivation, wildlife trade) and the capacity of management to effectively respond to these threats. In Laos, MIST (Management Information System) is an information management tool that is designed for ranger-based law enforcement monitoring, which is being used successfully at several NPAs including Nam Et-Phou Louey, Nam Kading and Nakai-Nam Theun. For example, changes in illegal activity are reflected in shifts in the spatial distribution of encounters with poachers and illegal camps, snaring or trapping incidents, illegal logging or forest clearance. Accurate and timely reporting via MIST helps to inform and alert PA managers of these changes, allowing them to alter their enforcement strategy through changes in the allocation of resources to the new hotspots. Walston et al. (2010) provide further detailed guidelines on establishing a law enforcement monitoring system for tiger source sites.

Stakeholder Engagement

A National Tiger Action Plan committee will be established to secure sustainable funding, oversee the implementation of interventions, and monitor progress towards achieving goals in priority source sites and Tiger Conservation Landscapes. The committee will work to ensure the continued involvement of all stakeholders at the site, landscape and national level in the recovery program for tigers.

At priority sites: Here the National Protected Area management units (NPAMU) will take a lead in cooperation and coordination with other local government agencies, e.g. police, customs, military, DAFO, tourism, and international conservation agencies and donors to implement management interventions on the ground. Alongside these management activities, the NPAMU is responsible for measuring the progress of project activities using internationally accepted scientific methods.

At landscape level: DAFO, PAFO, and the Provincial Protected Area management units (PPMU) are responsible for cooperation and coordination between government agencies at provincial and central levels, providing supervision to NPAMU on technical perspective to ensure the on-ground interventions are on the right track, and work together with other agencies to suppress illegal trade of tigers and their prey, and to ensure connectivity within/between landscapes.

At national level: MAF, DOF, and DFRC are directly responsible for cooperation and coordination with central government agencies and other international organizations to ensure that the Plan is;

- i) integrated into national development plan and investment,
- ii) is in compliance with other international agreements,
- iii) is supported by donors, and
- iv) taken into the on-the-ground implementation.

Public Reporting

In order to gain support for the recovery of wild tigers, their prey and habitats in Lao PDR, The NTAP committee will regularly update stakeholders and the general public of the results and outcomes of interventions made under the NTAP, via radio announcements, newsletters and newspapers. An NTAP website will be designed, maintained, and regularly updated to facilitate dissemination of information about the implementation of the Plan

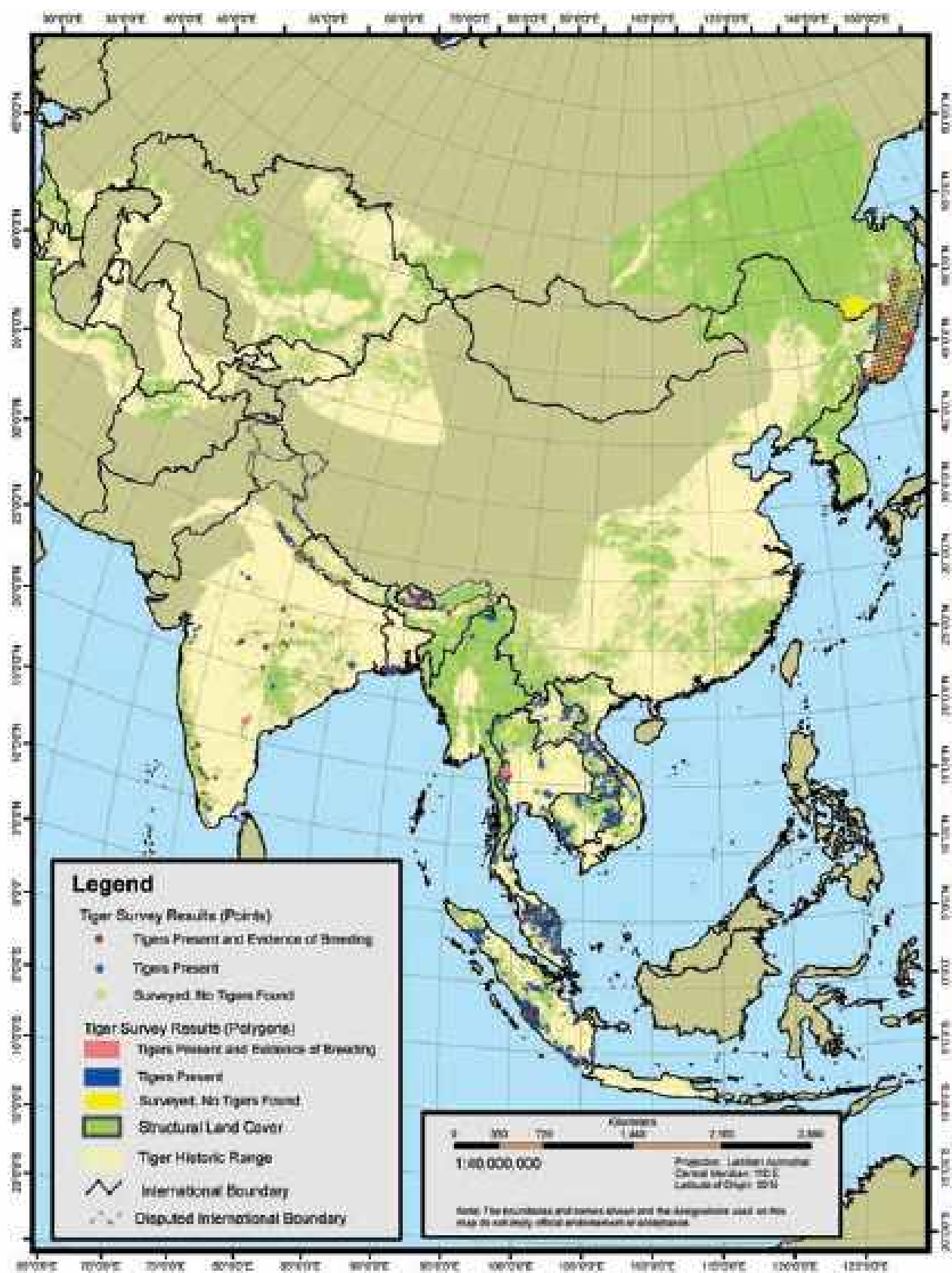
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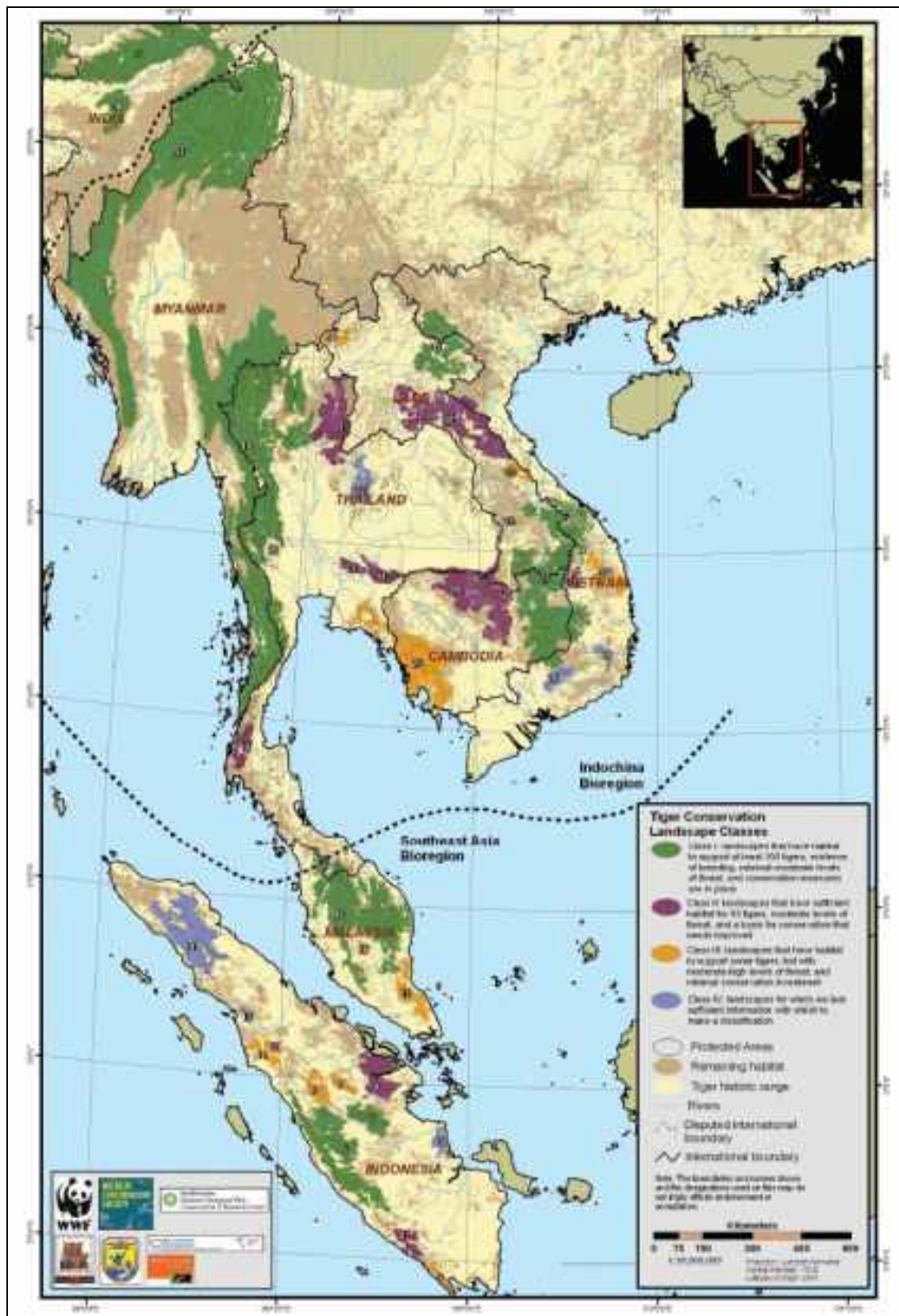
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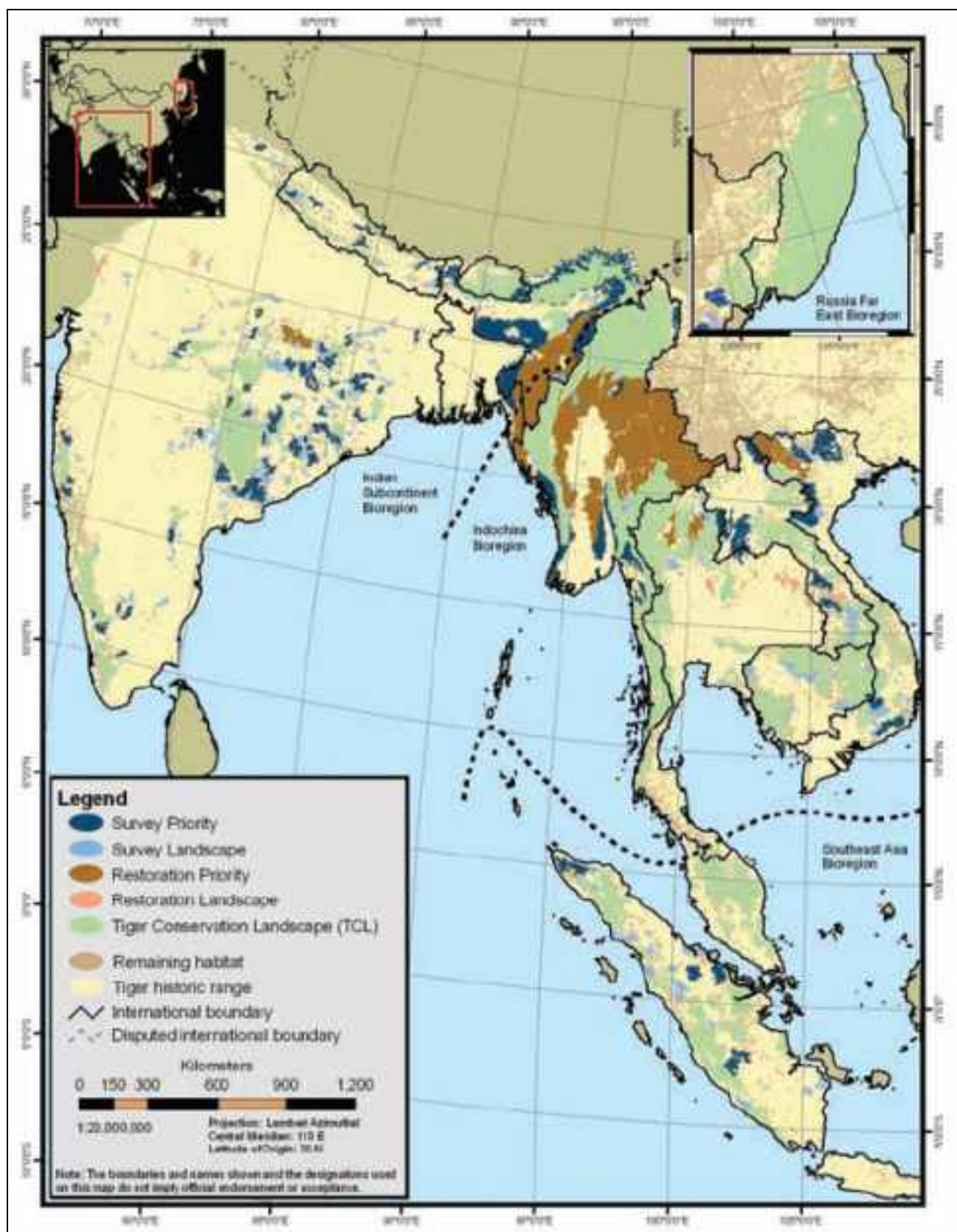
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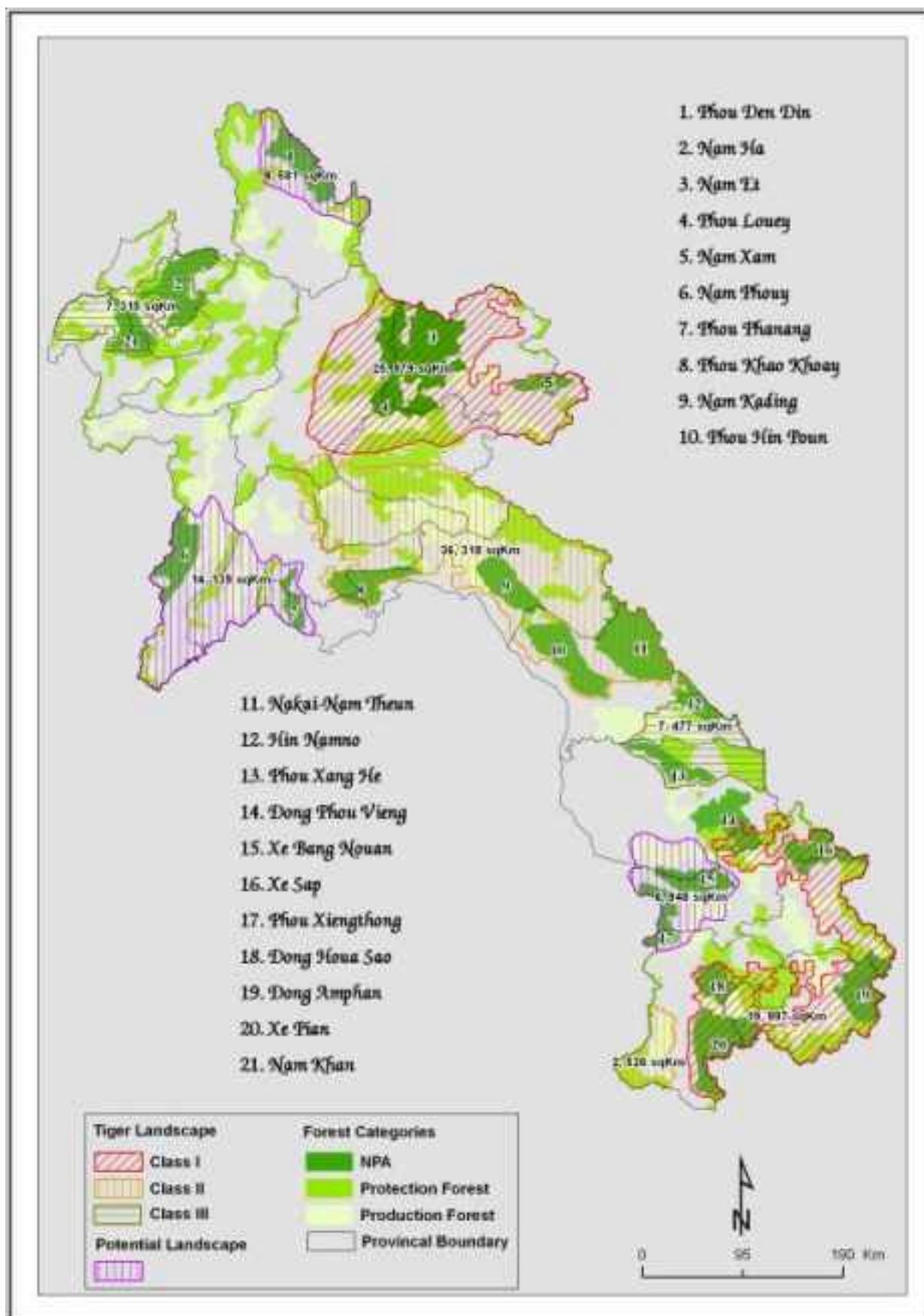
Appendix 1. Tiger survey reports (1995-2005)
(Source: Sanderson *et al.* 2006)



Appendix 2. Tiger Conservation Landscape Prioritization based on tiger records from 1995-2005.
(Source: Sanderson *et al.* 2006).



Appendix 3. Survey and restoration priorities based on tiger records from 1995-2005.
(Source: Sanderson et al. 2006)



Appendix 4. National protected areas and tiger conservation landscapes in Lao PDR.



Appendix 5. Lao PDR Tiger Conservation Workshop 2009 Participants

Appendix 6. Agenda of Tiger Conservation Workshop 2009

Time		Items	Responsible agency
8:00-8:30	30	Registration	DFRC
Day 1			
8:30-8:45	15	Opening Speech	DFRC (Khamphan)
8:45-9:00	15	Introduce participants	DFRC (Bouaphan)
9:00-9:30	30	Introduce steps in preparing Tiger National Action Plan; workshop objectives	DFRC (Bouphanh)
9:30-10:15	45	Status of tigers in Lao PDR (Background Notes sections 1-3)	WCS (Chanthavy)
10:15-10:30	15	Break	
10:30-11:15	45	Status of tiger conservation in Lao PDR (Background Notes sections 4-7)	WCS (Chanthavy)
11:15-11:35	20	Tiger Action Plan: Nam Et-Phou Louey National Protected Area	WCS (Venevongphet)
11:35-12:00	25	Smart Infrastructure	World Bank(Sombat)
12:00-13:00	60	Lunch break	
13:00-13:30	30	National Tiger Action Plan: Methods and Terms	WCS
13:30-14:15	45	Vision and goal for tigers in Lao PDR	WCS; participants
14:15-14:30	15	Direct threats	WCS; participants
14:30-14:45	15	Break	
14:45-16:15	90	Indirect threats (landscape working groups)	WCS; 8 working groups
16:15-16:30	15	Closing afternoon session	DFRC (Bouaphanh)
18:00		Reception & Dinner	All participants
Day 2			
8:00-8:30	30	Registration	DFRC
8:30-8:45	15	Review of Day 1	DFRC (Bouphanh)
8:45-10:00	75	Interventions-select actions to reduce threats	WCS; 8 working groups
10:00-10:15	15	Break	
10:15-12:00	45	Interventions-select actions to reduce threats	WCS; 8 working groups
12:00-13:00	60	Lunch break	
13:00-14:00	60	Interventions-select actions to reduce threats	WCS; 8 working groups
14:00-14:30	30	Groups report results (10 minutes each)	3 working groups
14:30-14:45	15	Break	
14:45-15:35	50	Groups report results(10 minutes each)	5 working groups
15:35-16:15	30	Review of Day 2 and next steps	
16:15-16:30	15	Workshop closing	DOF (Khamphanh)

Appendix 7. Lao PDR Tiger Conservation Workshop 2009 Participants

No	Name and surname	Organization Agency	Telephone
1	Mr Subanh	Phoukhaokouay NPA – army	3320065
2	Mr Sut Thiphong Vongsaiya	Scientific Authority (CITES), Science and Technology Agency, Prime Minister' Office	9895550
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4	Mr. Olavanh Dengdaravong	DFRC, DOF	6229784
5	Mr Sivone Sonemany	Viengkham DAFO, Luangprabang Province	5296461
6	Mr Somephan Thumavong	Forest Inventory, DOF, Ministry of Agriculture and Forestry (MAF)	9802802
7	Mr Boubpha Vongkhamchan	DOF, MAF- Administration	5612824
8	Mr Viengsavanh Phomasane	Khammuan Limestone National Protected Area	5850441
9	Mr Homkham Xaykosinphinit	Hin Nam Nor National Protected Area	5815387
10	Mr Thongpat Ladsavong	Department of Customs, Ministry of Finance	5517062
11	Mr Khamtan Amkhavong	Dong Houa Sao National Protected Area	2207162
12	Mr Savai Sithinalongsy	Phou Xang He National Protected Area	5743801
13	Mr Sitha Phongsuphane	DFRC, DOF	
14	Mr Chandy Chanthavong	Nam Pou National Protected Area	2988678
15	Mr Sang Somethina	Nam Xam National Protected Area	5093190
16	Mr Bounsou Sophavanh	DFRC, DOF	5494255
17	Mr Bounlup Sidavong	Dong Ampham National Protected Area	6573000
18	Mr Khanthalay	Xe Sup National Protected Area	5448413
19	Mr Souliya Sengdala	Phou Dendine National Protected Area	5932185
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21	Mr Thong Et Phaivan	Nakai Nam Theun National Protected Area	2324419
22	Ms Somesanouk Akhavong	Faculty of Forestry, National University	2245039
23	Mr Somsanith Chanthanasin	Department of Livestock and Fisheries, Ministry of Agriculture and Forestry	5687438
24	Mr Lummone	Xa Bang Nuan National Protected Area	5044200
25	Mr Sakhone	Tiger Farm representative	2330216
26	Mr Bounpone Phoudthavong	Ministry of Agriculture and Forestry - Chair	021216921
27	Mr Bounpheng Phengchanh	Luang Prabang PAFO	5770175
28	Mr Dalin Xaysaksi	Production Forest Division, DOF, MAF	5444983
29	Mr Souksan Phonpadith	Nam Ha National Protected Area	2390210
30	Mr Onta Bouaviset	Xepian National Protected Area	5439908
31	Mr Bounthop Praxaysombath	Faculty of Science, National University	2212699
32	Mr Bounsuan Phonphichit	Planning & Investment, DOF, MAF	229790
33	Mr Khamkhoun Khounbolin	WWF representative	4388239
34	Mr Ounkeo	Dong Phou Vieng National Protected Area	2325506

35	Mr Xaysongkham Sukhathammavong	Department of Planning and Investment. Ministry of Planning and Investment	7722239
36	Mr Vasanoon	Houaphan PAFO	5664710
37	Mr Xaiyasin Xongyongya	Nam Et - Phou Louey National Protected Area	4482345
38	Mr Dakhom Vilayvanh	Nam Khan National Protected Area	5884458
39	Mr Pimphet Dakham	Viengthong (Houaphan Prov) Department of Agriculture and Forestry	5748023
40	Ms Chanmaly	Phou Bia Minning	2497030
41	Mr Amone	Phou Bia Minning	2213829
42	Mr Somephong	Department of Planning, Ministry of Agriculture and Forestry	5562299
43	Mr Phaivanh Phiapalath	IUCN representative	
44	Mr keovongdeun Phanthanousy	Nam Kading National Protected Area	2337548
45	Mr Somesanouk	Department of Forestry, Ministry of Agriculture and Forestry - Forest Development Fund	5444499
46	Mr Sangvan Buavong	DFRC, DOF, MAF	5478797
47	Mr Renea Stenhouse	World Bank Representative	2221351
48	Mr Phaiveng Vongkhamheng	WWF representative	6588428
49	Mr Thavisouk Saithongdam	WWF representative	5017735
50	Mr Houmphan Rattavong	Lao Biodiversity Association	5537187
51	Mr. Troy Hansel	WCS-Lao PDR	21-215400
52	Mr. Chanthavy Vongkhamheng	WCS-Lao PDR	21-215400
53	Mr. Vene Vongphet	WCS-Lao PDR	21-215400
54	Dr. Arlyne Johnson	WCS-Lao PDR	21-215400

NATIONAL TIGER ACTION PLAN FOR MALAYSIA 2008 - 2020



Department of Wildlife and National Parks
Peninsular Malaysia



National Tiger Action Plan for Malaysia 2008-2020

Department of Wildlife and National Parks Peninsular Malaysia
Ministry of Natural Resources and Environment
Government of Malaysia

In collaboration with

MYCAT
Malaysian Nature Society
TRAFFIC Southeast Asia
Wildlife Conservation Society
WWF-Malaysia

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Diterbitkan di Malaysia oleh/ *Published in Malaysia by*
Department of Wildlife and National Parks Peninsular Malaysia
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ISBN: 978-983-44181-0-6

Citation: Department of Wildlife and National Parks Peninsular Malaysia. 2008. National Tiger Action Plan for Malaysia. Kuala Lumpur, Malaysia.

Cover photograph: Tracks of a Malayan tiger in the Tembeling Forest Reserve, south of Taman Negara, Pahang, Malaysia, in 2005.

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LIST OF ACRONYMS

ACAP	Asian Conservation Awareness Programme
ASEAN-WEN	Association of Southeast Asian Nations - Wildlife Enforcement Network
BMP	Better Management Practice
CFS	Central Forest Spine
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DANCED	Danish Cooperation for Environment and Development
DCA	Drug Control Authority
DID	Department of Irrigation and Drainage
DoA	Department of Agriculture
DoE	Department of Environment
DTCP	Department of Town and Country Planning
DVS	Department of Veterinary Services
DWNP	Department of Wildlife and National Parks Peninsular Malaysia
EIA	Environmental Impact Assessment
EPU	Economic Planning Unit
ESA	Environmentally Sensitive Areas
FDPM	Department of Forestry Peninsular Malaysia
FELDA	Federal Land Development Authority
FRIM	Forest Research Institute of Malaysia
FSC	Forest Stewardship Council
HTC	Human-Tiger Conflict
IPTA	Public Institutions of Higher Learning
JKPTG	Department of Lands and Mines
JKR	Public Works Department
JNPC	Johor National Parks Corporation
JPA	Department of Public Services
JUPEM	Department of Survey and Mapping Malaysia
KPKT	Ministry of Housing and Local Government
MACRES	Malaysian Centre for Remote Sensing
MNS	Malaysian Nature Society
MTIB	Malaysian Timber Industry Board
MTCC	Malaysian Timber Certification Council
MYCAT	Malaysian Conservation Alliance for Tigers
MYCAT	SO MYCAT Secretariat's Office
NFP	National Forestry Policy
NGO	Non-Government Organisation
NPBD	National Policy on Biological Diversity
NPE	National Policy on the Environment
NPP	National Physical Plan
NRE	Ministry of Natural Resources and Environment
T4T	Teachers for Tigers
PRF	Permanent Reserved Forest
PPKB	Biodiversity Education Programme
PSPC	Perak State Park Corporation
PWA	Protection Wild Life Act 1972
RAPPAM	Rapid Assessment and Prioritisation of Protected Areas Management
RELA	People's Volunteer Reserve
TCL	Tiger Conservation Landscapes
TCM	Traditional Chinese Medicines
TSEA	TRAFFIC Southeast Asia

UNESCO	United Nations Educational, Scientific and Cultural Organization
UPEN	State Economic Planning Unit
USM	Universiti Sains Malaysia
WCS	Wildlife Conservation Society
WG	Working Group

LIST OF IMPLEMENTING AGENCIES

Anti Smuggling Unit
Association of Southeast Asian Nations – Wildlife Enforcement Network
Department of Agriculture
Department of Environment
Department of Forestry Peninsular Malaysia
Department of Immigration
Department of Irrigation and Drainage
Department of Lands and Mines
Department of Public Services
Department of Public Works
Department of Town and Country Planning
Department of Veterinary Services
Department of Wildlife and National Parks Peninsular Malaysia
Economic Planning Unit
Forest Research Institute of Malaysia
Johor National Parks Corporation
Land Agencies
Land Offices
Local Authorities
Malaysia Timber Certification Council
Malaysian Conservation Alliance for Tigers
Malaysian Nature Society
Malaysian Timber Industry Board
Marine Police
Media
Ministry of Natural Resources and Environment
MYCAT Secretariat's Office
Perak State Park Corporation
Public Institutions of Higher Learning
Royal Malaysian Armed Forces
Royal Malaysian Customs
Royal Malaysian Police
Sabah Wildlife Department
Sarawak Forestry Department
State Economic Planning Unit
State Governments
TRAFFIC Southeast Asia
Universiti Sains Malaysia
Wildlife Conservation Society Malaysia Programme
WWF-Malaysia



MINISTER'S MESSAGE

Apart from being one of the 12 mega-diversity nations, Malaysia is one of the few strongholds for the tiger. A symbol of great strength, beauty and independence, the tiger was chosen as our national animal with the hope that it would protect the nation, illustrated by the two tigers flanking Malaysia's Coat-of-Arms in a protective stance.

Today, however, the tiger is in grave danger. Its endangered status is an indicator of ecosystems in crisis. Let us not be proud of a tiger economy without real tigers in the forest.

Vision 2020 promises Malaysia will attain fully developed status by 2020 but, as defined in the foundations of this vision, "It must be a nation that is fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally". Development always comes at a price, and we are challenged with balancing progress and conservation. If, however, we persist with improper and ill-planned development guided by short-term profit, the healthy ecosystems that we humans are entrusted to manage sustainably for other species and our future generations will be lost forever, marking our failure to capture the essence of Vision 2020.

It is the government's duty to formulate and implement policies for sustainable management of forests and biodiversity conservation with state governments, scientists, the business community and the public. Some of the main tools that we have are the National Policy on Biological Diversity, the Protection of Wild Life, the National Forestry and the Environmental Quality Acts. Of particular significance is the National Physical Plan, which guides us to preserve the integrity of areas designated for conservation of natural resources.

Policies and laws mean nothing if not implemented or complied with. Boldly, we must work together – government, NGOs, the public and the private sector – to shoulder this responsibility cohesively. The government is committed to securing wild tigers and their habitats for future generations, and we trust that support from all these parties will help realise this vision for Malaysia.

Congratulations to all involved in developing this Action Plan. You have taken the first step; now it is crucial that you labour together to see this Plan duly implemented.

Datuk Douglas Uggah Embas Minister
Ministry of Natural Resources and Environment



FROM THE DESK OF THE SECRETARY GENERAL

Indeed, what becomes of Malaysia, if we lose our national animal? We must feel pride when we think of the tiger, not a sense of loss.

The Ministry of Natural Resources and Environment, in line with its mandate, aims to ensure that Malaysia's natural resources and biodiversity assets are managed sustainably while contributing to national social and economic development objectives. It is not an easy balance to achieve, but the Ministry is firm in its commitment. To effectively counter increasingly sophisticated challenges, Malaysia continues to seek innovative methods and approaches.

For taking steps in the right direction of collaborative action to saving the Malayan tiger, I commend the Department of Wildlife and National Parks Peninsular Malaysia (DWNP) in the unique partnership with NGOs through the Malaysian Conservation Alliance for Tigers (MYCAT), the alliance comprising DWNP and the Malaysian Nature Society, TRAFFIC Southeast Asia, Wildlife Conservation Society and WWF-Malaysia.

This Tiger Action Plan is the true embodiment of the spirit of cooperation not just between the government and non-government sector, but also between agencies within the Malaysian government. Speaking of conservation area, while 6% of Peninsular Malaysia's total land cover falls under DWNP's jurisdiction as protected areas, a further 36% are permanent reserved forests managed by the Forestry Department. A crucial factor for successful implementation of the Plan is for these two departments, under this same Ministry, to work in unison for biodiversity conservation.

All the pieces are in place, now it is left to you to ensure you continue synergising your efforts in line with this Action Plan, and I wish you the very best of luck in successfully implementing the actions contained within.

A stylized handwritten signature in black ink, consisting of a large loop and several horizontal strokes.

Datuk Suboh bin Mohd Yassin
Secretary General, Ministry of Natural Resources and Environment



PREFACE

As the leading government agency in wildlife conservation in Malaysia, and in fulfilment with the National Policy on Biological Diversity, one of the critical roles of the Department of Wildlife and National Parks is to promote the integration of and collaboration with conservation partners in reaching the national vision of conservation excellence. It therefore gives me great pleasure to introduce the National Tiger Action Plan for Malaysia, truly a first-of-its-kind Plan developed in collaboration with Malaysia's NGOs.

The tiger is one of DWNP's priority species for conservation because it is an indicator species of ecosystem health, the keystone species at the apex of the food chain, and the umbrella species under which numerous other biodiversity can be protected. The Action Plan was developed in accordance to the existing government policies and framework. It is a practical instrument linking conservation ideals to giving wild tigers a future; a real future that will stretch beyond the next century. I believe that Malaysia can give tigers a chance to survive and that the success story of tigers will showcase Malaysian Government's commitment to biodiversity conservation.

The Action Plan is a 'living' document, which we will continue to review, update and amend to ensure its objectives are met in the context of a world that is constantly growing and changing. I look forward to implementing it with all the stakeholders involved.

A handwritten signature in black ink, appearing to read 'Dato' Abd. Rasid Samsudin'.

Dato' Abd. Rasid Samsudin
Director General
Department of Wildlife and National Parks Peninsular Malaysia

ACKNOWLEDGMENTS

We would like to thank the participants of the Malayan Tiger Conservation Workshop, held in Lanchang, Pahang on 7 to 9 November 2006, for their active participation in the series of discussions that shaped and led to the *National Tiger Action Plan for Malaysia* (hereafter referred to as 'the Plan').

The workshop and drafting of the Plan was made possible by generous financial support from 21st Century Tiger, a programme of the Zoological Society of London, in addition to in-kind contributions from the Malaysian Conservation Alliance for Tigers (MYCAT) partners; i.e. the Department of Wildlife and National Parks Peninsular Malaysia (DWNP), the Malaysian Nature Society (MNS), TRAFFIC Southeast Asia (TSEA), the Wildlife Conservation Society - Malaysia Programme (WCS) and WWF-Malaysia. The MYCAT Secretariat's Office (MYCAT SO) received institutional support from DWNP and financial support from the US Fish and Wildlife Service and Save the Tiger Fund. WWF-Malaysia also provided financial assistance to support the action plan drafting team leader.

The workshop organising committee, headed by DWNP's Siti Hawa Yatim and comprised DWNP's Abdul Kadir Abu Hashim, Mohd Khairi Ahmad, Rahmah Illias, Clement Wong and MYCAT Coordinator, Loretta Ann Soosayraj, ensured the smooth running of the workshop. Logistical support from personnel of all MYCAT partners also made substantial contributions to the success of the workshop.

Based on presentations and discussions during the workshop, a draft plan was compiled by the action plan drafting team: Kae Kawanishi (MYCAT SO), Loretta Ann Soosayraj (MYCAT SO), Melvin Gumal (WCS), Gareth Goldthorpe (WWF-Malaysia), Chris R. Shepherd (TSEA), Kanitha Krishnasamy (MNS), and Abdul Kadir Abu Hashim (DWNP). Additional assistance was provided by Brian Lee (WWF-Malaysia), Salman Saaban (DWNP), Abu Zahrim Ismail (DWNP), James Compton (TSEA), Song Horng Neo Liang (TSEA), Suzalinur Manja Bidin (MYCAT SO), Rick Gregory (MNS Selangor) and Caroline Yap in completing the draft. Comments received from Mislihah Mohamed Basir (DWNP), Sivananthan Elagupillay (DWNP), Zaharil Dzulkafly (DWNP), Dionysius Sharma (WWF-Malaysia), Surin Sukswan (WWF-Malaysia), Ahmad Zafir Abd Wahab (WWF-Malaysia), Mark Rayan Darmaraj (WWF-Malaysia), Carl Traeholt (Malayan Tapir Conservation Programme), John Seidensticker (Save the Tiger Fund) and Mahendra Shrestha (Save the Tiger Fund) helped improve the earlier draft of the Plan.

Besides numerous telephone and online discussions, the drafting team met 17 times between November 2006 and July 2007 to improve the draft plan, which underwent 11 revisions before submission to the DWNP Tiger Action Plan Advisory Board, headed by the DWNP Director General, Abd. Rasid Samsudin, and comprised Mislihah Mohamed Basir, Zainudin Ab. Shukor, Siti Hawa Yatim, Sivananthan Elagupillay, Zaaba Zainol Abidin, and Khairiah Mohd. Shariff in August 2007.

This Plan is the culmination of the joint efforts of all interested parties involved in tiger conservation in Malaysia. Many thanks to everyone who made contributions towards developing a single Tiger Action Plan that will lead to a future in which tigers thrive in Malaysia.

We look forward to working together with an even greater sense of cooperation and commitment towards protecting the Malayan tiger in Malaysia.

EXECUTIVE SUMMARY

Globally, the tiger *Panthera tigris* has lost 93% of its habitat and three subspecies in the last 100 years. Today, less than 3,000 wild tigers survive in 14 countries. The initial decline in tiger numbers was primarily due to large-scale loss of habitat but in more recent times such losses have been exacerbated as the smaller and isolated populations that survive are hunted for their body parts, persecuted by angry farmers and villagers, and starved as their prey is over-harvested. Threats to the survival of wild tigers are mounting and a world without wild tigers may become a reality in our lifetime unless drastic measures are taken. In stark contrast to today's situation, the 1950s saw as many as 3,000 tigers in Malaysia alone. During the subsequent two decades, however, as the countries agricultural base increased, tigers were seen as pests. Institutionally persecuted, with a bounty placed on them, tiger numbers rapidly dropped to only a few hundred. During the 1970s, attitudes changed and the fortune of the tiger in Malaysia took a turn for the better as it was listed as a totally protected species under the Protection of Wild Life Act 1972. However, this protected status has only slowed the decline down, not reversed it, and today only about 500 wild tigers are thought to survive in Malaysia. It has become increasingly clear that more precise conservation interventions are needed to recover and sustain tigers in Malaysia. By implementing a suite of concerted actions, backed by political commitment and public support, we as a nation and as part of the global conservation community can ensure that one of the most majestic and charismatic animals with which we share the planet will not vanish. To see the tiger disappear in this or any other century could only be a testament to our indifference, ignorance, greed and lack of compassion and foresight.

Malaysia is blessed with a rich and diverse store of biological resources, a stable socio-economic base and with national policies in place that promote sustainable development and biodiversity conservation. Although only 6% of the total land area of Peninsular Malaysia is protected by a network of Protected Areas (PAs) and most PAs are less than 1,000km², the system is augmented by the presence of Permanent Reserved Forests (PRFs) which act to buffer the PAs from the negative impacts often associated with human activities. This forestry management system covers an additional 36% of the land area of Peninsular Malaysia and is managed sustainably under the National Forestry Act 1984. The current thinking amongst conservationists in the country emphasises the essential roles that the PAs and PRFs, connected together with ecological corridors, play in supporting healthy, manageable, populations of tigers and their essential prey. Ensuring these connections will provide this endangered species and its prey with the condition they need to recover and thrive into the 22nd century. However, one of the big challenges for wildlife conservation in Malaysia is that, whilst policies are made at the Federal level, the implementation of actions pertaining to land-use and natural resource management are carried out at the level of the State.

Within Malaysia, tigers are found only on the peninsula and mainly in three landscapes. The Main Range Landscape (20,000km²) is in the west of the mainland and, runs from the Malaysia-Thai border to Negeri Sembilan. It is connected to the second landscape, the Greater Taman Negara (15,000km²) to the east, which includes Taman Negara National Park, the country's largest protected area. Finally, the Southern Forest Landscape (10,000km²) can be found south of the Pahang River but it is isolated from both the former landscapes. These forest landscapes form the basis for spatial planning in tiger conservation in Malaysia and each has a priority core area: Belum-Temengor Complex, Taman Negara, and Endau-Rompin Complex, respectively. In order to augment their potential for tiger conservation to facilitate the continued dispersal of tigers *within* the landscapes, priority ecological corridors have been identified, whereby habitat restoration and management can maintain connectivity: Belum-Temengor, Taman Negara-Lebir-Tembat, and Endau-Rompin-Mersing, respectively. One critical linkage that still exists and must be actively maintained and enhanced to ensure connectivity *across* the landscapes is a narrow strip of forest connecting the Main Range and Taman Negara near the western border of the park in Pahang. Existing and proposed linear infrastructures, such as roads, railways, and a major oil pipeline threaten the connectivity of habitats within and between all these areas but mitigation measures are available to counter the risk of fragmentation when incorporated into the early planning of infrastructural developments that may block corridors.

Because the challenges to the tiger's survival are complex, involving multiple stakeholders, the Department of Wildlife and National Parks Peninsular Malaysia (DWNP) formulated this National Tiger Action Plan for Malaysia in a participatory manner through a workshop and discussions with NGOs and other government agencies using a collaborative platform called the Malaysian Conservation Alliance for Tigers (MYCAT).

The aim of the Plan is to establish a holistic but focused and achievable conservation strategy that lays out specific actions to be taken over the next eight years (Phase I: 2008-15) towards an overarching vision of securing viable tiger populations in Malaysia for the next century and beyond. The Plan was developed around existing government policies and legislative structures relevant to wildlife conservation. Through this plan, the Malaysian government has the opportunity to present healthy tiger populations as an exemplar of its on-going efforts to develop economically in a sustainable manner rather than the Malayan tiger becoming another symbol of the systematic loss of tropical forest and an ecosystem in crisis. The nature of a country's development is demonstrated by the policies it implements. Of particular importance to wild tiger populations in Malaysia are the National Policy on Biological Diversity, National Forestry Policy, National Policy on the Environment and the National Physical Plan.

The National Physical Plan (NPP) is the blueprint for spatial planning in Peninsular Malaysia and, therefore, provides the backbone for the Plan's aspiration to secure a large expanse of interconnected tiger habitat, defined as the Central Forest Spine (CFS) in the NPP. Envisioned for realisation by 2020, the CFS is a network of forest complexes connected by green linkages that, together, form a contiguous forest spine for Peninsular Malaysia. Permanent Reserved Forests within the CFS provide critical habitat and connectivity to core tiger populations in the priority areas and buffer them from anthropogenic and natural demographic fluctuations. PRFs still contribute to the nation's economic drive, where ecologically sound land-use practices such as eco-tourism and sustainable forestry are permitted. This is vital for the nation and the tiger because the large forest ecosystems that the tiger needs to thrive are also a primary source of the resources upon which human livelihoods depend. The presence of healthy tiger populations across the CFS will signify the balanced progression of the country's ecology, society, culture and economy and, ultimately, an enhancement of the quality of life of Malaysians, which is the essence of the Vision 2020. The goal for 2020 identified in this National Tiger Action Plan for Malaysia is:

Tiger populations actively managed at carrying capacities across the three landscapes within the Central Forest Spine and connected with functioning corridors.

This Plan identifies four objectives towards achieving this goal:

1. Secure the Central Forest Spine with strictly protected priority areas in landscapes connected with corridors.
2. Provide effective and long-term protection of tigers and their prey.
3. Promote and practice ecologically sound land-use, compatible with tiger conservation outside the priority areas.
4. Apply science in monitoring the efficacy of conservation actions and improving the knowledge of tiger ecology.

This Plan further outlines priority outcomes for each of the objectives and then translates these conservation objectives and desirable outcomes into concrete actions, responsible agencies, measurable indicators and realistic time-frames. These details lay out the first phase of the Plan to be carried out between 2008 and 2015; dates that deliberately coincide with the 9th and 10th Malaysian Plan. In this Plan the importance of accountability and transparency in conservation actions is implicit, with an in-built evaluation and learning mechanism for a continued process of implementation. The overall indicator of success, or the Plan's measurable target, is:

About 1,000 wild tigers surviving on wild prey in the Central Forest Spine by the year 2020. The success of this conservation strategy must be reflected in the known status of the distribution and density of the tiger populations in Malaysia. In order to use these indicators, we must first establish a baseline upon which we can monitor our efforts to stabilise, increase and manage tiger numbers. By doing this, we hold ourselves accountable to the wild tigers for which this Plan is devised; the importance of

conservation science, the fourth objective of the plan, becomes imperative. Applying scientific methods to measure the efficacy of conservation actions allows for the efficient planning of, allocation of resources to, and the implementation of specific activities. This increases the accountability and transparency in the conservation actions taken.

As the custodian of the Plan, DWNP has the responsibility of implementing many of the identified actions. Of the 80 planned actions, DWNP, in collaboration with NGOs and other government agencies, takes the lead in implementing 59. Other government agencies that lead actions pertaining, for example, to the Central Forest Spine, sustainable forestry and park management include the Economic Planning Unit, Ministry of Natural Resources and Environment, Department of Town and Country Planning, Forestry Department, Perak State Park Corporation, and Johor National Parks Corporation. Eight actions are led and implemented by various NGOs, namely the Malaysian Nature Society, TRAFFIC Southeast Asia, Wildlife Conservation Society and WWF-Malaysia. Implementation of the full Plan is therefore a responsibility shared by many stakeholders. As it is a government document with cross-departmental implementation, the Ministry of Natural Resources and Environment will provide the inter-agency coordination to link its implementation with that of other relevant national policies.

By using an adaptive management approach to implement the Plan, the agencies involved can ensure a process that is both proactive and reactive, allowing lessons to be learned and new knowledge and methods to be incorporated as the work evolves. As such, it is a living document. This Plan is a collection of working models, strengthened through stakeholder dialogues, tested in practice, and constantly reviewed and revised. In order for real and mutual accountability and learning to take place, the core of the stakeholder engagement strategy must involve a two-way mechanism (dialogues). Here, responsible agencies and individuals will be actively encouraged to exchange views, clarify expectations, address differences, enhance understanding and encourage creative and practical solutions.

The MYCAT Secretariat's Office will act as Secretariat to the Division of Conservation and Environmental Management of the Ministry of Natural Resources and Environment to monitor the progress of the implementation of the Plan. The Secretariat will compile and submit bi-annual reports to the Ministry, which will then chair a central stakeholder meeting where necessary decisions and adjustments to the Plan will be made. Towards the end of Phase I (2008-2015), the implementation of the Plan will be evaluated by an independent conservation audit team. The results from the evaluation will form the basis for a stakeholder workshop to set the work plan for Phase II (2016-2020).



Malayan tiger © Chris R. Shepherd

INTRODUCTION

Malaysia is a tropical country rich in biological diversity and natural resources. Many of Southeast Asia's threatened large mammals, such as the Sumatran rhinoceros *Dicerorhinus sumatrensis*, Asian elephant *Elephas maximus*, tiger *Panthera tigris*, gaur *Bos gaurus*, Malayan tapir *Tapirus indicus* and Malayan sun bear *Helarctos malayanus*, are still found here. The status of some of these species has reached a critical state while that of others remains largely unknown. Thus more effective conservation and research efforts are required to ensure the survival of these species (Locke, 1954; Medway, 1965; Hislop, 1968; Oliver, 1978; Khan *et al.*, 1983; Aiken and Leigh, 1985; Zaaba *et al.*, 1991; Mislihah and Sahir, 1997; Foose and van Strien, 1997; IUCN 2006).

Wildlife conservation in Peninsular Malaysia dates back to 1896, when the first wildlife legislation was passed to regulate the exploitation of wild birds in the Straits Settlements. Subsequently, large mammals were protected in Pahang and in 1903 the Chior Wildlife Reserve, the first protected area in Malaysia was established in Perak. Since then, 41 protected areas have been added to the national list. The Wildlife Commission of Malaya, established by the colonial government in 1930 reviewed the prevailing status of wildlife protection throughout Peninsular Malaysia (then Malaya). Their work resulted in the creation of several State Game Departments in 1936 and provided a framework for the consolidation of the state game offices and the establishment of the Protection of Wild Animals and Birds Ordinance 1955 in Peninsular Malaysia. After independence, this ordinance was repealed and the Protection of Wild Life Act 1972 (PWA) was enacted by the Malaysian Parliament. This enabled the federalisation of all State wildlife departments and the empowerment of the Director-General for the Department of Wildlife and National Parks (DWNP) over the State wildlife departments. Currently, the PWA is under review and is likely to be replaced by more comprehensive wildlife conservation legislation in the near future. To complement conservation efforts by the government, several conservation organisations were founded. The country's oldest and premier nature conservation organisation, the Malaysian Nature Society (MNS), was formed in 1940 and currently has 3,000 members throughout Malaysia. Three decades later, in 1972, the global conservation organisation, WWF, established a country office in Malaysia (WWF-Malaysia). Following this, the New York-based Wildlife Conservation Society (WCS) established its Malaysia Programme in 1984 and more recently, in

1991, TRAFFIC, the wildlife trade monitoring network, established its Southeast Asian office, based in Malaysia (TSEA). The tiger is the symbol of two contrasting realities: the vanishing Asian wilderness and the thriving Asian economy. Thirty years have passed since the tiger was listed as a totally protected species under the PWA and Malaysia is one of the 14 nations where tigers still survive in the wild. In addition to being totally protected within Malaysia, tigers are listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits international trade of live tigers, their parts and derivatives for commercial purposes. Yet tiger poaching continues. Throughout its global range, the species has lost 93% of its original habitat (Dinerstein *et al.*, 2006) and three subspecies are now extinct; all in just the past century. Threats to the survival of wild tigers are mounting and a world without wild tigers may become a reality in our lifetime unless drastic measures, backed by strong political commitment and public support, are taken. Challenges to tiger conservation are multi-faceted. Finding solutions, therefore, requires an integrated conservation approach. As the leading government agency in wildlife conservation in Malaysia, one of the critical roles of DWNP is to promote the integration of and collaboration with conservation partners in reaching the national vision of conservation excellence.

Using this collaborative platform, DWNP organised and hosted a 3-day workshop in November 2006, at its Institute for Biodiversity in Lanchang, Pahang, to bring together key stakeholders and decision-makers to discuss the actions needed to save the Malayan tiger from impending extinction. The main goal of the workshop was to develop the *National Tiger Action Plan for Malaysia* (hereafter referred to as 'the Plan'). The Plan reflects national needs and local capacity in line with existing national policies relevant to tiger conservation.

Prior to the workshop, the MYCAT Working Group, comprising representatives from all partner organisations, met on four occasions to plan and prepare for the workshop. In September 2006, the Biodiversity Conservation Division of DWNP distributed threat assessment questionnaires to State DWNP, NGOs and other relevant individuals who have information on wild tigers to assess their threats.

The MYCAT Secretariat's Office analysed the data from 32 respondents and presented the results at the 4th MYCAT Working Group meeting in October 2006,

and again, during the workshop in November 2006. Prioritisation was impossible as the perception-based assessment, which could not be substantiated with reliable data, resulted in similar rankings for most of the threats. Therefore, the Plan addresses major threats equally without prioritisation.

The Plan was developed in a participatory process at many levels. Based on the discussions and results from the workshop and additional information from literature, it was jointly drafted by the MYCAT partners. Through 15 meetings, numerous phone calls and online discussions, the drafting team reviewed and revised 10 earlier drafts that led to developing the Plan's implementation mechanisms, as identified within this document (Sec. 2.7). The draft Plan was then submitted to the DWNP Tiger Action Plan Advisory Board. After their thorough review, a revised Plan was circulated to the workshop participants, as well as selected experts in the international tiger conservation community for peer review. After additional improvements were made, it was finally endorsed by the Ministry of Natural Resources and Environment. In effect, this Plan has crystallised the collaborative efforts, knowledge and commitment of those who have made the survival of the tiger their concern. The Plan outlines Malaysia's preparation for saving wild tigers in Malaysia and, as such, does not include management issues relating to captive tigers. In 2004, Malaysia's tigers were recognised as a new subspecies, *Panthera tigris jacksoni*, as they are distinct in mtDNA sequences from those of northern Indochina, *P. t. corbetti* (Luo *et al.*, 2004). While acknowledging the exciting new discovery, the Malaysian government recommends that this subspecies be named *P. t. malayensis* to reflect its geographic distribution. More recently, however, a morphological study has questioned the validity of this classification (Mazak and Groves, 2006). Regardless of the taxonomic classification, in this Plan, wild tigers resident to Peninsular Malaysia are referred to as Malayan tigers. Because of the dynamic and some of the unknown nature of the factors that affect tiger populations and their habitats, it was considered impractical to design a single,

comprehensive master plan. Similarly, such an approach would be precluded by the context where socio-political stability, emerging policies, macro and micro-economics, human population growth, and climate change are all key issues. Instead, by using an integrated and holistic approach, a focused action plan that seeks to address major issues for the next eight years towards a unified long-term vision was developed.

The Plan is divided into two sections. Part 1 comprises background information on the natural history and the overview of the conservation status of the Malayan tiger based on available knowledge; whereas Part 2 comprises the goals, priorities, targets and planned actions. The main contents of the Plan are found in Part 2, which lays out key actions. Specific actions are to be implemented over the next eight years (2008 to 2015) with the mid-term goal of actively managing tiger populations at carrying capacities across tiger landscapes connected with functioning corridors by 2020, in line with Malaysia's own development plans and existing government policies relevant to nature conservation. At the end of the eight-year implementation period, the Plan is to be evaluated by an independent auditor, its priorities and targets adjusted according to the eight-year outcomes, keeping in tandem with Malaysia's development plans (The 9th Malaysian Plan is for 2006-2010 and the 10th Malaysian Plan is for 2011-2015). The subsequent actions needed to reach the overall goal will then be planned. The implementation section in Part 2 describes mechanisms designed to monitor and measure the Plan's effectiveness and the accountability of parties and relevant stakeholders. Appendices provide supplementary information on the Malayan Tiger Conservation Workshop, held in November 2006. An effort was made to use minimal technical jargon without compromising on the scientific integrity of the Plan. In addition to the first-hand information gleaned from the workshop, other sources of information such as unpublished reports/data and personal communications were used but whenever possible, citations for these were also included.

Part 1

Status of Tiger Conservation in Malaysia

1.1 Natural History

1.1.1 Description, biology and behaviour

The tiger is the world's largest cat and a specialised predator that preys on large ungulate (hoofed animal) species. It is the only striped cat with the ground coloration of reddish orange to reddish ochre and white underparts. The pelage of tropical tigers tends to be darker than its temperate cousins, with shorter and less dense fur (Mazak, 1981; Sunquist and Sunquist, 2002). The largest tigers are found in the

Russian Far East and India, where an adult male can weigh up to 250 to 300kg. The smallest, however, are in Peninsular Malaysia and Sumatra, Indonesia, where a large male and female weigh only about 140kg and 110kg, respectively (Table 1). Likewise, the total length of a large Siberian or Bengal tiger can reach up to 3m, while a large Sumatran tiger is about 50cm shorter. Zoo Melaka's records of the captive Malayan tigers show that the total length of the largest wild caught adult male is 1.94m and the largest female, 1.81m (Table 1).

Table 1: Records of captive Malayan Tigers in Zoo Melaka.

No	Sex	Date of admission	Age (yrs)	Type of Acquisition	Origin	Weight (kg)	HBL (cm)	SH (cm)	CG (cm)	TL (cm)
1	F	16 June 98	~9	WC	Terengganu	100	162	93	94	79
2	F	4 March 99	~18	CB	Zoo Melaka	85	ND	ND	ND	ND
3	M	22 March 99	~19	WC	Kelantan	110	ND	ND	ND	ND
4	M	16 June 1999	~26	WC	Kelantan	110	ND	ND	ND	ND
5	F	18 Sept 2000	~19	WC	Pahang	ND	ND	ND	ND	ND
6	F	7 March 2002	5	CB	Zoo Melaka	90 1	51	85	97	89
7	M	20 Aug 2002	~15	WC	Kelantan	120	157	ND	102	96
8	F	16 June 1999	~9	WC	Terengganu	90	ND	ND	ND	ND
9	M	12 Dec 2002	5	CB	Zoo Melaka	120	175	88	102	85
10	F	12 Dec 2002	5	CB	Zoo Melaka	110	164	88	120	89
11	M	3 Nov 2003	4	CB	Zoo Melaka	130	ND	ND	ND	ND
12	M	3 Nov 2003	4	CB	Zoo Melaka	130	ND	ND	ND	ND
13	F	3 Nov 2003	4	CB	Zoo Melaka	100	130	ND	120	88
14	F	3 Nov 2003	4	CB	Zoo Melaka	100	ND	ND	ND	ND
15	M	9 Feb 2003	4	CB	Zoo Melaka	100	164	89	105	81
16	M	20 July 2003	4	CB	Zoo Melaka	120	ND	ND	ND	ND
17	F	26 Feb 2004	~9	WC	Pahang	105	181	89	110	87
18	F	28 March 2003	~20	WC	Kelantan	90	ND	ND	ND	ND
19	F	23 Aug 2004	3 CB	Zoo	Melaka	100	150	78	103	78
20	F	23 Aug 2004	3 CB	Zoo	Melaka	100	162	82	108	87
21	M	24 June 2005	~9	WC	Pahang	135	194	115	124	97
22	F	11 Aug 2005	~2	WC	Johor	110	ND	ND	ND	ND
23	M	13 June 2007	~4	WC	Kelantan	100	164	84	92	89

WC: Wild Caught, CB: Captive Bred

Body weight is estimate only as a suitable weighing scale was unavailable.

HBL: Head-Body Length, SH: Shoulder Height, CG: Chest Girth, TL: Tail Length

ND: Data unavailable.

Data source: Zoo Melaka, *in litt*.

A tigress comes into heat at intervals of around three to nine weeks, and is receptive for about three to six days within that period. Gestation averages to around 105 days and a litter usually consists of two or three kittens, with a range of one to four (Mazak, 1981). A tigress produces a new litter only after her young are all dispersed, usually within 18-28 months (Smith, 1993). Sexual maturity is usually achieved in the third year, for females, and towards the end of the fourth year in males; whilst, in Nepal, the average reproductive lifespan was recorded as 6.1 years for females but only 2.8 years for males (Smith and McDougal, 1991). The oldest recorded wild tiger lived for at least 15.5 years, also in Nepal (McDougal, 1991), whilst the oldest captive tiger died at the ripe-old age of 26 (Jones, 1977).

Tigers can swim and hunt well in the water, as verified by Burton (1933) when he recorded a tiger swimming the 8km stretch from the Malay Peninsula to Penang Island and Locke (1954) where a tiger was recorded swimming across the Straits of Johor to Singapore. In the Sundarbans, tigers swam a 29km wideriver (Garga, 1948). Tigers rarely climb trees but they can if provoked. The tiger is a highly adaptable species, exhibiting tolerance to a wide range of forest types, climatic regimes, altered landscapes and prey bases. Being a generalist, the only requisites for survival seem to be plant cover, water and sufficient prey (Schaller, 1967). The historical distribution of tigers exemplifies the variety of habitat types to which they have adapted, ranging from the pine-oak forests of the Russian Far East and the rocky mountain slopes of Manchuria, to the tall grasslands of Nepal, the mangrove swamps of the Sundarbans and, of course, the rainforests of Malaysia and Indonesia. Generally, tigers prefer lowland areas where large ungulates are more abundant, but they have been reported at altitudes of up to 4,360m in Sikkim, India (Mazak, 1981).

Tigers are essentially solitary outside of the mating season and when young are fully dependent on their mother; but they are not entirely non-social as some groupings, especially of related individuals, have been reported (Schaller, 1967; Thapar, 1989).

Earlier efforts to monitor tiger populations in Peninsular Malaysia focused on Human-Tiger conflict (Stevens, 1968) and aspects of livestock depredation (Blanchard, 1977; Elagupillay, 1984); research on basic tiger ecology is still in its infancy and much of what is known is based on studies carried out elsewhere, mostly in India and Nepal.



Wild pig juvenile © G. Fredriksson

1.1.2 Feeding ecology

The tiger is the top predator in its ecosystem. Almost any terrestrial vertebrate is potential prey for this ultimate predator, as it has been known to attack elephant and rhinoceros calves as well as other carnivores, such as leopards *Panthera pardus* and dholes *Cuon alpinus*. But across its range generally, the main natural prey base consists of various species of deer, wild pig *Sus scrofa* and wild cattle (Seidensticker, 1986). In addition to hunting down live prey, tigers also feed on carrion (Schaller, 1967; Sunquist, 1981). On the other hand, aside from Man, no other species is individually capable of killing a tiger. There are, however, isolated reports of incidences in which a herd of water buffalo, a pack of dholes or an elephant have killed a tiger.

Vertebrate predators in prey-rich habitats are selectively "energy maximiser(s)" (Griffiths, 1975). Tigers in Chitwan, for example, showed a preference for sambar *Cervus unicolor* (Sunquist, 1981; Seidensticker and McDougal, 1993); in Kanha tigers selectively killed adult male sambar (Schaller, 1967); and in Nagarhole, they selectively killed adult sambar and gaur (Karanth and Sunquist, 1995). A prey item the size of a gaur would sustain an adult tiger for one week. The nocturnal to crepuscular activity patterns of tigers in these areas reflect the activity patterns of the principal prey. That tigers in Taman Negara with minimal human disturbance were largely diurnal with three peaks at dawn, mid-day and dusk suggests that they were hunting diurnal and crepuscular species such as wild pig and barking deer *Muntiacus muntjak*, and possibly sun bear (Kawanishi and Sunquist, 2004). In more disturbed habitats of mixed secondary forests and plantations (e.g. Felda Jerangau Barat and Jerangau Forest Reserve in Terengganu and Gunung Basor Forest Reserve in Kelantan) in high Human-Tiger Conflict areas, tigers still show a crepuscular activity pattern, but were more nocturnal than tigers in Taman Negara (Ahmad Zafir *et al.*, 2006; Darmaraj, 2007).

Concealment and stalking are the main hunting strategies of tigers (Schaller, 1967; Sunquist *et al.*, 1999; Karanth, 2001)

and prey is located primarily by sight (Schaller, 1967). In the rainforest, where visibility is greatly reduced, the proportion of prey species taken by tigers may simply reflect the rate of encounter, hence relative abundance of prey species. It was found that large prey (i.e., sambar and gaur) was extremely scarce in Taman Negara at 0-0.22 animals/km² with occupancy rates as low as 46% for sambar and 4% for gaur (Kawanishi and Sunquist 2004). In rainforests where prey density is typically low, and its distribution unaffected by ample availability of water and cover, large predators may be more opportunistic than selective feeders (Kawanishi, 2002).

A tiger can eat between 18-40kg of meat in one sitting (Locke, 1954; Schaller, 1967) and will return to its kill for up to a week, until little remains (Sunquist, 1981). The maximum amount of meat a tiger can consume in 24 hours has been estimated to be equal to about 20% of its own body weight (Sunquist, 1981), which, for a 120kg Malayan tiger is 24kg, about the size of a wild pig.

Dietary studies specific to the Malayan tiger are lacking but it is generally expected that the principal prey are the two, relatively abundant, large (>20 kg) ungulates – wild pigs and barking deer – as well as the less common sambar deer. In addition, tigers in Taman Negara are known to prey on sun bears (Kawanishi and Sunquist, 2004). It is unknown, however, whether or not gaur and tapirs are principal prey for the Malayan tiger. Although the former is rare in Malaysia, the latter appears as the third most common large ungulate, after wild pig and barking deer (Kawanishi *et al.*, 2002; Kawanishi and Sunquist 2004; DWNP unpublished data; Ahmad Zafir *et al.*, 2006; Darmaraj, 2007; Lynam *et al.*, 2007). Bearded pigs *Sus barbatus* are larger than wild pigs and could be more ideal prey for tigers, but their distribution is now reduced, currently restricted to the southern portion of the peninsula, probably as a result of having their migratory routes disrupted by land clearance for oil palm plantations and other large-scale developments (Kawanishi *et al.*, 2006).

More studies are needed to determine the status of other potential prey species such as the bearded pig and serow (*Capricornis sumatrensis*) to establish their importance in terms of the tiger's dietary needs. Between the two principal prey species, due to its relatively greater abundance and availability, the wild pig

is probably the most important prey species for Malayan tigers. If feeding only on wild pigs, an average male (120kg) and female (100kg) tiger would consume annually at least 104 and 87 wild pigs respectively, that is nearly, 100,000 wild pigs killed annually by 1,000 tigers. As a result of this perceived importance of the wild pig in the tiger's diet, the wild pig was listed as a protected species under the PWA in 1972. Since then, the hunting of wild pig has been regulated through a system of hunting licences.

The tiger's diet also often includes livestock in every range-country where domestic animals are reared adjacent to tiger habitats without proper management. In Peninsular Malaysia, DWNP data suggest that the two common livestock species taken by tigers are cattle and goats. In extremely rural areas, buffaloes are reared instead of cattle because of the ease of maintenance and their superior defence behaviour against predators. In these areas, tigers take buffaloes occasionally but, due to isolation, the incidences are rarely reported to the authorities (Kawanishi, unpublished data).

1.1.3 Tiger land tenure system and social organisation

The tiger land tenure system, which refers to the spatial and temporal occupancy of a habitat by individual animals, is dynamic and, typically, a male's range encompasses those of several breeding females. The size of an individual's territory and home range varies depending on several factors, including habitat type, prey biomass, tiger density and demographics (Schaller, 1967; Sunquist, 1981; Miquelle *et al.*, 1999). Typical range sizes for resident females have been recorded as being as small as 17km² in South Asia (Sunquist, 1981; Karanth and Sunquist, 2000) and as large as 400km² in the Russian Far East (Matjuschkin *et al.*, 1980; Miquelle *et al.*, 1999). The variation in daily distances walked, however, is less obvious with records of up to 32km in India (Schaller, 1967) compared to 15-20km in Russia (Matyushkin *et al.*, 1980) and only 10km in Nepal (Sunquist, 1981). Maintenance of an exclusive home range or territory is an important component of tiger social structure (Sunquist, 1981; Smith *et al.*, 1987; Miquelle *et al.*, 1999). How dense tropical rainforests, as opposed to, say, more open temperate grasslands, affect territoriality is unknown. A home range study requires the application of telemetry technologies and these have not been tried on Malayan tigers. However, based on observations, the home range size of the Malayan tiger has been stated to be 380km² (Locke, 1954), whilst minimum range sizes, suggested by camera-trapping data in secondary forests and adjacent plantations, were 345km² for one male and 186, 198 and 229km² for three females in Jerangau Barat, Terengganu (Ahmad Zafir *et al.*, 2006). Smaller minimum ranges were recorded in Jeli, Kelantan with 60 and 289km² for two males and 98km² for one female (Darmaraj, 2007).

1.1.4 Tiger density

Tiger density has an inverse relationship with home

range size and correlates positively with prey biomass (Seidensticker, 1996; Miquelle *et al.*, 1999). Using the data from 11 ecologically diverse sites in India, Karanth *et al.* (2004) demonstrated a simple mechanistic model that predicts tiger density as a function of prey density. Using this model, the highest tiger density site, Kaziranga, with its highly dense prey base (68 animals/km²) and associated biomass (5,200kg/km²) can support around 16.8 tigers in 100km². This is roughly ten times as many as the mean estimated density of tigers in Taman Negara (Kawanishi and Sunquist, 2004) where the crude estimate of prey biomass ranges from 270 to 430 kg/km². Two recent camera-trapping studies in the mark-recapture framework estimated adult tiger densities, $D(\text{Standard Error})$, in Malaysia, as ranging from 1.10 (0.52) to 1.98 (0.54) tigers/100km² in the protected primary rainforests of Taman Negara (Kawanishi and Sunquist, 2004) and 2.59 (0.71) tigers/100km² in the disturbed mosaic habitat of secondary forest, plantation, orchards and human settlements in Gunung Basor Forest Reserve, Kelantan (Darmaraj, 2007).

The evergreen rainforests, especially mature primary rainforests like Taman Negara, offer little primary productivity at ground level and thus mammalian biomass is dominated by arboreal herbivores (Eisenberg, 1980). Consequently, tropical rainforests are not particularly rich habitat for tigers in terms of diversity and abundance of large ungulate communities. Tigers in rainforests at the southern extreme of its distribution range (Malaysia and Indonesia) occur at among the lowest densities recorded in the entire global range (Kawanishi and Sunquist, 2004). An even lower tiger density (<1 tiger/100km²) has been recorded in Sikhote-Alin, Russian Far East, at the northern extreme of its distribution range, where prey is equally scarce (Miquelle *et al.*, 1999). More detailed references to the natural history of tigers can be found in Mazak (1981), Nowell and Jackson (1996), and Sunquist and Sunquist (2002).

1.2 National and Global Significance

For thousands of years, humans have respected and admired great cats of the genus *Panthera* such as lions, jaguars, leopards and tigers, for their beauty and strength (Seidensticker and Lumpkin, 2004). In Malaysia, the tiger is a symbol of strength and royal power. Two tigers flank Malaysia's National Coat-of-Arms in a protective stance (Fig. 1) and the Johor state emblem. It is Malaysia's national animal, and the national sports teams call themselves "The Malaysian

Fig. 1 : Malaysia's National Coat-of-Arms with two tigers flanking the shield.



Tigers" and parade in yellow uniforms with black stripes.

The symbolic power of tigers manifests itself in a number of commercial products as corporate branding strategies. The global oil giant, ExxonMobil, is probably the most well-known example and is one of a few corporations that actually pay a "royalty" for the use of the tiger's image. Among all corporations using the image of the tiger for branding, ExxonMobil makes the largest financial contribution towards tiger conservation worldwide with US\$13.6 million (RM48 million) between 1995 and 2006 (Save the Tiger Fund, 2007). Malaysia's largest financial institution, Malayan Banking Bhd., also uses the tiger for its logo.

With its position at the apex of the terrestrial food chain, top predators maintain the balance of an ecosystem (Terborgh, 1988; Terborgh, 1990; Terborgh *et al.*, 1999; Miller *et al.*, 2001). This is the tiger's main ecological significance. Top predators not only have a numerical and behavioural impact on their immediate prey species, but sometimes even regulate their populations, which in turn have effects on plants or smaller animals that these prey feed on. In other words, the loss of top predators may release cascade impacts and changes across the food web. The tiger is also considered a landscape species since they roam a large area that encompasses different ecosystem or habitat types. And large carnivores generally are the first to disappear in the face of habitat destruction and human intrusion. The presence of a viable top predator population indicates the ecological integrity of a given ecosystem. Hence successful tiger conservation may not only ensure tigers, prey species and their habitat but also the

processes that maintain the ecosystem. Once lost, the latter cannot be recreated *ex-situ*. The tiger's functional role in an ecosystem is thus important to humans who benefit from the ecological service provided by healthy forests. Protection of large tiger habitats therefore means protection of forests, its biodiversity, water catchment areas, and soil, however difficult it may be to put a price tag on such long-term ecological services. Tigers are therefore important for Malaysians and the rest of the world culturally, ecologically, and economically. Aside from these reasons, humans have a moral obligation to safeguard a sufficient amount of wilderness areas where other creatures, such as the tiger that are so vulnerable to large-scale disturbance, can pursue their natural course of evolution, relatively, free of negative human impacts. We now risk losing one of Asia's most beautiful and majestic animals – so admired, feared and respected throughout the history of the human race – because of our careless, short-sighted actions and misplacement of priorities and values. Such actions are incongruous with moral and intelligent creatures such as ourselves, and we must today strive to be more morally responsible towards our fellow Earth inhabitants. Just like all other wildlife species, the tiger has an intrinsic value on this planet,

as each occupies a specific niche. Saving the big cat thus requires our willingness to forgo some of our immediate self interests.

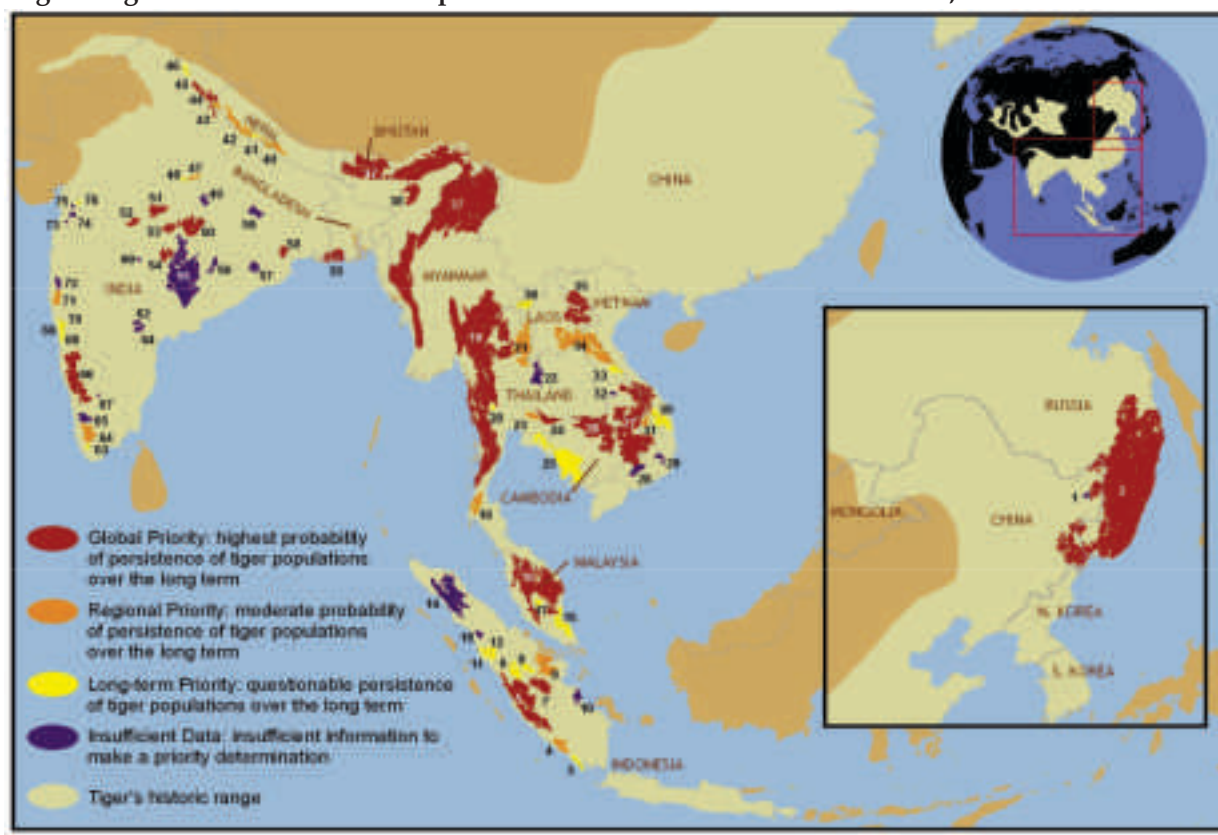
1.3 Tiger Distribution and Population

The historical distribution of tigers extended from eastern Turkey up to the northern tip of the Russian Far East and southward, through India, Indochina and the Malay Peninsula, all the way to the Indonesian islands of Sumatra, Java, and Bali. Tigers have been exterminated from 93% of their original range in the past century and estimates of the area occupied by tigers have dropped by as much as 40% in the past decade alone (Dinerstein *et al.*, 2006). The current distribution is represented in scattered fragments across this original range and a recent attempt to convey this into a kind of prioritisation process has identified 76 Tiger Conservation Landscapes (TCLs) where, there is sufficient habitat for at least five tigers, and the tiger presence was confirmed (Fig. 2). These TCLs were then prioritised into four classes based on their ecological and social potential for tiger conservation (Dinerstein *et al.*, 2006).

Source: www.savethetigerfund.org

With the extinction of the Javan and Bali tigers, true

Fig. 2 : Tiger Conservation Landscapes and Priorities. Source Dinerstein *et al.*, 2006.



“rainforest tigers” of evergreen rainforests are now found only in the Malay Peninsula and the island of Sumatra. These areas are collectively called the Southeast Asia Bioregion (Dinerstein *et al.*, 1997 and 2006). This bioregion has 15 TCLs, three of which are considered to be global priorities. The only global priority TCL found in Malaysia encompasses the Main Range (i.e., the main western spine of the mountain range) and the Greater Taman Negara Landscape (i.e., Taman Negara National Park and the surrounding Permanent Reserved Forests). This TCL extends across the national border into southern Thailand, but the coverage in Thailand is minimal (Dinerstein *et al.*, 2006).

Corresponding to the loss of tiger habitat, the number of tigers has also dramatically declined in the past century and the tiger cannot afford to have another century like the last. There were once believed to be about 100,000 tigers in the original extent of the habitat, which by the 1990s dwindled to about 6,000, including India’s 3,000 (Seidensticker *et al.*, 1999). After rampant poaching in some Tiger Reserves and mismanagement of resources (Thapar, 1999; Gupta, 2005), preliminary results of the India-wide population studies conducted in 2005 and 2006 have put the total number of tigers at between 1,300 and 1,500, more than 50% reduction from the 2001-2002 census result (Balla, 2007). Elsewhere in Cambodia, Vietnam and Myanmar, extensive forest tracts still remain but tigers have been hunted close to

extinction in all of these countries. In the Indochina bioregion, Thailand may represent the last hope for the tigers as it is estimated to have about 190 tigers remaining (Gratwicke *et al.*, 2006). All indications suggest that there may be fewer than 3,000 wild tigers left worldwide.

Peninsular Malaysia’s forests are managed according to three different categories. The majority (80%) of forest cover (not the total land area) is Permanent Reserved Forests (PRFs) that are managed by state Forestry Departments. They are further classified into Protection Forests (for specific purposes including soil protection, water catchment, research and recreation) and Production Forests (for timber extraction).

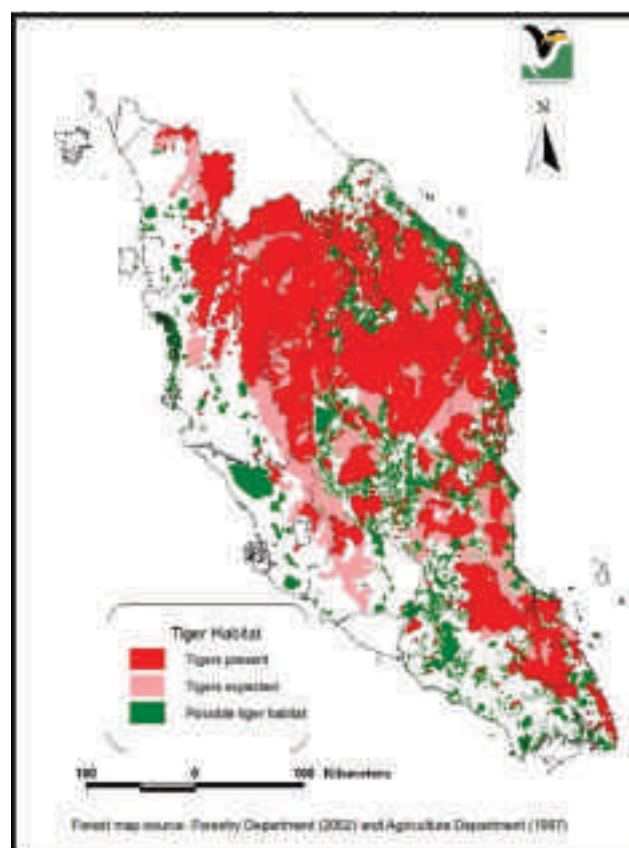
About 13% of the forest cover (not of total land cover) is classified as Protected Areas (PAs) such as national parks and wildlife reserves, managed by DWNP or, in the case of state parks, by state governments (e.g., Johor National Parks Corporation for Endau-Rompin and Perak State Park Corporation

for Royal Belum). The remaining 7% are state land forests that are managed by state governments (FDPM, 2006).

An analysis of data, collected by DWNP between 1991 and 2003, shows that 51% or 66,211km² of Peninsular Malaysia was considered suitable as tiger habitats, including all forest types from peat swamps to mountain forests and even some non-forest lands (Fig. 3). Because forests represent 45% of Peninsular Malaysia’s land-cover (FDPM, 2006), this means that 6% of suitable tiger habitats fall outside forests to include abandoned agricultural fields, early-succession scrublands, and pockets of swampy woodlands in plantations. The highest elevation where tigers have been recorded was 1,730m, on Gunung Bintang Hijau in Perak (DWNP, unpublished data). No tiger signs were recorded at the peak of Gunung Tahan at 2,187m (the highest mountain in Peninsular Malaysia) or in Cameron Highlands (Topani, 1990).

Source:http://www.wildlife.gov.my/webpagev4_en/printed_material/kmaklumat/harimau.pdf

Fig. 3 : Three types of tiger habitat in Peninsular Malaysia based on analysis of data collected by the Department of Wildlife and National Parks between 1991 and 2003.



Source:http://www.wildlife.gov.my/webpagev4_en/printed_material/kmaklumat/harimau.pdf

Not surprisingly, smaller states such as Perlis and Malacca and the highly developed Federal Territories of Kuala Lumpur and Putrajaya appear to have lost their tigers in recent times, though tigers have been captured or sighted in forest reserves adjacent to Kuala Lumpur as recent as 2001 (DWNP, unpublished data). There are only a few tigers remaining in Selangor and Negri Sembilan as an escalation in development projects continues to fragment forests (*Sec 1.5.1.2*).

An inevitable result of all these development projects, coupled with the loss of lowland forests to largescale agriculture over the last 50 years, is that nearly 90% of the remaining tiger habitat is found in only four states - Pahang, Perak, Kelantan and Terengganu. Each of these has relatively low human densities and large forest cover among the 12 states and federal territories of Peninsular Malaysia.

Tiger habitats fall into the following three categories depending on evidence of tigers, forest status, and forest connectivity. The qualitative assessment of a conservation value is meant to aid the decision-making process for intelligent resource allocation towards conservation of wild tigers.

1.3.1 Tiger Landscapes

From the location of confirmed and expected tiger habitats, three main broad spatial units referred to as "Tiger Landscapes" were identified for planning and management purposes.

Main Range (ca. 20,000km²) to the west of Peninsular Malaysia. This landscape includes hill and montane forests that stretch longitudinally over 5 or 6 states, from Perak, at the Thai border, to Kelantan, Pahang, Selangor, Negri Sembilan, and possibly Kedah. It includes the Bintang Hijau forest complex in Perak, but may or may not include Ulu Muda in Kedah, which appears isolated by the Federal Road bisecting a 2-km stretch of a forest corridor at the Perak-Kedah border. The newly established Royal Belum State Park, at 1,175km² and the adjacent Temengor Forest Reserve at the northern end, is likely the main stronghold for the Main Range tiger population. But only general information on tigers is available from Belum and Temengor. Apart from a study in Gunung Basor Forest Reserve in Kelantan, where tiger density was estimated at 2.59 tiger/100 km² (Darmaraj, 2007), not much is known from the rest of the Main Range.

Confirmed Tiger Habitats (37,674km² or 29% of total land area) with good conservation value. These habitats are either PAs or PRFs with evidence of tigers recorded between 1991 and 2003 by DWNP. All PAs (n=4) greater than 400km² in size in IUCN categories I-IV (IUCN 1994; DWNP/DANCED, 1996) were in this category. That 85% of the confirmed tiger habitats are in PRFs illustrates the significance of collaboration with the FDPM for on-the-ground protection of tigers and their habitats. The conservation value of these habitats is considered good because of the protected status of the forests combined with evidence of the presence of tigers.

Expected Tiger Habitats (11,655km² or 9% of total land area) with fair conservation value. These are forest blocks that are physically connected to confirmed tiger habitats but have yet to be adequately surveyed. Tigers are expected to occur in these habitats because of the physical connectivity. The conservation value of these areas can be raised once tiger presence is confirmed.

Possible Tiger Habitats (16,882km² or 13% of total land area) with marginal conservation value. These areas include forests in tiger states that are isolated from confirmed tiger habitats. It also includes areas with natural vegetation not defined as "forests" by the FDPM (e.g., scrublands and abandoned agricultural fields), but where tigers have been recorded (shown with red dots in Fig. 3). Because the future of these lands is uncertain, their conservation value is marginal, except for areas considered as potential corridors connecting confirmed/expected tiger habitats.

Data Gap: There needs to be a benchmark study on the status of tigers in Belum and Temengor and studies to determine their distribution throughout the Main Range. WWF-Malaysia has begun a study to determine the status of tigers in Temengor in 2007.

Greater Taman Negara (ca. 15,000km²) to the east of Peninsular Malaysia. This landscape encompasses Taman Negara National Park and contiguous PRFs north and south of the park that stretch over Kelantan, Terengganu, and Pahang. This area harbours the largest remaining lowland forests (<300 m asl) in Peninsular Malaysia. A benchmark study (Kawanishi and Sunquist, 2004) suggests that the Taman Negara tiger population, estimated at 52-84 adults, is viable if the threats from poaching are maintained at a negligible level to none. The population viability will be greatly enhanced by strong tiger-prey communities in the 11,000km² of PRFs surrounding the park. The genetic viability of the Greater Taman Negara tiger population will be enhanced by occasional gene flow from the two other landscapes. This landscape is at risk of isolation from the Main Range due to a railway and road running parallel to the western border of the park.

Data Gap: Population monitoring needs to be continued in Taman Negara and the distribution status in the rest of the landscape needs to be determined.

Southern Forest (ca. 10,000km²) to the south of Peninsular Malaysia. This landscape has already been isolated from the other two tiger landscapes and includes four groups of increasingly fragmented forest complexes located south of the Pahang River: the Chini/Ibam complex, south-east Pahang peat swamp forests, Endau Rompin, and Endau Kota Tinggi. It encompasses southern Pahang and Johor. Among the three main tiger landscapes, this is the smallest and most fragmented. Endau Rompin (402km² in Pahang and 489km² in Johor) is situated in the centre of the landscape and should serve as the source population, but little is known of tiger ecology in this area.

Data Gap: There needs to be a benchmark study on the status of tigers in Endau Rompin and surrounding areas. WCS has begun a study to determine the status of tigers and tigers' prey in the Johor portion of the landscape in 2007.

In the global assessment, the Main Range and Greater Taman Negara landscapes correspond with No. 16 Class I Tiger Conservation Landscape of a global priority, meaning that it has habitat to support at least 100 tigers, evidence of breeding, minimal-moderate levels of threat, and effective conservation measures in place and offers the highest probability of the persistence of tiger populations over the long term (Fig. 2;

Dinerstein et al., 2006). These two tiger landscapes make up the 5th largest TCL among the 20 global priority TCLs out of a total of 76 TCLs. The Southern Forest Landscape and Krau Wildlife Reserve are Class III TCLs that are considered long-term priority landscapes that require sustained efforts to restore them to Class I status. In the near- to mid-term, they are still important areas for developing a national tiger conservation strategy.

During wildlife surveys, tigers are rarely seen in the forest as they are widely dispersed at low densities and actively avoid humans. Camera-trapping studies, utilising a mark-recapture framework, (Karanth, 1995) is a powerful tool to estimate tiger densities but too expensive to be applied for large areas beyond a few selected priority sites. Hence, to gain a reliable estimate of the national tiger population is, then, an extremely difficult undertaking.

In the 1950s, it was roughly estimated that there were approximately 3,000 tigers in Malaysia (Locke, 1954). By 1977 the number declined to about 300 and in a decade it recovered to 600-650 animals (Khan, 1987) probably because the tiger was upgraded to the totally protected species in 1976. In 1990, based on surveys and verified reports of human tiger conflicts, the tiger population was conservatively estimated at 500 (Topani, 1990).

A more recent attempt for a crude population estimate was made based on typical prey biomass in tropical rainforests (Hoogerwerf, 1970; Seidensticker and Suyono, 1980; Seidensticker, 1986; Kawanishi and Sunquist, 2004), energetic needs of tigers (Sunquist, 1981), estimated tiger densities from studies carried out in tropical Asia (Griffiths, 1994; O'Brien et al., 2003; Kawanishi and Sunquist, 2004; Linkie et al., 2006; Darmaraj, 2007) and available tiger habitats in Peninsular Malaysia (Kawanishi et al., 2003). The available information indicates that it is reasonable to assume the mean tiger density estimates in tropical forests falling somewhere between 1 and 3 tigers/100km² as earlier suggested by Santiapillai and Ramono (1987). Then the confirmed and expected tiger habitats of 49,300km² could support between 493 and 1,480 adult tigers (Kawanishi et al., 2003). The wide range is typical of non-scientific guesstimates.

There are no demographic data on a wild Malayan tiger population. If we assume that 25% of a typical tiger population consists of cubs as suggested by Karanth and Stith (1999), the total potential tiger population is estimated at 657 to 1,973 tigers in Malaysia. Note, however, that this figure does not

include the tigers recorded in the possible tiger habitats and assumes that the expected tiger habitats actually do support tigers. Some data were collected more than 15 years ago and thus the distribution status indicated by these old data may no longer be valid. See Kawanishi et al. (2003) for other limitations of the analysis.

Taking the lower bound of 493 adult tigers, if the assumptions are correct, Malaysia could be supporting the largest tiger population in Southeast Asia. Studies on the nationwide tiger occupancies and densities estimates from more sites including mountain forests will allow us to test the prediction.

1.4 Opportunities

Before discussing the threats to tigers, national policies and legislation already in place to protect tigers, their prey and habitats are presented in this section. Malaysia's stable socio-economy and conservation partnership for tigers are also presented as unique opportunities that need to be further harnessed to strengthen the tiger conservation efforts.

1.4.1 Pro-conservation national policies

Under the Malaysian Constitution, land-use is a State matter and the Federal government has no power over this except for Articles 83-86 and 88 which deal with the reservation and disposition of land held for Federal purposes. However, the Federal government may legislate to the extent of ensuring common policies over land matters and a common system of land administration, though such legislation again has to be ratified by the respective states. The Federal government may also extend its executive authority in the form of advice and technical assistance to the states. In this respect, the federal level councils, such as the National Physical Planning Council, National Forestry Council, and National Biodiversity Council, are empowered to coordinate the planning, management and development of respective natural resources. The following three policies and one plan are considered relevant to tiger conservation.

1.4.1.1 National Policy on Biological Diversity

Malaysia became a signatory of the Convention on Biological Diversity in 1994. As a result, the National Policy on Biological Diversity (NPBD) was drawn up by the Ministry of Science, Technology and Environment in 1998. This Policy serves as a guide towards conservation and sustainable management of Malaysia's rich natural resources and is implemented

by the Ministry of Natural Resources and Environment. There are 15 strategies towards achieving the objectives of the policy, and almost all are reflected in this Plan:

- i. Improve the scientific knowledge base
- ii. Enhance sustainable utilisation of the components of biological diversity
- iii. Develop a centre of excellence in research in tropical biological diversity
- iv. Strengthen the institutional framework for biological diversity management
- v. Strengthen and integrate conservation programmes
- vi. Integrate biological diversity considerations into sectoral planning strategies
- vii. Enhance skill, capabilities and competence
- viii. Encourage private sector participation
- ix. Review legislation to reflect biological diversity needs
- x. Minimise impacts of human activities on biological diversity
- xi. Develop policies, regulations, laws and capacity building on biosafety
- xii. Enhance institutional and public awareness
- xiii. Promote international cooperation and collaboration
- xiv. Exchange of information
- xv. Establish funding mechanisms

The policy also acknowledges that current legislative support and conservation efforts are inadequate for holistic biodiversity conservation and further highlights the need for measures to alleviate the impact of human activities resulting in displacement of wildlife.

1.4.1.2 National Physical Plan

The National Physical Plan (NPP) is Malaysia's first national blueprint for spatial planning and was published by the Department of Town and Country Planning in 2005. The NPP Council is chaired by the Prime Minister of Malaysia and this statutory document is being used to guide the National Five Year Development Plans leading towards the achievement of Vision 2020. Furthermore, the Plan also guides State Planning Committees and local planning authorities when formulating their respective Structure and Local Plans. Most relevant to the Tiger Action Plan is that the NPP sets a spatial framework for sustainable development and

delineates important conservation areas for biodiversity and environmental protection purposes in a landscape ecology perspective. Under the NPP, 36 policies provide a framework for sustainable development, including safeguarding the environment and biodiversity. Two of these 36 policies are of specific importance to the aim of this Tiger Action Plan, namely Policy 18: Environmentally Sensitive Areas (ESAs) and Policy 19: Central Forest Spine (CFS). Realisation of the two policies is crucial for securing the long-term future of landscape species, such as the tiger, as they provide the main tools by which large-scale land-use issues can be brought in-line with conservation efforts. This is expected to be achieved primarily through the identification and protection of ESAs and establishing green linkages through the Central Forest Spine (CFS) and strict control and sustainable development of highlands and coastal zones. The three priority tiger landscapes identified in this Plan (Sec 1.3) fall within the CFS, complimenting current national policies and thereby reaffirming this Plan.

1.4.1.3 National Forestry Policy

Because individual states have complete jurisdiction over forestry matters, in order to ensure a common approach to forestry issues, the National Forestry Council was set up under the National Land Council in 1971. The National Forestry Council is the highest decision-making body on forest issues, representing a forum where head of states and federal governments discuss and decide on forest-related issues. The Council endorsed the National Forestry Policy in 1978. This Policy's objectives are to conserve and manage the nation's forest based on the principles of sustainable management and to protect the environment as well as to conserve biological diversity, genetic resources and to enhance research and education.

1.4.1.4 National Policy on the Environment

In keeping abreast with the country's rapid economic development and to meet with the nation's aspiration for an improved quality of life, the National Policy on the Environment 2002 integrates the three elements of sustainable development:

- 1) economic development,
- 2) social and cultural development, and
- 3) environmental conservation. The Policy aims to achieve:
 - 1) a clean, safe, healthy and productive environment for present and future generations;

- 2) the conservation of the country's unique and diverse cultural and natural heritage with effective participation by all sectors of society; and
- 3) a sustainable lifestyle and pattern of consumption and production.

1.4.2 Obligations under international conventions

Internationally, Malaysia became a signatory to the Convention Concerning the World Cultural and Natural Heritage (World Heritage Convention) in 1988 although no sites in Peninsular Malaysia have yet been nominated for inscription on the World Heritage list. Likewise, no sites have been designated under the UNESCO Man and the Biosphere Programme. Malaysia became party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1977. All tiger subspecies are listed in Appendix I of the CITES, which prohibits international trade of live tigers, their parts and derivatives for commercial purposes. DWNP is the local Management Authority for the CITES-regulated terrestrial faunal species. The commercial international trade in all tigers and their body parts and derivatives was banned in 1987 under CITES. In 1994, CITES Parties agreed that additional measures for the protection of tigers were necessary, including the specific acknowledgment of threats posed by unsustainable trade in tiger parts for use in traditional medicine. CITES Parties then adopted a resolution (Resolution Conf. 12.5) to urge States around the world to do everything possible to help conserve the tiger in 2002.

In Peninsular Malaysia, there are multiple CITES Management Authorities, which are responsible for the implementation of CITES. DWNP, however, has been historically the first point of contact for the CITES Secretariat and is the principal Management Authority. The Ministry of Natural Resources and the Environment (NRE), is the sole Scientific Authority for the country while the National Committee on CITES is a permanent committee that oversees the implementation of CITES in Malaysia. This structure may be changed in the near future, to strengthen the implementation of CITES in Malaysia. The Protection of Wild Life Act 1972 covers the protection of most CITES-regulated species in Peninsular Malaysia.

1.4.3 Existing administrative and legislative structure and enforcement agencies

Nationally, statutes relating to biological resources are in force at both state and federal levels, rendering a

complexity in approach. Many of these legislations are currently under review for amendment. Therefore changes are likely and improvements are expected in the near future. There are a number of legislations related to the conservation of tiger habitat or protection of tigers, the most relevant of which are as follows.

1.4.3.1 Protection of Wild Life Act

The Protection of Wild Life Act 1972 (amended in 1976 and 1988) is the main legislation concerning wildlife in Peninsular Malaysia, which is enforced by DWNP. The tiger is a totally protected species under the Act and a conviction for shooting, killing or taking tigers (and parts thereof) carries the penalty of a fine not exceeding RM15,000 (USD4,000) or no more than five years imprisonment. The tiger, Sumatran rhinoceros and clouded leopard *Neofelis nebulosa* are afforded with the highest protection under the Act. Tigers' primary prey species, wild boar, sambar deer, and barking deer are protected game species for which hunting is restricted by licensing. In PAs, however, all forms of fauna and flora are totally protected. Steel wire snares are banned and offenders possessing more than 25 snares incur a mandatory jail sentence of up to ten years. For less than 25 snares, an offender is liable to a maximum fine of RM5,000 (USD1,300) and/or imprisonment up to five years. The Act is currently being amended and the new legislation is expected to allow for higher fines and longer jail sentences for poaching tigers. The use of registered firearms, for the purpose of hunting of game species, is regulated through licensing by DWNP, and Malaysia's strict Firearms Act 1971, which carries a mandatory death sentence, effectively reduces the hunting pressure using firearms.

1.4.3.2 Sale of Drugs Act and the Control of Drugs and Cosmetics Regulations

One of the main threats to tigers comes from the trade in tiger parts for use in traditional medicines. Important legislation relevant to Traditional Chinese Medicines (TCM) are the Sale of Drugs Act 1952 and the Control of Drugs and Cosmetics Regulations 1984 that regulate the sale and import of drugs in Malaysia. The Drug Control Authority (DCA) of the Ministry of Health is the executive body established under the Regulations whose main task is to ensure the safety, quality, and efficacy of pharmaceuticals and health and personal care products that are marketed in Malaysia. In accordance with the legal requirements of the Act and the Regulations, the

Guidelines for the Registration of Traditional Medicines were drawn up by the DCA.

As of 1992, all traditional medicines must be registered under the Sale of Drugs Act. The DCA also ensures that all registered products are labelled according to stipulated labelling requirements. A product will be registered only if it satisfies all the requirements of the DCA through laboratory screenings, especially with respect to safety, efficacy, and quality of the product. After a product is registered, the applicant can apply for a licence for it to be manufactured, imported, or wholesaled (Ng and Burgess, 2004). Every registered product is given a registration number, which must be printed on its label or package. These numbers start with 'MAL' or 'PBKD', followed by 6 or 8 digits, and ending with the letter 'T' for traditional medicine products (Pereira et al., 2002).

1.4.3.3 National Parks Act

The National Parks Act 1980 (amended in 1983) provides for the establishment of national parks and 15 applies to Peninsular Malaysia. It is implemented by DWNP. The Act, as amended, allows the appropriate Federal Minister to request that any state land be reserved for the purpose of a national park, although this has no legal force without the assent from State authorities. Despite the federal budgetary allocation for the park management, the states have been cautious to establish new conservation sites, with the only one exception being the Penang National Park in 2003. Taman Negara was established before this Act and the power of the Act does not apply to the park.

Other legal instruments for the establishment of protected areas in Peninsular Malaysia include the National Land Code 1965, Local Government Act 1976, Johor National Parks Corporation Enactment 1989, Perak State Parks Corporation Enactment 2001, and (amended) Perlis Forestry Enactment 2001.

1.4.3.4 Taman Negara Enactments and Taman Negara Master Plan

The Taman Negara National Park was established by three separate enactments, which cover the three states the park spans:

- i. Taman Negara Enactment (Pahang) No. 2 of 1939
- ii. Taman Negara Enactment (Kelantan) No. 14 of 1938
- iii. Taman Negara Enactment (Terengganu) No. 6 of 1939

The content of the three enactments are similar. These enactments empower DWNP to manage Taman Negara as one National Park in accordance to the Taman Negara Master Plan (DWNP, 1987).

1.4.3.5 National Forestry Act

The National Forestry Act 1984 (amended in 1993) was formulated to standardise and update the various State Forest Enactments, which were adopted in the early 1930s and enables the Forestry Department to implement the National Forestry Policy. The Act provides for the administration, management and conservation of forests and forestry development throughout Peninsular Malaysia and is enforced by the respective State Forestry Departments. It classifies the Permanent Reserve Forests into eleven categories depending on its purpose and ensures that production forests are managed sustainably and the virtues of other forest types are protected permanently. Apart from production forests where logging is allowed, protection forests are broken down to ten categories depending on specific purposes: soil protection, soil reclamation, flood control, water catchment, forest sanctuary for wildlife, virgin jungle reserve, amenity, education, research, and forest for federal purposes. State governments have formally agreed to adopt the categories and restrictions on use in each category, although these differ slightly from state to state. Since 2002, Perlis, Kelantan and Selangor, have amended their respective National Forestry Enactments (the National Forestry Act as adopted by the individual states) to create an additional category of forest use, i.e. "state park". Selangor was the first to use this approach to gazette the Selangor Heritage Park in 2007.

To further supplement forest management and harvesting plans, the Forestry Department has adopted regulations and guidelines for sound forest harvesting, including 'Standard Road Specifications' and 'Forest Harvesting Guidelines' with special emphasis on environmental conservation measures. These regulations and guidelines are incorporated into harvesting licences issued to logging contractors and their implementation is monitored and supervised by State Forestry Departments' personnel.

1.4.3.6 Town and Country Planning Act

Conservation is specifically recognised to be an essential element of land-use planning under the Town and Country Planning Act 1976, which is enforced by the Department of Town and Country

Planning (DTCP). The Act gives the provision to the state and local authorities to set aside certain land to be conserved and protected in one way or another. However, the form and content of the Town and Country Planning Act adopted by states may differ significantly from the parent Federal Act. Rather than as a mandate, the Federal DTCP advises the state DTCP in the state land management plan.

1.4.3.7 Environmental Quality Act

Besides regulating the sources of possible pollutants to the environment, the Environmental Quality Act 1974 was amended to include Environmental Impact Assessments in 1985 which came into force in 161987. It is enforced by the Department of Environment. Detailed EIAs prepared by the project proponent are required by law to be made available to the public who are afforded an opportunity to comment on the Detailed EIA. The Environment Quality Act, Order 1987 contains a list of Prescribed Activities for which Detailed EIAs are required to be undertaken by the project proponent. For activities that do not fall under the list of Prescribed Activities, Preliminary EIAs may be prepared but these are exempted from the public participation process. Prescribed Activities involving logging and land conversion of forests are as follows:

- i. land development schemes converting an area of 500ha or more of forest land into a different land-use;
- ii. drainage of wetland, wildlife habitat or virgin forest covering an area of 100ha or more;
- iii. land-based aquaculture projects accompanied by clearing of mangrove forests covering an area of 50ha or more;
- iv. conversion of hill forest land to other land-use, covering an area of 50ha or more;
- v. logging or conversion of forest land to other land-use within the catchment area or reservoirs used for municipal water supply, irrigation or hydro-power generation or areas adjacent to state and national parks, and national marine parks;
- vi. logging covering an area of 500ha or more;
- vii. conversion of mangrove forests for industrial, housing or agricultural use covering an area of 50ha or more;
- viii. clearing of mangrove forests on islands adjacent to national marine parks;
- ix. other activities which may affect forest, such as coastal reclamation.=

1.4.4 Stable socio-political and economic system

As more and more tigers live in human-dominated landscapes, they have to contend with a myriad of threats brought by human activities. This is why their survival largely depends on the people who share the same landscapes. When the basic livelihoods of people are threatened by political unrest, social turbulence and unstable or unbalanced economies, wildlife suffers. In many countries where the rural poor are struggling for bare essentials such as clean water, cooking fuel, electricity, and sanitation, there is a perception among conservation and humanitarian organisations, a fairly recent concern for the former, that the first need is to alleviate the poor living conditions of the people with whom, for example, tigers have to share limited resources. Furthermore in nations where people's basic needs are not secured, it is difficult for the government to commit itself to saving wildlife before saving its people; yet such high level commitment is what is most needed to save the big cats (Jackson, 1997; Thapar, 1999; Dinerstein *et al.*, 2007).

Whether poverty alleviation actually makes a significant positive contribution towards conservation goals is unclear, but this is not of high, immediate concern for tigers in Malaysia, for the basic needs of most Malaysians are met, and poverty levels are among the lowest in the tiger nations (CIA, 2007).

Malaysia has one of the strongest Tiger Economies next to Singapore and Hong Kong. After the Asian financial crisis in 1998, Malaysia was the first to recover among the Southeast Asian tiger nations.

While maintaining steady national economic growth, the government thrives to eradicate rural poverty by improving welfare, youth and sports programmes, education, agricultural subsidies, low-income housing and health care. Malaysia is also one of a few countries in Southeast Asia where racial harmony is maintained. Malaysia, in fact, has bilateral agreements with the governments of neighbouring countries to assist them in improving social harmony.

Educated people tend to be more vocal in defending their interests and confronting unrepresentative governments. Research found that civil and political liberties are linked positively to improved governance, which in turn is positively associated with per capita income, quality of health care, and sustainable environment (Thomas *et al.*, 2000). Due to the distortion it introduces into the policy-making process, corruption is incompatible with sound

natural resource (such as logging) or environmental management.

The level of corruption is expected to be high in politically unstable, low-income nations (Transparency International, 2001). Among the tiger nations, Malaysia is the second-least corrupted nation after Bhutan (Transparency International, 2006).

Government accountability and transparency, together with the political will to prioritise conservation issues, are all important prerequisites for allowing the effective expenditure of conservation funds and for gaining public support. The case of the tiger reserves in India is a good example of how, despite lucrative 17 financial allocations, the lack of these three requirements can still result in disaster (Thapar, 1999; Gupta, 2005; Dinerstein *et al.*, 2007). Malaysia, however, has the political will and reasonably effective anti-corruption measures necessary to avoid a tiger disaster. The Malaysian government has made clear its priority to conserve wild Malayan tigers by seeking to consolidate national expertise, through the initiation of the Malaysian Conservation Alliance for Tigers (MYCAT) in 2003 (Sec. 1.4.6). In fulfilment with the fifth objective of the NPBD to enhance the scientific knowledge on biodiversity, DWNP has supported external tiger research projects such as those conducted by WWF-Malaysia, New York-based Wildlife Conservation Society, and the University of Florida in the past decade. DWNP is in the process of doubling its manpower and once the positions are filled, 17 entry/exit points in nine states will be manned permanently in an effort to eradicate illegal wildlife trade (Mislihah, B., DWNP, pers. comm.). Enforcement efforts are further strengthened by cooperation with the Royal Malaysian Army, Anti-smuggling Unit of the Royal Customs and Excise Department, Immigration Department and Royal Malaysian Police. With the support from the Army, for example, DWNP had arrested an unprecedented number of foreign poachers, 75 in the Protected Areas between 2001 and 2005 (DWNP, unpublished data). In addition to the existing enforcement units, to forge better networking among the staff with the intention to strengthen actions and produce efficient results, DWNP established a flying squad called the Wildlife Crime Unit in 2005.

These social contexts are not merely a background to biophysical requirements for tigers' long-term survival. A stable socio-political system and economy, coupled with sound conservation priority, are important for successful and cost-effective tiger conservation. So are the education and governance of

the people. This is why Malaysia stands a good chance of saving its tigers in the long run.

1.4.5 Contiguous forests and wide tiger distribution

As mentioned in the preceding *Sec. 1.3*, based on the data collected between 1991 and 2003, Malayan tigers are widely distributed in existing forests and even in non-forested habitats. There appeared many small tiger populations still surviving in isolated forests such as the Krau Wildlife Reserve (624km²) and Kemasul Forest Reserves (460km²) in Pahang, Mercang Forest Reserve (87km²) and Rasau-Kertih Forest Reserve (168km²) in Terengganu and Jemaluang-Tengaroh Forest Reserves (168km²) in Johor with little or no protection on the ground (DWNP, unpublished data). Whilst these populations may not be viable in the long run, they illustrate Peninsular Malaysia as a unique case where tigers are still found outside the major forest blocks or PAs. The tiger distribution is synonymous to the forest coverage (Fig. 3) and the proportion of tiger habitats vs. non-tiger habitats is similar to the proportion of forests vs. non-forests (Fig. 4).

Large contiguous forests, and therefore the largest contiguous tiger distribution in Peninsular Malaysia, are mainly found in the north of the Pahang River, in the Main Range to the west connected to the Greater Taman Negara Landscape to the east. At 49,181km², this area corresponds with the 5th largest landscape of the 76 Tiger Conservation Landscapes identified in Asia and assumes a significant conservation value to the global tiger conservation effort (Dinerstein *et al.*, 2006). More than 50% of the tiger habitat fall within forests with good conservation value and the majority

of the remaining forests are managed by FDPM as PRFs or DWNP and other state agencies as PAs (*Sec. 1.3*). Encroachment and land-use changes threaten PRFs, but a majority of tiger habitat appears to be secured from large-scale forest conversion. Forest fragmentation such as that caused by road construction is of a greater concern (*Sec. 1.5.1*).

1.4.6 Conservation partnership, MYCAT

“The future of the tiger lies in reaching out and forging and sustaining key partnerships.” - John Seidensticker, Sarah Christie and Peter Jackson, *Riding the Tiger*, 1999.

Those working to save wild tigers have come to recognise there is no “silver bullet”; saving wild tigers requires supportive tiger range governments in partnerships with NGOs and individuals, engaged in continued actions at multiple scales to contain and reduce threats over the long term (Seidensticker, 1997; Gratwicke *et al.*, 2007). Besides addressing the multitudes of threats directly, what is also needed in this century is a major shift in human values, interests, and behaviour that will allow tigers and their prey to share their landscape with humans. Such changes in the fundamental values and perceptions of quality of life involve a long and complex process of conscious actions by many and varied stakeholders all driven by a shared vision and a willingness to work together.

Stakeholder engagement that starts with dialogues with immediate partners is vital in finding solutions to the challenging dilemmas in the human dimension of wild tiger conservation. Frequent and open dialogues strengthen and broaden partnerships; it is the best

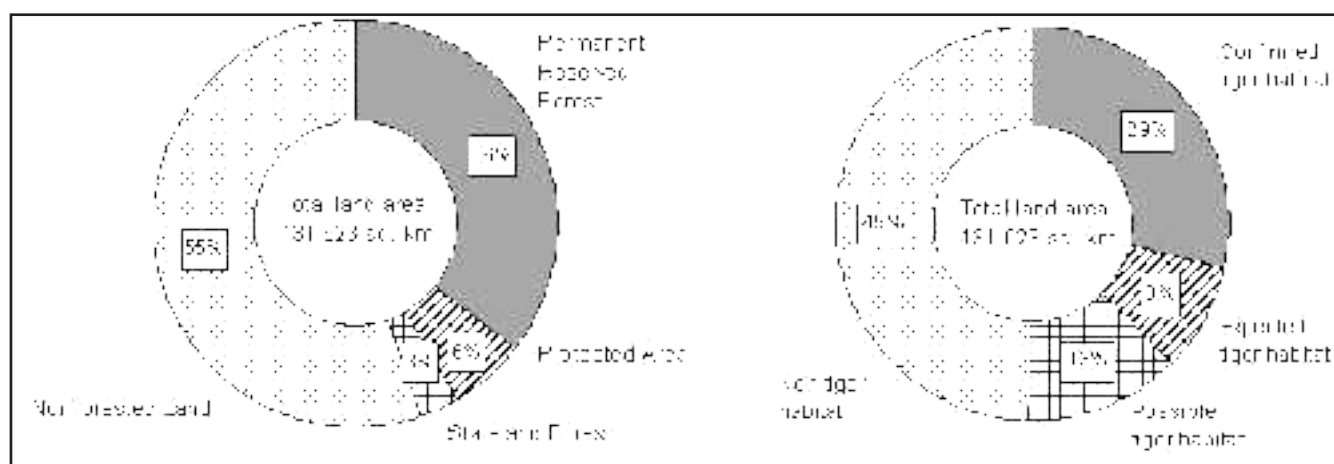


Fig. 4 : Comparison of the forest coverage (FDPM, 2006) and the three categories of tiger habitat (Kawanishi *et al.*, 2003) in Peninsular Malaysia. Detailed descriptions of the three habitat categories are in *Sec. 1.3*.

strategy to address the complex problems and create the solutions needed to sustain wild tiger populations.

Recognising the complexity of the challenges to conservation and importance of the partnership, international organisations are increasingly teaming up to share resources and expertise for wildlife conservation. Such alliances among groups that share similar goals can result in mutually beneficial programs. Partnerships increase efficiency by reducing duplication in effort and provide more innovative solutions to problems by bringing people together with a variety of experiences and perspectives. They strengthen public influence by pooling support, and further reduce inter-organisational conflicts through open communication and long-term collaboration, based on understanding. In its National Policy on Biological Diversity 1998, the Malaysian government recognises the importance of partnerships in biodiversity conservation.

As the lead government agency for wildlife conservation in Malaysia, DWNP promotes the integration of and collaboration with conservation partners in reaching the goal of conservation excellence.

For an integrated approach to conservation, close coordination amongst researchers, members of the public and the policy makers, is crucial. With the overarching spirit of partnership, DWNP initiated the Malaysian Conservation Alliance for Tigers (MYCAT) in 2003 (Siti Hawa and Kawanishi, 2003). It is chaired by the Director General of DWNP and the MYCAT Secretariat's Office (MYCATSO) is led by the DWNP Division Director of Biodiversity Conservation.

MYCAT is an alliance of conservation organisations with a unified goal of saving the Malayan tiger in the wild. MYCAT's primary objective is to provide a formal yet flexible platform for information exchange, collaboration, and resource consolidation among the conservation partners. It is the first Malaysian partnership to be focused exclusively on the conservation of tigers, their habitat and prey species. Internationally, it is the first formal coalition of tiger conservation organisations initiated and led by a national government. The current partners of MYCAT are: DWNP, MNS, TSEA, WCS and WWF-Malaysia.

The alliance's primary function emphasises the importance of communication among the partners. Enhanced knowledge of the focused areas and strength of the others help each partner ascertain ways to compensate weaknesses and share benefits while

avoiding duplicities towards the common goal. As a result of increased communication, MYCAT has experienced the benefit of consolidating resources such as funds, manpower, information, and expertise, across institutional boundaries, leading to the development of this National Action Plan.

To better facilitate close and regular communication, the MYCAT Working Group was established in March 2005. The members are representatives from the partner organisations. The Working Group meets quarterly to update and learn from each other the status of their respective tiger work, and discuss relevant issues or joint projects. Besides the quarterly meetings, subsets of the Working Group, consisting of personnel directly involved in joint projects, meet more often. Some of the members are trained biologists and thus are able to provide technical advice to partner organisation's research projects or 19 provide timely, ecologically sound information to policy makers on conservation issues ranging from an Environmental Impact Assessment on a development project in a critical wildlife corridor area to management of tigers in Human-Tiger Conflict situations.

The MYCAT SO receives institutional support from DWNP and financial support from external donors. Strategically located in the DWNP Headquarters, MYCAT SO serves as a hub of communication among the partners through Working Group meetings and other conventional communication means, as well as with the members of the general public through a media network, publications and the MYCAT e-group (http://groups.yahoo.com/group/malaysian_cat/). A case study of MYCAT's web-based communication is presented in Sec 1.6.2.4. Since 2003, more than 1,700 e-news and discussion items have been registered in the MYCAT e-group. The partners provide space in respective publications such as MNS' *Pencinta Alam* and the *Malaysian Naturalist* to raise public awareness and promote tiger conservation. In addition, the partners have jointly raised funds from international donors and the local corporate sector to support basic operational costs and joint projects. Besides the joint fundraising and in-kind support, the partners have directly contributed funds to MYCAT joint projects, such as WWF-Malaysia's contribution to the costs of drafting of this Plan or all partners' contribution to printing of the annual newsletter, MYCAT TRACKS, in 2005.

In addition to providing a platform for communication, since 2005, MYCAT has expanded the scope of its

partnerships by collaborating on joint projects coordinated by the MYCAT SO and led by an individual partner. Some of the notable examples are the DWNP Malayan Tiger Conservation Workshop, DWNP Taman Negara community outreach, WCS Teachers for Tigers (T4T) Zoo Educators Training Course, and TSEA Media Workshop Media Tigers. In 2007, MYCAT SO led a series of targeted campaigns against the local trade and consumption of tigers and their prey with newly identified partners at local levels such as the Johor National Parks Corporation and a local communications agency, 9-Lives Communications Sdn Bhd. The MYCAT network enables campaigns like this to be mobilised using a unique approach; the community outreach programmes in tiger trade hotspots are closely coordinated with DWNP's law enforcement arm.

In effect, MYCAT fulfils eight strategies in the National Policy on Biological Diversity as follows:

- i. Strengthen and integrate conservation programmes (Strategy V)
- ii. Improve the scientific knowledge base (Strategy I)
- iii. Exchange of information at the local and international levels (Strategy XIV)
- iv. Enhance institutional and public awareness (Strategy XII)
- v. Promote international cooperation (Strategy XIII)
- vi. Determine funding mechanisms (Strategy XV)
- vii. Encourage private sector participation (Strategy VIII)
- viii. Enhance skill, capabilities and competence (Strategy VIII)

Through the collaborative platform, the conservation partners try to balance competing interests and institutional differences for the effective implementation of the Action Plan. MYCAT is still a relatively new initiative, yet, the benefit of the alliance is clearly felt by all the partners. One of the challenges faced by MYCAT is quantifying the positive impact of from the partnership on wild tigers in Malaysia. In the immediate future, the success of MYCAT will be reflected in the implementation and monitoring of the progress of this Plan (Sec 2.7).

1.5 Key Threats

Most declining tiger populations are threatened, primarily, by habitat loss and fragmentation, commercial poaching, Human-Tiger Conflict, declining prey base, and science deficiency in monitoring of tiger and tigers' prey (Nowell and

Jackson, 1996; Seidensticker, 1997; Karanth et al., 2002; Sunquist and Sunquist, 2002; Myanmar Forest Department and Wildlife Conservation Society, 2003; Bhutan Department of Forests, 2005).

In Malaya, during colonial times, tigers were hunted for sport, and bounties were paid for tigers killed as a measure of pest control (Locke, 1954; Blanchard, 1977), which undoubtedly contributed to the earlier decline of tiger populations. After Malaya's independence from Britain in 1957, tigers continued to be actively hunted to make way for agriculture and development. In 1976, the species was finally listed as a totally protected species under the Protection of Wild Life Act 1972. Today, tigers can only legally be killed in Malaysia under exceptional circumstances where they threaten lives or property, and by law, any such 20 incidents must be reported to DWNP.

While a loss of genetic diversity is potentially a problem for tigers, large carnivores, especially felids, are known to maintain naturally low genetic heterozygosity. Even in a small population, say less than 50 individuals, a low level of genetic exchange of one male per generation appears sufficient to maintain genetic health (Sunquist and Sunquist, 2001). As we are most concerned about the next 100 years, the loss of genetic diversity or consequence of inbreeding is considered insignificant in comparison to other threats described in more detail below.

1.5.1 Habitat loss and forest fragmentation

The endangered status of the tiger in the larger part of the last century is a direct consequence of habitat loss and active persecution of tigers. The frequently quoted estimate of a reduction in tiger numbers from 100,000 to 5,000 during the 1900s directly reflects the severity of the habitat loss (Sec 1.3). Today, tigers number less than 3,000 as the cumulative impacts of all threats mentioned above in the recent past have taken a devastating toll, especially on India's populations that used to constitute more than half of the total number of wild tigers.

Although Malaysia still retains 45% of the land area as forest cover (FDPM, 2006) and there are other habitat types that support tigers (Kawanishi et al., 2003), the loss of majority of lowland forests in the last century certainly caused a great decline in the numbers of many large mammals, including tigers. Displaced animals have a higher tendency to be involved in conflict situations with humans, and are either physically removed by the authorities or killed by locals (Zainal Zahari et al., 2001). The Javan rhinoceros

Rhinoceros sondaicus is extinct; the Banteng *Bos javanicus* with a few alleged sightings may be ecologically extinct in Peninsular Malaysia (Aiken and Leigh, 1992), the Sumatran rhinoceros is critically endangered (IUCN, 2006) and the gaur exists in isolated populations of a few hundred in total (DWNP, unpublished data).

1.5.1.1 Rates of habitat loss in Malaysia

At the turn of the 19th century, primary rainforest covered over 90% of Peninsular Malaysia (Collins et al., 1991). By 1957, the estimated forested cover had declined to 74% (Myers, 1980). However, since then, vast areas of lowland forest (<300m asl) have been converted to agricultural use by the Federal Land Development Authority (FELDA) and other state agencies. Forest cover declined further during the 1970s (61%) and 1980s (47%) with an annual loss of around 7,000 km² (Lanly, 1982).

By the mid-1980s, there were little remaining lowland dipterocarp forests outside of protected areas available for large-scale conversion and the overall proportion of the forest cover has remained steady during the past two decades under the National Forestry Act 1984. Most of the remaining forests are found in mountainous regions (which, naturally, support a lower density of large ungulates), namely the Main Range in the west, the Tahan Range in the centre, and the Eastern Range in the east and the majority of these are logged-over forests. By 1985, only 9.8% or 13,000 km² of the land area was intact primary forest (Collins et al., 1991). In Peninsular Malaysia where the deforestation rate has stabilised and its main economy has moved from the forestry sector to industry to service, it is not necessarily the loss of habitat per se but cumulative impacts of forest fragmentation due to construction of roads, pipelines and railways that may impose a greater lasting threat to the tiger.

1.5.1.2 Forest fragmentation

Life history traits of large mammals generally make them more vulnerable to the effects of forest fragmentation and smaller populations are more susceptible to extinction due to stochastic events (Soule et al., 1979; Eisenberg and Harris, 1989). Seidensticker (1986, 1987) attributed the extinction of Balinese and Javan tigers mainly to extensive habitat fragmentation and the isolation of small forest blocks (less than 500 km²) as well as the loss of critical ungulate prey.

To support a minimal viable population of six breeding females suggested by (Karanth and Stith, 1999), under strict protection with no poaching of tigers and tigers' prey, a reserve must be at least 1,000 km² in tropical rainforest. This argument uses 1.6 adult tigers/100 km² as the typical tiger density in tropical rainforest (Griffiths, 1994; O'Brien et al., 2003; Kawanishi and Sunquist, 2004). Of 42 Protected Areas in Peninsular Malaysia, only Taman Negara and Belum are greater than 1000 km². It is clear, then, that the long-term survival of the Malayan tiger largely depends on improving protection mechanisms within the country's Forest Reserves (PRFs).

Currently, PRFs are criss-crossed by logging roads. Tigers that often come into contact with humans or livestock at the edge of PAs and on roads outside of PAs tend to be subject to relatively high mortality rates. Generally, the construction of linear features, such as roads or above-ground pipelines, result in habitat fragmentation and, thus, increases the potential for extinction in small populations by habitat removal and division (Schonewald-Cox and Buechner, 1992); the creation of barriers that inhibit the daily, seasonal and dispersing movements of animals (e.g. Fehlbeg, 1994); area avoidance (e.g. Mace et al. 1996; Lovallo and Anderson, 1996) and the provision of corridors for the immigration of non-resident species (e.g. Seabrook and Dettmann, 1996). More direct effects include disturbance of breeding activity (e.g. Reijnen et al. 1997) and, ultimately, an increase in levels of mortality (e.g., Bruindernik and Hazebrook, 1996; Putman, 1997; Philcox et al., 1999; Woodroffe and Ginsberg, 1999).

The numerical impact of forest fragmentation to large mammal populations is virtually unknown in Malaysia. The analysis based on the data collected by DWNP between 1991 and 2003 shows that the construction of the North-South Highway that was completed in 1994 effectively eliminated tiger habitats west of the road. Spanning 966 km in distance, it runs from Bukit Kayu Hitam in Kedah near the Malaysian-Thai border to Johor Bahru in southern Malaysia and is the longest highway in Malaysia. Tigers are reported every year in the east coast Malaysia where an improved transportation network is proposed with a highspeed rail connecting Kota Bharu at the Malaysian-Thai border and Johor Bahru, a multi-lane express way between Kuala Terengganu and Kuantan similar to the North-South Highway, and an upgrade of the existing coastal road (DTCP, 2005).

Forest corridors are imperative for the dispersal of sub-adult tigers, especially males. Without these corridors, the young dispersal-aged males are either killed by resident males or forced into inhospitable habitats and killed by humans as seen in the on-going case of the Florida panther (Smith, 1993; Maehr, 1997).

Maximising the size of contiguous, unfragmented protected areas and minimising the potential for conflict between tigers and humans is the single most important strategy for tiger conservation (Woodroffe and Ginsberg, 1998). In Malaysia where most PAs are too small to support viable tiger populations, the vast PRFs need to be considered as “unfragmented protected areas” of the future. The strengthening of enforcement and patrol efforts on main access roads near PAs in the Russian Far East has contributed to increased and stabilised populations of the Amur tiger despite fairly extensive poaching pressure on tigers (Kerley *et al.*, 2002; Miquelle *et al.*, 2005; Seidensticker, Save the Tiger Fund, pers. comm.). Collaboration with FDPM and other forestry sectors is critical to enhance the tiger’s survival in Malaysia’s vast PRFs.

1.5.2 Poaching and wildlife trade

While habitat protection is essential for the long-term survival of the tiger, illegal trade is a more urgent threat, having the greatest potential to do maximum harm in a short time (Nowell and Jackson, 1996). Tiger populations have been decimated in many parts of their former range due to illegal hunting for their skins, bones and other body parts (Banks and Newman, 2004; Shepherd and Magnus, 2004; EIA-WPSI, 2006; Nowell and Xu, 2007).



Tiger parts © DWNP

Table 2 : Tiger-related offences apprehended and fined either by court or DWNP from 1990 to 2006.

Type of Offence	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	Total
Stuffed tiger	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Skin	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	6
Bone and skull	1	1	2	0	0	1	0	0	0	0	0	1	0	2	0	0	0	8
Claw	3	1	3	0	0	0	1	0	1	0	0	0	0	2	0	0	0	11
Tooth	1	0	3	0	0	0	1	0	0	0	0	0	0	2	0	0	0	7
Penis	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	4
Meat	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Illegally importe	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Tiger killed	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1*	0	4
Misc. case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1*	0	1
TOTAL	8	2	11	3	1	2	2	1	1	0	0	3	1	7	2	3	0	47

* A tiger was found butchered and stored in a fridge.

** A tiger cub was 'rescued' or bought from a restaurant and handed over to DWNP.

Data source: Elagupillay *et al.*, 2001; Anon., 2002; Chandrasekaran, 2003; DWNP, 2004; Anon., 2004a; Anon., 2004b; Abdullah, 2005; Chia, 2005; Chiew and Teoh, 2005; DWNP, unpublished data.

Throughout Southeast Asia, one of the main threats comes from the trade in tiger parts for use in traditional medicines. Many different cultures use tiger parts for their purported medicinal qualities (Chalifour, 1996), including the bones, blood, sexual organs and other parts. Bones are the most valuable part of the tiger, more so than the skin (Sunquist and Sunquist, 2002). In a number of countries, skins, skulls, claws and canine teeth are traded as trophies and talismans, and meat consumed in restaurants serving exotic dishes.

The frequency of apprehension of tiger poachers or finding poached tigers has been on average less than 22 one case per year, excluding the cases pertaining to the illegal possession of tiger body parts for which the origin is unknown (Table 2). The actual number is suspected to be higher, but the detection of “redhanded” cases is difficult and more realistic figures are not available. Despite the lack of actual figures of tigers poached, it is obvious that tiger poaching continues and is likely to be having an adverse impact on Malaysia’s tiger populations.

Tigers are also killed in retaliation to livestock depredation (see Sec. 1.5.3.1). It is suspected that some of these “conflict” tigers also enter the illegal trade, as was found to be the case in Sumatra (Shepherd and Magnus, 2004), but the relationship between these mortalities and the trade are unclear here. Potential impact of poaching of tigers’ prey is discussed in Sec. 1.5.4.

1.5.3 Human-Tiger Conflict

DWNP defines Human-Tiger Conflict (HTC) as “attacks by tigers on humans or livestock, or the perceived fear of attacks”. The nature of the tiger and Man means that wherever the homes of either meet or overlap there will be conflict. Unfortunately, this overlap happens far too often as both species seek the benefits associated with lowlands with relatively fertile soils and the mechanisms for dealing with the consequences are lacking on the whole. As a direct result of this, tigers are pushed up into higher and less productive grounds and now, as discussed earlier, inhabit only a fraction of their original habitat.

Further exacerbating the problem is people competing with the tiger for large ungulates as a source of protein. This has effectively reduced the carrying capacity of remaining forests for tigers whilst encroachment into the forest has, through the concept of the “edge effect”, increased the likelihood that tigers, an ecotone species and naturally drawn to such

areas, will encounter humans and their livestock. Such encounters invariably result in the death of livestock, or in rare but extreme cases, humans. Both will lead to the removal of the tiger. Inappropriate management of some human interests, such as commercial plantations and livestock, augment this clash and, in some areas of the world, HTC has become a significant source of tiger mortality.

Ultimately, the impact of HTC on tiger conservation is compounded immeasurably as people who fear for their safety or perceive economic risks from tigers will not generally support conservation agendas. It is also suspected that poachers operate in high HTC areas in Sumatra, turning problem tigers into cash (Shepherd and Magnus, 2004).

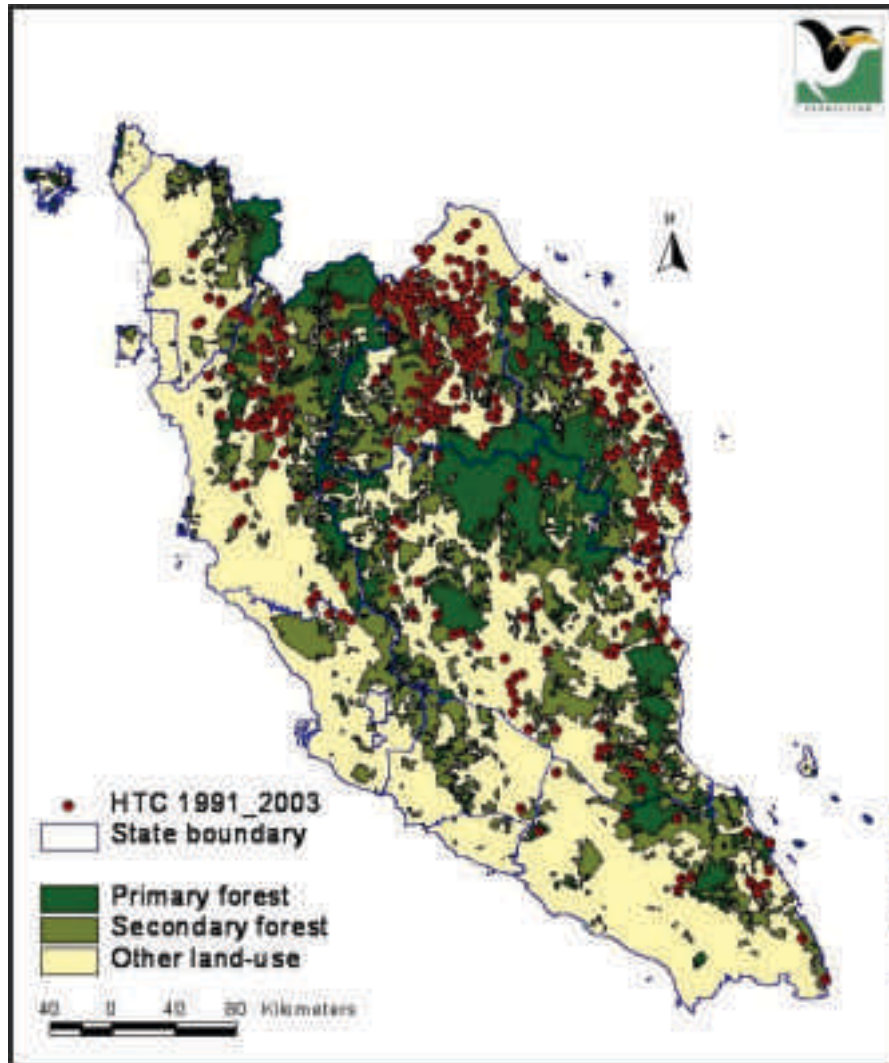
In Malaysia, when HTC events are reported, a response team is dispatched as soon as possible and such a rapid response is a routine task for the DWNP. Cases of HTC in Malaysia, consistently over the years, constitute only around 4% of general human-wildlife conflict events, whilst frequencies of those involving, for example, long-tailed macaques *Macaca fascicularis*, elephants and viverrids are 54%, 17%, and 6%, respectively (DWNP, 2004).

All states with tiger populations are affected by HTC (Fig. 5) and between 1991 and 2006, 2,398 HTC complaints, including tigers attacking humans, livestock, or merely tigers sighted by villagers, were filed at an average of 160 cases annually. The number of cases reported is in decline (from 355 cases in 1999 to 123 cases in 2006) but the reasons behind this are unknown as data is incomplete (DWNP, unpublished data).

1.5.3.1 Livestock depredation

Incidence of livestock depredation by tigers increased substantially in the 1970s due to a combination of two factors; the conversion of forest for other land use and the introduction of large scale livestock farming either on commercial basis or subsistence farming. This led to the killing of tigers by farmers and farm managers in defence of their livestock. As a result the DWNP had to undertake management interventions to resolve the conflict and protect the tiger population. One of the interventions was the creation of Tiger Management Units at the state level and a Tiger Research Unit headed by Richard Blanchard from the American Peace Corps (Elagupillay, 1983). To resolve the increasing livestock depredation by tigers, Tiger Management Units were deployed to devise methods to trap such tigers rather than kill them.

Fig. 5: Location of Human-Tiger Conflict cases reported to DWNP between 1991 and 2003.



Source: DWNP, unpublished data

About 23% of 204 HTC complaints filed in 2005 and 2006 constituted livestock depredation cases. The minimum economic losses estimated for 72 cattle and 12 goats were RM124,750 (DWNP, unpublished data). The seriousness of livestock depredation is probably much greater, however, as a gross disparity between the number of cases reported to DWNP and that to the Department of Veterinary Services (DVS) indicates that only a small fraction of cases is reported to DWNP. There is no compensation for loss, but because many breeding cows are on loan to the farmers by DVS, the loss has to be reported to DVS before applying for another loan (Noraini Kanis, Division of Livestock Commodity Development, Department of Veterinary Service, pers. comm.). It is also important to note that the figure represents only those cases that are reported to DWNP

headquarters, where annual statistics are calculated; there are an additional number of reports that only get as far as the state-level agencies and maybe many more that go completely unreported. For example, according to records kept by the Terengganu DVS, the average number of cattle reported killed by tigers in that state, between 1999 and 2003, was 309 per year. At an estimated value of RM1,200 per head of cattle, this represents a loss of almost RM2 million over the five year period, or RM380,000 annually (Sharma et al., 2005; WWF-Malaysia, unpublished data). A site-specific and detailed study of livestock depredation patterns in Jerangau Barat, Terengganu shows that, within only a six month period, 53 heads of cattle were killed by tigers with one particularly busy night that saw as many as 30 heads of cattle killed (Sharma et al., 2005).

Upon receiving a report, the relevant DWNP state office dispatches a response team to investigate the site and decide on further action following the stipulated guidelines (DWNP, 2006). Subsequent actions depend on the seriousness and urgency of the situation and include: monitoring, patrolling, drive-off shooting, trapping for placement in zoo, and shooting to kill.

Public safety is DWNP's priority and the team will advise farmers on safety measures and on ways to improve plantation and livestock management. DWNP also collaborates with police and Angkatan Relawan Malaysia (RELA), Malaysia's voluntary enforcement force, to enhance public safety. Frequent dialogues with those affected by HTC are important, if only to motivate communities to protect themselves effectively and DWNP does this on an informal basis. Villagers often assist the team with their investigations and may also be called upon to assist with subsequent actions. A community outreach programme, to enhance the working relationship between remote communities and DWNP, has just started near some of the priority wildlife conservation areas, such as Taman Negara (Kawanishi, 2005; Kawanishi and Soosayraj, 2005).

1.5.3.2 WWF-Malaysia experience in Jerangau: success and lesson learnt

WWF-Malaysia's pilot mitigation project in Jerangau, Terengganu (Sharma et al., 2005) showed that cattle depredation can be minimised if certain Best Management Practices (BMP) are applied to existing livestock husbandry systems. In the study, WWF-Malaysia assisted selected communities to build paddocks to house otherwise free-roaming cattle at night. Loss of cattle to tigers was, accordingly, prevented (for those who took part in the study) but a problem of continuity was identified, whereby, upon perceiving the threat to have been lifted, cattle owners would revert to allowing their animals to roam free at night. A longer-term solution, then, requires the programme participants to continue using these mitigation measures once support from organisations, such as WWF-Malaysia, have left. As Jerangau is one of many areas affected by livestock depredation by tigers, financial sustainability for replicating WWF-Malaysia's success is the biggest challenge. WWF-Malaysia is currently undertaking studies to identify economic approaches to HTC.

1.5.3.3 Attack on humans

Between 1979 and 2006, 31 attacks on humans were

recorded by DWNP (an annual average of just over one person), half of which were fatal (Badrul Azhar, 2003; DWNP, unpublished data). The figures also reveal that rubber tappers are a relatively high risk group, being involved in 39% of the attacks. In contrast to reports of livestock loss, almost all cases involving humans are reported to DWNP with possible exceptions being those involving aborigines (orang asli) living in the forests. An inter-state comparison shows that 15 cases, or nearly 50% of attacks on humans, occurred in Kelantan, followed by seven cases in Pahang and three each in Perak, Terengganu and Johor.

Though the tragedy of people being killed cannot be ignored, we must put these incidents into the context of conservation priority. Overall, only about 2% of all tiger-related complaints detail attacks on humans, and this constitutes less than 0.1% of the combined total of all human-wildlife conflict events reported to DWNP (DWNP, unpublished data). Despite this relatively small number, these cases usually feature prominently in the local and vernacular media. Though interest in these cases is understandable, the sensationalising of the issue compounds the overall negative impact that HTC has on tigers. People learn to fear and, therefore, hate the animal.

1.5.3.4 Removal of tigers due to HTC

Tigers are removed from high conflict areas by either trapping for relocation to Zoo Melaka, DWNP's wildlife rescue centre, or in cases of where humans have been attacked, are shot as the last resort if



Tiger of Gua Musang @ DWNP

trapping fails. Before 1981, all problem tigers were shot by DWNP for “agricultural protection”; between 1960 and 1967, 132 tigers were removed in this manner (Stevens, 1968). This practice, however changed, and DWNP began capturing problem tigers for relocation to zoos in 1981 (Ismail, 1981).

Since 1991, 13 tigers have been killed by the authorities whilst over the past decade 25 tigers have been captured and placed in Zoo Melaka (22) and Zoo Taiping (3) at an annual average of less than four tigers officially removed (DWNP, unpublished data). The restrictions laid down by the PWA mean that these actions must be carried out by DWNP staff, occasionally assisted by the police or RELA. However, there is a clause in the law (Section 56) that allows any person to kill a tiger that poses an immediate danger to human life. Another clause (Section 55) allows landowner, occupier or his servant to kill tiger which is killing (or about to kill) livestock. In both cases, the person who has killed the tiger has a legal obligation to report the incident to DWNP and the remains of the tiger are the property of the state.

The annual average of 3-4 tigers removed does not, of course, incorporate the retaliatory killing of tigers by villagers and the difficulties associated with obtaining this kind of data means that its impact remains unknown. However, of 112 Felda Jarangau Barat settlers interviewed, around 22 (20%) admitted to having the intention to kill tigers if they continued to attack livestock. Though most settlers could not recall an actual figure when asked how many tigers had been killed in the area, one claimed that he knew of about 10 tigers killed in retaliation (Sharma et al., 2005).

The overall decline in the number of HTC events reported to DWNP is not, necessarily, a cause for complacency as it could reflect any number of underlying causes, including a commensurate decline in tigers. The estimated tiger density in the forests surrounding Jeli, Kelantan is 2.59 tigers/100 km² (Darmaraj, 2007), the highest recorded density in Peninsular Malaysia. The removal of one animal a year would not seem to represent a significant threat to tiger populations, though further research is warranted. However, the frequent removal of resident tigers will have an impact on the stability of that population's land tenure system; one result could be an escalation in HTC.

1.5.3.5 Possible translocation of captured problem tigers

Tigers captured in HTC cases by DWNP are sent to zoos and are currently not considered for release back

to the wild. The difficult but, in many respects, preferred option of euthanasia is avoided due to the risk of public outcry. Although it has tremendous appeal, the translocation or reintroduction of large carnivores, especially of those labelled as problem animals, is extremely difficult both socially and biologically (Breitenmoser et al., 2001). Because tigers are wide-ranging and territorial predators, there is considerable risk and cost (both in terms of funding and manpower) involved in the release and subsequent monitoring.

Furthermore, there are currently no tried and tested methods for reliably monitoring post-release tigers in tropical rainforests, though recent advances in telemetry equipment are making this more and more feasible. Ultimately, however, this approach may merely result in relocating the problem itself, introducing HTC into an area in which it had not been an issue before.

1.5.3.6 Relief Fund for Wildlife Attack Victims (Tabung Bantuan Mangsa Serangan Binatang Buas)

There is financial support available for tiger attack victims. The Relief Fund for Wildlife Attack Victims, setup by the Malaysian Cabinet, has been operational since 2005. The fund is managed by the Ministry of Women, Family and Community Development under the Department of Welfare, with an annual grant of RM1 million. Either DWNP or the police are required to verify the authenticity of each claim and only serious injuries, causing permanent disability or death, qualify for compensation. The applicant has to be a Malaysian citizen who was not hunting, legally or illegally, at the time of attack. Cases in which an attack was provoked by the victim are automatically disqualified.

1.5.4 Depletion of Tiger Prey

The most important ecological determinant of tiger density is the abundance of large (>20kg) prey in a given area (Sunquist, 1981; Seidensticker, 1986; Karanth and Sunquist, 1995; Karanth and Stith, 1999; Sunquist et al., 1999; Karanth et al., 2004). Karanth and Stith (1999) used a stochastic demographic model to show that prey depletion has a strong impact on tiger populations by reducing the carrying capacity for breeding females, decreasing cub survival and, ultimately, decreasing population size. Similarly, prey depletion, due to adverse human impact, has been identified as a primary cause of decreasing tiger densities in 11 ecologically diverse sites around India (Karanth et al., 2004).

A basic understanding of feeding ecology and prey population dynamics is needed. Little is currently known about the ecology of the Malayan tiger, let alone its feeding ecology or prey population dynamics (Sec. 1.1.2). Basic knowledge of general rainforest ecology provides some insight. For example, tropical rainforests, particularly those dominated by dipterocarps, tend to have low primary productivity at the ground level and, as a result, the diversity and abundance of browsers, such as deer, is naturally low (Eisenberg, 1980). The low density of ungulates coupled with the low visibility of the rainforest may affect the hunting strategy of tigers that use visual cue to locate a prey (Schaller, 1967). This leads to the assumption that rainforest tigers are opportunistic, rather than selective, hunters (Sec. 1.1.2). However, understanding of the basic large mammal energetics also tells us that tigers cannot live on only smaller mammals, such as mousedeer *Tragulid* spp. and pangolins *Manis javanica* (Sunquist et al., 1999). In rainforests where very large ungulates (>40kg) are scarce, medium-size and abundant mammals such as wild pigs are likely to be important prey species for tigers.

The population status of the three expected primary prey species – wild pigs, barking deer and sambar deer – are even less understood than that of tigers. They are all protected species under the PWA, but all can be legally hunted with an appropriate licence from DWNP. Assuming a positive relationship between the number of photographs taken and the abundance of the species, 6,000 wildlife photographs taken in 13 camera-trapping studies carried out throughout Peninsular Malaysia give us some insights into the relative abundance of tiger prey. The studies jointly expended nearly 35,000 trap nights between 1998 and 2005 (Laidlaw et al., 2000; DWNP/DANCED, 2002; Mohd Azlan and Sharma,



Sambar deer ©DWNP

2003; Kawanishi and Sunquist, 2004; Ahmad Zafir et al., 2006; Darmaraj, 2007; Lynam et al., 2007).

We recognise the problems associated with relative abundance indices based on count statistics (Thompson et al., 1998; Nichols and Karanth, 2002) and we do not assume a perfect detection probability of animals or equal and constant probabilities among different animals at different sites. Almost unequivocally at all sites, however, the most abundant ungulate species, excluding elephants, appear to be the wild pig, followed by barking deer and tapir. Photographs of sambar deer, serow and gaur were all rare with the majority of them taken in the protected area, Taman Negara (Table 3). Next to the Sumatran rhinoceros, of which no photographs were taken, the gaur appears critically rare. These data combined with DWNP inventory and licence data can be used to gain a deeper insight into the critical status of some of the tigers' prey species needing urgent conservation actions.

Table 3: Preliminary analysis of the relative abundance of tigers' primary prey species based on 13 camera-trapping studies conducted in Peninsular Malaysia between 1998 and 2005.

Species	Total no. photos	No. sites recorded (Max no = 13)	Proportion of photos taken in Taman Negara (%)
Wild pig	2295	13	22
Barking deer	1391	13	42
Tapir	1156	12	46
Sambar deer	426	3	75
Serow	56	5	93
Gaur	10	2	90

Data source: Laidlaw et al., 2000; DWNP/DANCED, 2002; Mohd Azlan and Sharma, 2003; Kawanishi and Sunquist, 2004; Ahmad Zafir et al. 2006; Darmaraj, 2007; Lynam et al., 2007.

Relative abundance does not, however, give us any clues as to how much food, in terms of biomass, is available for tigers. In one of the 13 studies, in Taman Negara, the prey biomass was roughly estimated to be between 270 to 430 kg/km² and consists mainly of wild pigs and barking deer. This is comparable to other estimates suggested from Indonesian rainforests, all of which were below 500 kg/km² (Seidensticker, 1986). These biomass estimates are an order of magnitude less than biomass estimates from semi-tropical or seasonal forests in India that support ten times as many tigers in a unit area (Karanth *et al.*, 2004). Tigers naturally occur at low densities, but they are even rarer in tropical rainforests due to the naturally low prey biomass. A decline in prey density is likely to change the Malayan tiger status in specific areas from rare to extinction. It is even more important in Malaysia's forests that the prey species are protected.

The perception of the omnipresent and hyper-abundant wild pigs is dangerous if not tested. A benefit to the Malayan tiger is that consumption and selling of pigs is a prohibited for the Muslims who constitute the majority of the Malaysian population. High tolerance for human disturbance, preference for agricultural fields, high fecundity, and their adaptability to a wide environmental variables, coupled with the cultural avoidance by people and legal protection, all result in a general perception of the wild pig as being hyperabundant and, thus a concern of possible food deficiency for tigers is unnecessary. Incidental data from research projects, DWNP inventory data and interviews with local communities in the main tiger states all seem to support this. A worrying effect of this is a false sense of security that tigers' prey is indeed abundant. The densities of wild pigs except for a few sites (Ickes, 2001; Kawanishi and Sunquist, 2004), the trends in their populations in response to hunting pressure or environmental variables and the relative importance of wild pigs in the tiger's diet remains unknown. The hunting licence for wild pigs does not have a quota but there is an additional albeit indirect restriction; first, one must obtain a firearm licence from the police to own a firearm, usually granted for sport (shooting range activities), crop protection, defence etc. If one wants to use the firearm for hunting purposes, then it is necessary to obtain approval of the hunting clause from the police, which would allow the firearm to be taken out of one's premises/district where the licence was issued. Once approval is issued, one can apply for a hunting licence from DWNP.

Managers and researchers urgently need to undertake studies on wild pigs and other tiger prey species. Just as foresters have sustainable methods for

extracting timber from forests, wildlife managers must have sustainable methods to harvest game species. An important tool for this is population monitoring, which is difficult and costly in tropical forests. As a result, no one knows when the populations of the sambar, wild pigs or any other game species, reach their critical thresholds for recovery from either legal harvesting or poaching. Often, such species become ecologically extinct before we even notice a decline. At that point, any emergency actions are almost always too late. of tiger ecology from the realm of expert opinion to a more science-based approach (Seidensticker, 2002). Sampling-based research of large mammals in Peninsular Malaysia is still in its infancy. Without a doubt, there are many aspects of tiger ecology that are still unknown. For example, there is a lack of vital information on the tiger's feeding ecology; i.e. what they eat and in what proportion. How do tigers respond 29 to prey availability? No one knows the land tenure system and social organisations of tropical tigers. Technical difficulties hampered past attempts in Peninsular Malaysia to duplicate the efforts of successful predecessors in Nepal, Indian and Russia for radio-tracking tigers. Many questions important to tiger conservation remain unanswered, such as how many young a tigress produces in a lifetime, what affects the cubs' survivorships, how many years wild tigers live, how tigers communicate with one another, how tigers respond to different habitat matrices, how tigers respond to logging or any other human activity, how far a tiger can disperse in different land-use types, why tigers in certain areas are prone to attack humans, what values tigers have to humans, and how to make sustainable forestry management tiger-friendly. With new advancement in sophisticated technologies, a number of other innovative approaches to research methodology are underway and applications of these will allow us to delve deeper into the secret world of tropical tigers.

In the textbook used by tiger researchers and managers, *Monitoring of Tigers and Their Prey* (Karanth and Nichols, 2002), the authors talk about three goals of scientific monitoring of tiger and prey populations: 1) evaluate the success and failure of management interventions, so as to react adaptively and solve problems; 2) establish benchmark data that can serve as a basis for future management; and 3) develop a body of empirical and theoretical knowledge that can potentially improve our predictive capacity to deal with new situations. Goal 2 is basic research for biologists and managers and Goal 3 is applied research for academicians. Goal 1 is clearly the primary interest of wildlife managers and conservation agencies, but is currently not practised in Malaysia. Without monitoring of conservation

actions, resources can easily be spent on a wrong area or in an incorrect manner. Fifty years of global experience of tiger conservation suggests that surrogate measures such as money raised, number of schools reached and income generated for rural community are poor yardsticks for monitoring (Karanth, 2001). Two vital and direct measures of our success are distribution at the landscape level and population trend at priority areas (Sec. 2.5).

1.6.2 Insufficient public awareness and support
Tigers often invoke an emotional response from the public, either in support of these animals or in anger because of Human-Tiger conflict situations especially where death of humans have occurred. It is always much easier to work with groups that are supportive as the negative groups are not easily identified or open to discussions on education programmes to help save tigers, e.g. illegal traders, poachers and farmers. Researchers often have to go 'undercover' to find out more about these negative-impact groups and there is often a dearth of accurate information (Bulte and Damania, 2005; Goh and O'Riordan, 2007).

Malaysians are increasingly becoming more aware of the environment, given the repeated general awareness programmes on saving the planet from global warming, deforestation, toxic wastes, etc. through radio, television, newspapers and even within the school curriculum. Although surveys have been conducted to understand the awareness level, Rambo (2003) reported that only a few results have been published and are often anecdotal, or based on small, localised or biased sample sizes like those published in newspapers (e.g., Anon., 2007b). Furthermore, simply being aware of the issues does not translate to action (Wildlife Conservation Society and Sarawak Forest Department, 1996; Kingston, 2006). For instance, comparative studies done on different methods of communication between posters and hands-on activities have shown that whilst posters are useful in raising awareness, it does not lead to greater liking or empathy for conservation (Kingston, 2006; Gumal, unpublished data). There is thus a need to push the intended audience towards the conservation need (Ehrenfield, 2000; Nadkarni, 2004; Kingston *et al.*, 2006; Takacs *et al.*, 2006). Understanding how people learn (Leamson, 1999; Nuhfer and Pavelich, 2001) and the different methods of effectively communicating with the audience are thus extremely important, if resources and opportunities are not to be wasted. However, it is beyond the scope of this Plan to go into the details of knowledge surveys, learning cycles, generators, fractals, rubrics, neurons and growing brains (Leamson, 1999; Nuhfer and Pavelich, 2001). The Plan recommends educating the audience on 'what to think', i.e. conserving the tiger, its prey and

habitats, as opposed to a more general approach of educating on 'how to think'. It also advocates a multi directional approach, where there is a sharing of information and perspectives (Brewer, 2002), instead of a unidirectional where all the knowledge is passed on from the scientist or educator to the audience. Finally, given space limitations, this section of the Plan will also only focus on three items: the audiences; methods of communication in getting the message out, and case examples of how to get the message across. Closer examination of existing data will determine the current state of conservation and knowledge on tiger prey species as well as identify gaps that require urgent attention. The method for data collection must be improved and greater resources are needed to monitor ungulate populations both in terms of density and occupancy for better management of these species.

Following the rationale behind the precautionary principle, and until we know more, we must assume the worst and adopt a cautious approach to the management of a species like the sambar, where the best available information suggests rarity. Better protection from hunting and poaching will allow sambar populations to recover in the forest naturally.

1.6 Challenges and Indirect Threats

1.6.1 Insufficient understanding of the tiger's response to various human impacts

Understanding the negative impact of human activities and the positive impact of conservation actions is a vital component of wildlife conservation and adaptive management. The job of conservation biologists is to inform the public and policymakers of practical solutions based on careful research. In reality, actions such as arresting poachers or removing problem tigers cannot wait for research, and therefore, many actions have to be taken without any prior scientific basis. If, however, all conservation efforts are based on ad-hoc reactions, there is no chance to solve the problems from the root cause, reverse the negative trend and create a better future for the tiger. Science, then, provides a less subjective foundation for more proactive conservation. Ideally, conservation strategies should be based on sound knowledge from scientific research and adapted according to the efficacy of the prescribed actions (Sec. 2.7.1). Even in less ideal situations, the basic ecology of the target distribution and abundance, has considerably improved. At the national level, DWNP complied and analysed data collected by its staff between 1991 and 2003 to determine the tiger habitat and crude potential population size in the whole of Peninsular Malaysia (Kawanishi *et al.*, 2003; Sec. 1.3). In more

detailed ecological studies, coupled with population models, the modern technologies allowed researchers to estimate densities of tigers in Taman Negara (Kawanishi and Sunquist, 2004) and Gunung Basor Forest Reserve in Jeli, Kelantan (Darmaraj, 2007). Camera trapping also provided information on the activity period of the tiger and its prey (Laidlaw *et al.*, 2000; Kawanishi Sunquist, 2004; Ahmad Zafir *et al.*, 2006; Darmaraj, 2007; Lynam *et al.*, 2007), crude estimates of prey biomass (Kawanishi and Sunquist, 2004), relative abundance of tigers (Lynam *et al.*, 2007) and prey species (Darmaraj, 2007) and incontestable evidence of breeding populations (Mohd Azlan and Sharma, 2003; Darmaraj, 2007). With these, we have made the transition in our understanding of tiger ecology from the realm of expert opinion to a more science-based approach (Seidensticker, 2002).

Sampling-based research of large mammals in Peninsular Malaysia is still in its infancy. Without a doubt, there are many aspects of tiger ecology that are still unknown. For example, there is a lack of vital information on the tiger's feeding ecology; i.e. what they eat and in what proportion. How do tigers respond to prey availability? No one knows the land tenure system and social organisations of tropical tigers. Technical difficulties hampered past attempts in Peninsular Malaysia to duplicate the efforts of successful predecessors in Nepal, Indian and Russia for radio-tracking tigers. Many questions important to tiger conservation remain unanswered, such as how many young a tigress produces in a lifetime, what affects the cubs' survivorships, how many years wild tigers live, how tigers communicate with one another, how tigers respond to different habitat matrices, how tigers respond to logging or any other human activity, how far a tiger can disperse in different land-use types, why tigers in certain areas are prone to attack humans, what values tigers have to humans, and how to make sustainable forestry management tiger-friendly. With new advancement in sophisticated technologies, a number of other innovative approaches to research methodology are underway and applications of these will allow us to delve deeper into the secret world of tropical tigers.

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Tigers often invoke an emotional response from the public, either in support of these animals or in anger because of Human-Tiger conflict situations especially where death of humans have occurred. It is always much easier to work with groups that are supportive as the negative groups are not easily identified or open to discussions on education programmes to help save tigers, e.g. illegal traders, poachers and farmers. Researchers often have to go 'undercover' to find out more about these negative-impact groups and there is often a dearth of accurate information (Bulte and Damania, 2005; Goh and O'Riordan, 2007).

Malaysians are increasingly becoming more aware of the environment, given the repeated general awareness programmes on saving the planet from global warming, deforestation, toxic wastes, etc. through radio, television, newspapers and even within the school curriculum. Although surveys have been conducted to understand the awareness level, Rambo (2003) reported that only a few results have been published and are often anecdotal, or based on small, localised or biased sample sizes like those published in newspapers (e.g., Anon., 2007b). Furthermore, simply being aware of the issues does not translate to action (Wildlife Conservation Society and Sarawak Forest Department, 1996; Kingston, 2006). For instance, comparative studies done on different methods of communication between posters and hands-on activities have shown that whilst posters are useful in raising awareness, it does not lead to greater liking or empathy for conservation (Kingston, 2006; Gumal, unpublished data). There is thus a need to push the intended audience towards the conservation need (Ehrenfield, 2000; Nadkarni, 2004; Kingston *et al.*, 2006 Takacs *et al.*, 2006). Understanding how people learn (Leamson, 1999;

Nuhfer and Pavelich, 2001) and the different methods of effectively communicating with the audience are thus extremely important, if resources and opportunities are not to be wasted. However, it is beyond the scope of this Plan to go into the details of knowledge surveys, learning cycles, generators, fractals, rubrics, neurons and growing brains (Leamson, 1999; Nuhfer and Pavelich, 2001).

The Plan recommends educating the audience on 'what to think', i.e. conserving the tiger, its prey and habitats, as opposed to a more general approach of educating on 'how to think'. It also advocates a multi directional approach, where there is a sharing of information and perspectives (Brewer, 2002), instead of a unidirectional where all the knowledge is passed on from the scientist or educator to the audience. Finally, given space limitations, this section of the Plan will also only focus on three items: the audiences; methods of communication in getting the message out, and case examples of how to get the message across.

1.6.2.1 Conservation education philosophies and approaches

Underlying the push to garner public support are the basic goals to help individuals, communities and target audiences acquire

- Awareness: of the importance of tigers, their prey, and their habitats, and threats faced by these three elements;
- Knowledge: a basic understanding of the tigers, their habitats and their prey, its problems,
- and humanity's role in it; and
- Values: strong feelings of concern for the tigers, their habitats, and their prey, and motivation to participate in its protection.

At a much later stage, and with continued participation in either conservation education or training programmes, participants will then hopefully be able to acquire:

- Skills: the ability to investigate and offer possible solutions to these problems;
- Evaluation ability: the ability to evaluate conservation programmes on tigers, prey and their habitats; and
- Enthusiasm to participate: a sense of responsibility and urgency regarding the problems, stimulating appropriate action.

It is widely accepted that not all conservation education, training or even university education

programmes will lead participants up to the levels of increased evaluation ability, thus sometimes, dampening their enthusiasm to participate.

Even in the longer-term contact between lecturer and students at universities, these higher levels of thinking up to the ability to self analysis are rarely met (Nuhfer, Idaho State University, pers. comm.). There are therefore several important concepts that need to be known to the educator:

- i. Good teaching or instruction is learned.
- ii. Individual tutoring produces the most learning.
- iii. Conservation education programmes need Instructional Alignment. This refers to the degree to which intended outcomes, instructional processes, and instructional assessment match with efforts to produce the outcomes. Learning can be improved markedly by aligning the objectives with teaching and the evaluation. Instructional alignment is not pedagogy or an assemblage of "teaching tricks." It is an integrated approach to focused practice in a class or course.
- iv. A component that is often missed is "what is in it for me – the intended audience?"

The basic planning sequence in trying to solicit support for tigers either within general awareness, conservation education or training programmes would be:

1. Identify the audience (e.g., rural communities, community leaders, general public, school children, teachers); and become closely acquainted with them and their problems, or opportunities for increase in tiger conservation;
2. Identifying the message to be conveyed (e.g., general awareness, practical guidance, motivation);
3. Choose the educational strategy (e.g., exhibitions, demonstrations, shows, dramas, role playing, mass media, posters);
4. Evaluate the effectiveness of the strategy.

1.6.2.2 Tiger conservation education focal groups

Some of the target groups for tiger conservation are shown in Table 4. These target groups are listed as they affect tigers, their prey or their habitats. They are not ranked in order of priority, as different government departments and NGOs have their own set of priorities.

Early efforts to study tiger ecology in Peninsular Malaysia revolved around livestock depredation

studies (Hussain, 1973; Blanchard, 1977; Elagupillay, 1983; Khan, 1987) as the then Game Department assumed the major duty to keep the wildlife menace under control. Wildlife officials had a great understanding of the nature of depredation and hotspots. The traditional methods of data collection were observation of secondary signs and interviews with expert rangers and affected communities. The results were mostly expert opinion and perception-based.

Today, we aim for informed conservation interventions guided by reliable ecological knowledge. Insufficient knowledge on the status of tigers hindered past efforts to formulate an effective conservation strategy for tigers in Peninsular Malaysia and elsewhere. Furthermore, the lack of scientific rigor in the approaches to assess the status of wild tiger and prey is now clearly recognised as a serious gap in global conservation efforts (Karanth *et*

Table 4: Some target groups affecting tigers in Peninsular Malaysia, and examples of where conservation education programmes are often held. species and its response to major threats should be laid out before strategies are developed.

	Target groups	Examples of where the public awareness programmes are often carried out
1.	School and university students	Schools, universities, nature camps, field trips
2.	Teachers and lecturers	Schools, teacher training colleges, universities
3.	Rural communities living in and around areas having tigers	Village centre, community halls, field visits to protected areas, on-the-job training at parks and research projects
4.	Park staff	Universities, training centres, on-the-job training
5.	Reporters and journalists	Workshops for media, scientific and popular publications
6.	Faith groups	Mosques, churches, temples, training centres for the religious teachers, religious associations
7.	Politicians	Opening of research or conservation projects or workshops, discussions at cabinet, resource centre for parliamentarians
8.	Police, RELA and military personnel	Workshops, presentations, booklets at their training centres and headquarters
9.	Customs and airport personnel	Workshops, presentations, booklets at their training centres and headquarters
10.	General public	Mass media – newspapers, magazines, journals and sometimes attending field trips
11.	Logging company personnel	Meeting rooms at logging camps and in boardrooms of company managers
12.	Oil palm plantations	Meeting rooms at oil palm plantations and in boardrooms of company managers
13.	State-level Information Department and District Offices	Policies and booklets sent to District Offices
14.	Poachers and traders	Village centres, mass media and courtrooms

Table 5: Conservation education programmes by various organisations

Organisation	Target audiences	Communication methods	Notes
DWNP	School students, teachers, special interest groups such as RELA	<ul style="list-style-type: none"> • Hands-on activities • Posters • Booklets • Dialogue 	<ul style="list-style-type: none"> • 6 Biodiversity Education Centres • 3-day PPKB programmes • 3-day exhibitions • Community outreach programmes in PAs • 1 to 3-day programmes which includes T4T • Website news
MNS	School students and teachers	<ul style="list-style-type: none"> • Hands-on activities • Posters 	<ul style="list-style-type: none"> • 2-hour activities on T4T during Nature Camps • Co-production of ACAP Teachers' Educational Kit with WildAid
MYCAT Secretariat's Office	General public, school students, rural communities at wildlife trade hotspots	<ul style="list-style-type: none"> • Hands-on activities • Interactive presentations • Dialogues • PowerPoint presentations • Interviews on radio/TV • Publications in popular magazines and newsletters • Online news • Posters, bookmarks • T-shirts 	<ul style="list-style-type: none"> • Uses T4T and self generated interactive PowerPoint presentations • Interactive info booths/talks at invitation of schools conducting awareness programmes • Channels info to media contacts • MYCAT e-group which sends tiger news to 151 members currently
TSEA	Special interest groups such as airport personnel and customs, media	<ul style="list-style-type: none"> • PowerPoint presentations • 1 to 3-day workshops with hands-on activities • Booklets • Posters 	<ul style="list-style-type: none"> • Self-generated PowerPoint presentations and other training modules • Ranges from hour-long presentations to 3-day workshops on wildlife enforcement and trade
WCS	Rangers, conservation educators in NGOs and zoos, rural communities	Workshops	<ul style="list-style-type: none"> • 3 to 5-day workshops with target audiences
WWF Malaysia	School students and teachers	<ul style="list-style-type: none"> • Hands-on activities • General awareness from mobile units • Publications in booklet form, newsletters • Calendars, notebooks • T-shirts • Folders 	<ul style="list-style-type: none"> • 1 to 3-day programmes with target audiences. • Also carries out mobile conservation education with a van for schools throughout Malaysia. • Jeli community liaison

al., 2003). The life history characteristics of tigers make it difficult to study the animals, especially in the evergreen rainforest of Peninsular Malaysia, where chances of observing either the tiger or its prey are minimal. Even the most intensive scientific study on a tiger population done so far suffered from a weak inference due to a small sample size (Kawanishi and Sunquist, 2004).

The nature of scientific inquiry has changed as our ability and the tools to measure and quantify have advanced (Seidensticker, 2002). Application of infrared motion sensor cameras, "camera trapping", to detect otherwise difficult-to-observe wildlife brought an important advance in tiger research (Karanth, 1995; Karanth and Nichols, 1998). In India, the latest advance in analytical procedures of multiple years of camera trapping revealed demographic characteristics such as survival and recruitment rates of a tiger population that were possible only from radio-telemetry studies in the past (Karanth *et al.*, 2006).

In Peninsular Malaysia, since the late 1990s, with the advent of the modern technologies such as camera trapping and Geographic Information System, knowledge on the two basic aspects of tiger ecology:

1.6.2.3 Communication methods

The communication methods used by the various agencies in tiger conservation education are shown in Table 5. Only some of the organisations are listed.

1.6.2.4 Working examples – case studies

i. Web-based communication, linking research, education, policy and media

One of the main functions of the MYCAT Secretariat's Office is to facilitate communication among all the

organisations, government and NGOs, working on tigers in Peninsular Malaysia. The Secretariat's Office also ensures that each partner organisation is kept up-to-date on individual partner activities, and consolidates current expert information from partner organisations so as to inform the public through the mass media. In terms of the latter, MYCAT has been constantly pushing conservation stories out to newspapers although the print media is generally more interested in human-wildlife conflict issues (see Table 7). The Secretariat's Office also maintains an online news and discussion group (http://groups.yahoo.com/group/malaysian_cat/), which focuses on issues pertaining to tiger conservation. Discussions range from scientific comments on occupancy surveys to promoting tiger awareness through various media such as brochures, t-shirts and popular journals (see Table 6). This egroup often results in ideas which lead to further collaboration, new research, or newspaper articles.

The increased discussion also reflects a greater communication between partners. The media plays a great role in influencing public opinions. To increase the quality and quantity of conservation-related articles in the local media, TSEA organised two media workshops in Kuala Lumpur (hosted by Zoo Negara) and Singapore (hosted by Singapore Zoological Gardens) in December 2005. It was attended by 15 members of the print, online and broadcast media. It is difficult to ascertain the effectiveness of the workshop, as feedback from the reporters who attended, indicated that they are often at the mercy of editors who try to balance other interests such as politics, health, economy and business, etc. Environmental reporting is quite new in Malaysia, although a very small handful of reporters have been in this field for over 10 years. There is also quite a high level of turnover of reporters themselves.

Table 6: The number of news and discussions registered in MYCAT e-group between 2003 (the inception of MYCAT) and 2007.

Year/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	33	46	46	87	124	91	85	79	72	126	54	47	890
2006	52	58	42	62	32	52	63	77	43	29	46	70	626
2005		12	32	43	40	63	53	19	66	119	45	41	533
2004	2											5	7
2003									3	6	2	3	14

http://groups.yahoo.com/group/malaysian_cat/

Table 7: Breakdown of tiger- and wildlife-related reports carried by national Malaysian newspapers*.

Year	Tiger-related reports	Non-tiger related wildlife reports	Notes
2000	136	90	Four newspapers carried reports on tigers and wildlife throughout the year. Reports ranged from attacks by tigers on humans, to tiger road kill.
2001	42	1	Three newspapers reported on tigers in 2001. Most of the reports were on HTC issues.
2002	37	36	Six newspapers have included reports on tigers this year. Most reports were on HTC issues.
2003	40	91	Most of the reports were on HTC issues. There were some reports on education programmes, enforcement issues and permits for exotic pets. Eight newspapers reported on these issues.
2004	57	100	Nine newspapers carried reports on tigers. Most were on HTC issues.
2005	65	289	Five newspapers carried reports on tigers. There is a marked increase in investigative reporting on wildlife issues and trade. Most of the
2006	35	132	reports were on HTC.

Source: *TRAFFIC Southeast Asia, in litt.*

* Numbers of tiger- and wildlife-related reports were extracted from the online archives of the New Straits Times, New Sunday Times, The Star, The Malay Mail, and to a lesser extent, Berita Harian and Utusan Malaysia, as not all reports are uploaded. The archive search of the Malay and Chinese language media is incomplete, as these were not all available online, but was included wherever possible. Reports in foreign newspapers as well as Malaysian regional newspapers such as the Borneo Post are not included.

To attain the objectives of having more conservation reports in newspapers and accurate reporting, it is therefore imperative that the editors and the higher management of the local media houses be targeted in future training exercises, and important fact sheets in vernacular languages, where necessary, are provided to reporters covering stories. Educators, scientists and project coordinators should also be on hand, if follow-ups are needed.

Some of the guidelines for environmental reporters are (Nelson, 1995):

1. write original stories;
2. build and maintain good sources;
3. prepare in advance;
4. translate environmental jargon;
5. make the story alive and relevant;
6. report science carefully;
7. be careful with statistics;
8. look for hidden interests;
9. seek balance;
10. follow-up.

A breakdown of newspaper reports on tigers and other wildlife since 2000 is shown in Table 7. Between 2000 and 2002, tiger-related reports dominated

newspapers which carried cases on wildlife. However, by 2003, the ratio of tiger-related to general wildlife news (not tiger-related) decreased to about 44%. In 2006, the ratio declined to 27%. There are many factors which probably contributed to this change, among them increased media attention on other wildlife issues such as trade or other species and reduced Human-Tiger Conflict cases (reported to DWNP) over the recent years (*Sec 1.5.3*).

ii. Training the trainers

In 1978, DWNP initiated the Nature Study Programme and Weekend Camping Programme, designed to create nature awareness among youth, primarily secondary school students. These programmes are conducted jointly with the Ministry of Education, and include field activities such as jungle trekking, river expeditions, wildlife observations. From 1978 until 1997, approximately 30,000 students had participated in these programmes (Abd Rahim and Aminuddin, 1997). In early 2000, these programmes were revised and are now known as the Biodiversity Conservation Education

Programme, mainly used at seven DWNP centres currently, although there are plans to expand its application to all the states.

It was only in 2004 that Malaysia started having tiger-focused conservation education programmes, through the WCS' *Teachers for Tigers* (T4T) Programme. The first programme was carried out with 41 participants from DWNP as well as from NGOs such as MNS, TSEA and WWF-Malaysia. T4T was fine-tuned to Malaysian conditions as well as translated to Bahasa Malaysia. Since then, T4T has been continuously used by DWNP, MNS, the MYCAT Secretariat's Office, WCS Malaysia and WWF-Malaysia. Between the training held in January 2005 to May 2006, MNS used T4T modules in 15 Nature Camps, attended by about 350 participants (teachers and students) from schools throughout Malaysia. T4T continues to be used, and in March 2007, DWNP used the modules in their conservation education camps at Penang National Park for 40 students and three teachers from three schools from Perak (Nurul Azura, DWNP, pers. comm.). The MYCAT Secretariat's Office also uses T4T for their education outreach programmes and in 2007 the activities were translated to Mandarin, targeting Mandarin-language schools in rural areas. It does appear that participants from the initial workshop benefited from the training. Evaluations before and immediately after the training revealed a major change in knowledge on tigers and how they can be studied or conserved. However, it should also be noted that the participants were a motivated lot and as such the training was almost 'preaching to the choir'. It would be probably most interesting to examine whether this approach would

have a similar effect on school teachers, and rural communities or their leaders.

1.6.3 Insufficient human resources and capacity

1.6.3.1 Lack of staff

Lack of staff to help conserve and protect wildlife and their habitats has often been cited as one of the reasons why wildlife is constantly under threat in Peninsular Malaysia, from poaching, land clearance and illegal wildlife sale and trafficking (Mislihah and Sahir, 1997; DWNP-DANCED, 1996). The lack of capacity was considered so severe that DWNP-DANCED (1996) proposed a large increase in staff numbers from 758 to 1,070. As DWNP's responsibilities have grown in recent years, the staff figures have also grown (Table 8) and it is expected to surpass the DWNP-DANCED (1996) projection. In fact, DWNP expects to have at least 1,497 staff by the end of the new departmental restructuring exercise in 2008.

It is often difficult to compare staff numbers and budgets between similar departments or protected areas across several countries, due to cultural, economic, poaching and local population stresses on the park (Bruner *et al.*, 2001). A case-in-point would be, a comparison between staffing needs in Nagarhole National Park (India) (644km²) and Taman Negara (4,343km²) without considering poaching caused by local communities living close or within the protected areas. In Nagarhole, there are about 100,000 local people living inside or close to the park (@ 155 persons/km²), whereas in Taman Negara, there

Table 8: Increase in staff numbers, administrative and development expense (million RM) of the Department of Wildlife and National Parks Peninsular Malaysia and the size (km²) of Protected Areas in Peninsular Malaysia between 1996 and 2005.

Staff, budget/ Years	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05
Staff numbers	716	689	677	684	684	793	794	737	869	971-1,475*
Administrative expenses 2	20.2	20.3	17.7	18.1	NA	24.2	27.9	29.4	30.9	38.5
Development expenses	5.7	5.5	13.6	26.8	21.2	29.7	13.6	17.1	17.5	21.7
Total size of PAs	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,527	7,527	7,527

Source: DWNP Annual Reports, DWNP-DANCED (1996)

* The higher figure is the number of posts that has been approved but not yet filled.

would probably be less than 5,000 people living within or close to Taman Negara (@ 1 person/km²). Thus the need for more staff for patrolling would appear to be much greater in Nagarahole as compared to Taman Negara. But using numbers of local people living within or close to a national park as the only index for potential poaching would also be insufficient due to the global nature of wildlife poaching, as some poachers have travelled long distances (crossing international boundaries) as seen by the nationality of arrested poachers in Taman Negara (DWNP, 2005). But, if one were to just examine the coarse trend in staffing numbers/100km² in similar departments across Asia (Table 9), Taman Negara appears to have the lowest staffing/100km². This trend is important as a study on the effectiveness of Protected Areas in protecting biodiversity in the tropics, found that PA effectiveness correlated very strongly with the density of guards (Bruner *et al.*, 2001). In the 15 most effective PAs in the tropics, the median number of guards/100km² was more than 3. This figure does not include administration staff, and the most effective PAs had in general, over eight times more staff than the least effective PAs. In the most extreme form, one PA had up to 200 staff/100km², whereas another had none (Bruner *et al.*, 2001). In a subsequent analysis, Bruner *et al.* (2004) also found that under-funding jeopardised the ability of protected areas to safeguard biodiversity and the benefits that intact nature provided to society. Taman Negara has had repeated poaching issues even recently in 2007 (Anon., 2007c). Sadly, of the 42 Protected Areas in Peninsular Malaysia, only Taman

Negara is afforded with regular on-the-ground patrol. The majority of the 100+ Taman Negara staff is however engaged in the park administration, visitor facilitation, and law enforcement near the headquarters. DWNP alleviates this manpower issue by sending staff from state DWNP in rotation for 10 days a month to patrol Taman Negara jointly with the existing staff. With the limited manpower, DWNP also gets support from the Royal Malaysian Armed Forces to join the annual inventory that involves 100-200 men combing the forests in search of wildlife tracks and poachers. Poachers are apprehended or flushed out every year during the 2-week operation. Ideally, a patrol of this intensity or more should be conducted daily in a national park of such high conservation significance.

Since 2001, more than 80 foreigners have been apprehended for encroachment and poaching activities in Taman Negara. This is an issue of concern, given that the latest encroachment occurred in March 2007 (Anon., 2007c). Worldwide, tigers are disappearing from their natural range, and protected areas such as those in India have also become hotspots for poaching (Dinerstein *et al.*, 2007). It is therefore important to follow-up, to critically examine whether there is indeed adequate budget and staff for field patrolling and enforcement to ensure protection of wildlife and tigers in Protected Areas. Both adequate staff and budget are listed as criteria in widely accepted tools used for assessing management effectiveness (Hocking *et al.*, 2000).

Table 9: Staff numbers and annual operational budgets within protected areas with tigers.

PAs with tigers in various countries	Number of staff	Budget (million RM)	Total size of PA (km ²)	Staff/100km ² of PA*
Malaysia Taman Negara	105	3.2	4,343	2.41
Thailand Huai Kha Khaeng NP	200	1.68	2,740	7.30
India Nagarahole NP	200	NA	644	31.06
Indonesia				
a) Gunung Leuser	229	NA	7,927	3.68
b) Way Kambas	166	NA	1,300	12.77
c) Berbak-Sembilan	76	NA	1,700	4.47

* Inclusive of administration staff.

NP – National Park

NA – Data not available

1.6.3.2 Occupational standards

In line with having adequate numbers of staff, there is also a need to ensure that the enforcement, fines or penalties be carried out to completion (Akella and Canon, 2004; Albers and Grinspoon 1997; Dinerstein *et al.*, 2007; Gibson *et al.*, 2005; Lee *et al.*, 2005). Enforcement, patrolling and penalties when carried out regularly serve as a deterrent to poachers (Albers and Grinspoon, 1997; Gibson *et al.*, 2005). As there has been high profile losses of enforcement cases due to technicalities (Hah, 2007), there is thus an urgency to improve competencies among various officers within DWNP, among them law enforcement staff.

Improving competencies is not new, as DWNP recognised the importance of occupational standards for its staff by participating in the drafting of the 'Competence Standards for Protected Area Jobs in Southeast Asia, 2001' (Appleton *et al.*, 2001).

The document outlines clear sets of occupational duties and responsibilities by all officers at various levels. In late 2006, DWNP initiated discussions on a Training Needs Analysis in pursuit of increasing competencies among its staff.

Focus on staff competencies is important because increasing staff numbers alone without training and occupational standards does not mean a job well done. Increasing staff numbers may actually increase the level of corruption, thus dilution of conservation and enforcement efforts (Gupta, 2005; Brickle, WCS Indonesia, pers. comm.; Praveen, Centre for Wildlife Studies, pers. comm.).

1.6.4 Inadequate legislation, enforcement and penalties

Illegal wildlife trade is a major threat to the tiger and its prey species. The *Customs Act 1967* and the *Customs Regulations 1977* regulate the import and export of goods into and out of Malaysia. There are no specific provisions in the Act and Regulations regarding the import and export of protected and totally protected wildlife, though the Act identifies DWNP as the reference agency for import and export of any wild bird and animal, alive or dead. But, as the definition of "goods" does not explicitly specify parts or derivatives of wild animals, there is nothing that allows enforcement agencies, such as Royal Customs Malaysia or DWNP, to seize products that contain protected and totally protected animals in their ingredients, such as Traditional Chinese Medicine, at Malaysian ports of entry.

The trade of Traditional Chinese Medicines (TCM) containing tiger derivatives in Peninsular Malaysia continues partially due to a loophole in the PWA that allows non-readily recognisable parts and derivatives to be sold in the form of manufactured and processed medicines. The PWA states that "parts" of totally protected animals cannot be traded, but does not presently cover manufactured and processed medicines containing protected species (derivatives).

While on the subject of TCM, as of 1992, all traditional medicines must be registered under the *Sale of Drugs Act (Sec. 1.4.2.3)*. The Drug Control Authority also ensures that all registered products are labelled according to stipulated labelling requirements. The TSEA surveys of TCM shops conducted recently found that some medicines that claim to contain tiger bones carried registration numbers (Nijman, in press). However, the *Guidelines for the Registration of Traditional Medicines* maintain that traditional medicines containing parts or derivatives of animals listed in Attachment 8 of the regulations will not be considered for registration. The tiger and leopard are listed under Table 2, Part 2, of the Attachment. This means that all TCM products claiming to contain tiger parts or derivatives sold in Malaysia are illegal either by having fake registration numbers or sold without registration. What is needed is the enforcement of the current law.

Enforcement in general throughout all tiger range states and in consuming countries, is still insufficient, as evidenced by the continual availability of tiger parts in trade and the serious decline in wild tiger populations as well as declines in tiger prey populations (EIA-WPSI, 2006). Strong political will in range states to stop and reverse the declines in tiger populations as well as sufficient resources to tackle the illegal killing and trade are sorely needed.

Furthermore, wildlife crime is still not considered a priority within the judicial system and penalties for such crimes are often extremely low and therefore do not serve as a deterrent. Maximum penalties currently amount to a total of a fine not exceeding fifteen thousand Ringgit (USD4,286 at 2007 rates) or to a term of imprisonment not exceeding five years. No one, however, has so far received the maximum sentence. For instance, a Malaysian man in possession of one tiger skull, 31 tiger claws and 10 tiger canines was fined RM3,000 (USD857) by the courts in 2003 (DWNP, unpublished data), far less than the true market value of these items.



Seized tiger © DWNP

In another case, a Malaysian man found with a butchered tiger in his home was fined RM7,000 by the Magistrate's Court, despite the PWA providing a maximum custodial sentence of 5 years, or fine of up to RM15,000 (Table 10).

Table 10: Tiger-related offences recorded by the Department of Wildlife and National Parks Peninsular Malaysia between 2001 and 2005 and subsequent actions taken

Year	Offence	Action Taken
2001	Illegal possession of 15kg of tiger bones	Fined RM16,000 by court
2001	Illegal possession of 5 pieces of tiger penis	Fined RM3,000 by court
2001	Illegal possession of 1.5kg of tiger meat	Fined RM4,000 by court
2003	Illegal possession of 33.7kg of tiger bones, 4 tiger canines and 6 tiger claws	Fined RM6,000 by court
2003	Illegal possession of 1 tiger skull, 31 tiger claws and 10 tiger canines	Fined RM3,000 by court
2005	Illegal possession of 1 dead tiger	Fined RM7,000 by court; Later ordered retrial

Part 2

Action Plan

"Future generations would be truly saddened that this century had so little foresight, so little compassion, such lack of generosity of spirit for the future that it would eliminate one of the most beautiful and dramatic animals that the world has ever seen."

- George Schaller

This Tiger Action Plan (hereafter referred to as the Plan) will guide Malaysian politicians, civil servants, NGOs, biologists and the general public to create the social conditions that allow tigers to co-exist with humans on the same landscape. When this Plan is implemented, Malaysia will secure the future for the Malayan tiger.

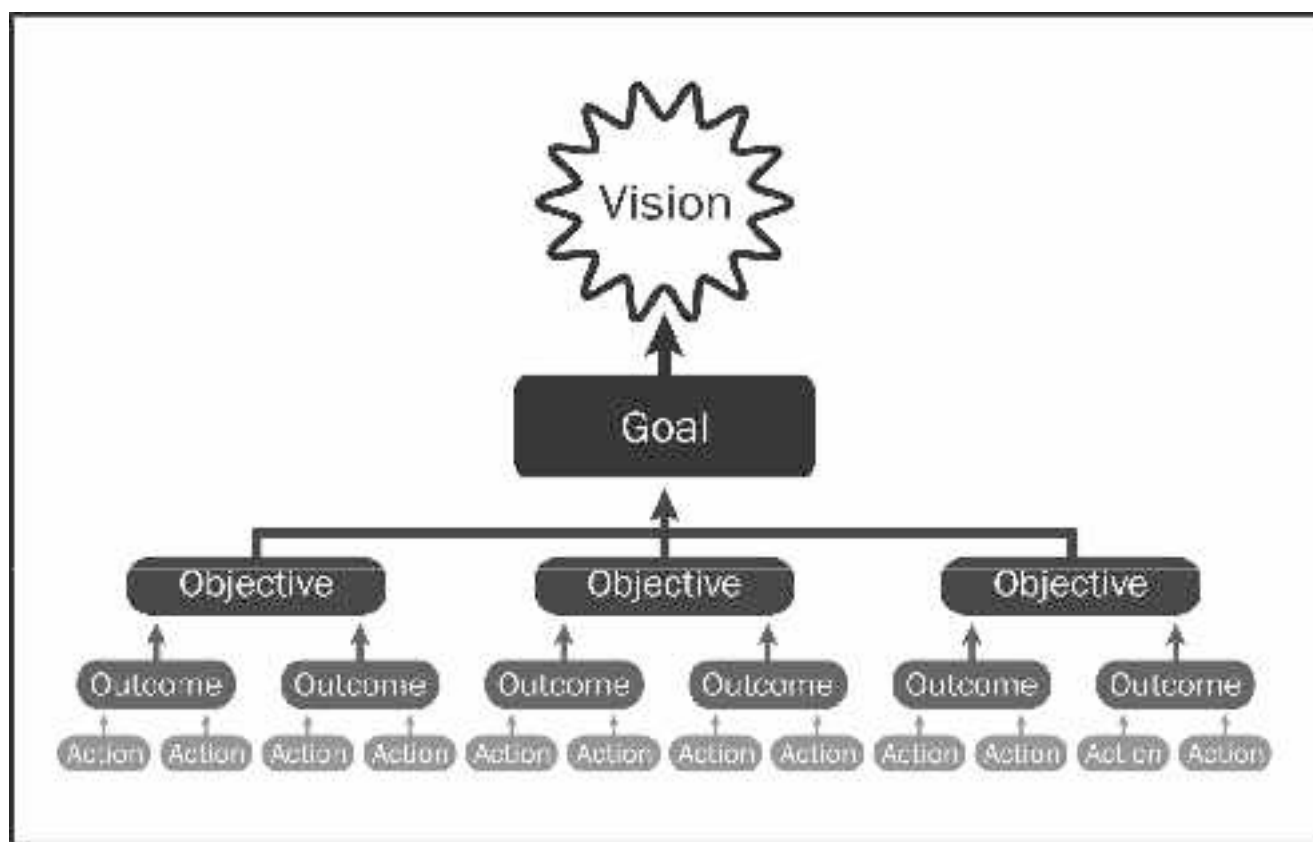
The aim of the Plan is to establish a holistic but focused conservation strategy that lays out specific actions for the next eight years (2008-2015) with the overall goal of securing viable tiger populations in Malaysia for the next century and beyond. We therefore need to have a clear vision of what we would like to see and a clear sense of how to get there. As such, we focus on short-term outcomes and measurable mid-term target, whilst keeping mindful of our ultimate vision. Obviously any conservation plan, in order to be useful, must be practical and in line with existing policies. To this end, the Plan was developed within the Malaysian Government's existing framework for

environmental and biodiversity conservation. Specifically, the National Policy on Biological Diversity and National Policy on the Environment set the underlining principles, whilst the National Physical Plan laid out the spatial framework. It is a result-driven, adaptive action plan, bound by the commitment of the Malaysian government and other MYCAT partners. The Plan first presents the shared long-term vision for the century, followed by the mid-term goal and thirdly the four main objectives (Fig 6). The Plan then identifies several realistic short-term outcomes, which is finally followed by specific actions. It is important to note that not all outcomes necessary to achieve the four primary objectives are included in this Plan; only those considered as urgent or priorities, achievable in the next eight years, are detailed herein. Depending on the performance of our actions in the next eight years, the Plan will be revisited and next steps identified and implemented wherever necessary, or more outcomes will be added, or existing ones adjusted. As such, efforts will be maintained or increased to ensure that these realistic objectives are met. In situations beyond the control of all the partners and stakeholders, objectives will be reviewed, and if necessary, realigned. Each of these components from the vision to actions is described in detail in the subsequent sections.

Definitions of the terms used often in Part 2 are as follows:

Short-term	The eight year period between 2008 and 2015.
Mid-term	Foreseeable future from 2008 to 2020.
Long-term	The 22nd century and beyond.
Action	A concrete measure to be implemented in the short-term towards the outcome.
Outcome	A priority condition that needs to prevail in the short-term towards the mid-term objective.
Objective	A primary change that needs to take place in the mid-term range as a precondition for the goal.
Goal	The mid-term goal that is achievable in our life time towards the vision
Vision	The ultimate long-term aspiration of the Tiger Action Plan

Fig. 6: A schematic diagram of the framework detailing the pathway from actions to success.



2.1 Vision

A Malaysia in which tigers thrive in the Central Forest Spine in the 22nd century and beyond.

The Central Forest Spine is defined in the National Physical Plan (DTCP, 2005) as the backbone of the Environmentally Sensitive Area (ESA) network (Fig. 7). Through the protection and restoration of this forest system, the NPP aims to maintain the country's forest cover, reconnecting the fragmented forests for better protection of the nation's environment and biodiversity, all within a timeline that runs to the year 2020. Encompassing approximately 51,000km², the CFS comprises mostly ESA Ranks 1 and 2, interspersed by smaller Rank 3 ESAs. The management criteria for the CFS (Table 11) are in line with tiger conservation in that it promotes the protection of core areas of biodiversity and resource rich forest (ESA 1) inter-connected through a system of large forest blocks where ecologically sound land-use, compatible with tiger conservation is practiced (ESA 2).

The CFS appears almost identical to the tiger habitat map (Fig. 3) because a generic forest cover map formed the base layer for both. That is to say, the tiger

is a forest dweller and the majority of forest remaining in Peninsular Malaysia can be found within the CFS. The NPP also used the tiger and elephant as the flagship landscape species to aid in identification of ESA Ranks 1 and 2 as well as approximate locations of the potential corridors. The NPP also suggests the use of river corridors to maintain the integrity and connectivity of forest ecosystems, which, when combined with an intact vegetative cover, would also be readily used as dispersal corridors by tigers.

At the moment, however, the CFS concept is represented only as a coarse grain polygon corresponding with forest-cover map. The actual delineation of boundaries and definition of linkages are immediate actions planned in both the NPP and this Plan.

2.2 Policy Statement and Guiding Principles

Instead of symbolising the loss of forests and ecosystem in crisis, a healthy tiger population can be the star in the Malaysian Government's on-going efforts in implementing a number of policies regarding sustainable development and management of natural resources (*Sec 1.4.1*), in addition to being the national symbol (*Sec 1.2*). Adapted from the policy

Fig. 7: Central Forest Spine identified in the National Physical Plan (DTCP, 2005)

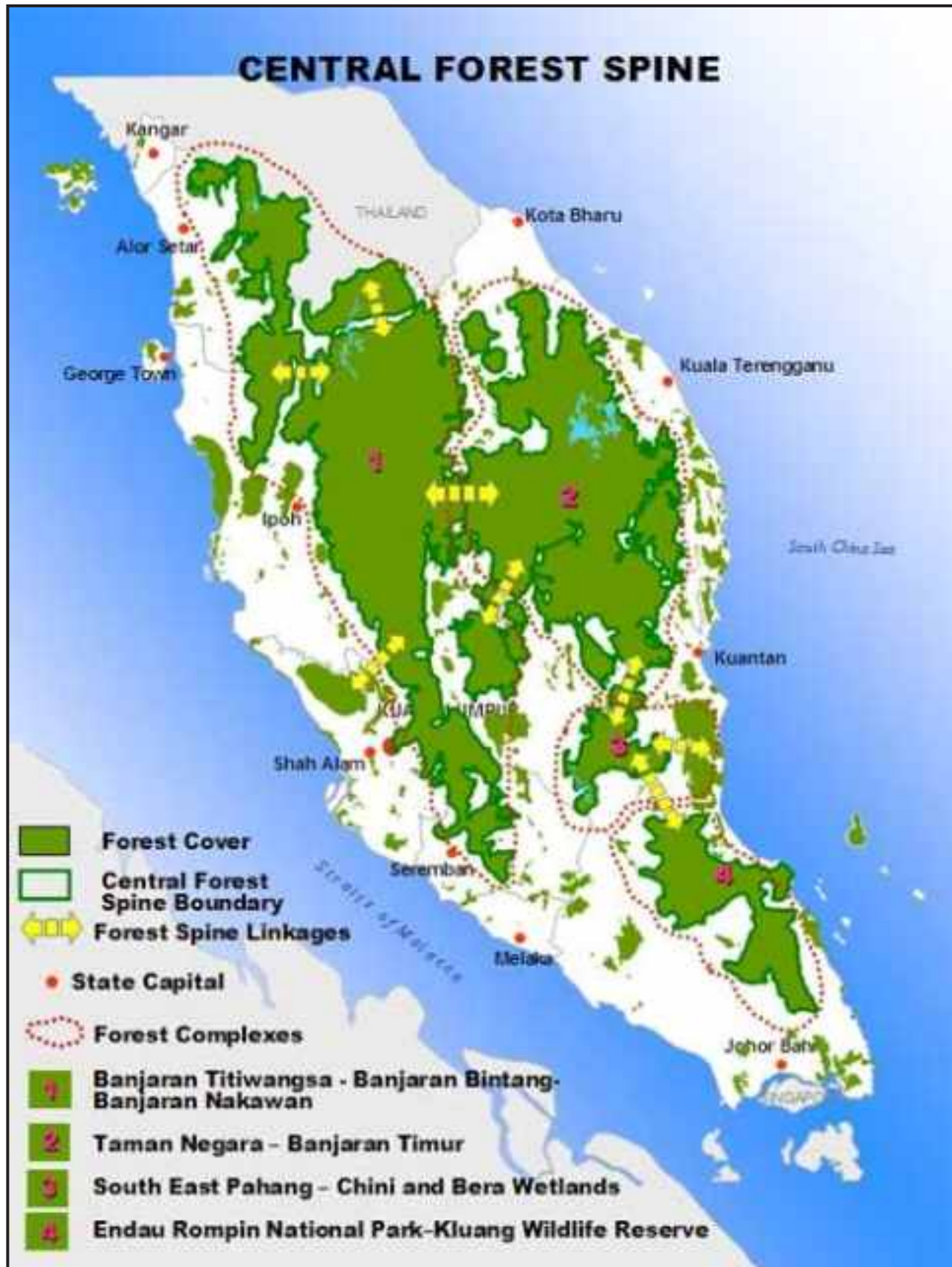


Table 11: The management criteria for the three types of the Environmentally Sensitive Areas in the Central Forest Spine.

ESARank	Criteria
1	No development, agriculture or logging shall be permitted except for low-impact nature tourism, research and education.
2	No development or agriculture shall be permitted. Sustainable logging and low impact nature tourism may be permitted subject to local constraints.
3	Controlled development where the type and intensity of the development shall be strictly controlled depending on the nature of the constraints.

Source: DTCP (2005)

A healthy tiger population across a landscape of well conserved and contiguous forest ecosystems indicates ecologically and socio-economically balanced progress of the nation that translates into a better quality of life for all Malaysians.

Table 12: Policy statements for the National Policy on Biological Diversity (NPBD) and National Policy on the Environment (NPE).

Policy	Policy statement
NPBD	To conserve Malaysia's biological diversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation.
NPE	For continuous economic, social and cultural progress and enhancement of the quality of life of Malaysians through environmentally sound and sustainable development.

Source: NPBD (MOSTE, 1998), NPE (MOSTE, 2002)

statements for the National Policy on Biological Diversity and the National Policy on the Environment (Table 12) the operative policy statement for this Plan is:

The definition of a healthy tiger population for the purpose of this Plan is:

A contiguous population of about 1000 adult tigers in the Central Forest Spine that has a greater than 90% projected survivorship into the 22nd century.

The following underlying Principles which are primarily based on the National Policy on Biological Diversity and National Policy on Environment form the basis for this Plan. Whilst the actions planned in this document are to address the priority and/or urgent issues for the next eight years, the Principles should be referred to for guidance in identifying actions needed to deal with emerging threats or events that are not specifically included in the Plan:

- i. Wild Malayan tigers are the pride and heritage of the people of Malaysia and the rest of the world. Decision makers, resource users, and NGOs, with support from the general public, are committed to securing the forests, and wild tigers, for future generations, and are accountable in formulating and implementing the Plan. Securing the continued existence of the tiger and its habitat while managing the forests in a sustainable manner is an indication of our ongoing effort to achieve a sustainable society and excellence in conservation. *Adopted from Vision 2020; NPBD Principles ii, iii, vi, v; NPE Principles 2, 4, 7 and Objective iv*
- ii. Conservation ethics, including the inherent right to existence of Malayan tigers in the wild, is deeply rooted in the religious and cultural values of all Malaysians. *Adopted from NPBD Principle i; NPE Principle 2*
- iii. Challenges to tiger conservation transcend political boundaries and Malaysia continues to

exercise a proactive, collaborative and constructive role in international activities with the aim of conserving forests and Malayan tigers. *Adopted from NPBD Principle viii; NPE Principle 8*

- iv. Public awareness and education as well as collaboration, information exchange, capacity building and research are all essential components of integrated conservation programme for Malayan tigers.

Adopted from NPBD Principle x, Objective v and Strategies I, V, VII, XII, XIII, XIV

- v. Malaysia prohibits the commercial trade of live tigers and tiger parts, whether sourced from wild populations or captive bred stock.

Protection of Wild Life Act 1972; CITES

2.3 Goal

The vision of ensuring a future for wild Malayan tigers beyond the 22nd century is the ultimate national level, long-term aspiration. Achievable in our lifetimes, our goal is:

Tiger populations actively managed at carrying capacities across the three landscapes within the Central Forest Spine and connected with functioning corridors.

The goal is broken down to a set of sub-goals that vary in terms of their implementation in space and time. In

order to be able to define these sub-goals the Plan uses three spatial scales, Nation, Landscape and Priority Area, (Fig. 8) and two temporal scales, short-term (2008-2015) and mid-term (2008-2020) to define how these goals will be achieved (Table 13).

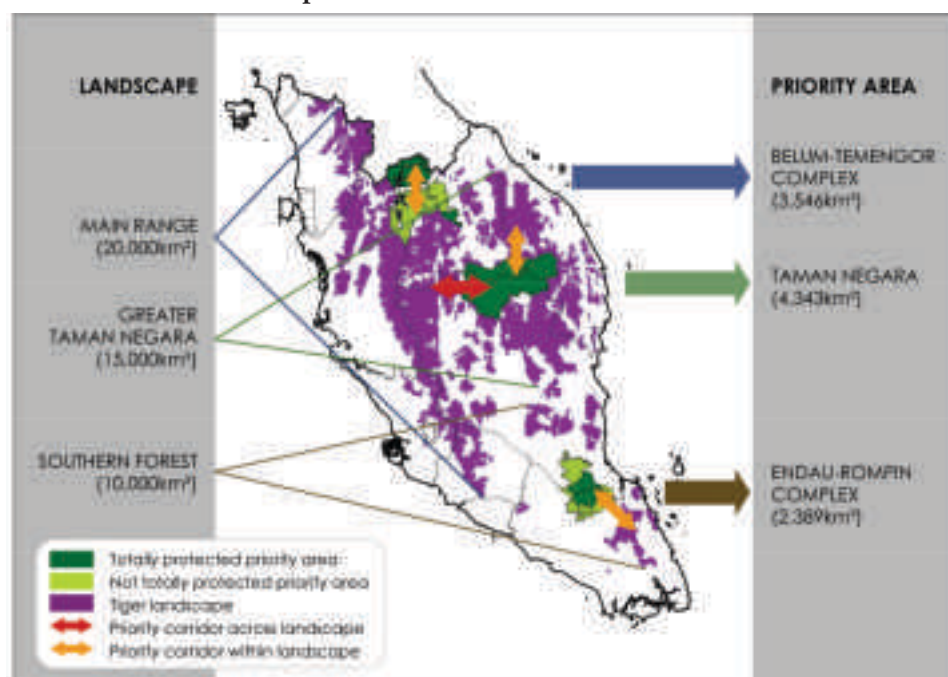
Each of the three tiger landscapes has a core priority area and priority corridor. The Belum-Temengor Complex in the Main Range Landscape contains the Royal Belum State Park, Gunung Stong Tengah State Park, Temengor PRF, Gunung Basor PRF and Gunung Stong Utara PRF. Taman Negara is the only priority area in the Greater Taman Negara Landscape. The Endau-Rompin Complex in the Southern Forest Landscape contains Endau Rompin National Park, Lesong PRF, Labis PRFs, Endau PRF and Pukin PRF (Fig.8).

The priority ecological corridor to be restored and maintained across the landscapes is the Main Range-Greater Taman Negara linkage. Within the landscapes, there are three areas where the habitat connectivity needs to be maintained and enhanced: Belum-Temengor, Taman Negara-Lebir-Tembat, and Endau-Rompin-Mersing (Fig.8).

The sub-goals that vary in terms of their implementation in space and time are shown in Table

13. The two temporal tiers are the short-term and the mid-term. The year 2020 was chosen as the end-year due to its

Fig. 8: The three priority areas in the three respective tiger landscapes with important corridors to link tiger habitats within and across the landscapes.



national significance, as defined by Vision 2020 and its restriction to what can be classed as the foreseeable future. Furthermore, 2020 sets the limit for our measurable target because any response to conservation efforts that will be seen in tiger population dynamics will, realistically, take longer than the initial eight years to manifest. During that initial period, however, a reliable and practical scientific methodology to better monitor the target tiger populations and their distribution is envisaged to be established.

2.4 Objectives and Outcomes

The four realms of consideration in the Plan to address the different types of threats described in Part 1 are: 1) Central Forest Spine; 2) patrol and enforcement; 3) habitat management, conflict resolutions and land-use; and 4) conservation science and monitoring. Some issues are cross-cutting and thus the realms are not mutually exclusive, but this division was necessary for the ease of planning, implementation

and monitoring. One main objective for each realm was identified, together to achieve the goal by the year 2020. Not all possible outcomes but three to four priority outcomes that need to take place in the next eight years to achieve each objective have been identified (Table 14 and also see *Sec. 2.6* for details of planned objectives and outcomes).

Addressing these objectives is not a feat that can be accomplished by the members of MYCAT and other primary stakeholders alone; it will certainly need support from the public through awareness programmes, support from other institutes in building local capacity and, of course, financial support from industry, international agencies and private philanthropists. Therefore, these enabling factors, awareness, capacity and financing are implicit in each objective (see *Sec. 2.6.5* for a discussion on public awareness programmes as part of a wider-view that benefits more than one objective).



Mangrove Forest @ DWNP

Table 13: Scale-dependent implementation of the goal for tiger conservation in Malaysia between 2008 and 2020.

		Temporal	
Spatial		Short term/Phase I 8 years (2008-2015)	Mid term Vision 2020 (2008-2020)
Priority Area	Belum-Temenggor Complex	<ul style="list-style-type: none"> Improved protection of habitat, tigers and their prey Connectivity between Belum, Temengor and others in the Complex maintained/restored Establish a benchmark for monitoring of tiger population Improved knowledge on the population status of tigers, their prey, and key threats Strengthening management capacity 	<ul style="list-style-type: none"> Increased carrying capacity of tigers Maintenance of breeding tiger populations at the maximum potential density in each priority area Strictly protected tigers and their prey with no loss to poaching
	Taman Negara	<ul style="list-style-type: none"> Maintained occupancy of tigers Stabilized tiger density at 1-2 adults tigers/100km² Improved protection of habitat, tigers and their prey Improved knowledge of tiger ecology and continued monitoring of the population Strengthening management capacity 	
	Endau-Rompin Complex	<ul style="list-style-type: none"> Establish a benchmark for monitoring of tiger population Improved knowledge on the population status of tigers, their prey, and key threats Improved protection of habitat, tigers and their prey Strengthening management capacity 	
Landscape	Main Range Greater Taman Negara Southern Forest	<ul style="list-style-type: none"> Improved knowledge on tiger distribution Directed patrol of selected key forests Directed campaign against local consumption of tiger and their prey at selected hotspots The landscape connectivity mapped and threats to fragmentation identified Maintenance of landscape connectivity Promotion of ecologically sound land-use, compatible with tiger conservation and forestry practice outside the core areas Community-based mechanisms and sustainable financing means to reduce HTC identified and implemented at the local level Land-use guidelines and recommendations for existing/potential HTC areas developed and incorporated into Local/Structure Plans at the state level 	<ul style="list-style-type: none"> Tiger distribution and landscape connectivity maintained in each landscape Loss of tigers suppressed Improved protection for prey
National	Peninsular Malaysia	<ul style="list-style-type: none"> Tigers present in natural habitats across the three landscapes (CFS) Maintenance of existing connectivity between Greater Taman Negara and Main Range No loss of forest cover in CFS Improved legislation for tigers and their prey Improved enforcement of existing legislation Established scientific monitoring system and research plan for tigers and their prey Nationwide consumer education campaign and awareness programmes Increased awareness and capacity Overall management capacity strengthened 	<ul style="list-style-type: none"> Tiger populations actively managed at carrying capacities across the three landscapes within the CFS and connected with functioning corridor

Table 14: The pathway from short-term outcomes to the overall vision.

<p style="text-align: center;">VISION</p> <p style="text-align: center;">A Malaysia in which tigers thrive in the Central Forest Spine in the 22nd century and beyond</p> <p style="text-align: center;">GOAL</p> <p style="text-align: center;">Tiger populations actively managed at carrying capacities across the three landscapes within the CFS and connected with functioning corridors</p>				
Realm	Central Forest Spine	Patrol and Enforcement	Habitat Management, Conflict Resolution and Land-use	Conservation Science and Monitoring
Objective (2008-2020)	CFS with strictly protected priority areas in landscapes connected with corridors	Effective and longterm protection of tigers and their prey	Ecologically sound land-use, compatible with tiger conservation outside the priority areas	Application of science in monitoring the efficacy of conservation actions and improving knowledge of tiger ecology
Outcome 1 (2008-2015)	Priority areas important to tigers are strictly protected, expanded, or sustainably managed	Strengthening of wildlife legislation	Sustainable utilisation of land areas in current and potential Human-Tiger Conflict areas as well as forest reserves with strengthened management capacity	<i>Malayan Tiger and Large Mammal Monitoring Guidelines</i> based on existing mechanisms in place within the DWNP and internationally accepted methods established
Outcome 2 (2008-2015)	Important tiger habitats outside the priority areas identified and effectively managed as Environmentally Sensitive Area 1 or 2 at state and local levels	Improved legislative or regulatory protection of key prey species	Community-based, Better Management Practices to mitigate HTC established in affected areas	Monitoring of the occupancy of tiger and their prey across landscapes and tiger densities in priority areas
Outcome 3 (2008-2015)	Critical areas for landscape connectivity acknowledged, established and managed at state and local levels	Marked focused and intelligence driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws	Effective awareness programmes in HTC areas at state and district levels	Improved planning, coordination and scientific integrity of research on tiger ecology and conservation through development and implementation of the tiger component of the <i>Wildlife Research Plan</i>
Outcome 4 (2008-2015)			Sustainable financing mechanism to mitigate HTC in place	Enhance knowledge and information base on tiger ecology and conservation
Enabling means and resources	Awareness building – Capacity building – Securing funds			

2.5 Target

Wild tigers are the primary beneficiary of this Plan. Ultimately, the success of any conservation action must be reflected in their population status and dynamics that need to be first determined, next stabilised and then finally increased – both in terms of distribution and density. By using the population status as the overall indicator of success, we hold ourselves accountable to wild tigers for which the resources are mobilised. The overall indicator of success is:

About 1,000 wild tigers surviving on wild prey in the Central Forest Spine by the year 2020.

Contrary to common belief, we will not count each and every individual tiger in the forest to measure our success. The target population figure is a function of estimates of the proportion of forest habitats that are occupied by tigers and estimates of tiger densities at representative sites. Currently, the maximum potential tiger population size, in all tiger habitat available in Peninsular Malaysia, is 1,480 adults. This is based on an expected mean density estimate of 3 tigers/100km² within 49,329km² of contiguous tiger habitat (Kawanishi et al., 2003) excluding small isolated forests where tigers are still present. Recent studies in Malaysia indicates that tiger densities range from 1.10 to 2.59 tigers/100km² (Kawanishi and Sunquist, 2004; Darmaraj, 2006).

With improved protection of tigers, their habitats and their prey, we expect the overall carrying capacity of tigers to increase by the year 2020. By then, most of the fragmented and isolated forests, and their associated tiger populations, that lie outside of the three main tiger landscapes (Fig. 8) may disappear. Since the future of the habitats outside the three landscapes are uncertain, this Plan focuses on the CFS to maintain and re-connect tiger populations. We can hypothesise multiple models that achieve the same target. For example:

- i. Tigers present with 100% occupancy in the CFS at a mean density estimate of 2/100km²
- ii. Tigers present with 80% occupancy in the CFS at a mean density estimate of 2.5/100km²
- iii. Tigers present with 100% occupancy in the three priority areas at a mean density estimate of 2/100km² and 80% occupancy in the rest of CFS at a mean density estimate of 2.5/100km²

During the next eight years, we will work on

establishing a nationwide tiger monitoring system, based on internationally accepted methods, which will allow us to test these hypotheses. Once these methods are shown to be field-worthy they will form the basis for a long-term monitoring programme. Note that, according to the principles of modern wildlife management, these models are adaptable to emerging knowledge and technologies as well as the success, or failure, of conservation interventions. For example, as a purely hypothetical situation, if we successfully increase the average carrying capacity of tigers in Malaysia to ten adult animals/100km², similar to the high densities documented from Indian forests, then our long-term measurable target will be raised. Given the potential prey biomass naturally supported in tropical dipterocarp forests, this is not however probable in any foreseeable future. Raising the mean carrying capacities to 2-2.5 tigers/100km² at the high occupancy rate of 80-100% in CFS is reasonably achievable in the next 13 years. Therefore, despite the potential to be much more ambitious, we set the minimum target of about 1,000 adult tigers in CFS.

In addition to directly monitoring tiger population status as the overall indicator of success, some other quantifiable indicators that could measure the progress of conservation actions include:

- Recruitment and mortality rates within the tiger population
- Population status of the main tiger prey species
- Nett loss or gain of forests in CFS
- Area of forest reserves in ESA 1 and ESA 2 gazetted as protection forests under the National Forestry Act
- Number of corridors maintained and actually used by tigers
- Number of traditional medicine practitioners selling medicines claiming to contain tiger
- Number of actual man-hours patrolled
- Size of area patrolled
- Proportion of tigers diet consisting of natural prey
- Number of cattle killed by tigers
- Number of offenders sentenced to imprisonment
- Number of snares confiscated

2.6 Actions, Implementing Agencies, Indicators and Timelines

This section translates the principles of conservation objectives and desirable outcomes (*Sec 2.4*) into concrete measures and tangible activities to be implemented in the field. It presents the steps which must be taken, and by whom and when, in order to deliver each outcome (summarised in Table 15 at the

end of this section). Besides the leading and collaborating agencies, each action lists a measurable indicator against which the progress will be monitored (*Sec. 2.7.4*). The leading agency will be ultimately responsible for implementation of the action and reporting the progress. Collaborating agencies in reality may include more than those listed since only currently known partners are included in the Plan. Some outcomes are achievable within the next eight years. Others may not be, and any additional time required for these is dependent on the performance by the related agencies over the next eight years. Not all the steps are in a sequential order; for the chronology of the steps, refer to the timeline for each step.

2.6.1 Secure the Central Forest Spine with strictly protected priority areas in the landscapes connected with corridors

The three outcomes are:

- i. Priority areas important to tigers are strictly protected, expanded or sustainably managed.
- ii. Important tiger habitats outside the priority areas are identified and effectively managed as ESA 1 or 2 at state and local levels
- iii. Critical areas for landscape connectivity are acknowledged, established and managed at state and local levels

This objective is primarily to secure the physical habitat requirement of a healthy, viable population of tigers (defined in *Sec. 2.2*). It is heavily driven by the National Physical Plan with an emphasis on the Central Forest Spine with Environmentally Sensitive Areas connected with corridors. As such, the collaborating agencies encompass a wide array of government agencies, especially at the state level. This poses a challenge to the DWNP, collaborating agencies and other stakeholders in terms of efficient coordinating and monitoring. Since DWNP and WWF-Malaysia are part of the Working Group for the NPP's Master Plan for Central Forest Spine (DTCP, in prep), the rest of the MYCAT partners will work closely with DWNP and WWF-Malaysia to implement and monitor the actions. Demarcation of CFS and ESAs conceptualised in NPP is identified as one of the priorities in the CFS Action Plan. Therefore the focus of the Tiger Action Plan is on the three priority areas and priority corridors (*Sec. 2.3*). Effective management of the three priority areas is included here as well.

The three existing PAs are to be expanded by inclusion

of Temengor as a gazetted National/State Park and/or buffer zones around the Protected Areas. All PAs must develop management plans, that include staffing and budgetary needs. Existing management plans for Taman Negara and Endau Rompin will be reviewed, updated and improved using existing guidelines, including those from IUCN and the Rapid Assessment and Prioritisation of Protected Areas Management (RAPPAM) methodology (Ervin, 2002). Other important tiger habitats, especially for breeding and dispersal, outside the priority areas, need to be first identified in order to secure these areas. The options and decisions to manage them as new PAs, buffer zones or protection forests are dependent upon national and state priorities and initiatives, and are within the prerogative of respective state governments, where land is concerned. Towards maintaining and improving the critical landscape linkages, specific sites must be acknowledged as wildlife corridors with appropriate management prescriptions in state Spatial Action Plans, Local Plans and Structure Plans.

2.6.2 Provide effective and long-term protection of tigers and their prey

The three outcomes are:

- i. Strengthening of wildlife legislation
- ii. Improved legislative or regulatory protection of key prey species
- iii. Marked improvement in focused and intelligence-driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws

More effective wildlife legislation will be enacted and implemented. It is anticipated that the amended legislation will raise the penalties, including mandatory jail sentence, for offences committed against totally protected species. There will be an increased emphasis on better protection of primary prey base through increased knowledge, upgraded status from protected game to totally protected species and regulation of issuance of hunting and dealer licences. In order to upgrade the protected status of threatened prey species, status reports for each species will be compiled based on existing information that will also identify knowledge gaps. In selected sites, the status of prey species will be closely monitored to determine the numerical response of the prey populations to the moratorium on the issuance of hunting licences. In addition to these ecological studies, monitoring of hunting and trade of tigers and their prey species will be continued.

Marked improvement in focused and intelligence-driven anti-poaching patrol and enforcement of wildlife and wildlife trade laws was identified as the utmost urgent priority by many at the National Tiger Conservation Workshop in 2006. The current effort will be enhanced with greater commitment, skills, resources, collaboration and a monitoring mechanism. To achieve this, prioritised needs for critical resources (e.g., skills, manpower, equipment, funds) for better enforcement/patrol will be identified and the ways to acquire them will be strategised. The performance and effectiveness of enforcement and antipoaching patrols will be monitored. Furthermore, inter-agency collaboration will be enhanced with FDPM to actively enforce the wildlife laws at checkpoints on key logging access roads and spot-checks at logging concessions; with local authorities/councils to revoke business licences from restaurants and traditional medicine shops that violate the wildlife laws; with other national enforcement agencies (e.g., Royal Customs of Malaysia, Anti-smuggling Unit, Immigration Department, and Royal Malaysian Police) for broader intelligence network; and with ASEAN-WEN and CITES member countries to reduce illegal trade across the national borders.

In addition, a study will be conducted to determine the feasibility of providing incentives to Customs, cargo and FDPM personnel for good detection of wildlife trade offences. Capacity building for trans-boundary enforcement/patrol and building and managing informant networks is planned for enforcement staff.

2.6.3 Promote and practice ecologically sound land use, compatible to tiger conservation outside the priority protected areas

The four outcomes are:

- i. Sustainable utilisation of land areas in current and potential Human-Tiger Conflict areas as well as forest reserves
- ii. Establishment of community-based Better Management Practices (BMPs) to mitigate HTC in affected areas
- iii. Effective awareness programmes in HTC areas
- iv. A sustainable financing mechanism to mitigate HTC

Habitat management and land-use practices inside the priority areas are addressed by the first objective (Sec 2.6.1). Here, land-use practices and human activities outside the priority areas, especially in the

HTC areas, are dealt with. Besides the HTC issues, ecologically sound forestry practice, compatible with tiger conservation is addressed by implementing sustainable forest management in PRFs, with practical and scientifically acceptable wildlife monitoring procedures incorporated into the management.

Land-use guidelines and recommendations for both existing and potential HTC areas (as based on spatial modelling) will be incorporated in the subsequent NPP review and eventually reflected in Local or Structure Plans. Community-based BMP to mitigate HTC will be established and complemented with sustainable financing mechanisms.

Where applicable, negotiations will be conducted with private land owners to ensure land use and activities on private lands are compatible with tiger conservation. Where it is difficult to impose restrictions on private land, the concept of conservation easements should be explored whereby land owners are compensated for giving up certain options pertaining to land use and activities.

2.6.4 Apply science to monitor the efficacy of conservation actions and to improve the knowledge of tiger ecology

The four outcomes are:

- i. Establishment of the *Malayan Tiger and Large Mammal Monitoring Guidelines* by adapting existing mechanisms in place within the DWNP and based on internationally accepted methods
- ii. Monitoring of the occupancy of tiger and their prey across landscapes and tiger densities in priority areas
- iii. Improved planning and coordination of research conducted on tiger ecology and conservation through development and implementation of the tiger section of the *Wildlife Research Plan*
- iv. Enhanced knowledge and information base on tiger ecology and conservation

The indicator of success is measured in tiger occupancy across landscapes and population sizes or densities in priority areas (Sec. 2.5). The nationwide occupancy survey will determine the distribution of not only tigers but also all large mammals, including tigers' main prey species that can be detected and identified by their secondary sign. In addition to the occupancy survey, the intensive camera-trapping studies in priority areas will provide information on not only tiger densities, but also on the relative abundance of many other wildlife species. Because

nationwide monitoring requires the collaboration of multiple parties, the basic sampling framework will be standardised using internationally accepted scientific methods. This is not a strict protocol, but a set of guidelines which remain flexible to site variables or the specific needs and priorities of a particular organisation. The minimum standard, such as the use of a unified grid and basic methodological frameworks, will be standardised and agreed by the involved partners. Proposed methods will be rigorously tested in the field and revised and updated until the guidelines are finalised. The nationwide monitoring will commence once the guidelines are established.

Besides the monitoring of the status of tigers and their prey, there are many other studies that can be conducted in order to deepen the understanding of tiger ecology and conservation. During the National Tiger Conservation Workshop in 2006, participants made a list of questions that could be addressed through such studies – questions that lend themselves to specific research topics for the future. The list encompassed a variety of topics, from biological to social issues, regarding wild and captive tigers. The next step is to prioritise these topics and identify the resources (skills, manpower and funds) required for their implementation in a MYCAT-organised workshop where MYCAT partners, local universities, other independent tiger researchers and potential donors are involved. The tiger section of the *Wildlife Research Plan* will provide guidance to planning, endorsement, and fundraising for tiger research in the future. Request for proposals by DWNP according to this section will be reviewed by MYCAT, assisted by international tiger experts when necessary, to ensure the integrity of the research conducted.

2.6.5 Educate and empower the public for greater support and engagement in tiger conservation

The steps to build capacity and secure funds for achieving respective outcomes are implicit in the respective objectives. Potential outcomes of public awareness programmes have compounding benefits to overlapping objectives. Therefore, except for the

community outreach programmes specific to issues of HTC (Sec. 2.6.3), the public awareness components are addressed in this separate section. Besides general public awareness programmes conducted by various partners in the forms of publications and talks (Sec. 1.5.2.3), programmes with more clearly defined goals are necessary if awareness and knowledge are to be translated to actions and changes in values. Although potential target groups are mentioned in Sec 1.5.2.2, identification of desirable outcomes and effective communication tools for each target group was beyond the scope of the National Tiger Conservation Workshop in 2006 and thus specific actions were not discussed. Important target groups identified during the workshop were:

- 1) exotic meat restaurant patrons,
- 2) TCM practitioners/dispersers/consumers,
- 3) private zoos,
- 4) enforcement agencies,
- 5) rural community living near tigers,
- 6) Orang Asli,
- 7) school children, and
- 8) media.

For each target group, the following actions are necessary (Sec 1.6.2.1).

- i. Define a desirable outcome to be brought about by changes in their actions, attitudes, and values
- ii. Identify the message to be conveyed
- iii. Select the educational/communication strategy
- iv. Identify and acquire necessary resources (skills, manpower and funds)
- v. Conduct the programme
- vi. Evaluate the effectiveness of the programme

Development and implementation of specific programmes will be further discussed and coordinated in the MYCAT framework either in a special meeting or workshop.

Table 15: Actions, implementing agencies, indicators, and timelines (Refer to Page viii for the list of acronyms)

		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
1	Secure Central Forest Spine with strictly protected priority areas in landscapes connected with corridors												
1.1	Priority areas important to tigers (i.e., Belum-Temengor Complex, Taman Negara and Endau-Rompin Complex) are strictly protected, expanded, or sustainably managed												
1.1.1	Identify potential for expansion of the targeted PAs and for new PAs	Management Authorities for Priority Areas (i.e. DWNP, PSPC & JNPC respectively)	NRE, UPEN, EPU, DTCP	Recommendations for targeted agencies	Proceedings of workshop; media; meeting minutes; correspondence	x	x						
1.1.2	Implement recommendations for expansion and creation of new PAs		State governments	Local Plans; EXCO decisions; notification of new PAs published in State gazettes	State gazette			x					
1.1.3	Ensure PAs have effective management plans for implementation		MYCAT	Published management plans	Management plans	x	x	x					
1.1.4	Ensure effective implementation of the management plans in PAs		MYCAT	Management effectiveness evaluated using RAPPAM or equivalent; revenues and expenditures for PAs.	RAPPAM reports; annual financial reports	x	x	x	x	x	x	x	x
1.2	Important tiger habitats outside priority areas are identified and effectively managed as ESA 1 or 2 at state and local level												
1.2.1	Identify important tiger habitats outside PAs	DWNP	WWF, MYCAT SO, NRE, DTCP, Land Office, UPEN, Local Authority, FDPM	Important tiger habitats outside PAs identified	Maps showing the areas; recommendations to various depts; proceedings	x	x	x	x				
1.2.2	Implement sustainable forest management in PRFs, with practical and scientifically acceptable wildlife monitoring procedures incorporated into the management	FDPM	DWNP, MTCC; concessions	Implementation of suitable conservation initiatives adopted by FDPM	Certificate from MTCC; checklist		x	x	x	x	x	x	x
1.2.3	Upgrade the conservation status or gazette important tiger habitats in state lands as PRFs, ESA 1 or 2 in line with the NPP	DTCP, FDPM, DWNP	Land Office, UPEN, MYCAT	ESAs identified in revised local plans/structure plans; notification of PRFs in State gazettes	Local plans/structure plans; State gazettes		x	x	x	x	x	x	x
1.2.4	Identify and/or secure important tiger habitats in private/alienated lands	DWNP,DTCP, UPEN	Land Office, JKPTG, MYCAT	Corridors and buffer zones implemented through purchase of private/land/conservation easements/restrictions to land use	State gazettes; reflected in local plans/structure plans; announcements; media; agreements with private land owners	x	x	x	x	x	x	x	x

Critical areas for landscape connectivity are acknowledged, established and managed at state and local levels													
1.3	Engage relevant authorities in identifying specific linkages and implementation options	NRE, DTCP	WWF, Linking Landscapes Working Group	Prioritised sites and implementation options approved by relevant authorities	Meeting minutes; Cabinet announcement; media; proceedings	X	X						
1.3.1													
1.3.2	Conduct relevant studies to select specific sites and implementation methods	DWNP	WWF, MYCAT SO, FDPM	Results of the studies	Reports; presentations; maps; meeting minutes	X	X	X					
1.3.3	Establish the respective linkages and implement effective management	NRE, EPU, UPEN	JKPTG, DWNP, FDPM, WWF, JKR, DoE, DID, DoA, relevant agencies	Infrastructure and/or ecologically sound land-use practices in place; guidelines/management plans in place; budget to implement the plans in place; increased socio-economic benefits to local community	Media; EIA reports; wildlife monitoring system; reports of tiger presence; guidelines/management plans with budget			X	X	X	X	X	X
1.X	Integrate above projects towards the 10 th and 11 th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10 th and 11 th MP	X	X	X			X	X	X
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
2 Provide effective long-term protection of tigers and their prey													
2.1 Strengthening of wildlife legislation													
2.1.1	Determine the level of illegal trade in tigers and their prey in Malaysia through surveys of TCM shops and exotic meat restaurants and highlight the need for improved legislation and enforcement	DWNP	TSEA, MYCAT SO	Publication and dissemination of TSEA reports on trade of tigers and their prey in Malaysia	Reports; media pick-ups	X							
2.1.2	Complete the internal review of the PWA	NRE	DWNP	Notice of passing of amended legislation published in Federal Gazette	Federal Gazette	X							
2.1.3	Publicise the amendment made to the PWA	DWNP, MYCAT SO	Media, MNS, TSEA, WCS, WWF	Information in the public domain	Media pick-ups; MYCAT e-group; press releases		X						
2.2	Improved legislative or regulatory protection of key prey species												
2.2.1	Place a 3-year moratorium on issuance of hunting licence for sambar deer and barking deer	DWNP	MYCAT	No licences issued	DWNP statistics	X							

[illegible]

3.3	Effective awareness programmes in HTC areas									
3.3.1	Carry out assessment for awareness programmes in HTC affected areas	DWNP	WWF, WCS	Appropriate awareness/outreach programme needs identified	Reports: statistics	x				
3.3.2	Enhance appropriate programme and materials	DWNP	WCS, WWF	Awareness programme manual and materials	Published manual	x				
3.3.3	Train personnel	DWNP	MNS, WCS, WWF	Relevant personnel trained to carry out the programme	Training workshop		x			
3.3.4	Implement the programme	DWNP	MNS, WCS, WWF	Programme implemented with positive feedback	Site visit; media pick-ups		x	x	x	x
3.4	A sustainable financing mechanism to mitigate HTC									
3.4.1	Conduct a feasibility study on sustainable financing mechanism for resolution of HTC	WWF		Potential mechanisms identified	Reports	x				
3.4.2	Develop a sustainable financing mechanism, modify and link to financial agencies	WWF	UPEN Kelantan, USM, DWNP, Financial agencies	Mechanism developed	Legal documentation of the developed mechanism	x	x			
3.4.3	Test out the mechanism in a pilot site	WWF	UPEN Kelantan, USM, DWNP, Financial agencies	Mechanism agreed and supported by stakeholders, financial agencies	Statistics	x				
3.4.4	Implement at other affected areas	WWF	Depends on the result of 3.4.2 and 3.4.3. Yet to be determined.	Reduced socio-economic losses among affected locals; sufficient funds to implement BMPs; new income generated	Survey; conflict incidence report; reports		x	x	x	x
3.X	Integrate above projects towards the 10 th and 11 th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10 th and 11 th MP	x	x			x
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12
4	Apply science to monitor the efficacy of conservation activities and to improve knowledge of tiger ecology									
4.1	Establishment of the <i>Malayan Tiger and Large Mammal Monitoring Guidelines</i> based on existing mechanisms in place within the DWNP and internationally accepted methods									
4.1.1	Introduce underlining principles and best practice for monitoring tiger and tiger prey populations to local researchers	WCS	DWNP, MNS, WWF	Training workshop conducted	Workshop programmes and materials	x				

[illegible]

2.7 Implementation of the Plan

The Plan thus far has presented:

- Natural history and conservation status of tigers in Malaysia
- The ultimate, shared vision to be achieved in this century
- The time- and space-dependent goals, primary objectives and main outcomes (i.e. the road map to success)
- Quantifiable target for the year 2020
- Specific actions with indicators, responsible agencies and timeframes for the next eight years

The adaptive approach that is needed to successfully implement the Plan relies wholly on the stakeholders collectively learning from experiences and identifying methods needed to improve the actions. This section describes this dynamic approach in more detail and explores the importance of accountability and stakeholder engagement in the learning process. This culminates in the presentation of a method to monitor the implementation of the Plan.

2.7.1 Adaptive Management

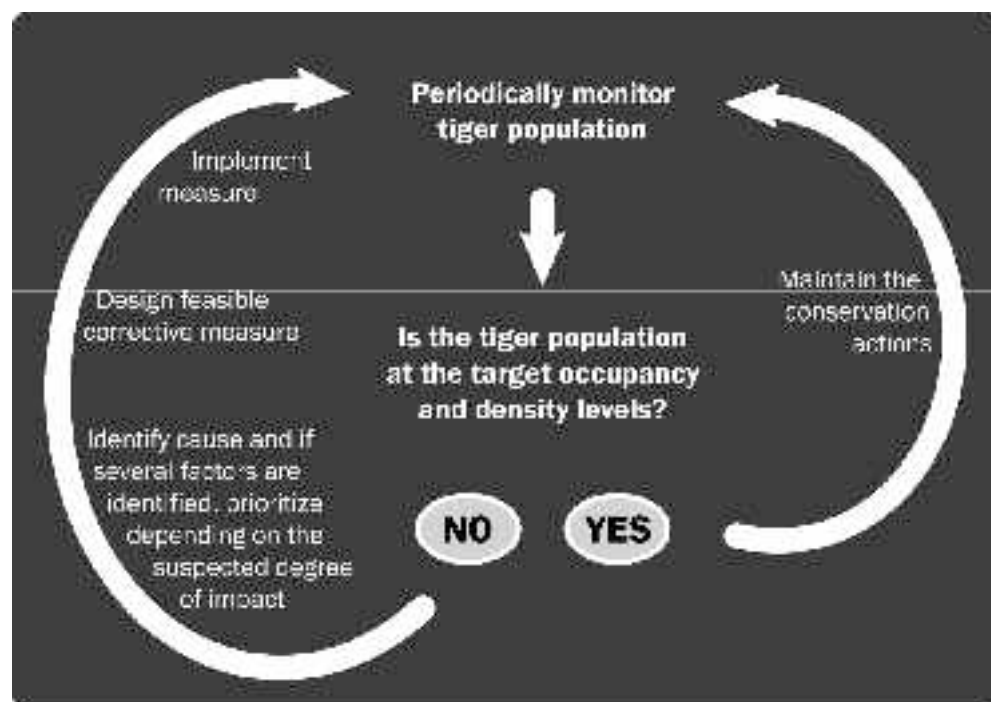
New knowledge and new solutions to complex problems faced by tigers are created by concerned and interested people coming together over a long period

of time to try things out, share their experience, insights and understanding, and to make decisions on what to do in the future. Besides obvious resources necessary, successful implementation of the Plan, therefore, depends on effective feedback and learning (Fig. 9).

This Plan is seen as the basis for more proactive, enhanced actions for tiger conservation, achieved through learning processes, improvements and advances in information and knowledge. It is a collection of working models to be strengthened through stakeholder dialogues and to be tested in practise, constantly reflected on and revised upon.

Given the limited resources available for conservation and the alarming rates at which both tigers and their habitat are disappearing, the accountability of conservation actions is critical. Applying sound methods to measure the efficacy of conservation actions can lead to more efficient planning, allocation of resources and implementation. In order for real and mutual accountability and learning to take place, the core of the stakeholder engagement strategy must involve a two-way mechanism (dialogues) for exchanging views, clarifying expectations, addressing differences, building shared understanding, encouraging creative but practical solutions, and building trust. Furthermore, all this must be done in an environment of openness and

Fig. 9: A simplified schematic diagram of an adaptive management framework for tiger conservation (Modified from Gratwicke *et al.*, 2006).



honesty where personal or organisational differences are set aside in order to focus on the task at hand.

2.7.2 Accountability

The strength in plans of this nature lies in the power to demand accountability. Accountability defines the relationship between the parties involved, and the beneficiary of the Plan should necessarily be in the best position to assess the effective implementation of the Plan. In this case, the beneficiary is the tiger, and therefore, the primary accountability will be reflected in their population status, which will be measured using internationally accepted methodologies standardised to Malaysian application (Sec. 2.5).

Besides the primary accountability to the beneficiary of the Plan, there are two other lines of accountability.

- i. **Vertical Accountability:** The implementing agencies are accountable to those who have legal authority and who can demand accountability because they control financial resources. For example, DWNP is accountable to NRE and, likewise, NGOs are accountable to their donors. The Malaysian Government is also accountable to the taxpayers collectively. On ethical grounds, the Plan, which is entrusted to save wild tigers in Malaysia, is ultimately accountable to the future generations of Malaysia as well as the global citizens at large, to whom the tiger in the wild may become an unknowable thing of the past.
- ii. **Horizontal Accountability:** The Malaysian government is accountable to the implementation of this plan in its entirety, which is developed in parallel to the various national policies it has established, keeping in mind its commitment to the international community through the multilateral environmental agreements it has subscribed to, such as the Convention on Biological Diversity and CITES. Implementing agencies are accountable to one another by the binding pledge to work together towards the unified goal. Since the implementing agencies are committed to using sound science, the agencies are also accountable to skilled peers within the scientific community.

2.7.3 Stakeholder Engagement

"... vision, persistence, thinking at the right social and spatial scales, and constructive dialogue are keys to the tiger's future."

- Ullas Karanth

Important stakeholders for this Plan are generally:

- **Primary stakeholders:** those who implement the Plan directly for the purpose of tiger conservation or provide necessary resources or skills to the implementation of the Plan; or influence the course of effective implementation significantly. These include MYCAT partners, NRE, FDPM and donors.
- **Secondary stakeholders:** those who implement the Plan primarily for other goals that indirectly contribute to the goal of this Plan. These include the DTCP, Police, Army, Customs, as well as specific local communities involved in sustainable resource utilisation or HTC resolution work. In other words, all other organisations involved in the Plan outside the primary partners are secondary stakeholders.
- **Tertiary stakeholders:** those who are affected by, or indirectly influence the outcomes of the Plan. These include state governments and the general public.

At an activity level, these categories are not hard-and-fast as what makes a particular group fall into a particular category depends on the level of involvement of each organisation in a specific programme. For example, in a conflict-resolution programme, the affected community is, at least, the primary stakeholder and perhaps even a beneficiary of the desired outcome. Furthermore, the Forestry Department exerts considerable influence on how tigers survive in forest reserves. Even though their primary task in forest management, FDPM is therefore considered a primary stakeholder for the Plan.

While short-term, project-based, collaborations around narrow objectives might be established and managed quite easily, the success of longer-term partnerships depends on building mutual confidence and trust, which requires frequent dialogues among the partners. This is where the MYCAT platform plays a vital role. Frequent dialogues are an excellent basis for learning through the adaptive management approach. There are four types of dialogues involved in the implementation and monitoring of the Plan:

- i. **MYCAT dialogues** – Besides day-to-day communications among the MYCAT partners, MYCAT Working Group members meet once every few months to keep each other updated on activities, and to discuss emerging issues and generally strengthen a mutually beneficial working relationship.
- ii. **Central stakeholder dialogues** – More formal dialogues with the primary and secondary

stakeholders will be called by NRE every six months to review the Plan implementation, share lessons, resolve issues, and to make minor adjustments to planned actions.

- iii. Local stakeholder dialogues – Dialogues with those local communities that are directly affected or local government agencies that are collaborating on specific projects will be done at the local level. The implementing lead agency will bring lessons learnt and unresolved issues from the local stakeholder dialogues to central dialogues to share with the rest of the stakeholders.
- iv. Dialogues with the donor of each project/organisation are done by the respective grantee. In the case of the Malaysian Government, the donors are the Malaysian taxpayers and the public reporting is done in the form of an annual report, which is available in print and online.

2.7.4 Monitoring Mechanism

As the custodian of the Plan, DWNP is given the responsibility of implementing many actions. However the implementation of the full Plan is a responsibility shared by both primary and secondary stakeholders. Because the primary stakeholder involves one other agency in NRE, namely FDP, and the secondary stakeholders involve many other agencies in NRE and in other Ministries, NRE will provide the inter-agency coordination and ultimately monitor the progress of the Plan implementation. Another key responsibility of NRE will be to link the implementation of the Plan with the implementation of other relevant Policies such as NPP, NPBD and NPE. The formal progress reporting will be conducted every six months during the central stakeholder meeting called by NRE (*Sec. 2.7.3 ii*). For this purpose, MYCAT Secretariat's Office will act as Secretariat to the NRE Division of Conservation and Environmental Management.

Every sixth month of the implementation (tentatively June and December of every year), the MYCAT SO will call for a 6th-month progress report from the implementing lead agencies using a standardised log frame. MYCAT SO will compile the reports, ensure the conformity of the report to a standard style and submit it to NRE that chairs the bi-annual central stakeholder meeting.

The reports include the following information for each action:

- Status of progress (completed, in progress, not yet started)
- Indicator
- Constraints which led to the delayed or incomplete action
- Measures taken or proposed to overcome the constraints
- Request for change or support
- Recommendations and plans for next step

The progress of each action will be reviewed in the order it appears in the Action Plan Table (Table 15). Necessary decisions and adjustments to the Plan will be made to resolve challenges to implementation. The specific responsibilities of MYCAT SO, as the Secretariat to the NRE Division of Conservation and Environmental Management, in the monitoring of the Plan are:

- To establish a standardised reporting format
- To ensure that all the relevant agencies are informed of the monitoring process
- To call for 6-month progress reports from the leading agency for each action
- To compile the report in a standardised manner and submit it to NRE
- To facilitate communication among MYCAT partners and other stakeholders
- To publicise and communicate with the public the implementation of the Plan Towards the end of Phase I (2008-2015), the implementation and success of the Plan will be thoroughly reviewed and evaluated by an external conservation auditing team working with the MYCAT SO. The results from the evaluation will form the basis for a major stakeholder workshop on the work plan for Phase II (2016-2020).

2.7.5 Public Reporting

For the purposes of public accountability and transparency, the log frame used for monitoring and resolutions from the bi-annual central stakeholder meetings called by NRE will be made available through the MYCAT e-group or from MYCAT SO to anyone who requests the progress report. Additionally, annual the MYCAT newsletter, *MYCAT TRACKS*, will highlight the major progress and challenges in implementing the Plan and this will be made available in print and online.

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Melaka Zoo @ DWNP

Appendix 2: Programme of the Malayan Tiger Conservation Workshop 2006

7 Nov 2006

Opening speech

Malaysia's vision for the Malayan Tiger

Dr Nadzri Yahya
Deputy Undersecretary, Conservation and Environmental Management Division
Ministry of Natural Resources and Environment

Introduction to the workshop

Expectations and outputs

En Rasid Samsudin
Director General, Department of Wildlife and National Parks

Malaysia in global tiger conservation efforts

Significance of Malaysia and international funding mechanisms for tiger conservation efforts worldwide

Dr John Seidensticker
Chairman, Save the Tiger Fund Council

Where we are and where we want to go?

Focused action plan using a holistic and integrated approach

Dr Kae Kawanishi
Secretariat, Malaysian Conservation Alliance for Tigers

Tiger Management Plan and priorities

Mr Kadir Hashim
Principal Assistant Director, Biodiversity Conservation,
Department of Wildlife and National Parks

Role of NGOs in tiger conservation

Ms Kanitha Krishnasamy
Science Officer, Malaysian Nature Society

Capacity building, community outreach and awareness programmes

Dr Melvin Gual
Malaysia Programme Director, Wildlife Conservation Society-Malaysia

Panel Discussion 1: Implementation of National Physical Plan

a. Implementation, enforcement and monitoring of National Physical Plan (NPP. 18 and 19)

Ms Siow Suan Neo
Deputy Director, National Physical Plan Division, Department of Town and Country Planning

b. What it means to tigers, challenges and possible resolutions

Mr Brian Lee
Tiger Project Leader, WWF-Malaysia

Panel Discussion 2: Combating the tiger trade

a. Specific trade-related threats to tigers in Malaysia

Mr Chris R. Shepherd
Senior Programme Officer, TRAFFIC Southeast Asia

b. Current mitigation measures, plans and recommendations for the future

Ms Mislihah Mohd Basir
Director, Law & Enforcement, Department of Wildlife and National Parks

Panel Discussion 3: Human-Tiger Conflict as a result of unsustainable rural development

a. Current status, mitigation measures and recommendations for the future

Mr Salman Saaban
Senior Assistant Director, Biodiversity Conservation Division,
Department of Wildlife and National Parks

b. Resolutions from Human-wildlife Conflict Mitigation Workshop in July 2006

Mr Ahmad Zafir Abd Wahab
Tiger Team Scientific Officer
WWF-Malaysia

A NATIONAL TIGER ACTION PLAN FOR THE UNION OF MYANMAR



Myanmar Forest Department,
Ministry of Forestry, Myanmar

May 1st, 2003



Wildlife Conservation Society
International Program

A National tiger Action Plan For The Union of Myanmar

Prepared by
Antony J. Lynam Ph.D
Associate Conservation Scientist "

May 2003

Cover illustration: The tiger (*Panthera tigris*) recorded by camera-trap in Htaung Pru Reserve Forest, Taninthayi Division.

A GUIDE TO USING THIS DOCUMENT

This document is divided into three sections. An executive summary of findings and general recommendations and a National Action Plan with specific recommendations, a schedule for the implementation of these actions, and responsible agencies is provided in pages 8-13. This is **minimum reading** for decision makers. For readers with some time to appreciate the background and rationale for these actions, PARTS 1-5 of this document (pages 14-43) is **essential reading**. PART 6 (pages 44-62) provides details of the field program that was mounted to acquire the information that provides the foundation for the Action Plan, and is **optional reading**.

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Errata National Tiger Action Plan for the Union of Myanmar

1. Inside cover. Cover illustration caption is from "Thayet Chaung Township, Dawei District, Taninthayi Division."
2. Contents. Fig. 3 is on p.6, Figs 4-8 are on p.7, Table I is on pages VII-X.
3. p. IV. 1st para. Schedule for implementation is on pages VII-X, PARTS 1-5 is pages 1-12, and PART 6 is pages 23-35.
4. p. VIII. Table I. item 2. k) scheduled for 2004, item 2. l) scheduled for 2004. item 5. a) should read "including recommendations in 2, 3, 4, and below"
5. p. IX. Table I. Item 5. c) should read "soften"; item 7. should read "Monitoring the status of the tiger and prey population to assess the effectiveness of conservation efforts."
6. p. 3. 2nd para, 3rd to last sentence should read "...for a deposit of US\$12."
7. p. 5. 1st para, remove "(see Essay Box 1)."
8. p. 9. 1st para, last sentence "25 CITES listed species."
9. p. 32. 5th para. should read "...3 globally near-threatened species. 12 CITES Appendix I, 6 Appendix II and 7 Appendix III."
10. p. 34. Fig. 13 no. 1. should read "Thayet Chaung Township, Dawei District, Taninthayi Division."
11. p. 42. Survey area for Sarawati (SRMT) was 254 sq. mi. (650 km²)
12. p. 40. Appendix I. Abbreviation for Thaukdut is (TD). Descriptions for sites 16 and 17 should be reversed
13. p. 47-48. Appendix II. IUCN status for Wild pig is Not Threatened, not on CITES appendix. CITES status for Wild dog (App II), Malayan sunbear (App I), Yellow-throated marten (App III), Crab-eating mongoose (App III), Elephant, Gaur, Tapir, Serow (all App I), Pangolin (App II), *Rangifer* spp. (App II), Black stork (App II).

PREFACE

The tiger represents many things to Myanmar people and to the Union of Myanmar and its natural wilderness. It is a national symbol for the country, a flagship for conservation, an indicator of intact and healthy forest ecosystems, and a keystone species upon which other biodiversity and the forest itself are dependent. Despite their importance, the status of Myanmar's tiger population was uncertain for many years due to poaching for the trade in Traditional Chinese Medicine (TCM), hunting of their prey species, and forest clearance to meet human needs at the expense of wildlife. In the absence of detailed knowledge about where the tigers live and how they are threatened in those places, plans to conserve the species were thwarted.

In 1999, the Myanmar Forest Department commissioned a study to determine the current status and distribution of the tigers, and formulate an updated national strategy for their future management and conservation. This document "A National Tiger Action Plan for the Union of Myanmar" is the end product of a three-year program conducted jointly by the Myanmar Forest Department and the Wildlife Conservation Society with funding from the US National Fish and Wildlife Foundation and Exxon Mobile's "Save The tiger Fund". I am pleased to say that the program has gone well beyond my expectations. The Plan details what is needed to save Myanmar's tigers from extinction and so provides a valuable prospectus for future conservation. It will become a part of the Myanmar forest policy for recovery of the species.

U Shwe Kyaw
Director-General
Forest Department
Ministry of Forestry

FOREWORD

It is with great pleasure that I introduce the National Tiger Action Plan to the government and the people of Myanmar. Upon first arriving in Myanmar in 1993, I remember how surprised I was by the intense feeling of "rightness" that overcame me. Having worked more than a decade in other parts of Asia I was feeling despair over the future of conservation in the region. I had grown tired of grappling with issues that never got resolved, despite my best efforts, and I was losing faith in the ability of people to realize how important wildlife and wild lands were to the quality and integrity of their lives. It seemed impossible to me at the time that any place I chose to work again would be different. But I was wrong. Myanmar was different.

I had first become interested in Myanmar because of its potential as one of the world's last strongholds for large mammal species such as the tigers, clouded leopards, and Asian elephants. And I hungered to go into the hinterlands of a country that contained the world's last great stands of teak trees, rugged, unexplored mountain ranges, and a diversity of wildlife almost unparalleled in the Asia-Pacific region. But what I had never anticipated was the intelligence, kindness, integrity, and diversity of the Myanmar people, and how seriously the Myanmar Forest Department and the Wildlife Division took their mandate to protect and conserve the country's remaining forests and wildlife.

I am pleased to have had the opportunity for the last ten years to work with staff of the Myanmar Forest Department. I feel honoured to have played a role in helping survey and designate some of the country's and the region's finest protected areas, such as Hkakabo Razi National Park and Hukaung Wildlife Sanctuary. But our work is only beginning. I was saddened to learn the results of the tiger surveys that were carried out by WCS and the Myanmar Forest Department. Yet I was heartened by the fact that there were still places of intact habitat where the tigers and other wildlife had a chance for the future if proper actions were taken.

This National Tiger Action Plan compiled by Dr. Antony Lynam and the Myanmar Forest Department is a landmark document. Nothing of this magnitude has been compiled for any country where the tigers still roam. But this document should not simply be viewed as a finished product to be placed on a shelf. It is a realistic plan of action that, if followed, could bring the tiger, a national treasure, back to Myanmar in numbers that will guarantee their future in the region for many generations to come. I am optimistic that the government and the people of Myanmar will do what needs to be done to save the tiger and the other spectacular wildlife species that wander their forests. And I hope that I and other WCS scientists will continue to have the opportunity to assist in any way possible towards this end.

I was correct about the feeling of "rightness" when I came to Myanmar in 1993. I hope I am also correct that in the years to come, Myanmar will point to its forests and wildlife with pride, and they will be held up as an example to other countries of what is possible when one cares about its natural heritage.

Alan Rabinowitz Ph.D
Director, Science and Exploration Program
Wildlife Conservation Society

ACKNOWLEDGMENTS

A vast number of people made this project possible. Firstly, the Minister of Forests, Director-Generals U Soe Tint, U Shwe Kyaw, and former D-G U Kyaw Tint, and U Khin Maung Zaw, Director of the Nature and Wildlife Conservation Division. Territorial staff of the Forest Department, the Local Commander of Taninthayi Division, and U Tun Paw Oo, Director of the Taninthayi Forest Department. U Aung Than wrote the first NTAP in 1996. In 1998 at the Saving the tiger Conference in Dallas, Texas, he and U Uga made the call for a revised NTAP. The field assessments were carried out by U Saw Htoo Tha Po, U Myint Aung, U Myint Maung, U Kyaw Thinn Latt, U Tin Mya Soe, U Sein Aung Min, U Thein Lwin, U Khin Maung Htay, U Tun Tun Lwin, U Moe Myint Aung, U Zaw Naing Tun, Daw Myint Myint Oo and Daw Khin Htay. U Kyaw Thinn Latt assisted with data management and analysis. U Saw Tun Khaing and U Than Myint coordinated with the Forest Department to initiate and guide the project. Drs Alan Rabinowitz, Joshua Ginsberg, Madhu Rao of the Wildlife Conservation Society provided advice on project design and implementation. They and Drs Tim O'Brien and Dale Miquelle (WCS) provided comments on this Plan. Workshops with WCS the tiger workers in New York (1999) and Thailand (2001) inspired some of the considerations for conservation action described in this report. Thanks to Dr Alan Rabinowitz for helping us see the big picture of the tiger conservation, and to Dr Ullas Karanth who showed us how the tigers can recover from the seemingly most impossible situations. Finally, the project was made possible with a generous grant from the "Save The tiger Fund", a joint project of the US National Fish and Wildlife Foundation and ExxonMobile Corporation, and from the Michael Cline Family Foundation. Initial funds for implementation of this conservation strategy are being made available by USFWS, the Nancy Abraham Conservation Fund and the "Save The tiger Fund".

EXECUTIVE SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. Background

A hundred years ago the tiger (*Panthera tigris*) occurred across Asia from eastern Turkey to the Russian Far East and south to the Indonesian archipelago. Myanmar is one of fourteen countries in Mainland Asia where the tigers persist today.

Reports and anecdotal information from surveyors, hunters, foresters, consultants and researchers attest to the former widespread occurrence of the tigers in Myanmar, except in higher elevation areas in the north. That the tigers existed over wide areas in the past was partly due to the existence of large expanses of intact habitat where human population density was low and disturbance to the tigers and their prey was minimal.

Recent attempts to quantify Myanmar's the tiger population were hampered because while rapid assessments for wildlife had been made in many areas, standardized survey methodologies for the tigers were not yet available.

While the tiger status remained uncertain, the trends for the tigers and their habitats are well understood. Widespread loss of habitat with changing land use patterns, and the uncontrolled hunting of the tiger prey, along with sport hunting, and commercial hunting for the tigers spurred by a recent demand for traditional medicines in Asia led to the demise of the tigers in the past. By the early part of the 20th Century thousands of the tigers had been reported killed in Myanmar.

Myanmar lost 25% of its forest cover, potential habitat for the tigers and other wildlife between the 1940's and 2000 (FAO, 2000). By 2002, 4.73% (31,792 km²) of the country was either formally protected or proposed for protection. The tigers require large areas of contiguous habitat, usually 3,000- 15,000 km² in size for long-term survival. While forest areas of this size exist in the country only three areas are currently protected. Nearly 80% of the protected areas are less than 1,000 km², with 10 areas less than 100 km².

2. Summary of activity and main findings

As a first step towards long-term future planning for the tigers in Myanmar, and to guide efforts to identify new areas for protection, a project to develop an updated National The tiger Action Plan was initiated in 1998. The primary objective of the program was to determine the tiger occurrence via direct field survey across potential the tiger habitats, and use this information to select areas for special protection for the tigers.

The tigers may serve as conservation "umbrellas". This is the concept that protecting places with the tigers effects the conservation of other wildlife and biodiversity elements with smaller ranges.

The Myanmar Forest Department and the Wildlife Conservation Society initiated the program with financial support from the "Save The tiger Fund," a joint project of the US National Fish and Wildlife Foundation and Exxon Mobile Corporation.

A the tiger conservation and survey techniques training workshop was conducted for Forest Department and NGO junior staff at Alaungdaw Kathapa National Park, historically known for its the tigers. From the training, a team of seven participants was recruited to carry out field surveys, and conduct awareness work in communities adjacent to survey areas.

Using the results of a previous planning analysis for the tigers, and updated maps of forest cover, a set of 17 potential tiger areas were identified from large blocks of forest. Interviews of local people were done to determine likely places where the tigers existed in these forest complexes and guide the selection of survey locations.

Using a field technique first developed in India, and modified for use in Southeast Asia, a team of trained staff conducted presence-absence surveys for the tigers at each site. A field survey effort during 1999-2002 involving > 15,000 nights with camera-traps, and > 1,300 hours of sign searching across 5,500 km² of potential the tiger habitat

revealed the following results:

- The tiger occurred in less than a quarter of the potential areas;
- Based on the results of field surveys, the tigers have disappeared from five areas surveyed; Alaungdaw Kathapa, Thaungdut, Mahamyaing, Nankamu, Panlaung-Pyadalin;
- Based on the results of field surveys, the tigers have disappeared or occur at very low density in eight of the areas surveyed; Paletwa and Kaladan river catchment area, Sumprabum, Khaunglanphu, Paunglaung, Momeik-Mabain, Central Bago Yoma, Rakhine Elephant Range, Saramati Taung and adjacent areas;
- Based on reports from forestry officials, the tigers may occur at low density in two other areas that were not surveyed; Shan Yoma (Kayah-Kayin) and S. Kachin;
- Based on the results of field surveys, the tiger occur in Htamanthi Wildlife Sanctuary, Sagaing Division and surrounding areas. The population is small (<10 individuals) and is threatened with extinction;
- Based on the results of field surveys, the tigers occur in a large intact forest landscape comprising Hukaung Valley and surrounding areas, in Kachin State. Moderate numbers (<50) of the tigers are thought to exist there;
- Based on the results of field surveys, the tigers occur in a large intact forest landscape in northern and southern Taninthayi Division. A relatively large (>50) population is thought to exist there. Together these areas represent the largest, intact habitats for the tigers in Mainland Southeast Asia;
- In all areas where they persist in Myanmar the tigers are threatened by poaching for commercial international trade, and poaching of prey for local consumption and local trade;

Based on information collected during the field survey program, probably no more than 150 the tigers now exist in the wild in Myanmar and the population is rapidly declining. The tiger might soon be on the verge of extinction in Myanmar if action is not taken immediately.

Recommendations for addressing conservation needs of the tigers

Although the situation is critical, the tiger populations may potentially be recovered if the Government makes an immediate and long-term plan of action.

The priority actions necessary in the short-term (2-5 years) for saving the tigers are;

- Establish protected areas, protected corridors and priority management areas in and around the Hukaung Valley, and in Taninthayi Division to protect wild the tigers and their habitat;
- Establish monitoring programs for the tiger and prey population in these places to assess the effectiveness of conservation efforts;
- Reduce killing of the tiger prey species and trade that has developed around those species. Train government staff in anti-poaching and anti-trafficking techniques and develop systems for patrolling these areas to ensure the preservation of these resources;
- Suppress all killing of the tigers and the illegal trade in the tiger products. Amend existing wildlife legislation to fall in line with international laws. Conduct wildlife conservation and awareness training for government personnel and recruit them to help identify and suppress wildlife trade;
- Define roles and responsibilities of field staff responsible for the tiger conservation;

The priority actions necessary for saving the tigers in the long-term (6-20 years) are;

- Improve public awareness and develop education curricula concerning the importance of the tiger conservation to increase support from local people;
- Stop further loss of the tiger habitat and to restore degraded habitat by practicing sustainable forest management;
- To conduct zoning of forest areas so as to avoid development and human intrusions inside the tiger critical habitats;
- Strengthen international cooperation to maintain connectivity of the tiger habitat across international boundaries possibly through the establishment of cooperative management of contiguous protected areas along borders.

TABLE 1. NATIONAL TIGER ACTION PLAN FOR MYANMAR

Action	Organisation collecting		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
1. Suppressing all killing of tigers and the illegal trade in tiger products at national, Provincial Wildlife and Protected Areas Law enforcement of international conventions within Myanmar. This would include articles prohibiting the sale to part sale of products originating or implying origin of tiger bone, tiger organs, blood, teeth, claws or skin.	Myanmar Govt		✓				
1a Impose heavy fines for offenders and use national authorities implementing international legislation.	Myanmar Govt		✓				
1c Conduct wildlife conservation and awareness training for 1000 government personnel including military, customs, police, immigration, provincial administrative staff in Yangon, Mandalay, Nay Pyi Taw and other international transit points for wildlife. This would include border, customs, immigration, wildlife personnel, border, and international, application and knowing their protection status.	Myanmar Govt & WCS	WCS and other NGOs	✓				
1d Conduct wildlife enforcement and awareness training for all staff in tiger sites and landscapes.	Myanmar Govt & Ministry of Natural Resources and Environmental Conservation	WCS and other NGOs	✓				
2. Recruit local government staff to help identify tiger sites and encourage them to report tiger observations to relevant authorities.	Myanmar Govt		✓				
3. Create a Wildlife Investigation Unit to investigate and suppress crime against wildlife, including trade, trafficking, illegal killing and capture, poaching, hunting, and other persecution. The unit will enforce current and international legislation. The unit would be composed of the Ministries of Home Affairs, Forestry and Tourism and would report directly to the Minister of Forestry.	Myanmar Govt	WCS and other NGOs		✓			
3a Recruit and recruit government staff to join the Wildlife Investigation Unit. Form model units to suppress wildlife crime across the country.	Myanmar Govt	WCS and other NGOs		✓			
3b Reducing killing of tiger prey species and associated trade	Myanmar Govt	WCS	✓				
3c Amend the Protected Wildlife and Protected Areas Law to make the enforcement of international laws within Myanmar. Modify Chapter V Article 15 to recognize the international classifications of wildlife species, and their associated protection status.	Myanmar Govt						
3d With the view to protecting tiger prey species, allow the commercial farming of only selected wildlife species only in facilities designated by the Forest Department.	Myanmar Govt		✓				
3e Take action to stop all killing of prey species at places where tigers are naturally or potentially found.	Myanmar Govt	WCS and other NGOs				✓	
4. Train government staff in the Kung Valley and Phawbun to anti-poaching and anti-trafficking techniques. Where possible involve local military personnel as instructors.	Myanmar Govt	WCS	✓				
4a Recruit teams of 200 persons whose responsibility is protect etc. Numbers of 150 persons should at least 2 rounds 100 km2 for effective management. Training for 100 persons with necessary equipment and salary incentives to motivate them to combat poaching.	Myanmar Govt	WCS		✓			
4b Develop warmside patrolling using all protected areas using be-dangers. Main patrolling a mandatory management activity with a monthly schedule and budget.	Myanmar Govt			✓			

Action	Organization delivering	Timeframe / to be completed by				
		Lead	Other possible relevant partners	2003	2004	2005
g) Update the Wildlife Law to include protection for wildlife outside protected areas, and empower government staff to enforce the legislation.	Myanmar Govt		WCS	✓		
h) Outside protected areas, study patterns of hunting and consumption of wildlife to determine its sustainability, especially for prey species.	WCS				✓	
i) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Protected status to Completely Protected, such as Wild buffalo (<i>Bubalus bubalis</i>)	Myanmar Govt.			✓		
j) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Seasonally Protected status to Protected status: Hog deer (<i>Axis porcinus</i>) and barking deer (<i>Muntiacus muntjak</i>).	Myanmar Govt.			✓		
k) Wildlife conservation and awareness training for all wildlife offenders.	Myanmar Govt.		WCS	✓		
l) Impose fines for wildlife offenders in tiger areas with proceeds towards supporting tiger conservation activities.	Myanmar Govt.					
3. Improving forestry management to stop further loss of tiger habitat and to restore degraded habitat						
a) The National Code of Forest Harvest Practice involves 30 year cutting cycles, a no use of elephants for removal of logs reduce environmental damage over other practices. Apply this traditional method of forest harvest effectively in a fewness in the country.	Myanmar Govt.		WCS, FAO, UNDP		✓	
b) Ban the hunting of wildlife in forest reserve areas.	Myanmar Govt.		WCS			✓
c) Provide wildlife conservation awareness and education training to timber harvest staff.	WCS		Myanmar Govt.	✓		
d) Define Strict Conservation Zones for Hkakum Valley and Hkamti where no human use of natural resources is allowed. Create buffer areas to a low restricted use by local people (including extraction of non-timber forest products, fuel wood collection, and livestock grazing). Ban shifting cultivation and hunting of animals in the buffer area. Use EcoBarge patrol teams to enforce the restrictions.	Myanmar Govt.		WCS	✓		
4. Improving forestry management to reduce intrusions of local people into tiger habitat, and improve planning to avoid development in tiger critical areas						
a) Reclaim plantations and revoke all mining licenses in Hkakum valley and Hkamti Wildlife Sanctuaries.	Myanmar Govt.					✓
b) Consider the location of government, camps and permanent settlements outside of these reserves.	Myanmar Govt.					✓
c) Stop the construction of roads in protected areas and forest reserves.	Myanmar Govt.			✓		
e) Close or limit access along logging roads in Taungtha Division to reduce the risk of collisions with tigers.	Myanmar Govt.				✓	
d) Include wildlife assessment in land development programs for Lamthaung Division.	Myanmar Govt.		WCS	✓		
f) Develop education programs to improve awareness about wildlife for local people living in and around forest reserves in Taungtha Division.	WCS		Myanmar Govt.	✓		
5. Establishing protected areas, ecological corridors and priority management areas to protect wild tigers and their habitat						
a) Review current management plans for the Hkakum Valley and Hkamti to include specific actions for conserving tigers, including recommendations in 6.2.2, 6.3.2, and 6.4.2, and below.	Myanmar Govt. & WCS			✓		

Action	Organisation delivering	Timeframe / to be completed by				
		Lead	Other possible relevant partners	2013	2014	2015
b) Expand Hkamti Wildlife Sanctuary to increase its size to at least 3,000 sq. km to ensure long term survival of tigers	Myanmar Govt.	Myanmar Govt.	WCS	✓		
c) Create a dedicated tiger reserve including the Hkakung Valley and adjacent forest reserves. The reserve will serve to link tiger populations in India with those in Myanmar. Expand the eastern border of Hkakung Valley Wildlife Sanctuary to protect potential tiger habitat in the Sangreben area.	Myanmar Govt.	Myanmar Govt.		✓		
d) Establish in-tiger human use zones (buffer) that will buffer the edges of Hkakung Valley and Hkamti reserves reducing the risk of mortality for tigers.	Myanmar Govt.	Myanmar Govt.		✓		
e) Create new protected areas or special tiger management zones (i.e. the Taitung and Eileton, including the Loiwa River, Greater and Lesser Taitung River catchments). These areas will protect tigers and their habitats and allow limited human use of natural resources around the reserves in a manner complementary to tiger conservation.	Myanmar Govt.	Myanmar Govt.				✓
f) Use existing GIS capabilities in the PD to identify and delineate special management zones and corridors for tigers.	Myanmar Govt. & WCS			✓		
5. Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of tiger habitat across international boundaries						
a) Corridors wildlife conservation and awareness training for (1) government personnel, including military, customs, police, immigration and local administrative staff, stationed near or on country borders. This would include basic training in identifying wildlife listed in the Myanmar Protection of Wildlife and Protected Areas Law 1994, and knowing their protection status.	Myanmar Govt. & WCS	Myanmar Govt.		✓		
b) Hold 2 internal workshops involving local government officials to discuss transborder issues including trade, trafficking and wildlife, and develop plans to suppress the trade.	Myanmar Govt.	Myanmar Govt.	WCS	✓		
c) Recruit local government officials on both sides of the Thailand border to suppress transborder wildlife trade at Mae Waung, Prachin Kiri Kiri, Kabinrang Ban 1 Ton, Kawthuan g-Raong especially Thai Hry Island, Myawady Mae Sot, Thae Pagoda Pass, and Tadulets Mae Sot, and prevent access by professional poachers from Thailand.	Myanmar Govt. Thailand Govt.	Myanmar Govt. Thailand Govt.	WCS	✓		
d) Create a tiger reserve in Taitung Division opposite Thailand protected areas that support large populations of tigers, Western Forest Complex and Kaeng Krachan National Park.	Myanmar Govt.	Myanmar Govt.		✓		✓
e) If possible expand the reserve or create new reserves to form a corridor between these two Thai reserves.	Myanmar Govt. & WCS Thailand Govt.	Myanmar Govt. & WCS Thailand Govt.	WCS		✓	
f) Develop a specially explicit tiger conservation database for the Huet Kha Khaeng - Thung Yai Naresuan TCU (Level 1 TCU T3).	Myanmar Govt.	Myanmar Govt.			✓	
g) Where possible coordinate anti-poaching patrols and/or wildlife surveys on both sides of the Thailand-Myanmar border.						
7. Monitoring the status of the tiger and core population to assess the effectiveness of conservation effort for Hkakung Valley landscape						
a) Identify critical habitats and core areas for tigers and prey across the landscape.	Myanmar Govt. WCS	Myanmar Govt. WCS		✓		
b) Estimate numbers of female tigers within the landscape and ascertain that there is a reproductively viable population of tigers.	Myanmar Govt. WCS	Myanmar Govt. WCS		✓		

Action	Organisation delivering		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
m) Determine the current threats, demography, sex, and range of human activities that must be taken into account if the proposed landscape is to be successful and sustainable in the long term.	Myanmar Govt. & WCS		✓				
n) Create a GIS map and database to show current and the patterns, possible future land use trends, and tiger and prey source areas.	Myanmar Govt. & WCS		✓				
For Faunahed Division, long-term							
a) Train local foresters how to identify tiger and prey via sign surveys, use of camera traps for wildlife survey, and methods for making observations and recording data.	WCS			✓			
b) Determine occupancy of habitats at accessible sites across the landscape, including Myanmar sub-habitat and Lantia River areas, away from sites where tigers are known.	Myanmar Govt. & WCS			✓			
c) Determine prey abundances using line transect sampling.	Myanmar Govt. & WCS			✓			
To Determine tiger abundance using double video camera trap sampling:							
<i>For sites in Paleywa and Kaladan river catchments, Sampraburn, Khawngkengpho, Pamphuang, Monah, Mahab, Central, Bago Yoma, Rakun, Elephant Range, Saranant Tang are.</i>							
ii) Train forest foresters how to identify tiger and prey using sign surveys.	WCS		✓				
ji) Determine occupancy of habitats at the sites using sign surveys.	Myanmar Govt. & WCS		✓				
ki) Establish a logbook to record observations of tiger and prey, and animals use of the logbook.	Myanmar Govt. & WCS		✓				
8. Improving public awareness of the importance of tiger conservation in Myanmar support from local people							
a) Develop wildlife education programs to discourage hunting by local people in and near tiger reserves. When possible recruit local people, especially ex-hunters to help implement these programs.	WCS			✓			
b) Involve 50 local people in wildlife survey and research activities to make positive use of their local or indigenous knowledge.	WCS	Myanmar Govt.	✓				
c) Collaborate with authorities in charge of development projects to include wildlife conservation as a component of these projects and resolve any potential conflicts between the needs of people and wildlife.	Myanmar Govt. & WCS		✓				
d) Produce a documentary about tiger conservation in Myanmar and broadcast it on National television.	WCS			✓			
e) Dub existing wildlife documentaries about Myanmar into local language and broadcast.	WCS		✓				
f) Adapt WCS education materials about tigers into Myanmar language and implement a special training program for school children at selected high schools in Yangon, and adjacent to tiger reserves.	WCS			✓			
9. Defining roles and responsibilities of personnel responsible for tiger conservation							
a) Provide special training for managers of tiger reserves in management techniques, including leadership skills, decision-making, planning, protection, use of information and technology, and personnel management.	WCS		✓				
b) Assist managers of tiger reserves to observe the day to day operations in selected tiger reserves in India and Thailand.	WCS	Thailand India Govts.		✓			
c) Define roles for junior staff in Hukang Valley and Hukang Valley Wildlife Sanctuaries, and for Tanintharyi Division junior forestry staff and staff in other areas in conducting field monitoring of tigers and prey.	Myanmar Govt.		✓				

PART 1

INTRODUCTION

Myanmar is a high priority country for biodiversity conservation in Asia with extensive forested landscapes, high species diversity and endemism (Wikramanayake et al. 2001). This diversity ranges from rich alpine floras and tropical pine forests in the north, to dry dipterocarp and mixed deciduous forest in central dry zone, to tropical rainforests in the Peninsular. Coral reef ecosystems in the Myeik Archipelago are among the least disturbed in the region.

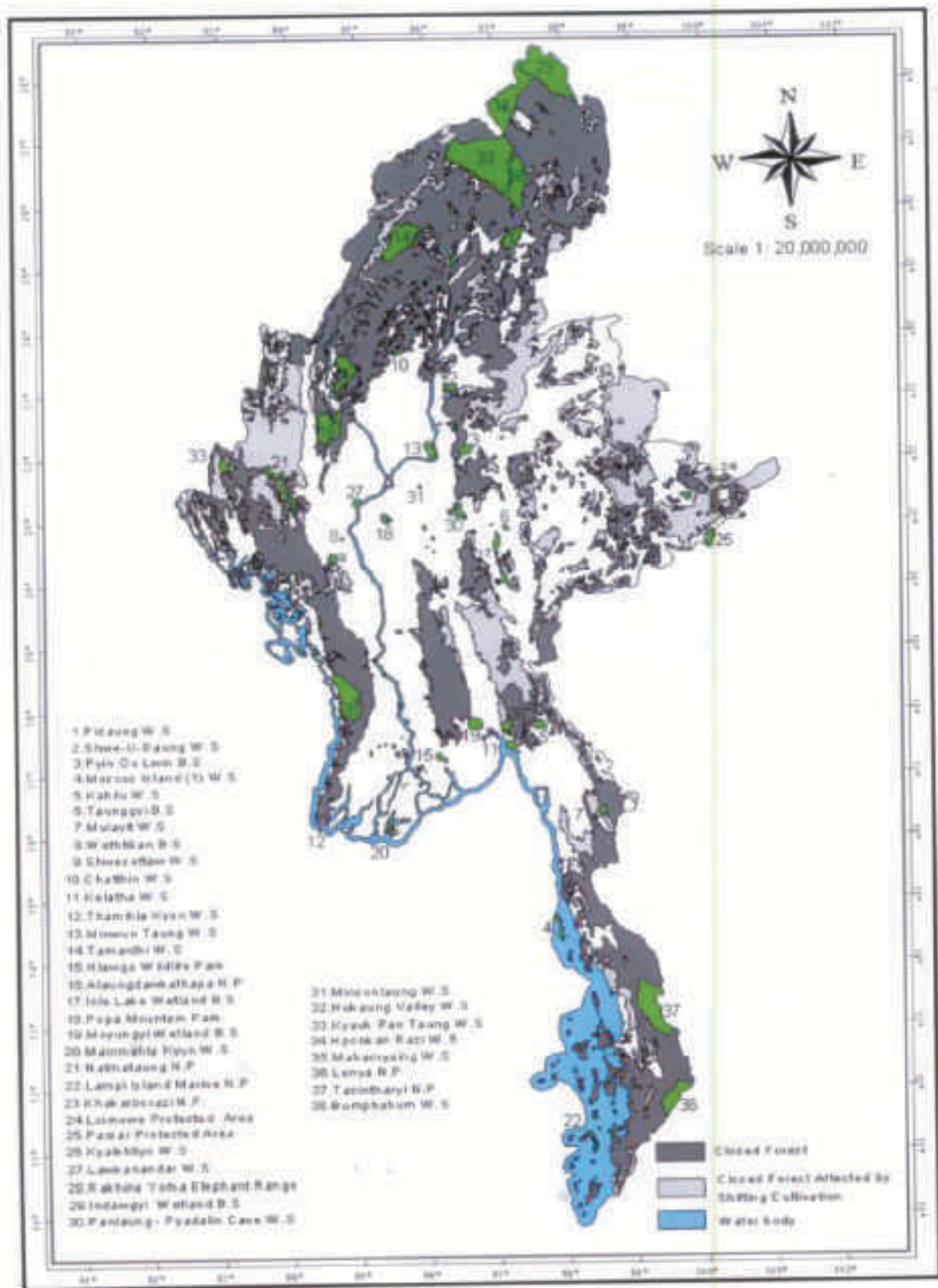
Unique to the region natural forests in Myanmar cover a third of the country, including large intact expanses with low human inhabitation (UNEP 1995). Prior to 1994 the country had <1% of lands in protected areas but by 2002 this had increased to just under 5% (Fig. 1), a 500% increase in size in less than a decade. While most reserves in the system are too small to support the tigers, later additions to the system include large expanses of forest and corridors between areas that are more than enough to support

the tigers as well as other species with large area requirements.

Deforestation in neighbour countries brought about by unsustainable land-use practices has led to pressure on Myanmar's natural resources, especially in border areas in the far north and south which contain high biodiversity but are difficult to access and monitor. Logging, extraction of forest products, loss and fragmentation of forests and hunting have reduced wildlife populations and their habitats.

The remainder of this essential reading section includes a review of the pressing threats to the tigers in Myanmar (Part 2), a review of the history of conservation planning for the tigers (Part 3), a summary of the current status and distribution of the tigers in the country (Part 4), and a rationale for the National The tiger Action Plan (Part 5), with proposed solutions for addressing the threats, for recovering the tiger populations and guiding future conservation efforts in the country.

FIG. 1. FOREST COVER, EXISTING AND PROPOSED PROTECTED AREAS OF MYANMAR – 2002.



PART 2

THREATS TO THE TIGERS

Although the tiger is potentially found over a wide range of habitat and disturbance conditions, it is sensitive to a variety of human influences. The prospects for the tiger survival in places where they occur in Myanmar are affected by a number of key threats;

2.1 Hunting for commercial trade in the tiger products

The hunting of the tigers has a long history in Myanmar- (Pollok & Thom 1900). The tigers were traditionally considered pests and until 1931 the government provided licenses and rewards for killing them. This led to depopulation on a massive scale through sport hunting. For example, during a 4 year period from 1928- 1932, 1,382 the tigers were reported killed in British Burma (Prater 1940), an order of magnitude larger number than the current tiger population in Myanmar. The tigers were historically widespread in Myanmar (Fig. 2) although their densities were not uniform across intact habitat, possibly a result of variation in hunting pressures from place to place (Prater 1940). More recently, declining the tiger populations across the range combined with increasing prosperity of Asian countries, have led to an increasing demand for the tiger products for traditional Chinese medicines.

Various tribal groups hunted the tigers to supply the trade (Rabinowitz 1995) leading to their extirpation in some areas (Rabinowitz 1998). The sale of the tiger products was banned by CITES since 1975 but thrives in the black market, especially in some border areas where it is uncontrolled (Fig. 3a). Although it is difficult to measure the size of the trade, at least 10,000 kg of the tiger bone representing 500-1,000 the tigers was imported by East Asian countries between 1970 and 1993 (Hemley & Mills 1999). The tiger hunting continues in those areas that still contain the tiger (Fig 3b.). As the population declines every the tiger killed makes the harvest an increasingly unsustainable one. To demonstrate the efficiency of the trade, Myanmar shopkeepers on the Thai border claim they can provide a tiger within 3 days for a deposit of only 500 Baht. Direct hunting of the tigers threatens to drive the Myanmar population to extinction. Improved domestic legislation combined with monitoring of markets and law enforcement can contribute to reducing the trade in the tiger parts.

2.2 Prey depletion

Because it is dependent on a relatively large intake of food to support its metabolism, the tigers are sensitive to loss of prey through hunting (Karanth & Stith 1999). The erosion of available energy has a "bottom-up" effect on ecosystem structure (Seidensticker 2002). Myanmar's per capita income in 1998 was US\$1,200, making it one of the poorest countries in the world. People living in and around forested areas traditionally hunted wildlife for subsistence. More recently local people hunt to supplement increasingly meager incomes from farming. This trend is widespread (Rabinowitz 1995) occurring in up to 70% of protected areas (Rao et al. 2002). Trade in the tiger prey species occurred near all the places where the National tiger Team conducted field surveys during 1999-2002. The illegal trade in wildlife is globally worth \$7 billion a year, only less than the trade in arms and drugs (Kanwatanakid et al. 2000). Myanmar is a part of the trade in Asia with a network of markets and routes established to supply the demand in China and Thailand. Markets for the sale of wild, meat and trophies, of the tigers and prey species have existed along the Thai border at Tachileik, Myawady, Three Pagodas Pass and Maung Daung for a long time and continue to offer wildlife prohibited by CITES (Bradley-Martin & Redford 2000; Hill 1994; International 1999; Bennett and Rao 2002).

The volumes of wildlife in the trade fluctuate according to the security situation, and decreased following the cancellation of Thai logging concessions after 1993, and escalation of hostilities between KNU and the Myanmar government after 1996 (International 1999). There is some evidence to suggest that some of the Thai border wildlife trade may have moved to Yangon. As an example, several restaurants and shops in central Yangon offers a range of wild meat dishes, and tonics made from animal parts (A.J. Lynam personal observation). In contrast, wildlife trade is rampant and uncontrolled in Shan State, especially towns near the China border (Than 1998) (see Essay Box I; Fig. 4.). Prey and the tiger populations may be restored in the wild if they can be protected from hunting and wildlife trade (Madhusudan & Karanth 2002).

Fig. 2 Historical Records (Pre - 1999) of Tiger Occurrence in Myanmar.

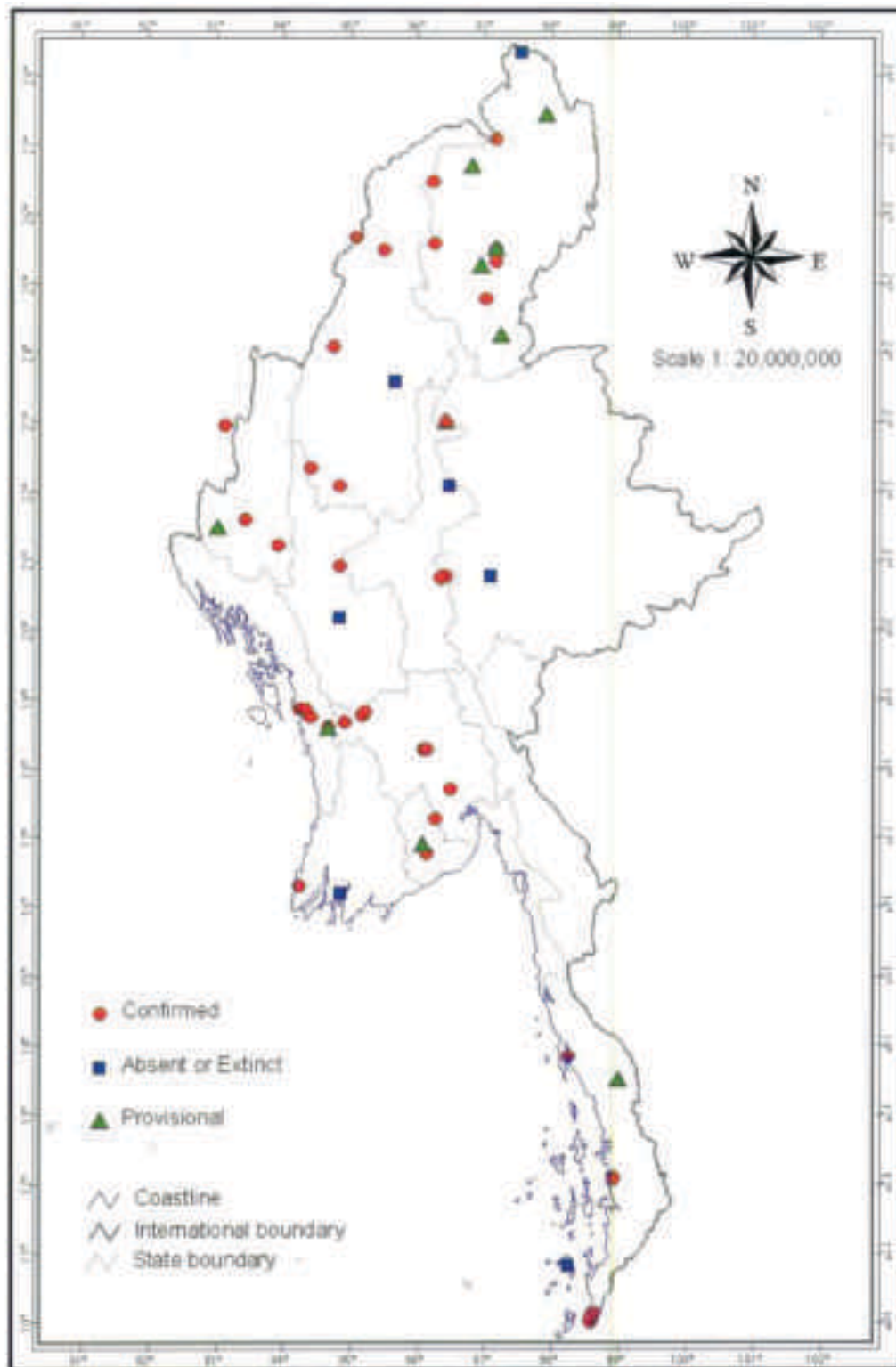




Fig. 3a. Tiger skin for sale in Tachileik market, Shan State.



Fig. 3B. Poacher recorded by camera-trap at Paunglaung Catchment, Mandalay Division. Poaching of tigers was the single most important factor causing the demise of tigers in Myanmar in the past.

2.3 Habitat loss, degradation and fragmentation -

Myanmar had an estimated 46.6% closed forest cover in 1990, with 37.4% remaining in 1997 (FAO 2000), one of the highest levels in the Asia - Pacific region. The net deforestation rate between 1989 and 2000 was 0.21% (Brunner et al. 2002), a fraction of the deforestation rate in Thailand during the same period. Deforestation is highly concentrated and is largely a result of logging in forest reserves (Rao et al. 2002)(Fig. 5). While forests are easily cut down they are only restored with great investments of time and resources (Elliott et al. 2000), usually beyond the capacity of forestry budgets. Except in parts of Shan State, where remaining forest resembles the highly fragmented situation in Thailand, large extensive tracts of closed forest characterize the Myanmar landscape providing good potential the tiger habitat (Fig. 1). Disturbance that degrades or destroys natural forests, including grazing by domestic animals, shifting and permanent cultivation, mining, permanent human settlements, and plantations occur in 90% of protected areas (Rao et al. 2002). These threats could be reduced by improved agricultural and animal husbandry practices, and improved land-use planning.

2.4 Harassment and displacement -

Rural development has progressed slowly in Myanmar so that dams, roads, pipelines, power lines, and settlements -infrastructure that disrupt wildlife populations by creating barriers to dispersal (Goosem 1997) -have had localized effects on the tiger

populations. For example, roads occur in only 25% of Myanmar protected-areas (Rao et al. 2002) (Fig. 6) and most are non-paved and seasonal access only. However, roads whatever their condition provides improved access to forests for poachers. Because the tigers often use non-paved roads as movement corridors, this potentially increases the chances of encounter with humans. Aside from human infrastructure, the disturbance caused by local people entering forests to engage in the extraction of non-timber forest products (Fig. 7.) can have adverse affects on the tiger behaviour. Such disturbances occur in 85% of protected areas (Rao et al. 2002), and



Fig. 4. Wildlife for sale at Mongla market, Shan State.



Fig. 5. Logging reduces available habitat, and alters habitat quality for tigers and their prey.

probably reflect the incidence in non-protected forests, so the effect may be considerable. Improved land use planning and zoning in forest reserves can reduce the threat from internal fragmentation.

2.5 Genetic erosion -

A number of studies have shown that small populations are more likely to go extinct than large ones. One of the reasons is that at small size, survival rate or reproductive rate of a population is reduced because its members have difficulty finding mates, sex ratios are skewed, and they tend to breed with related individuals (Allee 1931). This results in a net loss of genetic variation, sometimes expressed by an increase in expression of deleterious mutations



Fig. 6. Road construction opens up the forest facilitating access to poachers.



Fig. 7. The extraction of rattan and other non-timber forest products is often done on a massive scale and affect habitat quality

through homozygosity. Fitness is often reduced in the process. Despite this, many populations have persisted for long-periods of time with low levels of genetic variation e.g. cheetahs (Caro 2000). It is likely that genetic and demographic processes interact so that as populations decline it is increasingly harder to recover them (Gilpin & Soule 1986). The tigers in severely fragmented habitats in Myanmar would fall into this category. Maintaining natural corridors between forest patches inhabited by the tigers can reduce this threat.

2.6 Protected area management -

Myanmar is one of the least externally funded and internally protected tropical countries in Asia (Balmford & Long 1995). As a result while



Fig. 8. Myanmar foresters undertaking basic wildlife tracing with the author, Alaungdaw Kathapa National Park, December 1998.

forests have been conserved for timber production for almost 150 years (Bryant 1997), and the earliest protected area was gazetted in 1918, legislation to protect both wildlife and their habitats was only introduced in 1994. Wildlife training for protected area staff was initiated in 1995 with only a third of staff having received training (Rao et al. 2002) (Fig. 8). Only since 1998 have protected areas been designed to protect entire landscapes and the ecological processes within. Consequently, many of the older protected areas e.g. Pidaung Wildlife Sanctuary, no longer support the tigers and other wildlife because of large-scale degradation and loss of habitat inside them. A recent review found that human activities incompatible with conservation occur in every protected area (Rao et al. 2002). Extraction of non-timber forest products occurred in 85% of the areas, hunting in up to 70%, while buffer zones for the protection of core forest zones were generally lacking. The combined effect is a loss of habitat quality for the tigers. Myanmar protected

areas (Fig. 1.) currently do not provide adequate representation of the diversity of habitats inhabited by the tigers. Reserve managers need training to understand threats to wildlife, and how to best manage available resources to enable effective conservation of wildlife. In general, the roles and responsibilities of protected area staff need to be carefully defined so that available personnel cover important tasks.

2.7 Social perception -

Where the tiger populations have been decimated, their long-term recovery can be ensured only by a combination of political will and acceptance by people living in and around the tiger areas. If the tigers are worth more dead than alive to local people, then efforts to preserve the tigers in the human dominated landscape will fail. Awareness and education of the importance of the tigers can be improved through dedicated learning programs.

PART 3

BRIEF HISTORY OF CONSERVATION PLANNING, FOR THE TIGERS IN MYANMAR

Previous attempts to estimate the Myanmar tiger population were based on habitat models. Using information on existing forest cover (Collins 1991), and assuming the tiger densities of 0.6-1.0 individuals/100 km² from other places (Rabinowitz 1993a), a conservation plan estimated 600- 1,000 tigers for Myanmar across 12 priority areas and other fragmented populations (Myanmar Forest Department 1996). A previous tiger action plan recommended surveys to estimate population sizes in the priority areas, creation of the tiger reserves, strengthening of institutional capabilities to protect the tigers, a national policy and long-term action plan, increasing public awareness and cooperation with other tiger range countries.

Uga and Than (1998) revising this plan considered the original population estimates as overestimates and suggested the true numbers might be in the range 250-500. They considered the tigers probably occurred in potential areas defined by The tiger Conservation units (TCU's) (*sensu* Dinerstein et al. 1997). They defined a set of priority actions for the tigers including training of government staff, mapping of habitats, field assessments to identify critical tiger populations inside and outside of protected areas, and actions to preserve these populations, including the tiger reserves and protection of corridors, and the formation of mobile education units to provide awareness. This set the stage for the development of a

new updated The National Tiger Action Plan that was proposed to the Myanmar Government in June 1998 (WCS 1998).

A number of important actions were taken as part of the new project;

1. A special tiger survey and conservation-training course was provided to 23 protected area and forestry staff at Alaungdaw Kathapa National Park, during December 1998.
2. A 7-member National Tiger Survey Team was selected from the training participants to be responsible for spearheading research and conducting the tiger surveys within Myanmar.
3. Priority areas for the tiger surveys were located and mapped.
4. Surveys to determine the tiger presence-absence and prey relative abundance were done in high priority areas, and threats to the tigers documented for these areas.
5. A tiger information database was created from current and historical data for use with designing the tiger conservation activities and decision-making.
6. Official meetings were held with Myanmar government officials, to present information on the tiger status in order to draft and produce a The National Tiger Action Plan for the Union of Myanmar.

PART 4

STATUS AND DISTRIBUTION OF THE TIGERS IN MYANMAR -2002

Direct field surveys for the tigers were done at 17 sites (Fig. 9; see also Appendix I for site descriptions). Although the survey efforts covered only 1.3% of areas with forest cover, these sites were places where the tigers were known historically, and where the most recent available evidence, including reports from foresters and local people, suggested the tigers might still be found. The surveys provided new and unique records of occurrence for 19 globally threatened species, 16 CITES listed species and 45 Myanmar protected species (Appendix II).

4.1 The tiger status and distribution -

The tigers were reported present at 88% of sites, but confirmed by direct survey in just 23% of sites (Table 2). The rate at which the tigers were "caught" (detected) by camera-traps was just over 3,000 trap nights of sampling per photo-record. For example, if 30 camera-traps were placed in the field each for 100 days, one might expect on average 1 photorecord of the tiger from the survey effort. In comparison, using a similar survey design in Thailand (Lynam et al. 2001), the tigers were reported at all seven potential the tiger sites, and detected at 86% of the sites, for a capture rate of just over 200 trap-nights per photo-record. For example, of 20 camera-traps were placed for 10 nights, one might expect to get a single photo-record of the tiger. The survey effort required to find a tiger at the Myanmar sites was an order of magnitude higher than at the Thailand sites.

*All Thailand sites were in long-established protected areas

Several features of the data warrant further explanation. Firstly, the tigers were detected at a low proportion of sites where the tigers where they were reported. Some local people living in and near forest areas apparently perceive other animals in the forest

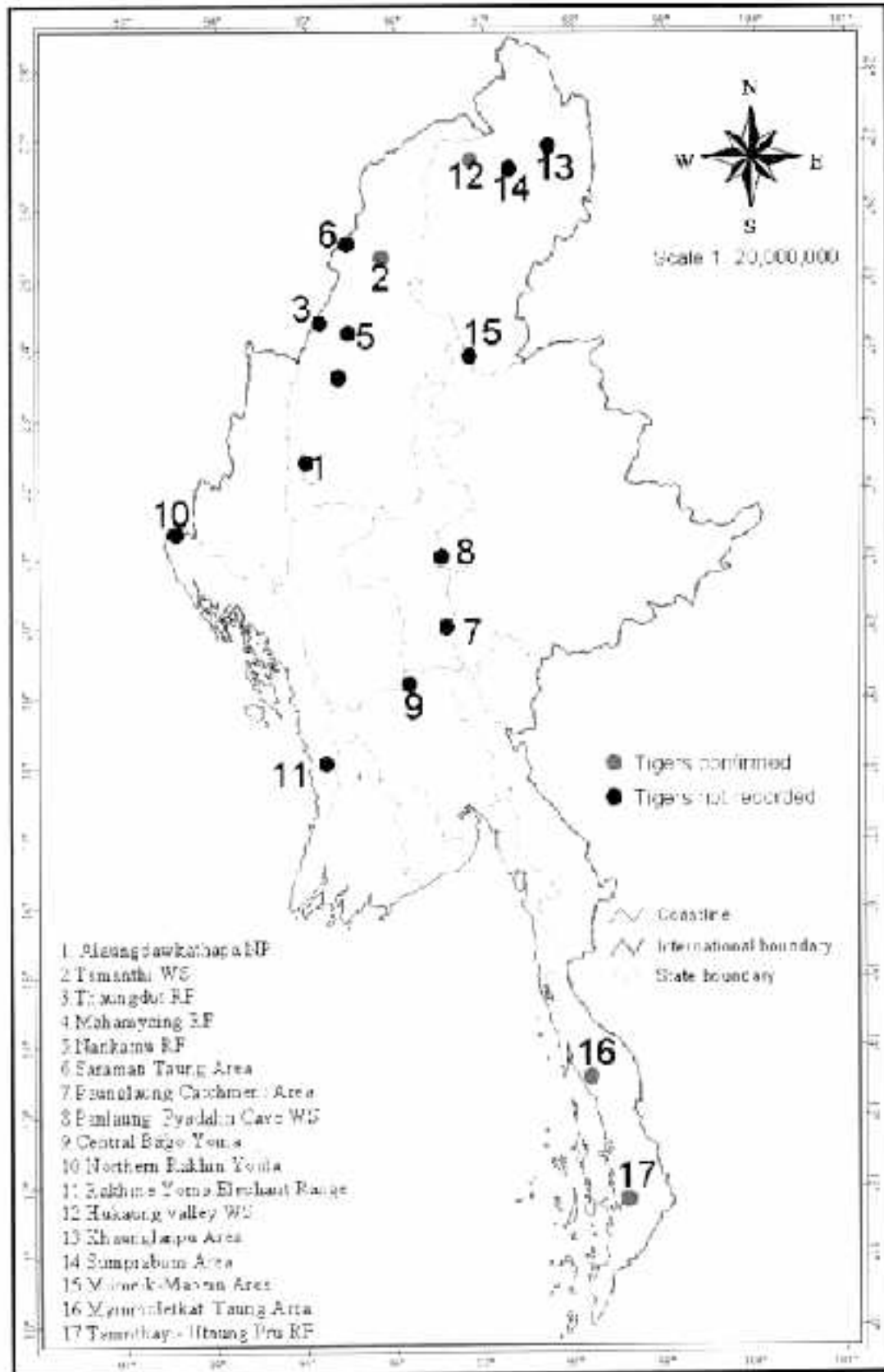
as the tigers. For example in Alaungdaw Kathapa National Park, rangers mistook tracks of Golden cat and Asiatic leopard for the tiger, and because these two species were abundant near park headquarters, the rangers reported the tiger as common (Lynam et al. 1999). As a result, a conservation agency mounted a campaign to "Save the tigers of Alaungdaw Kathapa", when direct survey efforts across 25% of the park found no the tigers. A wider monitoring of habitats found no further evidence of the tigers suggesting that they are now extirpated from the Park. Clearly, some rangers and local people cannot resolve the tiger track and sign from other cat species, and need further training to be able to do so with some degree of confidence. Almost a third of the reports of the tigers were of direct sightings made after 1990 (Appendix III). The two extreme explanations are that all local people made mistakes in identifying the tigers e.g. they saw something else but reported the tiger, or that all local people actually saw the tigers when they reported seeing the tigers. The truth probably lies somewhere between the extremes. It is possible, at least for more disturbed sites, that the tigers are no longer resident but populations instead consist of transient individuals that hold no territory or defined home range (G. Schaller pers. comm., 2002). These transient individuals might cover relatively large areas in search of food and mates, returning to a place only after a lengthy period of time. This would explain their absence during the surveys but infrequent recent reports from locals.

Differences in survey technique or skill levels are unlikely to explain the differences between the tiger occurrence at Myanmar and Thailand sites. Training for field staff was standardized and given by the same trainer (A.J. Lynam). Sign surveys were conducted with the same degree of rigor and camera-trap

Table 2. Comparison of the tiger survey results in Myanmar and Thailand.

Results of survey	Myanmar (17 sites)	Thailand (7 sites)*
1. Reports of tigers (Sites)	88%	All
2. Tiger confirmed	23%	86%
3. Capture rate – tigers (Days per capture)	3,112	217
4. Capture rate – large mammals (")	5	5
5. Species richness (large mammals)	16.4 \pm 1.3	15.2 \pm 1.8
6. Human traffic (Walk pasts per 100 days)	2.3	3.4

Fig. 9. Survey For Tigers in Myanmar, 1999-2002.



locations chosen in the same ways by teams in the different countries. If the tigers were present they should have turned up in the surveys in Myanmar. However, if the tigers are absent or not continuously present at a site, then their probability of detection by any survey method would be less than one. Where the tigers occur at very low density e.g. <0.38 the tigers/ 100 sq. km, a mammoth survey effort is required with camera-traps to detect the tigers (Carbone et al. 2001). That the tigers were found in only three of 17 areas surveyed, whereas other large mammals were detected at frequencies similar to the Thai reserves, suggests that the observations are real. The tigers were either absent or non-resident, or occurred at very low density at most of Myanmar survey sites, at the time of survey. Since the sites chosen were the best potential sites given all the information available prior to the surveys, the suggestion is that the tiger in Myanmar has suffered a range collapse and is in an advanced state of decline towards extinction.

Important to note is that the Thailand sites were all established protected areas with a history of protection. Only two Myanmar sites were protected areas, and the tigers were found in one of the areas. Protection at Thai sites, combined with a lower intensity of directed poaching for the tigers there explains why the tigers have persisted there better than at Myanmar sites. Despite the differences in occupancy patterns for the tigers, sites in both countries had similar richness and abundance of large mammals, suggesting similar availability of prey for the tigers. Therefore, Myanmar the sites have good potential for the recovery of the tiger populations.

4.2 The tiger population size -

It is impossible to know the true number of the tigers

remaining in Myanmar and difficult to estimate numbers. Because of their rarity and cryptic behaviour, the tigers cannot be directly counted, and sampling is required to estimate numbers. However, it is impossible to sample every square mile of every potential habitat using camera-traps. Despite these limitations, The tiger Team attempted to estimate very roughly how many the tigers might be present across the suite of available habitats. They did this not by considering the extent of available habitat, assuming a density and a correction factor, and extrapolating the tigers numbers (Rabinowitz 1993; Uga and Than, 1998). Instead they used a subjective approach, by sitting down at a table, poring over maps, and field notebooks, considering information from sign surveys and locations of camera-trap captures, and the most reliable interview data, and arriving at a consensus among themselves. Given their expert knowledge - they know more about the recent natural history of the study sites than any other workers - they estimated the numbers in Table 3. These numbers are one estimate of the remaining the tiger population Myanmar. In the absence of independent verification, the numbers are educated "guesstimates". However, it is possible to independently estimate the tiger numbers for the Hukaung Valley using a modification of the approach of Rabinowitz (1993), and the estimate of the tiger density (0.91 - 1.29 the tigers/100 sq. km; see section 6.8.7). If one assumes a 50% reduction in the tiger density because of direct poaching of the tigers within the reserve (the most serious threat to the tigers in Myanmar), and an additional 20% reduction due to hunting, forest fires, smaller settlements and human access provided by the Ledo Road, the number of the tigers in the reserve (6,460 sq. km) is 18- 25. This estimate is strikingly similar to that derived by the consensus approach (15- 20; Table 3). While the estimates may have some validity, carefully designed mark-recapture studies will however be needed to determine the size of the tiger subpopulations in the areas in Table 3.

Table 3. Status of the tigers in Myanmar*

Tiger status	Sites (estimated numbers)
1. Tigers confirmed	1. Tigers confirmed Htamanthi (5); Hukaung Valley (15-20) and adjacent areas (15-20); Htaung Pru (5), Pe Chaung (5), other areas of N. and S. Taninthayi Division (55)
2. Tiger not recorded but possibly present in low numbers	Paletwa and Kaladan river catchment area (3-5), possibly present in 19W numbers Sumprabum (3-5), Khaunglanphu (1-2), .Paunglaung (2-4), Momeik-Mabain (2-3), Central Bago Yoma (2-3), Rakhine Elephant Range (1-2), Saramati Taung area (5-7), Shan Yoma (Kayah- Kayin)**(5-7), S. Kachin** (3-5)
3. Tigers not recorded and assumed absent	Alaungdaw Kathapa, Thaungdut, Mahamyaing, assumed absent Nankamu, Panlaung-Pyadalin

* Numbers are estimates based on consensus approach of Myanmar The tiger Team surveyors.

** Indicates areas that were not surveyed. Evidence for the tigers comes from unconfirmed reports from local people and foresters

PART 5

RATIONALE FOR A NATIONAL THE TIGER ACTION PLAN FOR MYANMAR

Potentially the tigers are recoverable to their former abundance across their range in Myanmar. In practice however, full recovery is unlikely. This section describes a Plan for recovering the tigers to a semblance of their former abundance in key parts of their range where they still exist, and restoring areas where the tigers have been lost so that natural recolonization might in future occur in those places. Broadly, the Plan will work towards increasing the tigers, prey and habitat, which are "measurable currencies" for the tiger conservation (Ginsberg 2001).

The Plan will be implemented over a 5-year period between 2003-2007. This will allow a number of targets to be achieved over spatial scales relevant to the tiger conservation (Ginsberg 2001);

- Site (an area containing at least several breeding female the tigers) e.g. Htamanthi Wildlife Sanctuary is a tiger site.
- Landscape (a larger area containing several populations of females and habitat connections between the populations) e.g. the Hukaung Valley, and forest reserves in Taninthayi Division are the tiger landscapes.
- The tiger Conservation Units (TCU's) (areas encompassing several landscapes) e.g. the Northern Triangle TCU (60) which contains Hukaung Valley, Huai Kha Khaeng'- Thung Yai Naresuan TCU (73) which includes Taninthayi Division.

The targets for the tiger conservation will vary according to timeframes and spatial scales but fit into the general framework given in Table 4. By the end of the implementation period, the short-term targets should be realized. An annual review of progress is suggested with a comprehensive review of progress towards achieving the short-term goals at the end of 2007. Success at reaching the short-term targets will set the stage for meeting the longer-term (10-20 years) targets. Important to recognize is the fact that efforts to save the tigers in Myanmar are part of a larger global effort to save the species. The recovery of the tigers in Myanmar will contribute towards the larger goal of species recovery across the range.

The Plan addresses the key threats to achieving these goals for the tigers in Myanmar, described in section 3 (above); (a) Hunting for commercial trade in the tiger products, (b) Prey depletion, (c) Habitat loss, degradation and fragmentation, (d) Harassment and displacement, (e) Illegal trade in the tiger products, (f) Genetic erosion, (g) Protected Area management, (h) Social perception.

Specifically, implementation of the Plan will reduce the key threats by,

1. Suppressing all killing of the tigers, and the illegal trade in the tiger products.
2. Reducing killing of the tiger prey species, suppress associated illegal trade.
3. Improving forestry management to stop further loss of the tiger habitat and to restore degraded habitat.
4. Improving forestry management to reduce intrusions of local people into the tiger habitat, and improve planning to avoid development in the tiger critical areas.
5. Establishing protected areas, ecological corridors and priority management areas to protect wild tigers and their habitat.
6. Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of the tiger habitat across international boundaries.
7. Monitoring the status of the tiger and prey population to assess the effectiveness of conservation efforts.
8. Improving public awareness of the importance of the tiger conservation to increase support from local people
9. Defining roles and responsibilities of personnel responsible for the tiger conservation.

Specific issues and action items for achieving the targets of the tiger conservation in Myanmar are detailed as follows. For ease of reference the action items are also listed in Table 1 along with a proposed timetable for their implementation, and responsible agencies.

Table 4. Targets for the tiger conservation with various time and spatial scales (adapted from Ginsberg, 2001)

	Targets	
	Short Term (2 – 5 years)	Long Term (10 – 20 years)
SITE (An ear containing several breeding females) e.g. Htamanthi Wildlife Sanctuary, forest reserves in Taninthayi Division	<ul style="list-style-type: none"> • Maintain occupancy of tiger habitat • Define critical areas within sites • Stabilize present tiger populations • Prevent loss of tigers 	<ul style="list-style-type: none"> • Maintain potentially breeding populations of tigers at maximum density • Maintain expanding population (at $r > 1$) • Strictly protect core areas
LANDSCAPE (A larger area containing several populations of breeding females) e.g. Hukaung Valley, Taninthayi Division	<ul style="list-style-type: none"> • Maintain potential for dispersal between sites 	<ul style="list-style-type: none"> • Maintain ecologically functioning viable tiger populations • No human intervention required to achieve stable/growing populations • Recolonization of empty habitat
TIGER CONSERVATION UNIT (An area containing several landscapes) e.g. the Northern Triangle TCU(60), Huai Kha Khaeng – Thung Yai Naresuan TCU(73)	<ul style="list-style-type: none"> • Maintain integrity of intact habitat • Maintain sufficient prey base • Maintain multiple landscapes including transboundary landscapes in each TCU • Coordinate establishing protected areas across boundaries • Promote tiger friendly conservation in each country in TCU 	<ul style="list-style-type: none"> • Re-establish connections between sites and landscapes to ensure genetic exchange • Maintain heterogeneity of ecoregion

5.1 Suppressing all killing of the tigers and the illegal trade in the tiger products

5.1.1 Key issues

- The trade in the tiger products is part of the illegal trade in wildlife worth an estimated US\$7 billion annually (Bennett and Rao 2002).
- Myanmar is one of the countries supplying the tiger trade and has a well-developed network involving poachers, middlemen and trafficking routes to move the tiger products from forest to market (Bennett and Rao 2002).
- The hunting of the tigers to supply the trade has been the ultimate cause of extirpation of wild the

tigers from multiple forest and nature reserves e.g. Alaungdaw Kathapa, and entire regions e.g. northern Myanmar (Rabinowitz 1998).

- Knocking off the top predator can have destabilizing effects at lower trophic levels in tropical ecosystems (Seidensticker 2002).
- The tiger populations that exist today are being decimated by hunting and face certain extirpation in the short-term if action is not taken (Kenney et al. 1995; Seidensticker et al. 1999).

5.1.2 Key actions

- Amend the Protected Wildlife and Protected Areas Law (SLORC, 1994) to enable the enforcement of international laws within

Myanmar. This would include laws prohibiting the sale or purchase of products suggesting or implying content of the tiger bone, hair, organs, blood, teeth, claws or hide. Completion date: December, 2003

- b) Impose heavy fines for offenders and use partial proceeds towards implementing international legislation. Completion date: December, 2003
- c) Conduct wildlife conservation and awareness training for 100 government personnel, including military, customs, police, immigration and local administrative staff in Yangon, Mandalay, Myitkyina and other internal transit points for wildlife. This would include basic training in identifying wildlife protected by domestic and international legislation, and knowing their protection status. Completion date: December, 2003
- d) Conduct wildlife conservation and awareness training for all protected area staff. Completion date: December, 2003
- e) Recruit local government staff to help identify the tigers in trade and encourage them to report their observations to relevant authorities. Completion date: December, 2003
- f) Create a Wildlife Investigations Unit to investigate and suppress crime against wildlife, including trade, trafficking, illegal killing and capture, habitat destruction, and other persecution. The unit will enforce domestic and international legislation. The unit would include staff of the Ministries of Home Affairs, Forestry and Tourism and would report directly to the Minister of Forestry. Completion date: June, 2004
- g) Train and recruit government staff to join the Wildlife Investigations Unit. Form mobile units to suppress wildlife crime across the country. Completion date: June, 2004

5.2 Reducing killing of the tiger prey species and associated trade.

5.2.1 Key issues

- a) "The tigers cannot survive where they lack access to ungulate prey that is at least about half their own body mass because of mass-specific energy needs." (Seidensticker 2002)
- b) Because tropical forests support ungulates at relatively low densities, the killing of prey has been the proximate cause of the decline in the tiger populations in Mainland Asia (Karanth and Stith 1999).
- c) Few if any ethnic communities rely on large mammals as a subsistence source of protein but trade in wild meat, horns, fur, hides and other products is part of a massive illegal trade in Myanmar, and is well developed in border areas where enforcement is difficult (Rabinowitz 1998; Martin and Redford 2000).
- d) The commercial farming of wildlife provides a potential legal mechanism for the poaching of wild individuals to supply the trade and may contribute to the extirpation of some species.
- e) Evidence suggesting that hunting can be sustainably managed exists for only a few tropical wildlife species but evidence that wildlife harvest is unsustainable exists for a vast number of species (Robinson and Redford 1994; Robinson, and Bennett 1999).
- f) Protected areas are currently understaffed and ill equipped to prevent the loss of wildlife to poachers (Bennett and Rao 2002).
- g) The presence of forest guards in sufficient numbers can mitigate against hunting of wildlife (Bruner et al. 2001).
- h) Outside of protected areas, laws governing wildlife are difficult to enforce because staffing is low and capacity is low.

5.2.2 Key actions (in addition to those described above for the tigers but are generally relevant)

- a) Amend the Protected Wildlife and Protected Areas Law (SLORC 1994) to enable the enforcement of international laws within Myanmar. Modify Chapter V, Article 15 to recognize the international classifications of wildlife species, and their associated protection status. Completion date: June 2003.
- b) With the view to protecting the tiger prey species, allow the commercial farming of only selected wildlife species only in facilities designated by the Forest Department. Completion date: June 2003.
- c) Allow the hunting of wildlife species only when scientific evidence proves it can be done sustainably. Completion date: June 2003.
- d) Take action to stop all killing of prey species at places where the tigers are currently or potentially found. Completion date: December 2007.
- e) Train all government staff at Hukaung Valley and Htamanthi, in anti-poaching and anti-trafficking techniques. Where possible involve local military personnel as instructors. Completion date: December 2003

- f) Recruit teams of EcoRangers whose sole responsibility is protection. Numbers of EcoRangers should at least be 3 guards /100 sq.km for effective management. Provide EcoRangers with necessary equipment, and salary incentives to motivate them to combat poaching. Completion date: June 2004.
- g) Develop systematic patrolling inside all protected areas using EcoRangers. Make patrolling a mandatory management activity with a monthly schedule and budget. Completion date: December 2004.
- h) Update the Wildlife Law to include protection for wildlife outside protected areas, and empower government staff to enforce legislation. Completion date: December 2004.
- i) Outside protected areas, study patterns of hunting and consumption of wildlife to determine its sustainability, especially for prey species. Completion date: December 2005.
- j) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following the tiger prey species from Protected status to Completely Protected status; Wild water buffalo (*Bubalus bubalis*). Completion date: June 2003.
- k) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following the tiger prey species from Seasonally Protected status to Protected status; Hog deer (*Axis porcinus*) and Common barking deer (*Muntiacus muntjak*). Completion date: June 2003.
- l) Wildlife conservation and awareness training for all wildlife offenders. Completion date: June 2003.
- m) Impose fines for wildlife offenders in the tiger areas with proceeds towards supporting the tiger conservation activities. Completion date: June 2004.

5.3 Improving forestry management to stop further loss of the tiger habitat and to restore degraded habitat

5.3.1 Key issues.

- a) Extraction of non-timber forest products, fuel wood collection, shifting cultivation and livestock grazing disturbs the tigers, damage the tiger habitat, and depletes prey resources (Rao et al. 2002).
- b) Clear cutting of plantations, and cutting of other economically valuable hardwoods may seriously compromise the tiger habitats (Rao et al. 2002).
- c) There exist no economic incentives for conducting

environmentally sound forest use practices.

5.3.2 Key actions

- a) The National Code of Forest Harvest Practice involves 30-year cutting cycles, and use of elephants for removal of logs reduces environmental damage over other practices. Apply this traditional method of forest harvest effectively in all concessions in the country. Completion date: December 2005.
- b) Ban the hunting of wildlife in forest harvest areas. Completion date: June 2004.
- c) Provide wildlife conservation awareness education training to timber harvest staff. Completion date: December 2004.
- d) Define Strict Conservation Zones for Hukaung Valley and Htamanthi where no human use of natural resources is allowed. Create buffer areas to allow restricted use by local people including extraction of non-timber forest products, fuel wood collection, and livestock grazing. Ban shifting cultivation and hunting of all kinds in the buffer area. Use EcoRanger patrol teams to enforce the restrictions. Completion date: December 2003.

5.4.1 Key issues

- a) Plantations and mines open up forest areas (Rao et al. 2002), encourage markets that wipe out the tiger prey, and allow the tigers to be hunted more easily.
- b) Permanent camps and settlements seriously compromise the tiger habitat (Rao et al. 2002)
- c) Road construction internally fragments and damages the tiger habitat, facilitates intrusions by poachers, and opens up remote areas to wildlife trade (Bennett and Rao 2002; Rao et al. 2002).

5.4.2 Key actions

- a) Reclaim plantations and revoke all mining licences in Hukaung Valley and Htamanthi Wildlife Sanctuaries. Completion date: December 2007.
- b) Consider the location of government camps and permanent settlements outside of these reserves. Completion date: December 2007.
- c) Ban construction of roads in protected areas and forest reserves. Completion date: December 2004.
- d) Close or limit access along logging roads in Taninthayi Division to reduce the risk of collisions with the tigers. Completion date: December 2005.
- e) Include wildlife assessment in land development programs for Taninthayi Division. Completion date: December 2003.

- e) Develop education programs to improve awareness about wildlife for local people living in and around forest reserves in Taninthayi Division. Completion date: December 2004.

5.5 Establishing protected areas, ecological corridors and priority management areas to protect wild the tigers and their habitat

5.5.1 Key issues.

- a) The minimum area required to support a genetically viable population of large predators would be the area that supports 300 breeding females (Barbault & Sastrapradja 1995).
- b) If female 'the tigers in Myanmar have home ranges the size of Nepali the tigers (10- 50 sq. km; (Smith 1987), the area required would be 3,000-15,000 sq. km.
- c) Landscapes of this size exist in Myanmar but most are not yet protected for wildlife. The largest intact forest expanses in Myanmar are in Kachin State, Sagaing and Taninthayi Divisions.
- d) The tigers may use forest reserves as movement corridors between the Hukaung Valley and Sumprabum, and possibly as far east as Kaunglamphu; within Taninthayi Division, and across the Thai-Myanmar border, and; between northeastern Sagaing Division and western Kachin State.
- e) There is a lack of landscape level planning and analysis for wildlife conservation in Myanmar (Rao et al. 2002).
- f) Management plans for sites containing the tigers do not specifically define actions necessary to conserve the tigers.

5.5.2 Key actions

- a) Revise or create management plans for the Hukaung Valley and Htamanthi to include specific actions for conserving the tigers, including recommendations in 5.2.2, 5.3.2, and 5.4.2, and below. Completion date: December 2003.
- b) Expand Htamanthi Wildlife Sanctuary to increase its size to at least 3,000 sq. km to ensure long-term survival of the tigers. Completion date: December 2004.
- c) Create a dedicated the tiger reserve including the Hukaung Valley and adjacent forest reserves. The reserve will serve to link the tiger populations in India with those in Myanmar. Expand the eastern border of Hukaung Valley Wildlife Sanctuary to protect potential the tiger habitat in the Sumprabum area. Completion date: June 2004.

- d) Establish limited human use zones (buffers) that will "soften" the edges of Hukaung Valley and Htamanthi reserves reducing the risk of mortality for the tigers. Completion date: June 2004.
- e) Create new protected areas or special the tiger management zones in the Taninthayi Division, including the Lenya River, Greater and Lesser Taninthayi River catchments. These sites will protect the tigers and their habitats and allow limited human use of natural resources around the reserves in a manner complementary to the tiger conservation. Completion date: December 2007.
- f) Use existing GIS capabilities in the Forest Department to identify and demarcate special management zones and corridors for the tigers. Completion date: December 2003.

5.6 Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of the tiger habitat across international boundaries

5.6.1 Key issues

- a) Trade and trafficking in the tiger and other wildlife products is often associated with the trade in drugs and arms (Bennett and Rao 2002).
- b) In Myanmar the trade is concentrated in areas with weak enforcement, especially along the border with China and Thailand (Bennett and Rao 2002). The trade is fuelled by the disparity in economies between neighbour countries, creating an underground economy and a drain on Myanmar's wildlife.
- c) Local government officials in border areas are unaware of the Wildlife Law or the importance of wildlife, and sometimes supplement their incomes from wildlife trade.
- d) Local militias effect law enforcement in order areas but National laws are only weakly enforced or not enforced at all.

5.6.2 Key actions

- a) Conduct wildlife conservation and awareness training for 100 government personnel, including military, customs, police, immigration and local administrative staff, stationed near or on country borders. This would include basic training in identifying IUCN and CITES protected wildlife species. Completion date: December 2003.
- b) Hold internal 2 workshops involving local government officials to discuss trans border issues including trade, trafficking and wildlife, and develop plans to suppress the trade. Completion date: December 2003.

- c) Recruit local government officials on both sides of the Thailand border to suppress transborder wildlife trade at Mawdaung-Prachuap Kiri Khan, Kaleinaung-Ban I Tong, Kawthaung-Ranong (especially Tha Htay Island), Myawaddy-Mae Sot, Three Pagoda Pass, and Tachileik-Mae Sai, and prevent access by professional poachers from Thailand. Completion date: December 2004.
- d) Create a the tiger reserve in Taninthayi Division opposite Thailand protected areas that support large populations of the tigers, Western Forest Complex and Kaeng Krachan National Park. Completion date: December 2004.
- e) If possible expand the reserve or create new reserves to form a corridor between these two Thai. reserves. Completion date: December 2007.
- f) Develop a spatially explicit the tiger conservation database for the Huai Kha Khaeng – Thung Yai Naresuan TCU (Level I TCU 73). Completion date: December 2005.
- g) Where possible coordinate antipoaching patrols and/or wildlife surveys on both sides of the Thailand-Myanmar border. Completion date: December 2004.

5.7 Monitoring the status of the tiger and prey population to assess the effectiveness of conservation effort

5.7.1 Key issues

- a) The success of the Plan will need to be assessed by monitoring the tiger and prey populations.
- b) The Hukaung Valley landscape will be a target for an extensive monitoring program.
- c) Landscapes not yet protected but containing the tigers e.g. Taninthayi Division, should be targets for medium intensity monitoring.
- d) Sites where the tigers were not found but are suspected to occur (Table 3) should be targets for low intensity monitoring (Karanth and Nichols 2002).
- e) Specific methods used for monitoring will depend on the level of knowledge available for the tigers (Karanth and Nichols 2002) (Table 5).

5.7.2 Key actions for Hukaung Valley;

- a) Identify critical habitats and core areas for the tigers and prey across the landscape. Completion date: June 2003.
- b) Estimate numbers of female the tigers within the landscape and ascertain that there is a reproductively viable population of the tigers. Completion date: December 2003.
- c) Document the current threats, demographics, and range of human activities that must be taken into

account if the proposed landscape is to be successful and sustainable in the long term. Completion date: June 2003.

- d) Create a GIS map and database to show current land use patterns, possible future land use trends, and the tiger and prey source areas. Completion date: December 2003. For forest reserves in Taninthayi Division;
- e) Train local foresters how to identify the tiger and prey via sign surveys, in use of camera- traps for wildlife survey, and methods for making observations and recording data. Completion date: December 2004.
- f) Determine occupancy of habitats in accessible sites across the landscape, including Myintmoletkat and Lenya River areas, which away from sites where the tigers are known. Completion date: December 2005.
- g) Determine prey abundance using line transect sampling. Completion date: December 2005.
- h) Determine the tiger abundance using double-sided camera-trap sampling. Completion date: December 2005. For sites in Paletwa and Kaladan river catchment, Sumprabum, Khaunglanphu, Paunglaung, Momeik Mabain, Central Bago Yoma, Rakhine Elephant Range and Saramati Taung area;
- i) Train local foresters how to identify the tiger and prey via sign surveys. Completion date: June 2003.
- j) Determine occupancy of habitats at the sites using sign surveys. Completion date: December 2003.
- k) Establish a logbook to record observations of the tiger and prey, and encourage use of the logbook. Completion date: December 2003.

5.8 Improving public awareness of the importance of the tiger conservation to increase support from local people

5.8.1 Key issues

- a) Local government officials encourage local people to hunt the tigers and split profits from the sale of wildlife products.
- b) Professional hunters and hill tribal people (Kachin, Lisu, Naga, Khanti Shan) who consume wildlife live in villages adjacent to the Hukaung Valley, and pose a threat to wildlife.
- c) Little public information exists about wildlife in Myanmar.
- d) Wildlife education essentially does not exist in schools.

5.8.2 Key actions

- a) Develop wildlife education programs to scourage

hunting by local people in and near the tiger reserves. Where possible recruit local people, especially ex-hunters to help implement these programs. Completion date: December 2004.

- b) Involve 50 local people in wildlife survey and research activities to make positive use of their local or indigenous knowledge. Completion date: December 2003.
- c) Collaborate with authorities in charge of development projects to include wildlife conservation as a component of those projects and resolve any potential conflicts between the needs of people and wildlife. Completion date: December 2003.
- d) Produce a documentary about the tiger conservation in Myanmar and broadcast it on National television. Completion date: June 2004.
- e) Dub existing wildlife documentaries about Myanmar into Myanmar language and broadcast. Completion date: June 2003.
- f) Adapt WCS education materials about the tigers into Myanmar language and implement a special training program for schoolchildren at selected high schools in Yangon, and adjacent to the tiger reserves. Completion date: June 2004.

5.9 Defining roles and responsibilities of personnel responsible for the tiger conservation

Table 5. A guide to research methods for the tiger conservation

Knowledge Base	Goal	Technique
No information	Determine occupancy	Sign surveys for tigers ¹
	Determine occupancy but sign survey inappropriate	Camera trap surveys for tigers
Tigers present	Potential carrying capacity (K) for tigers	Line transect for prey Dung surveys for prey
	Determine Occupancy	Sign surveys for tigers
		Camera trap survey for tigers using single camera sets
	Determine tiger and prey abundance	Camera trap survey using single camera sets
		Line transect sampling for prey/dung
	Determine abundance of tigers	Camera trap survey for tigers using double camera sets
		DNA population estimation
Abundance/distribution data available	Determine K for tigers	Line transect sampling for prey/dung
	Habitat analysis	GIS to extend results of intensive habitat surveys
	Monitoring	Camera trap monitoring of tigers
		Calibrated sign surveys
	Ecological Studies	Radio telemetry
		Diet studies
		Demographic studies
		GIS

¹ 'for the tigers' implies that sampling is designed to maximize the probability of encountering the tigers

5.9.1 Key issues

- a) Wildlife conservation is hampered by a lack of understanding of roles and responsibilities of government staff.
- b) The efficiency of protected area management can be improved by defining tasks and expectations for staff.
- c) Park managers need leadership training to be able to perform their jobs successfully, and to direct human resources to effect conservation.

5.9.2 Key actions.

- a) Provide special training for managers of the tiger reserves in management techniques, including leadership skills, decision-making, planning, protection, use of information and technology, and personnel management. Completion date: December 2003.
- b) Invite managers of the tiger reserves to observe the day-to-day operations in selected the tiger reserves in India and Thailand. Completion date: June 2004.
- c) Define roles for junior staff in Hukaung Valley and Htamanthi Wildlife Sanctuaries, and for Taninthayi Division junior forestry staff, and staff and in other areas in conducting field monitoring of the tigers and prey. Completion date: December 2003.

PART 6

HISTORICAL DATA, FIELD SURVEY METHODS AND DATA ANALYSIS

This section is optional reading for researchers and others interested in the historical distributions of the tigers, specific field methods used to collect information on current distributions, and data analysis techniques. All of this material provided the background for developing the Action Plan described in the previous section.

6.1 Past distributions of the tiger in Myanmar.

In order to provide a framework for understanding the current situation for the tigers, information on where the tigers used to occur and the factors that brought about their decline was considered. For the purposes of this report, historical records were considered as those pre-1999, when this study began. A number of sources were used to reconstruct former distributions of the tigers in Myanmar:

1. *Published scientific papers.*

Prior to 1999, few biological surveys had been attempted in the country. Milton and Estes (1963) conducted the first dedicated biological surveys in the early 1960's. They identified declining wildlife populations in areas such as Pidaung Wildlife Sanctuary. Then during the 1980's a series of wildlife assessments were done in the context of assessing areas for forest protection by UNDP/FAO (1985). These reports prescribed the formation of new protected areas as critical for the future conservation of wildlife. In the 1990's WCS made efforts to document and define new areas for inclusion in the protected area system.

2. *Hunter records.*

The majority of historical records come from published reports and books written by hunters. Game hunting was popular during the period of occupation by the British (pre-1948). These publications describe in detail the circumstances in which the tigers were shot, trapped, snared or otherwise encountered by humans.

3. *Survey reports.*

A number of reports by foresters and surveyors attest to the former occurrence of the tigers.

6.2 Quality and reliability of information.

A gazetteer was assembled from historical the tiger records. The information was categorized as follows;

- (a) *Confirmed presence* -where there was no reasonable doubt the observation was of the tiger. These observations were from direct sightings, the tigers killed, or reports of attacks by the tigers on humans or livestock;
- (b) *Provisional presence* -where there was a possibility that leopard or other species was in fact observed but was mistaken for the tiger. These were observations of tracks and sign, or reports from other sources e.g. villager reports.
- (c) *Provisional absence* -where a lack of evidence of the tigers was reported. True absence over a given area can only be confirmed through monitoring over a period of time ranging from several months to several years (depending on the size of the area) but except for recent efforts at Alaungdaw Kathapa this has yet to be attempted at any of the study sites. Verbal reports were not considered as historical records due to the persistent problems with identifying large cats from track and sign (Duckworth & Hedges 1998; Lynam 1999) and because reports not written down at the time of observation invariably change in content and accuracy and become unreliable.

6.3 Characteristics of past distribution.

A total of fifty-eight observations provided an historical record of the tigers for the period 1903 – 1999 (see Fig. 2.; Appendix IV). The tigers were historically recorded from all areas but gaps in information exist for the delta area, the central east (Shan State) and the

far north. The absence of records probably reflects that the tiger was not reported rather than it never existed in these places. The tigers can survive in mangrove forests although the habitat is sub optimal (U. Karanth, pers.comm. 2002). Similarly, the absence of documented records from Shan State is due to the inaccessibility of the area rather than lack of the tigers. (Rabinowitz 1998) reported the tigers had disappeared from the far north but evidence from hunters suggests their existence there in the past.

6.4 Potential the tiger areas.

During the early 1990's with the advent of new techniques for assessing population viability through consideration of genetics, the focus on conserving the tigers shifted towards a small population paradigm (*sensu* Caughley & Gunn, 1996). The idea was that the tigers were fast being driven towards extinction in the wild so that captive breeding and genetic management would be necessary to save them' (Tilson et al. 1995). There is no doubt that for some critically endangered species such as Guam rail, Black footed ferret and Arabian oryx, and the subpopulation of the tigers in southern China, species survival depended primarily on successful management in zoos. However, this approach ignored the fact that potentially viable populations of the tigers still existed across most of their range in the wild but that their status remained unknown (Rabinowitz 1999), so that effective conservation planning could not happen. In an attempt to refocus attention on the plight of wild the tigers, WWF and WCS attempted a geographic assessment of the extent and availability of habitat, and potential prey resources (Dinerstein et al. 1997). This analysis identified a series of potential areas – The tiger Conservation (TCU's) – in which the tigers could conceivably occur. For example, it was considered that the tigers might occur across large expanses of potential habitat. In Myanmar, four areas with the greatest potential for the tigers (Level I TCU's) are large and relatively intact forest transboundary forests in the west along the Myanmar – Bangladesh and Myanmar – India frontier; and forests in central Bago Yoma (Fig. 10). A series of much smaller, highly fragmented forest areas provide lower potential for the tigers. These are termed Level II and III areas. According to the analysis, forests in the far north, central east and delta areas had unknown occupancy for the tigers. These areas were considered priorities for immediate survey reflecting large gaps in historical information on the tiger occurrence.

Several characteristics of the potential the tiger habitats are worthy of mention. Firstly, despite the relative intactness and contiguity of forests in the level I category, the tigers may not be uniformly found across available habitat (Prater 1940; Rabinowitz 1995). Secondly, the Level I TCU's include areas of degraded or completely cleared habitats. The tigers if occurring there would likely be nonbreeding transient individuals (G. Schaller pers. Comm., 2002), a small percentage of the population that are prepared to risk movement across hostile areas in the landscape to cross between forest patches. Finally, the TCU analysis was a very useful exercise because it did two things; it refocused attention on the plight of wild the tiger populations, defined areas where information on the status of the wild populations was lacking.

6.5 Rationale for the tiger status survey program.

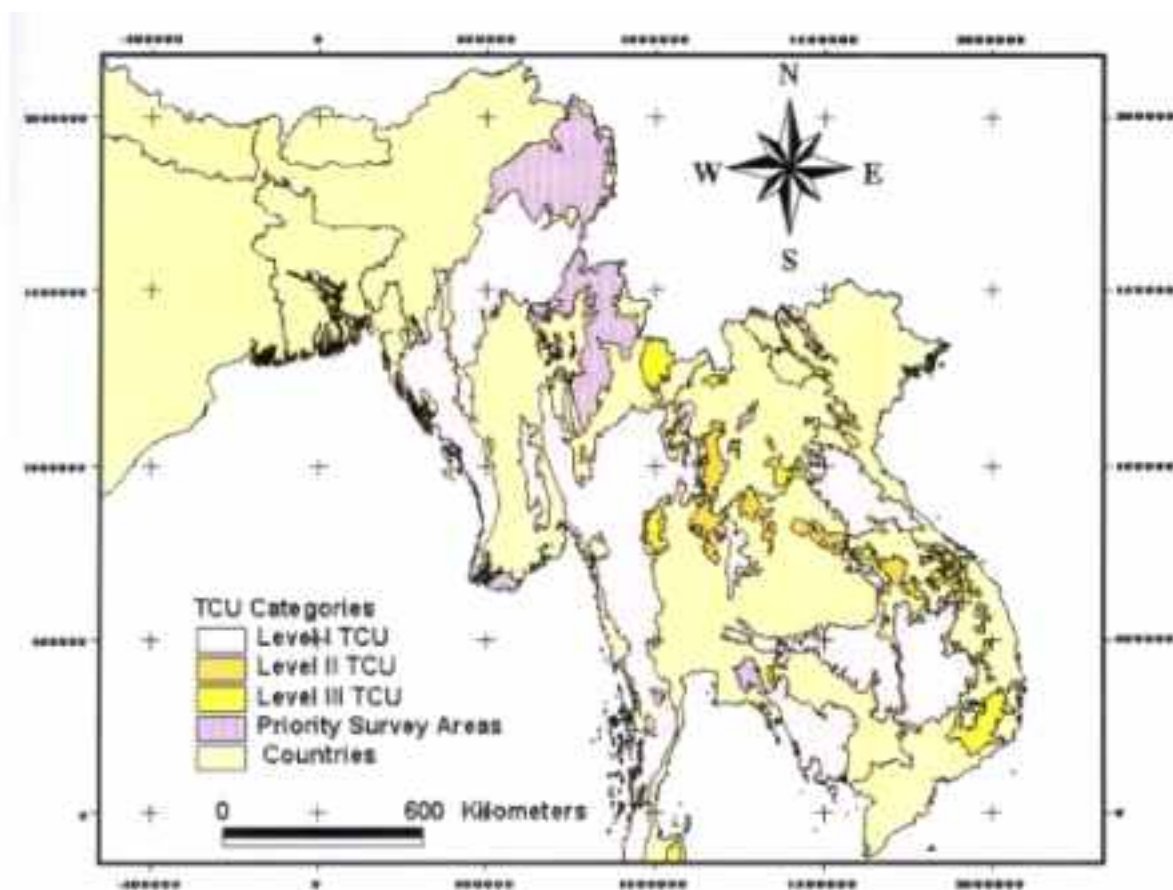
Despite the past distributions and current potential areas for the tigers, areas of natural vegetation available for wildlife declined from 75% of land area to 50% in 50 years (Collins 1991; FAO 2000). Land use patterns changed after 1948 when traditional forest management regimes that regulated and systematized harvest were replaced with less regulated and in some cases opportunistic clearance. For example, while good management of natural forest occurs in most areas, foreign logging companies clear – cut or felled timber outside concessions in near the border during the period 1989 – 1993 (International 1999).

By the early 1990's hunting and illegal trade had reduced the tiger populations to an unknown subset of the potential areas. Some areas with apparently suitable habitat were devoid of the tigers (Rabinowitz 1999). Prior to the commencement of this project in 1999, the state of knowledge of the tigers amounted to reports of the tiger occurrence for a limited number of areas (Rabinowitz 1999). Hunting of the tigers has been going on for a very long time (Pollok & Thom 1900). More recently with reduced supply of the tigers and the tiger parts in the marketplace, demand has increased (Hemley & Mills 1999) with unmeasured effects on wild the tiger populations.

In order for effective conservation planning to take place, there was an urgent need to know where the tigers existed across the vast landscapes of Myanmar, and what was the condition of the tiger subpopulations. A field program was mounted to satisfy the following objectives:

Part 6: Historical Data, Field Survey Methods and Analysis

Fig. 10. Tiger Conservation Units (TCU's) for Myanmar and Neighbour countries



1. To train government field staff in the tiger assessment methods.
2. Using information on potential the tiger areas from historical records and local knowledge to determine the tiger presence-absence across these areas, and limits of the tiger distributions.
3. To define threats to the tigers and their habitats.
4. To redefine priority areas for future the tiger conservation.

6.6. Training and selection of The tiger Team members.

The capacity of field staff to conduct independent wildlife survey and research is generally poor in Asia and this had led to problems with interpreting basic information on species occurrence and abundance for protected areas (Duckworth & Hedges 1998). Park staffs are generally unfamiliar with animal tract and sign thus making reports of the tiger occurrence

unreliable. As an example of this, at Alaungdaw Kathapa National Park, historically one of the better-known the tiger areas (UNDP/FAO 1982), park staff reported the tigers as common in 1998 but plaster casts of tracks purported to be of the tiger were on inspection found to be of Asiatic leopard and Golden Cat (Lynam et al. 1999). Part of the problem in Myanmar is a general one across Asia in that training of government staff has traditionally focused on production forest management and silviculture. Protected areas conservation is relatively new task for foresters and wildlife training is generally unavailable at the college or university level.

Wildlife training for Myanmar foresters began with a WCS program in 1995. The training based on a standard curriculum (Rabinowitz 1993b), provides instruction in techniques for observing and recording wildlife, and basic survey and analytical techniques. Since 1995, 270 protected area field staff, and local

NGO staff have received the WCS basic training Smithsonian Institution, and the California Academy of Sciences provided other specialist training in wildlife monitoring techniques to Forest Department staff.

As a starting point for the National The tiger Action Plan project, the Wildlife Conservation Society – Myanmar Programme in collaboration with the Myanmar Forestry Department provided a training course in the tiger survey techniques and conservation at Alaungdaw Kathapa National Park, from December 7 – 21st, 1998. The objectives of this training were,

1. To train junior forestry staff in basic techniques of map and compass, wildlife observation and data recording.
2. To provide specialized training in describing the tiger habitats, conservation and census techniques for the tigers and the tiger prey species.
3. To identify talented Forest Department staff for inclusion in a National The tiger Survey Team (NTST).

WCS staff from New York, Thailand and Myanmar conducted the training. Dr. Alan Babinowitz, Director of Science, Asia Programs, an expert on large carnivore conservation ecology, and the author, lectured to the trainees and directed a variety of classroom based and field based training activities. WCS Myanmar Country Programme Coordinator U Saw Tun Khaing and Research and Training Coordinator U Than Myint supported them. This was the first time this kind of training had been done in Myanmar, and the first time anywhere in Southeast Asia.

Twenty trainees and three observers attended the 14-day training (Fig. 8.). Those staff came from twelve national parks and sanctuaries, the Institute of Forestry, and the Forest Resources and Environment Development Association (FREDA). The trainees were assessed on their participation in group assignments and a 4-day field project, and on their individual performance in class and practical assignments, a comprehensive exam, and overall level of participation in the training.

From the training a group of six talented young forestry professionals were selected to form the first roving the tiger field survey team to participate in field assessments for the tigers at selected forest sites across Myanmar.

6.7 Methodology.

The surveys were intended to determine presence – absence for the tigers, and relative abundance for prey species, so as to permit the evaluation of study areas for their potential for the tigers. The surveys were not intended to determine numbers of the tigers in the reserves.

The tigers, like other tropical mammals, are generally difficult to observe directly due to their rarity, cryptic behaviour, partial nocturnality and avoidance to humans (Griffiths & van Schaik 1993; Schaller 1967). A combination of indirect and direct survey methods was used to detect the tigers and other large mammals; potential prey species.

Field observations of the tigers can be categorized so as to facilitate interpretation of their ecological status. Four types of observations are given in Table 6. The tigers may be detected or not detected by a given survey technique. The detection of the tigers confirms presence but may or may not indicate a reproductive population. Where the tigers are not recorded, this could indicate problems with sampling, for example where the tigers are missed due to extreme rarity, or true absence.

Where the tigers occur at densities under 0.38 the tiger/100 square kilometer, very large amounts of sampling with camera-traps (>1,000 trap nights) needs to be done in order to detect them (Carbone et al. 2001). In this study sampling of > 1,000 trap nights were not feasible so that the tigers might not be recorded at some low – density sites though they were present.

6.7.1. Choice of study areas –

Given the time frame of the project (3 years) it was not possible to investigate the tiger occurrence in all forest areas. Using information from historical records and potential the tiger areas, 17 sites with the highest probability of supporting the tigers were chosen for survey (Fig. 9). These areas represented a non – random subset of available landscape and habitat options for the tigers spanning the geographic extent of the country from approximately 11o – 27oN, and 93o – 99o30'E.

1. Alaungdaw Kathapa National Park (AKNP)
2. Htamanthi Wildlife Sanctuary (HTM)
3. Thaungdut Reserve Forest (TD)
4. Mahamyaing Reserve Forest (MHM)

Table 6. Interpretation of The tiger Population Status from Field Observations

Observation	Population Status	Interpretation
1a Tigers recorded	Reproductive population	Indicated by observations of pregnant females, juveniles and/or cubs
1b Tiger recorded	Present but not necessarily reproductive	Indicated by observations of adult male or non – pregnant adult female individuals
2a Tigers not recorded	Low density, ecological effective absence	Tiger may be present at low density but are not recorded due to sampling errors e.g. tigers not present in survey area. A tiger population may be disrupted, sex ratios skewed, or individuals have difficulty finding mates so that reproduction is not possible (Allee effect)
2b Tigers not recorded	True absence	Tigers are not recorded over a period of monitoring at a site.

5. Nankamu Reserve Forest (NKM)
6. Saramati Taung (SRMT)
7. Paunglaung Catchment (PGL)
8. Panlaung Pyadalin Cave Wildlife Sanctuary (PPDL)
9. Central Bago Yoma (BGY)
10. N. Rakhine (RN) or Paletwa and Kaladan river catchment
11. Rakhine Elephant Range (RER)
12. Hukaung Valley (HKV)
13. Khaunglanphu (KLP)
14. Sumprabum (SBP)
15. Momeik – Mabain (MB)
16. Myintmoletkat (MMLK)
17. S. Taninthayi (TNTY)

Descriptions of each site are given in Appendix I.

6.7.2. Interview surveys –

Interviews of people living in suspected tiger areas are potentially useful because they draw upon local knowledge of wild animals accumulated over long periods of time, and may help determine the status and identify threats to the tigers and other mammals (Rabinowitz 1993b). However, the reliability of information to be gained depends upon a number of factors, especially the correct interpretation of local information by the interviewer (Duckworth 1999), the manner and disposition of the interviewer, and how the interviewee perceives this. An interview protocol (Appendix V) was designed during the tiger – training course (Lynam et al. 1999) and this was used by Myanmar – speaking interviewers to gain indirect evidence on the tiger occurrence in the 17 potential

areas. Direct survey was done in and around locations of the most recent reliable reports of the tigers from interviewees.

6.7.3 Track and sign –

Large mammals produce tracks, faeces, scrapes, scratches, kills and other sign so that under certain circumstances the substrates on wildlife trails, streambeds and ridges may indicate their recent presence (Wilson 1996). However, there is significant overlap between large cats (Duckworth & Hedges 1998; Kanchanasakha et al. 1998) so that the tiger may be confused with other species (Lynam et al. 1999). For these reasons sign was considered not sufficient for the identification to species level for cats, dogs, civets, deer muntjak, wild cattle, and otters. However, the abundance of sign was generally indicative of the level of mammal traffic in an area. Ungulate sign was additionally used to indicate possible areas of carnivore activity, and as such to help guide the placement of camera – traps for detecting the latter (below).

Standardized datasheets were used to record date, time of day, weather, location (latitude/longitude) type of sign, dimensions of track/sign, probable species/genus identity, age, substrate, and habitat type (Appendix VI). Locations where mammal sign was encountered were recorded with a Global Positioning System (GPS) device capable of resolving position information beneath tree canopies, accurate to + 100 m* (Garmin 12XL, Garmin Corporation, Kansas USA). Feline tracks with total

length 120 mm or pad width 7cm, and scat 3.5cm in diameter were considered to be indicative of the tigers (A.J. Lynam, A Rabinowitz & R.K. Laidlaw unpublished data; Cutter 1999; Duckworth & Hedges 1998). Where the size of a feline track was ambiguous because of the substrate or age of a track, the track was identified only as "large cat" meaning either the tiger or leopard. Other species were identified using a field guide to Thai mammal tracks (Green World Foundation 1999). An index of abundance "Encounter Rate (CR)" was estimated from sign surveys as $ER = \text{No. Sign detected/hr.}$

6.7.4. Camera – trapping

Remote Camera methods have been used successfully to photographically record wildlife in tropical Asian forests (Chapman 1927; Griffiths & van Schaik 1993). Although these devices are relatively expensive they offer a reliable method for inventory of species that are cryptic nocturnal or rare, including the tigers (Lynam et al. 2001). Passive infrared –based camera – traps (Camtrak South Inc., Georgia USA) (Fig. 11.) were used in all surveys.

To achieve the best possible resolution of species identity from photographs, camera – traps were secured to trees 0.4m above the ground, 3 – 5 from a wildlife trail. All camera – traps were set to allow

continuous recording of wildlife movements day and night. Traps were left in place for at least 24 days to allow for adequate sampling of large mammals species richness (A.J. Lynam unpublished data) and atleast 1,000 trap nights to correctly determine the tiger presence or absence (Carbone et al. 2001). For example, the tigers were considered absent from a site if they were not recorded in any trap, with absence referring to the particular area was estimated by placing a buffer around the outermost locations of camera – traps with the length of the buffer equivalent to half the mean distance between camera – traps. A time delay of 3 or 6 minutes prevented entire rolls of film being taken by groups of animals lingering in front of the camera – trap. An index of abundance "Capture Rate" (CR) was estimated from camera trapping as $CR = \text{No. Photo records/100 camera – trap nights.}$

6.7.5. Survey design –

Two survey designs were employed for the tigers (Fig. 12.) In both cases, the primary intention was to gain information on

- (1) the tiger presence –absence,
- (2) the tiger and prey micro distribution and activity in each study area.

First, camera-traps were placed at random locations



Fig. 11. Infrared – based camera – traps were used to detect the tigers and prey species.

within 10 x 4 km sampling grids, in alternative 1 km² grid blocks. This was termed the plot-based survey design (Lynam et al. 2001). The random locations were reached using Global Position System (GPS) receivers (Garmin 12XL, Garmin Corp. Kansas USA). Traps were established on trails or other suitable positions within 100m of random locations. Grids were located in areas where interviews suggested the tigers occurred, or where the tiger occurrence could not be determined, in the part of a study area least disturbed by humans. The tigers require a core area of undisturbed habitat for their survival (Schaller 1967) although this may be a small part of their entire home range (Miquelle et al. 1999). If the tigers are present in an area they are likely to at least frequent a core undisturbed area and should be detectable there. In the second design, camera-traps were deliberately placed along trails and roads where sign of the tigers, large cats or their prey species were recorded. This was termed the *trail* based survey design (Lynam et al. 2001). Sampling locations where capture probabilities for the tigers are highest (Karanth and Nichols 1998) increases the likelihood of their detection at a site.

Because the stripe patterns of the tigers are unique to an individual (Schaller 1967) but are different on left and right sides, camera-trap photographs of both sides of an animal must be used to distinguish it from other the tigers (Franklin et al. 1999) While specific methods are available for estimating the tiger density from double-sided camera-trap designs (Karanth 1995) this was not the purpose of this study. However, to gain information on the minimum number of the tigers known to be alive (MNKA) inside the survey area, pairs of camera-traps were placed on opposite sides of animal trails, staggered by 2-3 m at locations where field staff considered the tigers were likely using e.g. because of presence of sign of the tiger and/or large ungulates. These “checkpoint” arrangements were established to gain double-sided photographs of the tigers.

In summary, the surveys obtained four types of indices: (i) the tiger presence-absence, (ii) minimum numbers of the tigers known alive (MNKA); (iii) minimum ranges of individual the tigers from linking outermost points of locations where the tigers were captured in camera-traps or identifiable from tracks and sign; (iv) an index of abundance (traffic) of large mammal species, i.e. $\text{Capture Rate} = \text{No. Captures} / 100 \text{ trap nights}$



Fig. 12. The tiger survey design (see text for details)

6.7.6 Survey personnel.

At all sites surveys were done by Myanmar Forest Department staff in collaboration with WCS personnel (except in Taninthayi Division), and local forestry or other government staff. Local people were hired as porters to carry equipment and assist with field logistics. In security areas teams of military personnel joined the survey team. The size of the field survey teams was 3-7 key staff with 10-40 support staff. The average cost of each survey was US\$ 3,600.

6.7.7. Survey effort, constraints and coverage.

In most cases, the survey areas were remote and difficult to access, and surveys required special permissions and clearances. Surveys were constrained by a number of factors including extremes of weather, topography, and security considerations. The particular sites where camera-trap surveys were done at MMLK and TNTY were *not* optimal sites, and were in fact selected by security personnel assisting the team. At each site, field staff attempted to obtain the maximum coverage of the area suspected in the tiger survey. All surveys were conducted on foot and consumed 26+ 5 days (range: 15-100) to reach the survey area, and 86+ 12

days (range: 10-207) to complete a survey from start to finish. Total survey coverage was 3,432 sq.mi (5,491 km²), or 202+ 29 sq.mi (range: 91-525 sq.mi). At Alaungdaw Kathapa and Htamanthi the areas covered by survey (244 and 329 sq.mi, respectively) were each one-quarter the size of the protected areas. Interviews of a total of 990 people, or 58+ 17 interviews (range: 5-276) per site were done to determine areas for direct survey. A total of 1,382 hrs, or 81 + 9 hrs (range: 32-171) per site were spent searching for track and sign of the tigers. Camera-traps were established in a total of 430 locations, or 25 + 3 locations per site (range: 0-45) to detect the tigers.

6.7.8. Data recording and storage-

Standardized data recording forms were employed to record all field data from surveys (Appendices VI-VIII). In the field, staff recorded information on camera-trap operation, measured a suite of microhabitat characteristics at survey locations, and records of track and sign taken along survey routes. All records of wildlife were spatially referenced in UTM grid format using GPS. Following camera-trap retrieval, films were developed at a laboratory in Yangon, and slides catalogued and scored, with records entered into a spreadsheet. Slides were scanned at low resolution and archived.

In order to manage the volume of information arising from the field program, to facilitate analyses of data, and to develop a clearinghouse of baseline information on the tiger and other wildlife for the 17 survey areas for use in future management efforts, an electronic database was developed for the project. This database, written in Microsoft Access by U Myint Thann, contains 15,021 records including all results of track and sign and cameratrap surveys, as well as measurements of microhabitat structure.

In addition to the Access database, a spatial database was developed using Arcview 3.1 software (ESRI Systems, Inc., Redlands, USA) with the assistance of the Myanmar Forest Department (FD) GIS Facility. The database includes information on forest cover and land use, locations of survey sites, drainages, topography, human settlements, roads and other human infrastructure. In the future, the two databases will be linked to allow quick retrieval of information from surveys directly from the spatial database. This GIS could serve as a template for a National Wildlife Database to which other information on biodiversity might be archived in the future.

6.8 Results

6.8.1. Camera-trap operation.

A total of 4,099 photo records were made by camera-traps including 3,341 records (88%) of wildlife, 358 records (9%) of humans, and 112 records (3%) of domestic animals (Appendix II). A total of 19 globally threatened species and 7 globally near- threatened species were recorded by camera-traps, and eight CITES Appendix I, three Appendix II, and five Appendix III species. Eighty-three percent were Myanmar protected species, with 40% totally protected species.

The mean failure rate per site was 17 + 3% (range: 1-33, N=15). Camera-traps failed to work for a variety of reasons ranging but were mostly a result of mechanical failure. Extremes of heat, cold and moisture may cause internal circuits and sensors to stop working in the field. Theft, and damage from animals, especially elephants, were secondary reasons for trap failure.

6.8.2. Species richness.

Camera-traps revealed a diverse assemblage of fauna at fifteen sites (Appendix II). Forty-two species of large mammals were recorded with an average 16.4 + 1.3 species (range: 6-22, N = 15) per site (Appendix IX). Six species were recorded at MB, the least rich site, while at four sites, AKNP, TMT, RN and SPB, 22 species were documented.

In addition, sixteen species of birds, small mammals and reptiles were recorded. However, these fauna were likely to be recorded as accidents of sampling in camera-traps so that the surveys were not representative of their richness.

6.8.3. Wildlife traffic.

Surveys indicated a range of levels of wildlife traffic across sites. Only large mammal species are considered here. From camera-traps, sites had a mean capture rate of 15.0 + 2.6 animals/100 trap nights (N = 17). MB had the lowest capture rates (5.7 animals/ 10 trap nights) with BGY and RN having the highest capture rates (36.2 and 34.2 animals/ 100 trap nights, respectively). From track and sign surveys, the mean encounter rate of wildlife sign was 4.1 + 0.5 signs/hr. PPDL had the lowest encounter rates (1.7 signs/hr) with NKM the highest (8.3 signs/hr).

6.8.4. Human traffic.

Levels of human traffic also varied across sites. From camera-traps, sites had a mean capture rate of 2.1 ± 0.7 photorecords/100 trap nights ($N = 17$). TMT and SRMT had the lowest human traffic (0.15 and 0.18 photorecords/100 trap nights) with PPDL having the highest traffic (11 photorecords/100 trap nights, respectively). From track and sign surveys, mean human traffic was 0.3 ± 0.05 signs/hr. TMT and RER had the lowest encounter rates (< 0.1 signs/hr) with TPTY the highest (0.7 signs/hr).

6.8.5. Occurrence of carnivores.

One or more of the large carnivores—the tiger, Asiatic leopard (*Panthera pardus*), Malayan sunbear (*Helarctos malayanus*) and Asiatic black bear (*Selenarctos thibetanus*) and Asian dhole (*Cuon alpinus*) were recorded by cameratraps at all 17 survey sites (Appendix IX). Sunbear occurred at all but two sites, SRMT and PPDL, making it the most frequently occurring large carnivore species. Dhole occurred at all but four sites, TMT, SRMT, PLG, and MB. Leopard occurred at just over half the sites. Asiatic black bear occurred at just under one-quarter of sites.

6.8.6. Occurrence of the tigers across study sites

Interviews. A total of 990 local people were questioned about the occurrence of the tigers and other wildlife at the 17 sites (Appendix III). These individuals were local villagers, hunters, and government officials living in or around forest areas. Two hundred and thirty eight (24%) individuals interviewed reported having either seen the tigers, encountered sign, or heard the tigers. One hundred and seven (45%) records were direct sightings. Eighty-seven (81%) of these eyewitness accounts were made after 1990. Direct survey. Signs of large cats (the tiger or leopard) were recorded at all survey sites. The tigers were confirmed by camera trapping at four of 17 sites, TMT, HKV, MMLK and TPTY (Appendix IX; Fig. 13.).

1. TMT: a single photo of a the tiger was recorded during October 1999 along with two sets of tracks during the trap retrieval exercise. After the survey team left the area, a tiger was reported killed by hunters from an area adjacent to the survey site.
2. HKV: Fresh sign was found on both sides of upper

and lower Shipak Hka between Tarung Hka and Brangbram Hka, and at Numpraw Hka on 3rd February 2002, during the camera-trap set up exercise. Three photos of the tiger were recorded by camera-traps on 11.2.01, 10.3.01, and 11.3.01. The tigers are thought to be resident in the upper Brangbram Hka, upper Tanaing Hka, Maingkwan and surrounding area, and around Shingbweyang.

3. MMLK: Fresh tracks were found during the camera-setup (26.9.01-4.10.01) and retrieval exercises (7.11.01-14.11.01) and plaster cast records made. A single photo of a tiger was recorded from a camera trap unit set up on a trail on 10.10.01. Nine of 25 units failed to operate so more photo-records might have been made.
4. TPTY: a set of tracks was encountered during the camera-setup operation (17- 20.1.02) and a plaster cast made. Although no photo records were made local people reported a killing of a tigress on 17.1.02 at Kyachaung Village, 2 mi S of Manoron

6.8.7. The tiger density.

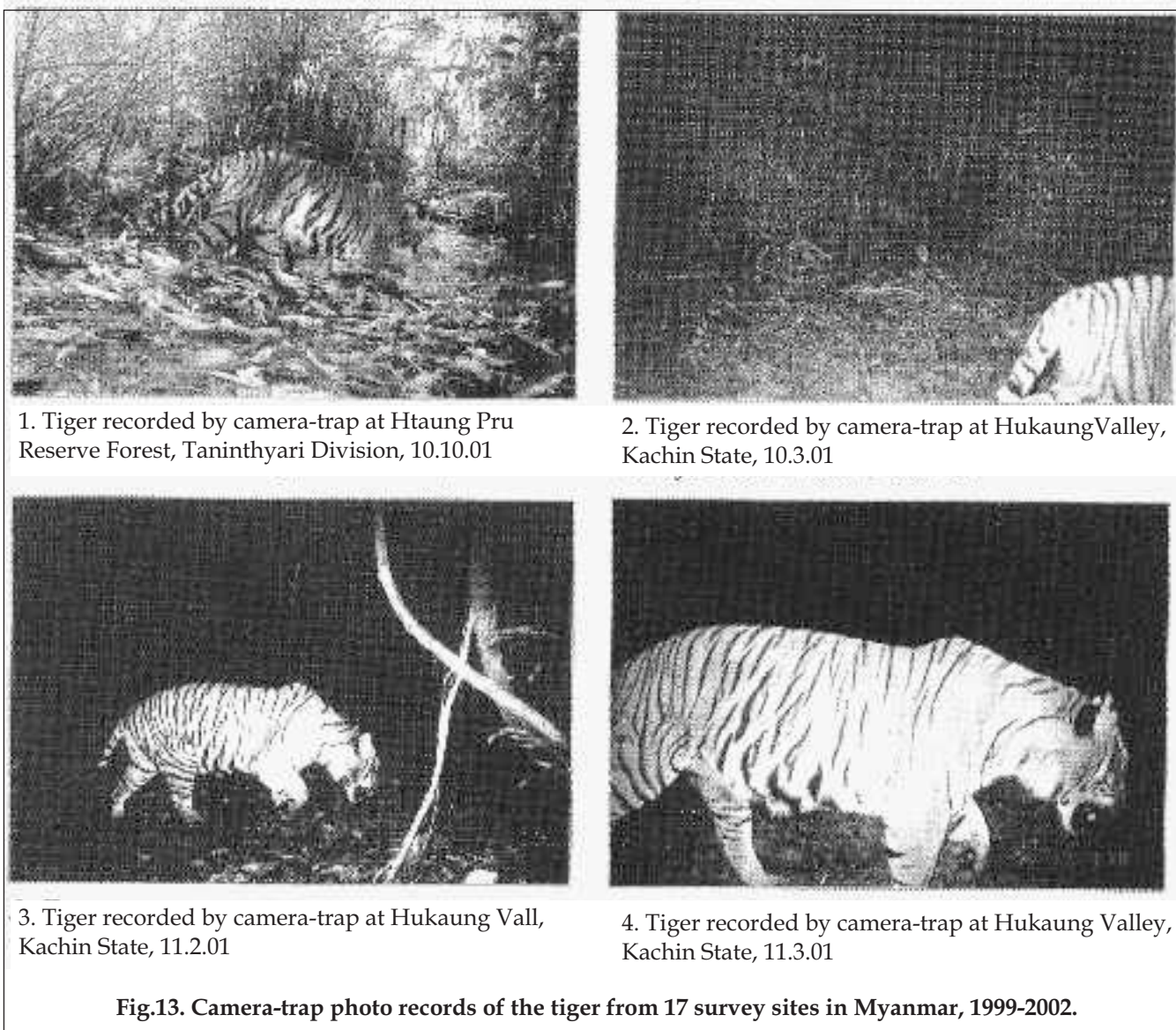
(Karanth & Nichols 2000) estimated the tiger density for multiple sites in India. One of their study sites—Bhadra—is similar in topography and vegetation to northern Myanmar forests. Using information from single sided captures, the tiger density was estimated for the Hukaung Valley, where captures of two individual the tigers were made. Using a mark-recapture approach (Karanth and Nichols 1998) and assuming a capture probability for the tigers (0.788) and a sampling buffer (2 km), densities were estimated for the tiger populations at HTM, HKV and MMLK (Table 7).

6.8.8. Occurrence of other large mammals.

Large (> 1 kg) herbivores were recorded from all survey sites (Appendix IX). Common muntjak (*Muntiacus muntjak*) was the most abundant species in camera-traps and was found at all sites. Wild cattle were recorded at all sites except SRMT, PPDL, and MMLK. Banteng (*Bos javanicus*), a globally threatened species was found at 3 sites, AKNP, MHM and BGY. Sambar (*Cervus unicolor*) was present at all sites except SRMT, PPDL, and MB. Serow (*Capricornis sumatraensis*) was recorded at just fewer than 50 % of sites.

(Footnotes)*

As of 1 May 2000 the United States Department of Defence, the agency that controls GPS satellites, turned off Selective Availability (SA) or “scrambling” of GPS satellite signal information. Prior to this date the accuracy of GPS position fixes was limited to ± 100 m. Most recreational GPS devices are now capable of real time position fixes accurate to ± 20 -25m.



6.8.9. Human traffic within study sites.

amera-traps recorded suspected poachers at 8 (47%) of sites (Appendix IX) with villagers recorded at all but three sites, HKV, SPB, MB. Traps at AKNP recorded park rangers on patrol, while traps at MMLK and TNTY recorded military personnel on patrol.

Table 7. The tiger Densities at Some Rainforest and Evergreen Forests in Myanmar and other Southeast Asia Countries.

Country	Site	No. the tigers detected	Density est.* (thetigers/100 km ²)	Min density	Max density
<i>India</i>	<i>Bhadra</i>	7	3.42	2.58	4.26
Thailand	Kaeng Krachan	4	2.82	1.96	3.67
Thailand	Hala	3	2.68	2.42	2.93
Thailand	Bala	2	1.79	1.50	2.07
<i>Malaysia</i>	<i>Temenggor</i> ¹	2	1.78	0.94	2.63
<i>Indonesia</i>	<i>Bukit Berisan</i> ²	9	1.60	1.2	3.2
Myanmar	Hukaung Valley	2	1.10**	0.91	1.29
Myanmar	Myintmoletka	1	0.67**	0.38	0.96
Thailand	Phu Khieo	1	0.62**	0.35	0.88
Myanmar	Htamanthi	1	0.49**	0.28	0.70
Thailand	Khao Yai	1	0.38**	0.22	0.54

* Single sided M-R estimates using Program CAPTURE

** No recaptures. Density (D) = No. the tigers (N)/ Area, where N = No. the tigers detected/p, and p=0.778 (from Badhra, India; Karanth and Nichols, 2000)

1 R. Laidlaw and DWNP (unpublished data)

2 O' Brien et al. ms

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APPENDIX I. DESCRIPTIONS OF 17 MYANMAR THE TIGER SURVEY SITES

1. Alaungdaw Kathapa National Park (AKNP)

Location: Lies between 22°14'–22°29'N and 94°17'–94°36'E between the Chindwin River floodplain and Myittha River valley in Sagaing Province, approximately 100 mi (160 km) west of Mandalay.

Elevation: 100–3,440' (30–1048m).

Survey area: Centred on Mindon Camp covering an area of 152 sq.mi (390 km²).

Description: The area is dissected by a number of high elevation 2000–4000+' (700–1219m) ridges that run in a north-south direction, and is drained by the Patolon and Taungdwin Rivers that flow northwards into the Chindwin River.'

Vegetation: Varies from Dry Upper Mixed Deciduous (DUMD) forest on the high ridges and slopes to Moist Upper Mixed Deciduous (MUMD) forest on lower slopes. Bamboos are common in the under storey on lower slopes. Semi-Indaing forest, high Indaing forest or Pine forest occur in patches on the tops of some high ridges.

Access: Alaungdaw Kathapa is accessed from the east by road from Yinmarbin, and via a newly constructed road that links India with Mandalay and cuts through the northwest of the park. Walking distance from the nearest road was 1 day.

Rainfall: The area is subject to two monsoons, a southwest monsoon which brings most of the yearly rainfall between May and October, and heaviest between August and September. Mean annual rainfall is 588" (1,507 mm). Water is available year round in the major drainages with smaller tributaries mostly drying up by the end of March.

Human impact and landuse: The park is surrounded almost completely by cultivated land but inside the park the only settlements are of park staff, mahouts and a monastery. Government camps and religious pilgrimages pose threats to wildlife. Other threats are hunting for wildlife trade, extraction of non-timber forest products, livestock grazing and fishing.

2. Thaungdut

Location: Lies between 24°17'–24°30'N and 94°30'–94°43' E in the Homalin Township, Sagaing Division and includes with Kabaw Valley.

Elevation: 432–2,314' (130–695 km²)

Survey area: Covers an area of 82 sq.mi. (210 km²) 10 mi (16 km) from Thuangdut village.

Description: The survey area is surrounded by Thaungdut Reserve Forest in the east, southeast and by Kabaw Valley in the north and northwest. The Nantanyit Chaung runs south to north between Minthamee Mountain 1,871' (570m) and Nantanyit Mountain 3,545' (1,080m) and enters the Chindwin River near Thaundut village. **Vegetation:** Varies from DUMD forest, MUMD forest, to Indaing forest. Bamboos such as Myin Wa, Tin Wa, Wa Bo, Wa Nipa, Theik Wa, Kya Khet Wa, as well as rattan are common.

Access: Thaungdut village is accessible by boat along the Chindwin River year-round. It takes about 2 days travel by boat from Monywa. From Thaungdut village the survey area can be accessed by elephant or on foot.

Rainfall: 74-99" (188-251 mm) of rain per annum. **Human Impact and Landuse:** Timber extraction has occurred in the area for several years, with the Myanmar Timber Enterprise still extracting hard wood, mainly teak. Hunting, timber cutting, and intrusions by elephant workers and fishermen are threats to wildlife in this area. There were no signs of human settlements or cultivation in the area at the time of survey.

3. Htamanthi Wildlife Sanctuary (TMT)

Location: Lies between 25°16"-25°44' N and 95°19"-95°46" E. It is bounded to the N by Nampilin Chaung, to the E and SE by Pali Taung, Temein Taung, and New-ta-mein Taung 1,000"-2,000' (304-609m) and the Uyu River, to the S by numerous streams, and to the W by the Chindwin River.

Elevation: 490-1,100' (149-335m).

Survey area: Covers an area of 205 sq.mi (526 km²).

Description: Vegetation is primarily tropical evergreen forest with dense bamboo and rattan undergrowth. Mixed deciduous teak forest is also found on higher slopes in the eastern part of the sanctuary.

Access: The area is accessible by boat from Homalin, the nearest town, 57 mi. (91 km) and a 2 day journey away.

Rainfall: 136" (3,491 mm) per annum. The area is drained by the Nampilin, Nam Emo, Nam Ezu, Nam Pagan and Nam Yanyin all of which flow W into the Chindwin River.

Human impact and landuse: No permanent human settlements exist inside the sanctuary but the area is used by Lisu hill tribes who hunt wildlife, and by local people who fish and extract non-timber forest products. Oil drilling occurs in the area. 4. Mahamyang (MHM).

Location: Lies between 23°31"-23°43' N and 94°51"-94°57' E. The area includes parts of Lawthar, Pyaungtha, Maingwan, Mahamyang and Nonsabai Reserve Forests.

Elevation: 226"-2,071' (68-631m).

Survey area: 78 sq.mi. (200 km²)

Description: The landscape is characterized by evergreen, mixed deciduous and Indaing (Dipterocarp) forests. The area is drained in the W by the Kaedan Chaung which originates at Honan Taung Dan 2,017" (614m) and flows into the Chindwin River. In the E the Pyaungthwe Chaung drains into the Mu River.

Access: Reached on foot from Aungchanthar Village, 20 mi. (32 km) away on the Monywa-Khanti highway.

Rainfall: 46-69" (117-175mm) per annum.

Human impact and landuse: Timber extraction from the surrounding areas has taken place since 1973. At present two private companies are extracting dipterocarp timber from part of the area. Numerous current and old settlements occur in the area. Cattle grazing is taking place. Oil drilling occurred in the past.

5. Nankamu (NKM)

Location: Lies between 24°03'-25°15' N and 94°57'-96°12' E between Paungbyin and Pinlebu Townships. It includes parts of Sanda, Kaingshe and Paungbyin Reserved Forests. In the N it is bounded by the catchment of Thetla Chaung, a tributary of the Chindwin River, to the E by Zibu Taungdan 2,319'-2,910' (706-886m), a catchment of the Mu River, to the S by the Namkawin

and Kodan Chaung, tributaries of the Chindwin River. **Elevation:** 186-2,100' (56-640m)

Survey area: 94 sq.mi. (243 km²).

Description: Vegetation is dominated by moist upper mixed deciduous forest, with evergreen forest and Indaing forest.

Access: The area is accessible by the newly constructed Pinlebu-Paungbyin Road. Paungbyin Town is 300 mi (482km) from Monywa. The base camp was 25 mi (40 km) from Paungbyin.

Rainfall: Averages 91" (2,342 mm) per annum

Human impact and landuse: Teak extraction occurred in the area 15 years ago. Bamboo and mushroom collecting occurs along trails in the area.

6. Saramati (SRMT)

Location: Lies between 25°20'-25°43'N and 94°50'-95°40'E. To the N it is bounded by the Saramati Range, to the E by the Chindwin River and Laytin Ridge 5,790' (1,764m), to the S by Lawpe Mountain 8,455' (2,577m) and W by the Myanmar-India border.

Elevation: 410-12,553' (124-3,826m)

Survey area: xx sq.mi. (xxx km²)

Description: Streams in the Saramati and Laytin catchments flow to the Nantalaik River, one of the principal tributaries of the Chindwin River. The survey area is contiguous with India's Shiloi Reserve Forest. Vegetation cover consists of evergreen, pine, moist hill evergreen and sub-tropical evergreen forest with bamboo under storey.

Access: The area is accessible by road from Layshi in the dry, or during the wet season on foot. Mt Saramati, in the N of the survey area is 40 mi (64 km) from Layshi, accessible only on foot.

Rainfall: Averages 91" (2,342 mm) per annum

Human impact and landuse: Though sparsely populated, shifting cultivation occurs as high up as 7,000' (2,133m) elevation.

7. Paunglaung Catchment (PLG)

Location: Lies between 19°52'N-20°17'N and 96°24'E-96°35'E in Pyinmana Township, Mandalay Division. It is bounded to the N by Yamethin Township, to the E by Pinlaung Township, to the S by Pyinmana Township, and to the W by Tatkan Township.

Elevation: 500-6,252' (152-1,905m)

Survey area: 134 sq.mi. (343 km²)

Description: Riverine evergreen and moist upper mixed deciduous (MUMD) forest occur in the lowlands with dry upper mixed deciduous (DUMD), Indaing (dipterocarp), grassland and alpine forest at higher elevations. The entire catchment is 1,779 sq.mi. (4,608 sq.km). A rugged mountain range dissects the area.

Access: Two days walk from Taunggya to the centre of the study area across a 6,000' (1,828m) mountain range.

Rainfall: 55-95" (140-241 mm) per annum

Human impact and landuse: Numerous villages occur near the study area. Shifting cultivation occurs in the area, encroaching on the reserve forest. The area is sparsely populated owing to difficult access.

8. Panlaung Pyadalín Cave Wildlife Sanctuary

Location: Lies between 20°56'N-21°00'N and 96°16'-96°27'E in Ywa Ngan Township, Shan State, 21 miles (33km) from Kinda Dam and Hydro Power Project

Survey area: Covers an area of 61 sq.mi. (157 km²) in the Kinda Dam area and includes two reserve forest areas, Panlaung and Pyadalín.

Description: The area is bounded by the Kinda Dam in the north, Ywa Ngan Township in the east, Thazi township in the south and Wan Twin Township in the west, respectively.

Vegetation: Riverine evergreen forest, Moist deciduous forest, and Dry deciduous forest each with diverse bamboo communities, and rattan.

Access: Panlaung-Pyadalín is accessible by road from Kume village, Myittha Township, 1 hour by boat from the Kinda Dam, and one hour's walk.

Rainfall: No data available

Human Impact and Landuse: Temporary human settlements occur in the area. Bamboo collection for making chopsticks is practiced. Timber extraction, non-timber extraction, fishing, hunting and cultivation are threats to wildlife. Roads passing through the wildlife sanctuary are used for extracting timber and moving cattle.

9. Central Bago Yoma (BGY)

Location: Lies between 19°02'-19°15'N and 95°53'-96°59'E, and includes parts of Sabyin, West Swa and Kabaung Reserve Forests. It is bounded to the N and E by the Sabyin River, to the E by the Swa River, to the W by the Bago Yoma Range 1,865' (568m), and to the S by the Pyu Mountain 1,537' (468m) and the Kabaung River catchment.

Survey area: 130 sq.mi. (334 km²)

Elevation: 330'-1,885' (100-574m)

Description: The area is drained by the Sittaung River and its tributaries. Vegetation is characterized by DUMD forest, MUMD forest and evergreen forest. Bamboos are common in the under storey.

Access: The area can be reached by 3 days walk from Swa Dam, to the west of Swa Town on the Yangon-Mandalay highway about 200 mi. (320 km) from Yangon by road.

Rainfall: 126" (3,235 mm)

Human impact and landuse: Large scale extraction of teak and other hardwood, and other signs of human encroachment including bamboo and rattan collection, hunting and fishing was observed during the study period. No evidence of cultivation or permanent human settlement was observed in the study area.

10. Northern Rakhine (RN) (Paletwa and Kaladan river catchments)

Location: Lies between 21°05'-21°22'N and 92°21'-92°29'E is located between and contains the northern Kalapanzin River catchment, Saingdin Ridge and northern Mayu Range.

Survey area: 69 sq.mi. (177 km²)

Elevation: 710' -2,494' (216-760m)

Description: The area is bounded to the N by the Myanmar-Bangladesh border, with the Saingdin River to the E, the Obru and Pairwan Rivers to the S, and the Mayu Range in the W. Vegetation is characterized by sporadic evergreen forest in ravines with extensive Kayin bamboo patches. Forest covers approximately 40% of the survey area. Bamboo is more common in shifting cultivation areas at lower altitudes with dry evergreen forest at higher elevations. Due to logging and bamboo cutting, degraded secondary growth occurs on undulating slopes.

Access: The survey area is accessible by boat along the Mayu and Kalpanzin Rivers, and during the dry season by 6' wide paths cleared by the UN.

Rainfall: (no data available)

Human impact and landuse: A number of tribal settlements occur in areas fringing the forest. The lower Kalapanzin River valley is fertile and supports large villages (100-1,000 households) of Bengali people. Hunting, shifting cultivation and extraction of non-timber forest products all occur in the area.

11. Rakhine Elephant Range (RER)

Location: Lies between 18o01'-18o59'N and 94o36'-94o45' E on the western side of the Rakhine Yoma Range.

Survey area: 57 sq.mi. (146 km²)

Elevation: 252' -3,416' (77-1,041m)

Description: The area is dissected by a series of tall ridges running north to south range from 2000'-4000'. The area is drained by the Tandwe, Salu and Kyeintali Rivers that flow westwards into the Bay of Bengal. Vegetation includes semi-evergreen, mixed deciduous and secondary tropical moist forest, and bamboo brake.

Access: The study area was 3 days walk from Bogale Village, which is 48 mi. (77 km) from Gwa by road. Gwa Town is 180 mi (289 km) NW of Yangon by car.

Rainfall: (No data available)

Human impact and landuse: Thirty-three villages surrounding the Elephant Range consisting of Rakhine tribes (82%) and Chin tribes (18%). They farm rice and groundnut, practice shifting cultivation, and practice commercial hunting of wildlife.

12. Hukaung Valley (HKV)

Location: Lies between 26o36'-26o42'N and 96o34'-96o53'E in the newly declared Hukaung Valley Wildlife Sanctuary (2,493 sq. miles; 6,459 km²).

Survey area: 525 sq.mi. (840 km²)

Elevation: 193' -1,307' (59-398m)

Description: To the N an upland area 6,758' (2,060m) divides the Tarung-Tawan watershed and Gedu River catchment, with the Kumon Mountains to the E, the Nambyu and Nampyek River catchments in the S and the Tarung River and old Ledo Road to the W. Vegetation is predominantly dense lowland evergreen forest interspersed with meadows.

Access: The area lies 20 miles (32km) N of Tanaing and can be accessed during the wet season by boat and during the dry season by baggage elephant. The Ledo Road is paved for 90 miles (149 km) of its length providing year-round access from Myitkyina.

Rainfall: 91" (2,339 mm)

Human impact and landuse: Apart from a 5 acre shifting cultivation area near Tawang River there were no permanent human settlements in the area.

13. Kaunglaungpu (KLP)

Location: The survey area is located in the Kran River and Phet River catchments between 26°44' - 26°53' N and 97°53' - 98°04' E.

Survey area: 127 sq. mi. (326 km²)

Elevation: 200' - 9,080' (61-2,767m)

Description: These rivers along with the Shinyan and Hteei Rivers drain the area. The area is covered in natural forest (40%) consisting of tropical evergreen, subtropical hill, warm and cool temperate rainforest and alpine. The remainder (60%) is secondary forest damaged by shifting cultivation in former times. These areas are dominated by bamboo, teak trees, phetwin, and old woody lianas. Extraction of some hard woods was taking place.

Access: This area is reached from Putao by road to Mabweza (63mi.; 101 km). The survey area is accessed by a 63 mi. (8 day) walk on foot passing Sunnochat Mountain.

Rainfall: (no data available)

Human impact and landuse: Intensive shifting cultivation has transformed natural forests into secondary forests. Threats to the tigers and prey include a new road built from the China border, timber extraction, non-timber forest product extraction, mining, subsistence hunting and wildlife trade with China.

14. Sumprabum (SPB)

Location: The survey area lies 9mi. (15km) east of the Kumaon Range and 10 mi. (17 km) W of Sumprabum at 26°29' - 26°36' N and 97°21' - 98°28' E.

Survey area: 130 sq. mi. (334 km²)

Elevation: 460' - 4,950' (140-1,508m)

Description: It is bounded to the N by the Chaukan Pass and hills that receive snow in winter. The Hukaung Valley lies to the W, with Myitkyina Township to the S. The area is drained by the Hpungchan, Hpung-in and Mali Rivers in the east and northwest, and from the south by the Magyeng River. Vegetation is tropical evergreen, sub-tropical moist hill forest, and subtropical wet hill forest. Bamboos and rattan species occur in the under storey. Some swamp land occurs in the area.

Access: The area is reached on foot from Sumprabum. Sumprabum is 131 miles (210 km) N by road from Myitkyina.

Rainfall: 91" (2,339 mm)

Human impact and landuse: The area is sparsely populated (3.8 people/sq.mi.; 2.5/sq.km) with local people practicing shifting cultivation.

15. Momeik-Mabain (MB)

Location: The survey area is located between 23o45'-23o55'N and 96o43'-96o51' E and includes parts of Manpon, Nampa and Namme Reserve Forests.

Survey area: 133 sq.mi (340 km²)

Elevation: 426'-1,965' (130-599m)

Description: It is drained by the Maingthar and Namme River. Alluvial plains dominate the survey area with some rugged, rocky peaks including Parhoke Mountain 3,101' (945m), Wantu Mountain 3,003' (915m) and Kweanung Mountain 2,393' (729m). Vegetation comprises evergreen, MUMD and Indaing forest.

Access: From Mabain the study area is accessed by boat (18 mi.; 29 km), then by cart (12 mi.; 19 km), then on foot (18 mi.; 29 km). Mabain is 38 mi. (61 km) by ferry from Momeik. Momeik is 156 mi. (251 km) from Mandalay.

Rainfall: 52" (1,338 mm)

Human impact and landuse: Development of roads and infrastructure for gold mining has taken place since 1988 resulting in forest disturbance and pollution of natural drainages. Over 300 residents inhabit four goldmines in the forest. In the dry season, miners turn to bamboo and rattan cutting and resin tapping.

16. Myintmoletkat (MMLK)

Location: The survey area lies in the Htaung Pru Reserve Forest between 11o45'-11o38' N and 99o07'-99o03'E in Taninthayi and Bokpyin Townships, Myeik District.

Survey area: 120 mi. (310 km²)

Elevation: 110'-2,264' (33-690m)

Description: The eastern portion is drained by the Naukpyan, La Mu, Tabalat, and Ngawun Streams which flow into the Little Taninthayi River. To the west the Monoron Stream flows into the Lenyar River to the south. The area is partially low-lying with swamp and grassland that is annually flooded, interspersed with mixed evergreen-bamboo forest groves on higher ridges. The area lies on both sides of the new Taninthayi-Bokpyin highway, and is partially under cultivation for rice and areca palm with some shifting cultivation.

Access: By road from Myeik (58mi).

Rainfall: The area has two monsoons with a prolonged wet season from June-November, and annual rainfall of around 160" (4,127 mm).

Human impact and landuse: Base camp was situated 3 miles (5 km) S of Htaung Pru Village containing 15 households, with a further 38 households in adjacent Monoron Village.

17. S. Taninthayi (TNTY)

Location: The survey area lies in the Pe River Valley at 13o30' N and 98o38'E in Thayetchaung Township, Dawei District.

Survey area: 110 mi. (285 km²)

Elevation: 208'-2,010' (63-612m)

Description: Pe River Valley is bounded to the N by the Mintha Reserve Forest, to the E by Myintmoletkat Mountain 6,801' (2,072m) to the S by the fork of the Pe and Plauk Rivers and on the W by Pe Mountain 2,720' (829m). Vegetation is characterized by a mosaic of riverine evergreen forest (30%) with sporadic secondary growth (30%) and shifting cultivation and orchard (40%). Areca palm and catechu plantations dominate the cultivated areas.

Access: The area is accessible from the Dawei-Myeik Highway, 53 mi. (85 km) south of Thayetchaung, and on foot 15 mi. (24 km) east of Pedat.

Rainfall: The area has two monsoons with a prolonged wet season from June-November, and annual rainfall of around 161" (4,127 mm).

Human impact and landuse: Due to the security situation, permanent settlements no longer exist in the area and farmers are permitted only weekly access to maintain and harvest their lands.

APPENDIX II. WILDLIFE RECORDED BY CAMERA-TRAP SURVEYS AT 17 SITES IN MYANMAR 1999-2002

Species	Scientific name	IUCN Status	CITES Status	Myanmar Status	No. records
The tiger	<i>Panthera tigris</i>	EN	App I	TP	5
Leopard	<i>Panthera pardus</i>	LR	App I	TP	92
Clouded Leopard	<i>Neofelis nebulosa</i>	VU	App I	TP	50
Golden cat	<i>Catopuma temminckii</i>	LR/VU	App I	TP	34
Marbled cat	<i>Pardofelis marmorata</i>	DD	App I	TP	15
Leopard cat	<i>Prionailurus bengalensis</i>	EN	App II	P	80
Wild dog	<i>Cuon alpinus</i>	VU	-	P	34
Small Indian civet	<i>Viverricula indica</i>	-	App III	TP	6
Large Indian civet	<i>Viverricula zibetha</i>	-	App III	P 1	35
Large spotted civet	<i>Viverricula megaspila</i>	-	-	P	1
Common palm civet	<i>Paradoxurus hermaphroditus</i>	VU	App III	P	14
Three-striped palm civet	<i>Arctogalidia trivirgata</i>	EN	-	P	1
Masked palm civet	<i>Paguma larvata</i>	-	App III	P	3
Spotted Linsang	<i>Prionodon pardicolor</i>	-	App I	TP	2
Banded Linsang	<i>Prionodon linsang</i>	-	App II	TP	5
Binturong	<i>Arctictis binturong</i>	VU	App III	P	15
Malayan sunbear	<i>Helarctos malayanus</i>	DD	App II	TP	72
Himalayan black bear	<i>Ursus thibetanus</i>	VU	App I	P	17
Yellowthroated marten	<i>Martes flavigula</i>	-	-	P	16
Wild Pig	<i>Sus scrofa</i>	VU	App I	-	443
Hog badger	<i>Arctonyx collaris</i>	-	--	--	33
Myanma ferret badger	<i>Melogale personata</i>	-	-	-	1
Mongoose species	<i>Herpestes spp</i>	--	--	P	1

Crab-eating mongoose	<i>Herpestes urva</i>	-	-	P	22
Elephant	<i>Elephas maximus</i>	EN		TP	81
Gaur	<i>Bos gaurus</i>	VU		TP	265
Banteng	<i>Bos javanicus</i>	EN		TP	38
Tapir	<i>Tapirus indicus</i>	VU		TP	3
Sambar	<i>Cervus unicolor</i>	-		P 1	66
Serow	<i>Naemohedus sumatraensis</i>	VU		TP	25
Common muntjak	<i>Muntiacus muntjak</i>	-		SP	847
Leaf deer	<i>Muntiacus putaoensis</i>	-		TP	2
Large mouse deer	<i>Tragulus napu</i>	EN		TP	9
Lesser mouse deer	<i>Tragulus javanicus</i>	-		TP	9
Malayan porcupine	<i>Hystrix brachyura</i>	VU		-	128
Brush-tailed porcupine	<i>Atherurus macrourus</i>	EN		-	32
Pangolin	<i>Manis javanica</i>	LR/NT		TP	2
Rhesus macaque	<i>Macaca mulatta</i>	LR/NT		P	97
Pig-tailed macaque	<i>Macaca nimestrina</i>	VU		P	59
Capped leaf monkey	-	-		-	2
Phayres langur	<i>Prebytis phayrei</i>	-		P	1
Dusky leaf monkey	<i>Semnopithecus obscurus</i>	LR/NT	-	TP	1
Squirrel	<i>Ratufa spp</i>	-		-	11
Other small mammal species	-	-		-	24
Blue Whistling Thrush	<i>Myiophoneus caeruleus</i>			SP	1
Green magpie	<i>Cissa chinensis</i>			P	1
Indian pied hornbill	<i>Anthracoceros albirostris</i>			TP	1
Jungle fowl	<i>Gallus gallus</i>			-	80
Laughingthrush species	<i>Garrulax spp</i>			P	1

Orange bellied	<i>Chloropsis hardwickii</i>			SP	17
leafbird Owl	<i>Strigiformes spp</i>			TP	2
Parrot	-			P	4
Pheasant species	-			TP	163
Black Stork	<i>Ciconia nigra</i>			-	2
Quail	<i>Coturnix spp</i>			-	2
Monitor lizard	<i>Varanus spp</i>			P	1
Tortoise	-				P 1
Green viper	<i>Trimeresurus spp</i>			P	1
Unidentified Human sign					165
Domestic elephant					10
Domestic buffalo					29
Domestic cow					46
Domestic dog					27
Villagers Suspected					242
poacher					61
Military Government					30
staff					25
				Total	3811

APPENDIX III. RESULTS OF INTERVIEW SURVEYS FOR THE TIGERS AT 17 SITES IN MYANMAR

Site	Direct observation (sighting)	Track and sign	Heard	Total observ.	Date of most recent direct observation
AKNP	3	5	9	17	1998
BGY	2	10	1	13	1998
HKV	9	10	0	19	2001
KLP	6	21	0	27	Oct 2000
MB	16	1	1	18	2001
MHM	2	5	0	7	Dec 1998
MMLK	14	6	0	20	Oct 2001
PLG	9	20	1	30	Apr 2000
PPDL	6	7	1	14	2000
RER	6	1	3	10	Jun 2000
RN	7	4	0	11	Jan 2000
SPB	6	10	0	16	1998
TD	3	3	1	7	2000
TMT	4	5	1	10	1996
TNTY	14	4	1	19	Feb 2002
Totals	107	112	19	238	

APPENDIX IV. HISTORICAL RECORDS OF TIGER IN MYANMAR - PRE-1999

Ref.	Location	Year	Sex	Age	Weight (kg)	Length (cm)	Notes
1	Chindwin River, Mandalay	1890	♂	Adult	100	180	First recorded tiger in Myanmar
2	Chindwin River, Mandalay	1895	♂	Adult	110	190	Second recorded tiger in Myanmar
3	Chindwin River, Mandalay	1900	♀	Adult	90	170	Third recorded tiger in Myanmar
4	Chindwin River, Mandalay	1905	♂	Adult	120	200	Fourth recorded tiger in Myanmar
5	Chindwin River, Mandalay	1910	♀	Adult	80	160	Fifth recorded tiger in Myanmar
6	Chindwin River, Mandalay	1915	♂	Adult	130	210	Sixth recorded tiger in Myanmar
7	Chindwin River, Mandalay	1920	♀	Adult	70	150	Seventh recorded tiger in Myanmar
8	Chindwin River, Mandalay	1925	♂	Adult	140	220	Eighth recorded tiger in Myanmar
9	Chindwin River, Mandalay	1930	♀	Adult	60	140	Ninth recorded tiger in Myanmar
10	Chindwin River, Mandalay	1935	♂	Adult	150	230	Tenth recorded tiger in Myanmar
11	Chindwin River, Mandalay	1940	♀	Adult	50	130	Eleventh recorded tiger in Myanmar
12	Chindwin River, Mandalay	1945	♂	Adult	160	240	Twelfth recorded tiger in Myanmar
13	Chindwin River, Mandalay	1950	♀	Adult	40	120	Thirteenth recorded tiger in Myanmar
14	Chindwin River, Mandalay	1955	♂	Adult	170	250	Fourteenth recorded tiger in Myanmar
15	Chindwin River, Mandalay	1960	♀	Adult	30	110	Fifteenth recorded tiger in Myanmar
16	Chindwin River, Mandalay	1965	♂	Adult	180	260	Sixteenth recorded tiger in Myanmar
17	Chindwin River, Mandalay	1970	♀	Adult	20	100	Seventeenth recorded tiger in Myanmar
18	Chindwin River, Mandalay	1975	♂	Adult	190	270	Eighteenth recorded tiger in Myanmar
19	Chindwin River, Mandalay	1980	♀	Adult	10	90	Nineteenth recorded tiger in Myanmar
20	Chindwin River, Mandalay	1985	♂	Adult	200	280	Twentieth recorded tiger in Myanmar
21	Chindwin River, Mandalay	1990	♀	Adult	5	80	Twenty-first recorded tiger in Myanmar
22	Chindwin River, Mandalay	1995	♂	Adult	210	290	Twenty-second recorded tiger in Myanmar
23	Chindwin River, Mandalay	2000	♀	Adult	0	70	Twenty-third recorded tiger in Myanmar
24	Chindwin River, Mandalay	2005	♂	Adult	220	300	Twenty-fourth recorded tiger in Myanmar
25	Chindwin River, Mandalay	2010	♀	Adult	0	60	Twenty-fifth recorded tiger in Myanmar
26	Chindwin River, Mandalay	2015	♂	Adult	230	310	Twenty-sixth recorded tiger in Myanmar
27	Chindwin River, Mandalay	2020	♀	Adult	0	50	Twenty-seventh recorded tiger in Myanmar
28	Chindwin River, Mandalay	2025	♂	Adult	240	320	Twenty-eighth recorded tiger in Myanmar
29	Chindwin River, Mandalay	2030	♀	Adult	0	40	Twenty-ninth recorded tiger in Myanmar
30	Chindwin River, Mandalay	2035	♂	Adult	250	330	Thirtieth recorded tiger in Myanmar
31	Chindwin River, Mandalay	2040	♀	Adult	0	30	Thirty-first recorded tiger in Myanmar
32	Chindwin River, Mandalay	2045	♂	Adult	260	340	Thirty-second recorded tiger in Myanmar
33	Chindwin River, Mandalay	2050	♀	Adult	0	20	Thirty-third recorded tiger in Myanmar
34	Chindwin River, Mandalay	2055	♂	Adult	270	350	Thirty-fourth recorded tiger in Myanmar
35	Chindwin River, Mandalay	2060	♀	Adult	0	10	Thirty-fifth recorded tiger in Myanmar
36	Chindwin River, Mandalay	2065	♂	Adult	280	360	Thirty-sixth recorded tiger in Myanmar
37	Chindwin River, Mandalay	2070	♀	Adult	0	0	Thirty-seventh recorded tiger in Myanmar
38	Chindwin River, Mandalay	2075	♂	Adult	290	370	Thirty-eighth recorded tiger in Myanmar
39	Chindwin River, Mandalay	2080	♀	Adult	0	0	Thirty-ninth recorded tiger in Myanmar
40	Chindwin River, Mandalay	2085	♂	Adult	300	380	Fortieth recorded tiger in Myanmar

APPENDIX V. THE TIGER INTERVIEW PROTOCOL

1. How long have you been in this village?
2. What is your ethnicity?
3. Where do you get bamboo and wood to repair your house?
4. (If you get it from the forest) How far from your house to the forest?
5. How many times do you go into the forest per month?
6. Have you ever seen wild animals when you go inside the forest?

If yes,

Sr.	Animal (Prey)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

Sr.	Animal (Predator)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

1. Do you have any experience with predators attacking humans or livestock?

Sr.	(Predator)	Livestock						Time occur	Place occur	Remark
		Human	Buffalo	Cow	Goat	Pig	Others			

2. How do people use wild animal products in this area?

Sr.	Animal	Products				Usage		Marketsituation				Remark
		Meat	Bobne	Skin	Horn	Medicine	Food	Traditional	Place	User	Price	

3. What hunting methods do people use? What kinds of tools do they use for hunting?

Sr.	Prey	Hunting methods							Tool					
		Tracking	Smelling	Remnants	of	food	Info	Gun	Crossbow	Bow	Dogs	Snare	Trap	Digginghole

4. (If he/she does cultivation) How much land do you use? What kinds of crops do you plant? Do wild animals destroy your crops? If yes, what animals are they?

Sr.	Crops	Acres			Total acres	Animal that destroyed crops	Time occur		Remarks
		Paddy field	Shifting cultivation	Extended land			Day		

1. What kind of animals do you raise? How do you raise livestock?

(Free grazing/ farming) How far from village to grazing field? How many acres used for grazing/ (estimate)

2. Have you ever seen a the tiger?

(Yes-No Place...../ Time...../ Size.....)

Have you ever heard a roar of a the tiger?

3. Have you ever seen track, scratch, and faeces of the tiger?

If yes, how big is it?

(Showing a track of the tiger) Have you ever seen a track like this?

4. Have you ever seen a leopard? Size? Colour pattern?

5. What is your opinion about the usages of the tiger product medicine?

6. How many the tigers do you think live around this region?

7. Is there any the tiger product trade around this region?

8. What is your feeling and opinion about the tigers?

9. Please show animals you have seen from these pictures?

10. Please talk about the tigers that your parents and grandfather/ mother have talked about?

General notes:

Myanmar Tiger Survey Wildlife Conservation Society, Myanmar Program

Figure 2
Track & Sign Data

Date
 Title page
 Time first
 Length time

.....
.....
.....
.....

Early Site
 Greenbeltway
 Mainroad

[illegible]

2000

Chloroform 10.0 ml

三

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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APPENDIX IX.

a. Detections of wildlife from camera-trap surveys at 17 sites in Myanmar, 1999–2002

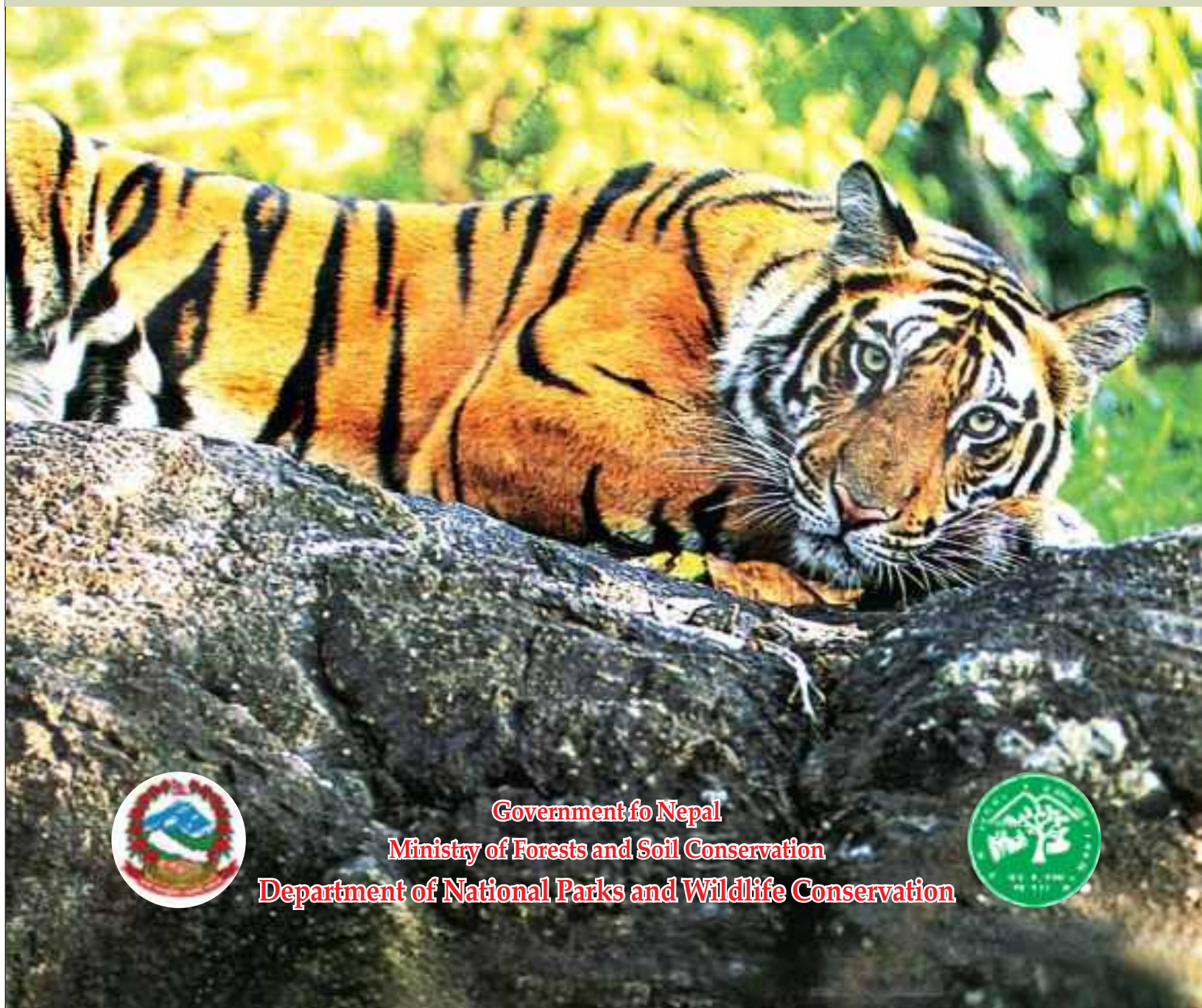
[illegible]

b. Detections of wildlife from track and sign surveys at 17 sites in Maryland, 1999-2002

[illegible]

TIGER CONSERVATION ACTION PLAN FOR NEPAL

2008-2012



Government of Nepal
Ministry of Forests and Soil Conservation
Department of National Parks and Wildlife Conservation



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Citation DNPWC/MoFSC/GoN. 2007. Tiger Conservation Action Plan for Nepal. Kathmandu: Government of Nepal, Ministry of Forests and Soil Conservation, Department of National Parks and Wildlife Conservation.

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 Yearly Detail Budget Breakdown for Objective 3 Conflict Resolution
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ACRONYMS AND ABBREVIATIONS

BCC	Biodiversity Conservation Center
BNP	Bardia National Park
BZ	Buffer Zone
CBAPO	Community Based Anti-Poaching Operation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNP	Chitwan National Park
DDC	District Development Committee
DFID	Department for International Development
DNPWC	Department of National Parks and Wildlife Conservation
EIA	Environment Investigation Agency
GIS	Geographical Information System
GO	Gazetted Officers
GoN	Government of Nepal
GPS	Global Positioning System
GTF	Global Tiger Forum
ITNC	International Trust for Nature Conservation
IUCN	The World Conservation Union
MoFSC	Ministry of Forests and Soil Conservation
MIS	Management Information System
NA	Nepal Army
NG	Non-gazetted staff
NGO	Non-Governmental Organizations
NP	National Park
NPWCA	National Parks and Wildlife Conservation Act
NTNC	National Trust for Nature Conservation
PA	Protected Area
PALNet	Protected Areas Learning Network
PWR	Parsa Wildlife Reserve
Rs	Rupees
SAARC	South Asian Association for Regional Cooperation
SNV	Netherlands Development Organization
SWR	Shuklaphanta Wildlife Reserve
TAL	Terai Arc landscape
TCAP	Tiger Conservation Action Plan
TCL	Tiger Conservation Landscape
TCM	Traditional Chinese Medicine
TRAFFIC	Trade Records Analysis of Flora and Fauna in Commerce
UNDP	United Nations Development Program
UNESCO	United Nations Economic, Scientific and Cultural Organization
VDC	Village Development Committee
WCPA	World Commission on Protected Areas
WR	Wildlife Reserve
WTO	World Trade Organization
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

The goal of this Revised Tiger Conservation Action Plan (TCAP) is to preserve, recognize, restore, and increase the effective land base that supports tigers in Nepal, in order to maintain a viable tiger population. The action plan aims at identifying areas that are most important for maintaining the largest, least fragmented land base for tigers; and developing conservation strategies that include and benefit local communities. Ecosystem management, with an emphasis on building partnerships is crucial for maintaining tiger habitats outside protected areas because:

1. the existing protected areas, by themselves, are not large enough to maintain viable tiger populations
2. there are extensive forestlands outside protected areas where tigers currently occur
3. forests outside protected areas are often degraded and need ecological restoration
4. the key to restoring habitat outside protected areas is the inclusion of local people as stakeholders, who directly benefit through conservation actions, and contribute to management decisions.

Threats to tiger populations continue to increase, due to poaching, loss of habitat and illegal trade. Many of the world's tiger populations are restricted to small protected areas, with uncertain long-term viability. Therefore, it is critical to manage entire tiger populations, by maintaining corridors, and by including both prime habitat, in protected areas, and large tracts of adjacent forest habitats. Preservation of the tiger will ensure the conservation of all the species sharing its habitat, as well as a healthy ecosystem.

With establishment of Chitwan National Park (CNP) in 1973, a network of protected areas (PA) was established all across the country. The establishment of protected areas undoubtedly protect important wildlife habitat. However, it also initiated conflict, between the park authorities and the local people regarding forest based needs. Subsequently, various management measures have been applied to combine conservation goals with the needs of the local people.

Successful participatory resource management practices and its replication in Buffer Zone management program brought revolutionary change in the concept of protected area management. These change involved the active participation of local communities, in the conservation and management of protected areas and the adjacent buffer zones. In return, local communities get a 30-50 percent share of park income, to be used directly in conservation and community development.

This partnership, between the park management and local communities, has widened the scope of wildlife conservation beyond park boundaries. A significantly degraded area, in the periphery of CNP, has been restored, in collaboration with local communities. Now, tigers and rhinos occur in the restored habitat; and local people have begun to market elephant rides and overnight stays to visitors in these areas. In collaboration with various organizations, the Department of National Parks and Wildlife Conservation (DNPWC) has launched several projects, in the periphery of protected areas, to address conservation and community needs.

Historically, tigers were distributed continuously across the lowland forests. At present, three isolated populations (CNP, BNP and SWR) remain in Nepal. In these three populations, the tiger census of 1995-1996, minimum tiger populations was found to be 48-49, 30-32 and 15-16 breeding animals, respectively.

In Nepal, conservation efforts, so far, have focused on establishing and managing protected area systems. Unfortunately, protected areas, by themselves, are not large enough to sustain viable tiger populations. For the long-term viability of tiger populations, it is important to consider a landscape approach to management, by treating the entire tiger population as a single management unit. Lack of detailed information, on the spatial location of tigers, is one of the impeding factors for a landscape approach to tiger conservation. Furthermore, wildlife conservation is not a priority for the management and administration of forest areas outside the parks. This requires cooperation among various governmental and non-governmental organizations, and the local communities.

To achieve forementioned goal, five major sets of objectives has been devised, which includes: Tiger and Prey Information, Habitat management, Conflicts Resolution, Anti- poaching and Anti-trafficking operations, and Transboundary cooperation.

Many of these recommended activities are already being carried out in the field. They need strengthening and systemization, however. The natural history of tiger is given in the Appendix, to provide general information on the tiger and its biology.

For the implementation of the Action Plan, the existing human resources of the government and the partner organizations will be mobilized. The community based organizations will also be mobilized where applicable as outlined under various activities of the tiger conservation action plan. The programs pertinent to tiger conservation will be coordinated at three levels of implementation, namely center, landscape and protected area.

The total budget for the action plan for the period of five years is estimated to be US\$ 1,150,000 of which 31% budget has been set aside for anti-poaching and anti trafficking operations, 33% in conflict resolutions, 18% habitat management, 12% tiger and prey information and 6% trans-boundary cooperation. The financial resources that will be available under various programs will also be mobilized as complementary to the tiger conservation.

Considering the areas of interests and scopes of the partners, resources for the action plan could be generated from various sectors including government, donors, international nongovernmental organizations, private sectors, local governments (DDCs and VDCs) as well as the Buffer Zone organizations.



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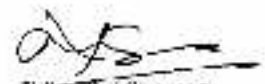
The tiger, at the apex of the food web, is an indicator species of a healthy ecosystem. Acting as an umbrella species, its conservation includes the preservation of a whole array of species sharing the same habitat. The tiger has played vital role to consolidate the biodiversity conservation. The long term survival of this magnificent animal is challenging, however, largely due to the loss and fragmentation of its habitat and poaching for illegal trade of its body parts.

Effective implementation of Tiger Conservation action Plan is essential to ensure long term conservation of the tiger. Rapid shrinkage and fragmentation of habitat in Nepal has made us realize the importance of a landscape approach to tiger conservation. Corridors and connectivity between protected areas within the country as well as between Nepal and India are essential to allow for the safe dispersal of the tiger. Trans-boundary conservation initiatives between India and Nepal have extended the scope of mutual conservation interests of the two neighboring countries. Cooperation among international conservation communities is very important to achieve the tiger conservation goal.

The efforts of anti-poaching units and the active cooperation from local people have been successful in curbing the poaching of several endangered wildlife species including the tiger. The Department of National Parks and Wildlife Conservation in collaboration with the WWF Nepal and National Trust for Nature Conservation is conducting annual surveys of parks and reserves in the Terai to assess the status of the tiger.

The revision of the tiger conservation action plan for the Kingdom of Nepal 1999 was felt necessary to include program and budget for a year and to meet the request of Global Tiger Forum to prepare costed action plan. Thus, the revision was initiated after the formation of task force under the coordination of then Ecologist (Acting Director General, DNPWC) Mr. Shyam Bajimaya with members from Ministry of Forests and Soil Conservation, National Trust for Nature Conservation, WWF Nepal, Department of National Parks and Wildlife Conservation, and Department of Forests. His team led by Mr. Bajimaya deserves recognition for revising this document. Review and comments of Mr. Ananta V. Paudyal, Dr. Krishna C. Paudyal, Mr. T. B. Prajapati and Mr. Sagarimal from Ministry was useful to streamline the content. Review and expert comments from several scientists, scholars and officials in Nepal and abroad, were valuable in revising this document.

Nepal successfully hosted 4th General Assembly of Global Tiger Forum along with International Tiger Symposium this year in April 2007 and was useful to revise this plan. WWF Nepal provided support to prepare this plan. Save the Tiger Fund supported to host expert meeting to review the plan. I thank them for their generous support. Cooperation from all sectors including government, non-governmental organizations and Communities of Terai Area Landscape was received during the implementation of conservation action plan for the Kingdom of Nepal 1999. Similar support is essential for effective implementation of this plan and I am confident that the prey-predator dynamics will be more balanced by its implementation.


Tika Raj Sharma
Secretary



Government of Nepal
Ministry of Forest & Soil Conservation
Department of National Parks & Wildlife Conservation



Acknowledgements

On behalf of the Department of National Parks and Wildlife Conservation, I would like to express my deep appreciation to all those who provided contribution in preparing this plan. This plan was reviewed by national and International officials and academia. The comments and suggestions from governmental and non-governmental organizations from Nepal and abroad were provided during the expert meeting held in March 2007. Comments, feedback and insights were helpful in refining this revised action plan. We appreciate the inputs from all of them.

Concerns and problems were shared during the field consultations and interactions in Chitwan and Bardia that formed the major frame for this plan. I thank for their contributions especially the buffer zone institutions, conservation partners and stakeholders. I would like to thank the team members Dr.Shanta R. Jhaoli, Dr.Siddharth B.Bajracharya, Dr.Sorala Keeling, Mr.Megh N. Kalle, Mr.Gunesh Pant, Mr.Naresh Subedi, Mr.Chiranjibi Pokhrel, Mr.Shubash Lohani, Mr.Santosh M.Nepal, Mr.Kanchan Thapa and Mr.Ukesh R. Bhujel for their inputs, expertise, and experiences pertaining to tiger conservation in Nepal. I would also like to thank the staff of the Department of National Parks and Wildlife Conservation Mr.Mahesh B.Karki, Mr.Laxmi P. Manandhar, Mr.Buddhi S.Poudel, Mr.Tika R. Adhikary, Mr.Purn B. Shrestha, Mr.Gopal P. Upadhyay, Mr.Pamindra R.Kharel, Mr.Baburam Yadav, Mr.Shiv R. Bhandari, Mr.Sher S. Thaguna, Mr.Surya B. Pandey, Mr.Gopal P. Bhattarai, Buffer Zone Management Committee members and other staffs of Chitwan and Bardia National Parks and Parsa and Suklaphanta Wildlife reserves. We recognize the contribution of former Director General late Narayan P.Poudel and Trina M. Maskey. Their comments and support in revising this plan are much appreciated.

Special thanks go to Dr.Mahendra K.Shrestha, Director, Save the Tiger Fund who had contributed in the first plan, helped to revise this plan through his expert inputs and he had to organize expert meeting. I would like to extend my sincere gratitude to Mr.Anil Manandhar, Country Representative, WWF Nepal and WWF Network for providing support for the entire work of revising the Tiger Conservation Action Plan. The national and International professionals helped through valuable comments in meeting through review and providing information which guided us to consolidate the content and acknowledge their support.

The revision of this Tiger Conservation Action Plan has been possible due to the deep interest of many people and organizations. I hope that these characteristics of collaboration and interest will also continue in its implementation.



Shyam Bajracharya

Acting Director General

Part A

Context

1.1 Introduction and Background

1.1.1 Global and National Scenario

The tiger, one of the world's most magnificent mammals, is highly endangered and faces extinction in the near future, if the present trend of poaching and habitat degradation continues. Two of the eight tiger subspecies, the Balinese and Caspian, are already extinct; and the Javan tiger is thought to have disappeared in the 1980s (Table 1). A drastic rise in tiger poaching was first noticed in 1990; by 1992, there were reports of severe poaching from across the tiger's range, strongly impacting all five remaining subspecies.

The primary consumers of tiger products are Chinese communities throughout the world, where tiger parts-in the form of tiger bone wine and tiger plasters-are used as a traditional medicine. The sale of these products has been documented in every major Chinese community that has been examined. If the present rate of poaching continues, many tiger populations might be extinct in near future. The Royal Bengal tiger (*Panthera tigris tigris*)

was once widespread across south Asia. Great hunts were organized by the Rana rulers in 19th Century-to honor European royal visitors and Indian princes where several hundred tigers were killed at a time. Despite this, there was little effect on the general tiger population: there were significant intervals between hunts; these hunts were held over large spans of high quality habitats, which contained an abundance and variety of prey species. Hence, the tiger population was able to recover rapidly, even after such losses.

As human populations converted the rich alluvial plains to agricultural lands, however, tigers gradually became confined to the protected forest areas. By 1906, the tiger was exterminated in Pakistan (Roberts 1977), but

there was still an estimated 40,000 tigers on the Indian subcontinent at that time (Gee 1963). The clearing of forests accelerated sharply after World War II, however, resulting in extensive loss and fragmentation of forest lands.

Furthermore, since 1990, reports from across the tiger's range indicate that there has been a sudden, drastic, Asia-wide increase in tiger poaching (Jackson 1993); an estimated 25 % of Russian tigers have been poached since 1992 (Miquelle et al. 1993). Sanderson et al, 2006 studied current tiger distribution in its historical ranges and reported that tiger may have vanished in as much as 40 % of their remaining habitat in last 10 years, but some areas, including Terai Arc Landscape and Russian Far East, have stable or even increasing tiger numbers.

The Royal Bengal tiger now occurs only in small, isolated protected areas. Most of these areas are not large enough to sustain long-term, viable populations. To address issues such as forest fragmentation, habitat degradation, and poaching-conservationists and resource managers must shift their scale of management, from individual parks and wildlife reserves/sanctuaries, to larger scale units that encompass entire tiger populations (Smith et al. 1998). This requires management to bridge several jurisdictions and ultimately address, not only the needs of tigers, but also the needs of local people.

1.1.2 Nepal Perspective

In Nepal, tiger habitat has been protected since 1846, when the first Rana Prime Minister ordered that the rhinoceros and its habitats, primarily in the Rapti and Reu Valleys of Chitwan, be saved (Caughley 1969, Shrestha 1998). Early in the 19th Century, the government of Nepal discouraged settlement and agriculture in the lowlands, or the Terai, in order to form a buffer of malarial forests, as a defense for invading armies (Gurung 1983, Mishra

Table 1. The Status of the Tiger (*Panthera tigris*) in the World

Tiger Sub-species	Range Countries	Population
Royal Bengal Tiger		3,176 4,556
Panthera tigris tigris	Bangladesh	62-362
	Bhutan*	67-81 (adults)
	India	2500-3750
	Myanmar, Western	124-231
	Nepal*	93-97 (adults)
Caspian Tiger	Formerly: Afghanistan, Iran, Chinese	
<i>P. tigris virgata</i>	Turkestan, Russian Turkestan, Turkey	Extinct 1970s
Amur Tiger	China, North Korea, Russia*	360-406
<i>P. tigris altaica</i>		
Javan Tiger	Java, Indonesia	Extinct 1980s
<i>P. tigris sondaica</i>		
South China Tiger	China	20 30
<i>P. tigris amoyensis</i>		
Bali Tiger	Bali, Indonesia	Extinct 1940s
<i>P. tigris balica</i>		
Sumatran Tiger	Sumatra, Indonesia	400 500
<i>P. tigris sumatrae</i>		
Indo-Chinese Tiger	Cambodia, China, Laos, Malaysia,	
<i>P. tigris corbetti</i>	Eastern Myanmar, Thailand, Vietnam	1,227 -1,785
Totals		5,183- 7,277
Rounded Totals		5,200- 7,300

* Note: Most estimates are educated guesses, based on the reports from range countries. Estimates for Bhutan, Nepal, and Russia provided more reliable numbers.

Figures for Bhutan, Nepal, and Russia are for the adult breeding tigers counted. Tiger specialists consider such figures more realistic, because many cubs are unlikely to survive to maturity.

Source. WWF-World Wide Fund for Nature 1999

and Jefferies 1991). Human disturbance was minimal; the few settlements primarily consisted of small patches of jungle, cleared by the Tharu people the oldest inhabitants of Chitwan, who were believed to have developed immunity against malaria (Philips 1925). With the collapse of the Rana regime in 1951, however, much of the wildlife habitat in Chitwan suffered heavy destruction (Talbot 1959, Gee 1959, Spillet and Tamang 1967).

In the 1950s, the government enacted a malaria eradication campaign and a resettlement program, which dramatically altered Chitwan's human population distribution and density, and profoundly impacted land use patterns (Gurung 1983). Although resettlement programs were

intended to provide land for people with no land holdings, many individuals (of varied economic statuses and ethnic backgrounds) moved into the Chitwan Valley, from the hill districts. Population in the Chitwan District increased from 42,800 in 1954 to 194,000 in 1971, and dramatically altered forest cover (Gurung 1983). Between 1961 and 1977, 65 percent of the forests in Chitwan were destroyed, and the land was converted to cultivation (Gurung 1983, Mishra and Jefferies 1991).

Most of the immigrants to the Chitwan Valley settled along the Rapti River, destroying tall grasslands and riverine forests, home to a variety of wildlife. In 1964,

the late King Mahendra declared the southern part of the valley, across the Rapti River, as the "Mahendra Mriga Kunja"; more than 22,000 people were moved out of the park (Willan 1965, Upreti 1973, Shrestha 1998). In 1973, to protect the remaining forest lands and wildlife from further degradation, the government enacted the National Parks and Wildlife Conservation (NPWC) Act, 2029; and the park was declared to be the Chitwan National Park (CNP), the first national park formally established in Nepal. Parallel to the establishment of CNP, the Tiger Ecology Project was initiated in the early 1970s as a joint venture of the Government of Nepal, the Smithsonian Institution, and World Wildlife Fund to conduct research on the tiger. Based on the recommendations of Tiger Ecology Project, the park boundaries were extended in 1977, to its current size of 932 km² (Mishra and Jefferies 1991, Shrestha 1998). Furthermore, as an extension to CNP, the Parsa Wildlife Reserve (PWR) was established in 1984, to maintain the continuity of habitats, based on the ecosystem management approach.

Concurrently, a network of protected areas (national parks and wildlife reserves) was established throughout the country. The establishment of protected areas undoubtedly protected important wildlife habitat. It also initiated conflict, however, between park authorities and local people, because they were denied easy access to protected areas, where they attained basic needs such as fodder, firewood. In recognition to the public outcry, the government decided to open protected areas in the Terai to collect thatch grass (Thatch grass and grass reeds are used as local roofing and building materials). Community participation, in natural resources management, has been widely recognized in Nepal. We are the pioneers in combining conservation goals to meet the needs of the local people. Such indigenous systems now form the basis for users' group management of the forests, watersheds and buffer zones; these systems also support wildlife conservation.

In support of the public sentiments, the fourth amendment of NPWC Act, 1993 provisioned buffer zones in and around the national parks and wildlife reserves. Accordingly, 30 to 50 percent of the total revenue of the protected areas could be plowed back for conservation and community development. Following the

formulation of the Buffer Zone Management Regulations (BZMR) 1996 and Buffer Zone Management Guidelines (BZMG) 1999, buffer zones were first declared in CNP and BNP. The buffer zone program has brought a revolutionary change in the management concept of protected areas allowing local communities to organize themselves for management of natural resources and biodiversity conservation.

Apart from the ecological significance, tiger is culturally reflected in the philosophies of Sanatan Hinduism and Buddhism

Historically, tigers were distributed continuously across the lowland Himalayan forests. Surveys, between 1987 and 1997, documented that only three isolated tiger populations remain in Nepal (Smith et al. 1998) (Figure 1).

The Chitwan population occupies the largest area (2,543 km²); 75 percent of the population lives within the protected areas, while the remaining 25 percent lives outside. The Bardia population, 180 km west of Chitwan, occupies a land base of 1,840 km²; Bardia National Park (BNP) encompasses 51 percent of this land base. Between 1987 and 1997, tigers west of the Karnali River became increasingly isolated from the core of the Bardia population. Without habitat restoration, this area is currently too small, and does not have the prey density to support a separate, viable tiger population. The third population resides in Shuklaphanta in western Nepal. The land base is only 320 km², but the prey density is high. The Shuklaphanta population was formerly connected to tiger habitat in India, but is now becoming isolated. The tiger census of 1995-1996, in the protected areas of Chitwan, Bardia and Shuklaphanta, estimated tiger populations to be 48-49, 30-32, and 15-16 breeding adults respectively.

The estimated population of tigers was between 98 and 123 breeding adults as per the census carried out in 1999/2000. In addition to this, seven tigers were reported from the Barandabhar forest in 2005 using camera traps and other indirect methods (KMTNC. 2005). The preliminary findings of the recent research on tigers outside the protected areas have revealed that the potential habitats in Kailali, Jhapa and Trijuga (Gurung et al. 2006 claims no tiger east of Bagmati River) could hold certain number of tigers (Table 2).

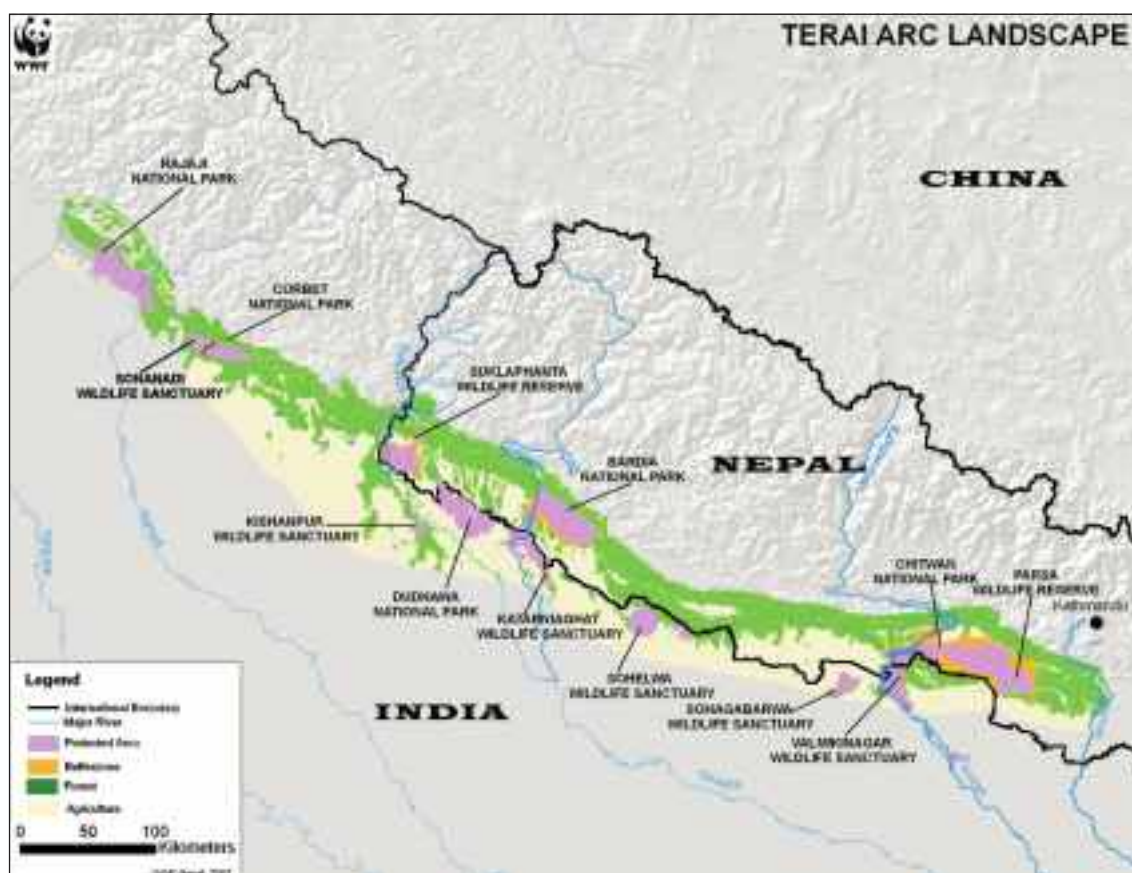


Figure 1. Tiger Conservation Landscapes in Nepal

Table 2. Status of Tiger Populations in Nepal

Location	1999/2000		2005	
	Adult	Total	Adult	Total
Chitwan National Park*	50 to 60	173 to 209	50 to 60	173 to 209
Barandabhar*	---	7		
Bardia National Park**	32 to 40	111 to 139	32 to 40	111 to 139
Shuklaphanta Wildlife Reserve	16 to 23	56 to 80	16 to 23	56 to 80
Kailali, Trijuga and Jhapa***	5 to 7	-5 to 7		20
Total	98 to 123	340 to 350	103 to 130	360 to 370
<p>* Due to different techniques used in census, total number of tigers could not be estimated.</p> <p>** Based on the results of camera trapping in the Karnali flood plain.</p> <p>*** Not included in the total tiger population</p> <p>Sources: DNPWC/ 2006. Karki 2006</p>				

1.3 Efforts and Achievements

1.3.1 Conservation Policy

Since the preparation of the tiger conservation action plan for Nepal in 1999, several efforts have been made and some positive results have been achieved to date.

The status of tiger and their habitat was continually monitored showing gradual improvement in the quality of habitat. Priority tiger habitats identified were further refined and improvement/restoration of the habitat quality and conservation/mitigation efforts has shown the signs of tiger and prey movements in some of the corridors. Studies were carried out in conflict and biological aspects in tiger and its prey base. Conservation education program along with the landscape approach including community based anti-poaching operation added by poaching control efforts and reduction of park people relationship has improved the overall conservation of tiger. The development of domestic partnership and transboundary initiatives in local and national level may improved the trade control and conservation inputs in the year 2000-2005 during the implementation of TCAP.

The four protected areas with the key tiger habitats (management plans of CNP& BNP-2001-2005; SWR-2006/07-2010/11 and PWR-under preparation) are managed in planned manner by implementing management plans. These PAs form the core parts of the Terai Arc Landscape.

Tiger conservation has been explicitly mentioned as a priority in the management plans, as well as in the Nepal Biodiversity Strategy 2002 and its Implementation Plan 2006. These four protected areas are managed by 13 professionals, 312 subordinate staff and 152 hattisares, and augmented with over 1,700 army personnel.

Buffer zones have also been in full operation in these PAs with 77 VDC in 10 districts, thus, paving a clear way to mobilize the local communities. The BZ institutions in the four PAs have created a biodiversity trust fund of Rs17.5million.

Research activities on tiger have been encouraging in the last five years. DNPWC, NTNC, WWF, ITNC (International Trust for

nature Conservation) have continued their joint efforts of camera trap monitoring in the three major protected areas, Chitwan, Bardia and Shuklaphanta. Under the joint efforts of DNPWC, NTNC, and WWF, 94 individuals (37 males and 57 females) have been trapped in the three locations between April 2000 and December 2001.

Along with the government bodies, a number of nongovernmental organizations like NTNC, WWF and IUCN have emerged in the last few years for tiger conservation.

The other conservation efforts that have eventually become favorable for tiger conservation are the successful community forests and sustainable livelihoods in the lowlands. The number of forest user groups is increasing in Terai districts with 1,477 till February 2005.

A network of village-rangers was successfully established for mapping the meta-population structure of tigers throughout Nepal (Gurung, B. 2002). There is a growing interest among the youths in conservation of tiger and other wildlife. Some youth groups have carried out research works, habitats maintenance and even antipoaching operations. These self emerged groups have become change agents in the local communities through their public awareness campaigns for saving tigers.

The Community Based Anti-Poaching Operation (CBAPO) has been formed and institutionalized in Khata and Basanta corridors of the TAL Nepal. Local communities organized in the CBAPOs regularly patrol the community and national forests to control illegal activities such as illegal logging, encroachment, poaching etc. Similar efforts have been initiated in Chitwan and other PAs.

In the policy front, the 2002 Nepal Biodiversity Strategy has stipulated for the keystone species conservation plan. The plan stresses upon the population surveys, monitoring, protecting key habitats, and relocation and restoration of certain species (NBS 2002). Similarly, the Nepal Biodiversity Strategy Implementation Plan which was finalized in 2006 contains project outlines on two major activities as follows:

1. Implement the Tiger Action Plan 1999 (survey and monitoring, habitat improving, public awareness, community development, anti-poaching, trans- boundary cooperation and networking), and
2. Upgrade the baseline information on tigers and its prey base outside protected areas. The anti-poaching operation strategy has been drafted out and is in the process of approval at the Ministry of Forests and Soil Conservation. The strategy addresses the three key aspects of tiger conservation, such as
 - i. patrolling,
 - ii. information collection, and
 - iii. operations and CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) implementation in towns and cities.

1.3.2 Management Plans

Tiger conservation is one of the priority activities outlined in the management plans for the lowland protected areas namely Parsa and Shuklaphanta Wildlife Reserves, and Chitwan and Bardia National Parks. The target of the management plan is to increase tiger population by 10 % within the five year period of plan. The major activities include monitoring of tigers using camera-trap and pugmark, special arrangement to handle aged and man-eaters. Participation of buffer zone community is a strategy adopted in the management plans.

In the WWF Global Tiger Conservation Strategy Workshop (September 4-8, 2000, Indonesia), the Terai Arc was identified among the seven focal tiger landscapes¹, where the chances of long-term tiger conservation were best and its involvement would be most valuable (WWF International. 2002). On the basis of the Tiger Dispersal Model, six Tiger Conservation Landscapes-TCLs² have been identified in TAL, such as follows:

- Three Level I-TCLs: Chitwan Parsa Valmiki, Bardia Banke, and Rajaji Corbett;
- Two Level II -TCLs: Dudhwa Kailali and Suklaphanta Kishanpur; and
- One Level III -TCLs: Dang Churia.

The 11 protected areas³ within Terai Arc Landscape provide the critical habitats for the tigers (WWF 2004). Along with the improvements of the protected areas

management, the immediate objectives of TAL-Nepal include:

Restoration of key corridors connecting protected areas; Elimination of poaching in wildlife corridors and protected areas; and Strengthening community-based anti- poaching efforts along critical forest corridors in Basanta and Khata, and buffer zones of lowland protected areas (WWF. 2004).

1.3.3 Global Commitments

Nepals global commitments for tiger conservation have been much reflected in various national and international programs including the Global Tiger Forum, CITES, Effort and Achievements CBD and other conservation programs. Considering the overall achievements in conservation including tiger conservation, Nepals lowland protected areas have been internationally recognized. The 5th World Parks Congress held in South Africa in September 2003 recognized the Chitwan National Park as the best managed park. The Terai Arc Landscape (TAL) has been selected as one of the ten field learning sites for the Protected Areas Learning Network (PALNet). In fact, the fundamental concept of TAL was strategically adopted at the WWF Global Tiger Conservation Strategy Workshop held in Anyer, Indonesia in September 2000.

1.3.4 Human Resource Development

Existing human resource for tiger related research and monitoring has been priority; which is reflected in ongoing monitoring and research work conducted by protected areas staffs.

While assisting in the tiger research activities and participating in training programs, the park personnel learned tiger survey techniques especially camera trapping, tracking pugmarks and other signs. In the training need assessment of the DNPWC personnel, the topics tiger and its prey were identified as priority areas of learning (DNPWC 2003).

- 1 Russian Far East (Russia), Terai Arc (Nepal and India), Satpuda-Maikal range (India), Sundarbans (Bangladesh and India), Lower Mekong Forests (Cambodia, Lao, and Vietnam), Taman Negara-Belum-Halabala (Malaysia and Thailand), and Kerinci Seblat/ Bukit Barisan Selatan (Indonesia)
- 2 previously known as Tiger Conservation Units
- 3 Nepal

- 4: Parsa Wildlife Reserve, Chitwan National Park, Bardia National Park, and Shuklaphanta Wildlife Reserve; India 7:

Valmikinagar Wildlife Sanctuary, Sohelwa Wildlife Sanctuary, Katarniaghat Wildlife Sanctuary, Dudhwa National Park, Kishanpur Wildlife Sanctuary, Corbett National Park, and Rajaji National Park

These observations indicate that capacity of DNPWC personnel has been enhanced in the recent years.

At the landscape level, major research work has been completed in November 2004. The research was on relative ungulate abundance in a fragmented landscape with the implications for tiger conservation (Shrestha. 2004). Similarly, multidisciplinary research work on tiger-human conflict has been conducted in protected areas involving PAs staff (Gurung et al 2006). Similarly, study on Tiger-Prey Relationship was also completed in Chitwan National Park in 2005 (Bagale. 2005).

1.3.5 Field Implementation

During the ten years period of 1994-2004, twenty persons have been prosecuted on the crimes pertinent to tiger poaching in Chitwan alone. The total seizure of tiger bone was 48.8 kg, of which 5.8 kg was presumed to be from India. During the period of July-October 2004, four tigers were poached in Chitwan. During the period of January 2004 and September 2005, nineteen persons were arrested for the tiger related cases in Kathmandu and elsewhere. The confiscations of items include 21 pieces of tiger skins (DNPWC 2006).

Handling of man-eating tiger was a major task during the period between 2001 and 2005. During that period, 30 people were killed by tigers outside the protected area and were compensated with Rs 0.75 million. While, 17 injured persons were also compensated with Rs 0.06 million for the

treatment. Criteria for compensation and treatment disbursement have been outlined by the park authorities in cooperation with the buffer zone representatives.

The relief fund has been established in Bardia National Park with amount totaling Rs. 1.3 million of which only the interest will be used

for the treatment, cremating the dead bodies, and livestock depredation. So far a total of Rs. 0.28 million has been compensated during the period 2001-2005.

In Suklaphanta Wildlife Reserve, tiger human conflict has been minimal since there has not been any case of human casualty. However, there are a few reports of cattle lost to tigers inside the reserve for which no compensation will be given.

1.3.6 Institutional Strengthening

Buffer zones have been declared in all the four tiger range protected areas (PWR, CNP, BNP and SWR). Following the extension and education programs launched by the conservation organizations, several local groups of conservationists have come forward to save tiger and other wildlife. There are a few examples of how the local groups like Rhino Tiger Conservation Society, youths anti-poaching groups and others have been involved at the community level against poaching and for wildlife rescue. Similarly, biodiversity conservation subcommittee has been formed in Chitwan which awards a letter of appreciation for contributing in rescuing of tiger as well as operates relief fund mechanism.

1.4 Challenges and Opportunities

Threats and challenges to the tigers in Nepal can be viewed from five different aspects, such as:

- i. Tiger and Prey,
- ii. Habitat,
- iii. Conflicts with Humans,
- iv. Antipoaching and anti-trafficking, and
- v. Transboundary.

1.4.1 Tiger and Prey

1.4.1.1 Status

Considering its endangered status, tiger is in Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), and Appendix I (List of Protected Species) of the National Parks and Wildlife Conservation Act (1973) of Nepal. The total population of Royal Bengal Tiger throughout its range has been estimated around 3,176- 4,556

individuals. In Nepal, its estimate population is around 123 adults and 350 individuals. A ratio of 2.8 cubs and sub adults per breeding adult has been used to calculate the number of tiger population (Smith et al 1998). (See Chapter 1.2 Status and Distribution of Tigers).

1.4.1.2 Distribution

Historically, tigers were distributed continuously across the lowland forest. It is now only occurs in small, isolated protected areas in Nepal. The protected areas are not large enough to sustain long-term, viable tiger populations. The tiger population in Nepal is decreasing due to various reasons. Surveys between 1987 to 1997 documented that only three isolated populations that remained in the country are

Chitwan-Parsa complex, Banke-Bardia complex, and Shuklaphanta-Kailali complex (Poudel N. 2000, Gung et al 2006). Sporadic distribution of tigers has been recorded in outside protected areas in corridors and connectivity of Terai Arc Landscape.

1.4.1.3 Density

Tiger density is positively related to prey abundance particularly wild ungulate (Smith 1998; Karanth & Smith 1999; Sunquist et.al 1999 cited in Shrestha M. 2004). Thus, information on habitat quality as measured by prey abundance is critical for guiding tiger conservation action from local management interventions to regional conservation planning in the focal landscape (WWF 2002).

1.4.1.4 Prey base

A threshold of prey abundance that indicates poor and good quality habitat and intimately reflects potential for presence of breeding tiger is important for developing necessary conservation action (Smith et. al 1998; Smith et. al 1999 cited in Shrestha, M. 2004).

Based on comparison of number of pellet groups Chital, a medium sized tiger prey species, was dominant among the ungulates

in the Terai landscape. Sambar was an important prey species in protected areas (12%) but much less common in national forests (3%). Wild pig, barking deer, blue bull, langur/monkey, and livestock were more abundant in national forests and buffer zone than in protected areas. Swamp deer

and hog deer were recorded only in protected areas. The distribution of blue bull was very restricted; this species was found only in the dry scrub forest. Domestic livestock (cow, water buffalo) contributed 26% to the total ungulate composition outside protected areas. Sambar and barking deer were more abundant at higher elevations with rugged terrain than in lower elevations (Shrestha 2004).

1.4.2 Habitat

1.4.2.1 Shrinkage

The tiger habitat today has shrunked to just 7 percent of the historic range and the biggest tiger landscapes now are in the Russian Far East and northeastern China and along the Nepal-India border, according to a comprehensive scientific study of tiger habitat jointly released by the World Wildlife Fund, the Save the Tiger Fund and the Wildlife Conservation Society (2005). According to the report, the tigers have 40 percent less habitat than they did a decade ago. In an average, a single tiger requires nearly 50 km² of good quality forests. In Nepal, the figure seems to be much less. The Bardia and Chitwan populations are estimated to have one tiger in 37 km², and the Shuklaphanta population to have one tiger in 20 km² (Smith et al 1987).

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1.4.2.2 Degradation

Establishing protected areas is not enough for tiger conservation. The potential tiger habitat outside the PAs do not support adequate size the population of tigers to ensure long-term viability (Smith et. al 1998; Smith et al. 1999 cited in Shrestha M.2004). In many parts of tigers range, ungulate assemblages with no large or medium sized prey (cervides or bovids) support low tiger density and reproduction rate declines in an impoverished habitat with low prey base (Karanth & Smith 1999 cited in Shrestha M.2004). Decline in prey base as a result of habitat degradation and widespread poaching has limited land base that can support tigers.

The first threat is the loss and degradation of its habitat. This is due to the conversion of forests to agricultural lands, and the resulting excessive human and livestock pressure. These, in turn, increase competition for food, resulting in low prey availability.

1.4.2.3 Fragmentation

The second threat is the fragmentation of its habitat. This causes habitat islands, which, in turn, creates a fragmented population. The small habitat means limited dispersion of new individuals, which results in high competition for the available habitat. With this limited dispersion also comes the risk of inbreeding.

Fragmentation of the tiger habitats are the major concerns identified in the 1999 Tiger Action Plan. If populations are connected, population viability should be increased. Under the Terai Arc Landscape programs, attempts are underway to restoring forest habitats linking the protected areas.

1.4.3 Conflict with humans

As human populations expand and natural habitats shrink, people and animals are increasingly coming into conflict over living space and food. The impacts are often huge. People lose their crops, livestock, property, and sometimes their lives. The animals, many of which are already threatened or endangered, are often killed in retaliation or to 'prevent' future conflicts. Human-wildlife conflict is one of the main threats to the continued survival of many species, in many parts of the world, and is also a significant threat to many local human populations. And, if solutions to conflicts are not adequate, local support for conservation also declines.

Over the last quarter of century 88 people have been killed by tigers in and around Chitwan National Park. The trend of human loss has been increased significantly from an average of 1.5 person per year (1979-1998) to 8.25 per year since 1999. The increasing trend of people killed was significant in the buffer zone than inside the park. On the other hand, a total of 37 tigers were involved in killing 88 people. Of these, 17 were removed due to such man eating behavior (Gurung et.al. 2006).

The park personnel in cooperation with the buffer zone representatives developed a set of management criteria for relief and compensation fund for tiger related incidents (DNPWC 2006).

In Asia, tigers are suffering not only from significant loss of habitat but also from a decline in their prey species. As a result, there has been increase competition for limited food by which more and more tigers are forced to search for food among the domestic livestock that many local communities depend on heavily for their livelihood. When livestock predation occurs, tigers are often captured, killed in retaliation or actively persecuted in an effort to prevent similar events happening in the future. Sometimes the carcasses of livestock killed by tigers are baited in order to poison the tiger when it returns to its kill, also killing any other animal that chooses to opportunistically feed on the carcass. Tiger prey species are also killed by villagers in retaliation for destroying essential crops, further exacerbating the problem by reducing the availability of the tigers natural source of food.

1.4.4 Anti-poaching and Anti-trafficking

1.4.4.1 Poaching

During the period 2004-05, poaching incidents as are few in the protected areas, only four reported case of tigers being killed by poachers was found in Chitwan National Park. However, magnitude of seizure across the country including the capital city of Kathmandu indicated that poaching could be high in the country (Table 3). During the period from January 2004-September 2005, 19 persons have been arrested on the charge of poaching. Similarly, during the period 1994 -2004, 20 persons were prosecuted on the cases related to tiger poaching, and 48.8 kg of tiger bone was also seized from them (DNPWC 2006).

During the period (1988-2005), Bardia National Park attested 20 casualties of tigers (8 M, 10 F, and 2 U). Of them, one poaching case, and nine cases were fighting, and the remaining 10 cases were either due to natural death, flood or others (BNP 2006).

1.4.4.2 Illegal trade

In the early 1990s, it became evident that medicinal trade in Tiger bone threatened to drive the already endangered Tiger to extinction in the wild.

Nearly every part of the Tiger has a value. It is believed that at least one tiger is killed daily for its use in traditional Chinese medicine. An increased demand for endangered tiger parts exists throughout the world. The rising demand for tiger parts and rapid increase in price of tiger bone continues to be an irresistible incentive to poachers. Poaching and smuggling of tiger parts are interrelated cases. A series of layers of networks play their roles from luring the local shooters to middle men to international smugglers to illegal sellers and finally the consumers.

Nepal obviously is a transit country for the illegal trade between India and China, and also a country of origin of tiger parts. The Environment Investigation Agency's (EIA) recent report *The Tiger Skin Trail* described Kathmandu as a staging point for illegal skins brought in from India to be sent to Tibet. Available information indicates that although Nepal is no longer the hub for skin trade that it was in the early 1990s (EIA 2004), it is used as a transit point for illicit trafficking of wildlife parts and derivatives.

Kathmandu is believed to be one of a transit point for the underground trade centers in the region. Commodities include Shahtoosh, fur, musk pods, bear bile, tiger skin and bones, ivory, rhino horn, leopard parts and live animals (turtles, birds). Recent seizures of wildlife parts also indicate that Nepalese territory is increasingly being used to transport these goods to the end users in Tibet/China, East Asia and even to the west.

There is a well-connected nexus for smuggling these commodities linking Nepal with China and India. Further, Nepal's porous border and its extensive international airline connections have made it an easy flow area (Wright and Kumar 1997). A single case of a poacher named Sansar Chand reveals the magnitude of volume of illegal trade in wildlife parts especially tiger parts, and also its network across the international borders.

At the 12th conference of the parties to CITES

(November 2002 in Santiago), the resolution was passed to replace word 'tigers' by 'Asian Big Cats (Tiger, Snow Leopard, Clouded Leopard, Common Leopard and Asiatic Lion)'. The Resolution noted the impact of illegal trade in these species and calls for a number of measures including legislation and enforcement controls, and recommends the Secretariat to expand the remit of the CITES Tiger Enforcement Task Force to include all Asian Big cat species and calls upon governments, intergovernmental organizations, international aid agencies and non-government organizations to provide funds and other assistance.

1.4.5 Transboundary Cooperation

1.4.5.1 Global Tiger Forum (GTF)

Following the international symposium on tiger held at New Delhi in February 1993 the Global Tiger Forum was created in March 1994 by 11 tiger range states and others. So far, seven tiger range countries viz. Bangladesh, Bhutan, India, Cambodia, Myanmar, Nepal and Vietnam have become members of GTF by ratifying its statutes and regulations. In addition, United Kingdom has formally joined the Forum and the Government of Canada is seriously considering the issue of joining the Forum. Of the international nongovernmental organizations (NGOs), WWF-International and International Fund for Animal Welfare (UK/USA) have also joined the Forum.

As decided at the 8th meeting of the Executive Committee meeting of the GTF, an international symposium on tiger was convened in Nepal on 16th-20th of April 2007. On the occasion, the 4th General Assembly of GTF was also held along with 9th and 10th Executive Committee meeting. At present, Nepal is a chair of GTF. The major recommendations of the symposium are:

Countries who have not updated and prioritized their costed tiger action plan are urged to do so by the end of 2008. More attention to be given on protection and development of the habitat, and improve tiger prey base. In all tiger conservation work there must be a balance between sustainable development and conservation, protection and due consideration of human livelihood issues. There must be good consideration of habitat fragmentation, and management of habitat outside protected areas. Mitigation plans are necessary to address the root causes of human/tiger conflict.

1.4.5.2 Nepal India transboundary meetings

The past three national transboundary meetings⁴ between the senior officials of the Governments of India and Nepal from the past seven years were aimed to provide a forum for an extensive interaction on areas of common interest and possible cooperation between PA managers, conservationists and officials of the two countries. The meetings were outstanding covering all aspects of trans-frontiers conservation, it had vision to effect CITES legislation, conserve, protect, regulate trade, share information and development networks to control illicit wildlife trade in international boundaries. The benefit of such would be to conserve and protect wildlife beyond national territories and complement protected areas for enhancing movement of wildlife. As a follow up to the national level transboundary meetings, the park authorities from Nepal and India exchanged their reciprocal visits to the transborder protected areas of the two countries in the local level now also involving local stakeholders.

1.4.5.3 Tripartite Meeting

The very nature of the illegal trade demands for closer transboundary cooperation between the countries for the control of illegal trade

in tiger parts. Delegates from Nepal, India and China met in Beijing on June 22, 2006 to discuss ways to work together to control the growing cross-boundary trade on wildlife species and products including Chubas.

1.5 Strengths and Capacities

The tiger has become an icon of biodiversity conservation in Nepal. In the recent years, with the changed political environment, it is most likely that tiger conservation will continue to be a national priority.

Manpower to manage, Buffer zones with revolving funds and institutions, Buffer zone community forests and livelihood support programs, research information and conservation partners, CBAPOs, informers and village rangers are strengths to implement the plan that gains public participation in buffer zones.

4 The First Transboundary meeting took place in Kathmandu, 3-5 January 1997, the second in Suraj Kund, near New Delhi, India from 28 February- 1st March, 1999, and the Third in Budanilkantha, Kathmandu from 13-15 September 2002.

Table 3. Poachers Arrested and Tiger Parts Confiscated

SN	Date	Location	Persons Arrested	Wildlife Parts Confiscated
1	January 9, 2004	Kathmandu	2	Tiger skin and bones
2	April 18, 2004	Banke	1	Six pieces of tiger skins
3	April 26, 2004	Chitwa	2	Tiger and rhino skins
4	June 12, 2004	Kathmandu	2	219 pieces of tiger bones (4kg)
5	July 12, 2004	Kathmandu	1	Two tiger skins, eight leopard skins,
6	July 18, 2004	Nawalparasi	2	five sacks of wildlife bones
7	June 5, 2005	Chitwan	2	Two pieces of tiger skins
8	June 17, 2005	Kathmandu	1	Tiger skin trading
9	August 11, 2005	Chitwan	1	One tiger skin and one leopard skin
10	Kathmandu	Rasuwa	5	Five tiger skins, bones 113.5kg, leopard skins 36, otters skins 238 pieces
11	2006		2	2- Tiger Skin
12	2007		2	11 kg tiger Bones and 5 Leopard Skin
13	2004-2007		26	25-Tiger Skin; 128.5 kg Tiger Bones

Source: DNPWC 2007; as on 31/03/2007.

Part B

Action Plan

2.1 Nepal's Tiger Conservation Action Plan Outline

Considering the ecological phenomena, it has been felt important to shift management from protected areas to ecosystem or landscape management (Grumbine 1994), so that entire tiger populations are treated as a single management unit (Dinerstein, et al. 1996). This large-scale perspective will identify the areas where habitat restoration will achieve the greatest positive effect. Prior to the landscape approach, conservation efforts used to focus on establishing and managing protected area systems. Unfortunately, in Nepal and across most of the tiger's range,

PAs, by themselves, are not large enough to support viable tiger populations. Additionally, forested and wild areas, outside the PAs, are often not administered and managed for wildlife conservation.

This plan has been updated with the lessons learnt from the implementation of Tiger Conservation Action Plan 1999, NBS 2002, NBSIP 2006 and the International Tiger Symposium which was held in Kathmandu between 16-18 April, 2007.

2.2 Goal

The goal of this Tiger Conservation Action Plan is to preserve, recognize, restore, and increase the effective land base that supports the Royal Bengal tigers (*Panthera tigris tigris*) in Nepal, in order to maintain a viable tiger population. The Government of Nepal (GoN) will expand conservation efforts, beyond existing protected areas, and recognize the entire Terai and Siwalik forest areas as tiger habitat. A broad-scale, land use approach to conservation is critical, not only for tigers, but also for the restoration and maintenance of intact ecosystems, upon which biodiversity depends, and which determine the quality of human life.

The ecosystem management, with an emphasis on building partnerships with local people, is crucial for maintaining tiger habitats outside protected areas because:

1. the existing protected areas, by themselves, are not large enough to maintain viable tiger populations
2. there are extensive forest lands outside protected areas where tigers currently occur
3. forests outside protected areas are often degraded and need ecological restoration
4. the key to restoring habitat outside protected areas is the inclusion of local people as stakeholders, who directly benefit through conservation actions, and contribute to management decisions.

On the basis of Nepal's tiger conservation efforts and achievements, and the challenges, strengths and opportunities as discussed in the foregoing chapters, the following five specific objectives have formulated to meet the overall goal of the action plan:

1. **Tiger and Prey Information:**
Establish sound scientific information base for management of tigers and prey base.
2. **Habitat management:** Manage tiger habitats at the landscape level.
3. **Conflicts Resolution:** Minimize tiger human conflicts.
4. **Anti-poaching and Anti-trafficking operations:** Protect the tigers and their prey base from poaching, retaliatory killing and illegal trade.
5. **Transboundary cooperation:**
Enhance transboundary cooperation for combating illegal trade in wildlife, maintaining ecological integrity in the tiger landscapes, and promoting tiger tourism.

For each of the objectives, key issues, strategies and activities have been identified on the basis of the information gathered from various sources such as review of the 1999 Tiger Action Plan

and literature survey of the recently published materials on tiger conservation, field and central level consultation meetings, international tiger expert meeting, coordination meetings of the tiger conservation action plan revision task force. Over 70 individuals participated in the three consultation meetings, one central level in Kathmandu (May 21, 2006), two field levels in Chitwan-Parsa (May 31-June 2, 2006), and Bardia Shuklaphanta (June 13, 2006). Information was also gathered from the recent field observations made by the task force members on various occasions. The task force is chaired by DNPWC senior official, and is composed of the representatives of MFSC, WWF, NTNC and a facilitator.

2.2.1 Objective 1. Tiger and Prey Information

To establish a sound scientific information base for management of tigers and prey species

Issues

Tiger Population

In critical tiger habitats (CTH) within TAL, harboring reproducing tiger populations, particularly in protected areas, their population dynamics including demographic patterns are not fully understood; Inadequate studies of tiger behavior and of adverse human impacts on them in critical habitats; Inadequate monitoring of tiger based on standardized monitoring protocol; Inadequate human resources, technical skills and physical capacity to gather and process the necessary information on tigers.

Prey base

Inadequate information on prey population dynamics, human impacts of these (in particular impacts of livestock, and hunting) in CTH;

Poor understanding of human and livestock implication of diseases on prey population at high densities areas;

Negative impact of any flood-control measures on critical habitats are not fully understood; Increase use of chemical poisons, home-made explosives etc to kill ungulates in agricultural landscapes outside core areas.

Inadequate human resources and physical capacity to

gather and process necessary information on prey base.

Strategies

Enhance knowledge and information base on tigers and its prey base on the basis of scientific works using tested methods on regular intervals using landscape level approach linking academic/conservation institutions

Strengthen necessary human and physical capital in the PAs management system / government and civil society institutions for enhancing continues works on tigers

Activities

1. Compile all available scientific information on tigers and prey species in Nepal and make it available widely to government and civil society institutions. However, the focus of information collection should be on ecological, methodological and human impacted topics that have management relevance.
2. In critical tiger habitats, develop rigorous protocols and methods for measuring demographic parameters (abundance, survival, dispersal, source-sink dynamics etc) in tigers, and, abundance and demographic structure for ungulates, on an annual basis.
3. For TCL as a whole, once every 3 year, conduct sign surveys to estimate habitat occupancy patterns and changes in these, for both tiger and prey species.
4. At CTH on an annual basis, a variety of surveys should be designed and implemented to tap sources of information such as government law enforcement records, village informant surveys and direct surveys of human impacts (snares, fires etc.). At the landscape level, during the 3-year surveys, questionnaire surveys of human impacts should be carried out.
5. Given the huge capacity needs for the monitoring activities outlined above, it is essential to create sufficient technical/human resources for carrying out joint monitoring involving government staff, conservation NGOs, Universities, buffer zone user groups, and other civil society institutions. These capacity building needs are to be prioritized particularly for the central and PA management levels of the management system.

6. Some of the detailed information needs that require high levels of scientific skills, should be conducted by reputed Universities and research institutions in Nepal and from outside, with active encouragement of the government.
7. Develop a feedback mechanism to incorporate all the above information to both create and update PAs/forest management plans for critical tiger habitats and the TCL as whole.
8. Improve the existing physical infrastructure and equipments in PAs for tiger and prey base monitoring

2.2.2 Objective 2. Habitat Management

To maximize high quality, well connected tiger habitat using best management practices across the entire terai arc landscape.

Issues

Shrinkage

Incomplete tiger habitat shrinkage data considering global figures of habitat shrinkage to 7% of the historical area and 40% decline in the last decade; Once luxuriant subtropical lowland forests (Char Koshe Jhadi) in the Bhabar region have been mostly restricted to the PAs, restricting most current tiger habitats;

The potential habitats outside the PAs are under immense pressure from human activities including expanding infrastructures development.

Fragmentation

Forest corridors between PAs are under pressure from human activities making dispersal of tigers difficult ; The expanding physical infrastructures (canal systems, high-tension electrical lines, highways, settlements etc) including traditional rights of ways are the major barriers against the dispersal, gene flow among tiger populations and fragmenting intact habitat.

Disturbances

Collection of forest resource (NTFP, grasses, fuel wood), livestock grazing, forest fire, religious visits, tourism, highways and infrastructure related disturbance (including headwater repair and maintenance) and natural disaster (flood,erosion etc) causes disturbances in CTH.

Degradation

Wetland Management: Continued pollution intake in Rapti and Narayani River including siltation & encroachment in natural wetland in Pas (like Rani Tal in SWR). Equally serious phenomenon is the encroachment of wetlands and waterholes by the invading species like Water hyacinth, Cyperus sp., Trapa sp., etc.

Grassland Management: Decrease in grassland habitat by Natural Succession in PAs. This in turn has effect on prey base population. Management of Invasive species is becoming threat in the present times as Mikania micrantha is a major problem in Chitwan, whereas Lantana camara is a serious problem in western Nepal.

Human Related Wastes: Some of key habitat for tigers has been become dumping grounds for human related wastes particularly non biodegradable wastes.

Management

In most of the cases, PA boundary is open and unfenced. Thus, intentional or unintentional intrusions are frequent.

The management of the PAs and the forest outside are inadequately equipped with resources and equipment. The staff mobility is restricted due to severe shortage of resources as well as equipment.

Entry of local people for annual grass cutting events in PAs is not well regulated or done in a way that benefits tigers.

Shooting range practice by Nepal Army inside PAs causes disturbances and unintentional fires.

Strategies

Develop landscape approach of habitat management to restore the remaining historical tiger habitats from being further loss, and to maintain the critical corridor connecting the major chunks of habitats to stop further fragmentation and increase amount of suitable habitat for tigers and prey base;

Work with local community stakeholders (CBOs, NGOs, CFUG and other forest management modes) to ensure their activities in tiger habitats are sustainable and not causing disturbance or habitat degradation and explore economic incentives to benefit local communities for conserving tigers; Proposed

Infrastructure Developments must include thorough Environmental Impact Assessment that takes into consideration that impact on tigers and mitigates the impact to the tiger Habitat.

Activities

2.1 Develop landscape approach

Restore vegetation and water hole in the geographical connections and forest corridors between the PAs of TAL for safe dispersal of tigers.

Manage the grassland habitats and waterholes to maintain a healthy population of tiger prey species.

Monitor habitat quality, both potential and priority, using the DNPWC-MIS formats for ground verification, data validation and management implications such as to maintain grasslands.

Update digital database maps using latest topo sheets, satellite imageries and aerial photographs for updating tiger information.

Prepare land use plans for critical habitats of tigers outside PAs and manage them on the basis of land use plans.

2.2 Develop alternative resource

Manage grasslands in the PAs by involving buffer zone residents with incentives of grass and firewood collection generated during habitat management. Construct/maintain cattle pool (a fenced enclosure for the illegally entering cattle) to control livestock grazing in the tiger habitats.

Construct/maintain fire lines for fire control.

Construct/maintain watchtower for habitat inspection

Plant indigenous tree species in the open areas or implement the enrichment plantation of degraded forest areas.

Develop program and activities to the local residents in lieu of grazing of livestock, such as improved cattle breeds, stall-feeding, biogas plants, and forming dairy cooperatives.

2.3 Strengthen coordinated efforts

Conduct coordination meetings of the PA managers and forest officials. Prepare operational guidelines for

the user groups and committees of the buffer zone and community forests on the habitat management activities in the potential tiger habitats, such as grazing control, sewage control and garbage management. Review/integrate tiger conservation in CFOPs and district forest management plans.

Prepare operational plans for the restored areas by involving local communities.

Establish and operate veterinary services for the livestock in the buffer zones.

Arrange study tours for the representatives of the CBOS to the sites of successful forest management leading towards tiger habitats.

Discontinue hunting license in tiger occurring districts in favor of tiger conservation.

2.2.3 Objective

3. Conflicts Resolution

Minimize tiger human conflicts

Issues

Resource demand

Local people rely on the natural resources (fire wood, fodder, grass, etc) available in the PAs due to increasing demands and the nearby forests in spite of potential threats from the wildlife including tiger. Main reasons for this pressure on the tiger habitats are the supply of natural resources.

Local people chose the readily available resources in the surrounding forests since the alternative resources such as biogas are not easily available for them.

Grazing is restricted in the buffer zone habitat to conserve BZ Community Forests and subsequent increased pressure on park.

Sharing of natural resources in the existing community forests is found to be not judicial. Hence the deprived people have to rely on the other forests for their needs.

Resource demands: gravel (construction materials), fishing, NTFP both outside and inside the PAs (although illegal) is increasing the conflicts.

Co-existence

Humans and tigers share the same area for several

reasons and this can be termed as co-existence; for example, tigers and humans often use common paths and trails during their movements.

For various reasons including supply of basic needs, rituals etc, human beings use tiger habitats such as grasslands, forests, and water holes.

Human beings regard tigers a source of inspiration, strength, encouragement and attraction. Tigers are the major icons of the festivals and religious activities of the Nepalese traditions. However, these traditional festivals and modern conservation programs are not interrelated for the overall benefit of tiger conservation. The recreational values of this magnificent animal have not been cashed for its overall conservation in the wild; and

Poor Facilities for the management of Orphan Tigers.

Compensation

Arrangement of compensation for the tiger related damage is not legally defined, as also discussed in the warden seminar 2006. However, the government provides compensations to the sufferers on the basis of human judgments based on degree of damage made by the tigers. Government contribution in the form of annual budget needs to be explored;

Even if compensation is made available, it used to be very late. Thus involvement of council/user committees/groups has to be established;

A wildlife damage compensation fund has been created in the buffer zone, but not a separate one especially to address the cases pertinent to tiger related damage. Similar funds need to be established for the conflict outside the PAs;

Actual reporting and field verification mechanism needs to be established;

Experience from the other tiger range countries needs to learnt and incorporated in future.

Incidents

Human casualties and killings are the most unfortunate side of the human-tiger conflicts and sometime more intensified. The loss of livestock to tiger is equally important and the number of such incidents has been increased in the recent years;

The indirect, yet very sensitive issue is loss of agricultural crops by ungulates ;

Retaliatory killing of tigers is related to aforementioned conflicts; and Poor documentation of conflict incidents

Awareness

A frequently asked question, What is the benefit of saving the tigers has not been satisfactorily answered at the community level. Even the users who are participating in the tiger conservation programs are not fully aware of the benefits of tiger conservation.

Incidents related to common leopard has been frequently mixed with tiger, thus, creating a mass misunderstanding.

Weak awareness program is also causing conflicts.

Strategies

Develop alternatives for natural resource base for the local communities so that the local people do not have to rely on the potential tiger habitats for the supply of natural resources.

Develop safety measures while exercising traditional rights including rights of ways, resource collection, festivals etc.

Develop a transparent community based mechanism of appropriate and timely compensation for the tiger related damage.

Develop a community awareness program to address the issues pertinent to tiger-human conflicts. Database management and research to understand the causal factors and for planning (incidents).

Activities

3.1 Develop alternatives for natural resource base

Identify and hand over community forests in the buffer zones as well as CFs outside PAs.

Restore the degraded forests in the buffer zone/national forests and CFs outside PAs by artificial or natural regeneration. Prepare operational plans for the buffer zone community forests/CFs for sustainable harvest of natural resources.

Develop community plantations, by mobilizing local resources and labor, so that local people need not collect their fodder and firewood from tiger habitats.

Alternative energy sources such as biogas installations.

Reduce livestock number by encouraging High Yielding Varieties.

3.2 Develop safety measures

Erect signs of warning to the passersby in the major rights of ways, resource collection sites and shrines.

Conduct awareness meetings at the local level during tiger marauding seasons.

Monitor tigers around the human activity areas with local community engagement and database management.

Take a man-eater tiger under control immediately (for which a clear policy will also be developed and circulated). Help desk will be established in all tiger range PAs.

Establish field rescue team with necessary equipment. Conduct awareness meetings. Erect sign and posts for awareness.

3.3 Develop a community based mechanism of compensation

Review conservation policies to incorporate compensation schemes.

Establish community funds for the families of tiger victims.

Establish the Help Desk and appoint responsible staff.

Establish Field Rescue Team equipped with vehicles, communication sets and treatment gear. Establishment of relief fund. Explore for the community based human and livestock insurance against wildlife accidents. Establish field verification mechanism system.

3.4 Develop a community awareness program

Conduct seminars and interactive programs, to emphasize on the co-dependency of humans and the Terai ecosystems; i.e., the health of such ecosystems is important, not only for biodiversity, but also for sustaining the ecosystem processes, upon which local people and development depend.

Develop a curriculum for school children, which portrays tigers as part of the ecosystem, rather than as an object for human exploitation.

Develop audiovisual programs, for local people, which focus on tiger biology; they should be entertaining, as well as educational.

Develop information centers, where problems faced by tigers are publicized; information should be in the form of photos or display cards in local languages.

Make tiger documentary films and exhibits in awareness program.

Publicize the fact that a strong economic link, between tourism and biodiversity, benefits both local people and conservation efforts.

Prepare guidelines and awareness materials on the sales, distribution and application of toxics such as pesticides, insecticides, poisons etc.

Conduct interaction meetings with the government line agencies (e.g. agriculture, livestock, and drug administration), nongovernmental and private sectors at the grassroots level on the control of sales, distribution and application of toxic materials such as pesticides, insecticides, poisons etc.

3.5 Database management and research

Establish Database on tiger-human related conflict in all tiger occurring PAs;

Conduct research on man eater tiger and their behaviors; and

Develop strategy on managing orphan tigers.

2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations

Protect the tigers and their prey base from poaching, retaliatory killing and illegal trade.

Issues

Illegal trade

Although the number of poaching incidents was found to be comparatively low in the PAs, the volume of tiger parts seizure was comparatively high.

In 2004-05, the number of tiger killed by poachers was four, whereas over 19 pieces of tiger skins were seized mostly in Kathmandu and Chitwan, and as far as Rasuwa near the Nepal China border.

Since all parts of tiger are consumed in various possible forms of medicines, poachers may collect almost everything of their kill leaving virtually no evidences for the PA guards.

Growing affluent populations in Asia and elsewhere have created high demand on the tiger body parts in various traditional medicines. Increased accessibility with modern transportations has helped illegal trade in tiger body parts.

Apart from the traditional Chinese medicine for which much criticism has been made in various forums. The other side of social demands for tiger skins is related to the conservative mind, luxury, power and imitation.

Nepalese territory has been increasingly used to transport the wildlife body parts to the consumers in Tibet/China, East Asia and even to the west

Law enforcement

Poaching poses a significant threat to tigers and their prey. No amount of habitat restoration will result in successful tiger conservation, if high poaching levels continue. Efforts to prevent poaching must be made on a landscape scale, to protect tigers, both inside and outside protected areas.

Army patrolling is limited to protected areas and is very expensive.

Control over tiger poaching has not been effective due to armed conflicts in the field.

Direct compensation to the affected people has not been materialized, due to various practical reasons such as reporting, valuation and authentication.

Due to inadequate security, people are unwilling to cooperate with the management by identifying the poachers, helping the management arrest the poachers, providing the management with information.

The NPWC Act is flexible, since the range of fines and punishment vary from the minimum of Rs 50,000 to the maximum of Rs100,000, and similarly imprisonment ranges from the minimum of 5 years to the maximum of 15 years. (The price for tiger bones is estimated between Rs 10,000 and Rs 30,000 per kilogram, and in average poachers gather 10 kg of bones from a single tiger.)

Political commitment of the government plays a vital role in combating poaching and illegal trade. The arrested poachers and smugglers were found using their network penetrating in the political circles to exert on the decision makers on their favor.

There are informal reports that powerful personalities were found involved in the offense and protection of the poachers

Incentives

Attractive awards have been announced from time to time for the informers who bring valuable information pertinent to tiger conservation. But there are community complaints that these awards had great discrepancies in words and deeds.

Communities who are directly involved in tiger conservation are not directly benefited from the tiger conservation programs.

There are community resentments towards tigers and wildlife conservation. Efforts to minimize such resentments are inadequate as well as misrepresented. The needy and genuine communities have been treated in general.

Coordination

Several government agencies are responsible for tiger conservation within their boundaries, such as the District Forest Offices and National Park/Wildlife Reserve Offices. Coordinated efforts have been felt essential for the successful operations of anti poaching.

Considering the network of the poachers and smugglers, it has been experienced

that involvement of the police organization would be indispensable. However, the police organization has been involved more in social problems rather than in wildlife conservation.

Illegal trade in wildlife products has been possible due to various reasons such as porous boundary between Nepal and its neighbors, less informed custom officials on the wildlife products.

Coordination among the varied organizations is a major challenge for the DNPWC whose expertise is mainly to manage the protected areas and protect wildlife.

Coordination at district level will be done by the chairperson of the District Forest Coordination Committee and inter district coordination will be done by the regional forest director of the concerned region.

Information sharing among the national and international organizations has been found to be inadequate on the issues of tiger related cases. Only few research works have been initiated in the fields of tiger poaching and illegal trade.

The Nepal Army serves as a major protection unit in the protected area. They are stationed in a particular protected area for about two years. The men are unaware of conservation responsibilities.

Conservation organizations (namely DNPWC, NTNC, WWF etc) conduct orientation programs for them. But, by the time they are knowledgeable and used to the terrain, they are transferred to another protected area.

Capacity

The strength of the civil servants in the four protected areas (Parsa, Chitwan, Bardia and Shuklaphanta) is 325 compared to 1,748 men of the Nepal Army stationed in these areas totaling over 4,700 km² land base. Legally both the army men and civil servants operate their activities within the protected area boundary.

The antipoaching units of the civil guards are equipped with the subsistence facilities such as field gear. Field equipment such as binoculars, communication sets have been either lost to the

insurgents during conflict days. Their mobility depends on their foot, and sometime supported by elephants and vehicles.

The antipoaching operations are under funded with the regular budget. The DNPWC has to rely on the external sources for the urgent and unprecedented activities. Ideas of establishing endowment fund for antipoaching operations have been limited to the conceptual level only. The conservation fee collected at the PAs has been left unused.

Nearly 500,000 populations are organized under the buffer zone management system in the tiger conservation landscapes. They are organized in various community based organizations such as User Groups and User Communities. Over 3,660 User Groups have been formed under the aegis of the Participatory Conservation

Program. However, their only strength is their voice and work force. Against the fully equipped poachers, their unarmed force becomes helpless.

The local youths have also taken initiatives by forming antipoaching groups in the Nawalparasi and Chitwan districts. However, their activities are limited mostly to public awareness and intelligence networks.

Villagers can easily identify suspicious activities like poaching; past experience shows that local undercover informants are very effective in helping to identify and apprehend poachers.

Poverty and unemployment have also been linked with poaching and illegal trade in wildlife parts. Local individuals are found to be lured with a handsome money for little crime. The poor youths take high risks of conducting crime when their family members are taken care of by the concerned parties.

The buffer zone policy of recycling park revenue has been linked with community development. However, the policy does not lay any terms and conditions for anti poaching operations.

Awareness

The confiscated items are mostly stored under the government custody. At times with special decisions, some degraded items have been destroyed by fire. On the want of clear policy on such confiscated items, the concerned government is under constant threats of loss or theft.

Samples of tiger parts could be displayed in the museums and visitors centers for educational purposes, and to be used for scientific research purposes.

Strategies

Strengthen institutional network and coordination for CITES enforcement to control illegal trade in wildlife and its derivatives with special reference to tiger body parts.

Strengthen antipoaching efforts in and around the protected areas by also mobilizing the civil societies for the effective implementation of law enforcement to save tigers in the wild.

Enhance public awareness programs by considering cultural sentiments and values related to poaching of tiger and trade in tiger parts.

Activities

4.1 Strengthen institutional network

Enact CITES bills

Strengthen CITES units in management and scientific authorities

Conduct CITES implementation training for the management and scientific authorities, government officers at the custom, police, and other relevant agencies. The topics will include identification of wildlife and their derivatives especially tiger body parts, forensic procedures, national and international laws on the control of illegal trade and poaching.

Conduct transboundary meetings with the neighboring countries focusing on the cooperation for the control of illegal trade in wildlife and their derivatives.

Prepare updated reports for the national, regional and international meetings pertinent to CITES, GTF, IUCN, TRAFFIC, WCPA, WTO and others as appropriate.

Participate in the national, regional and international meetings, conferences and seminars that are pertinent to the control of illegal trade and poaching.

Maintain records of incidents related to poaching, illegal trade, confiscation etc on tiger and other wildlife species Identify key customs for CITES enforcement

Prepare a status report on the rights and duties of stakeholders who are directly or indirectly responsible for the protection of tigers in the wild.

Conduct coordination meetings to review on the status of tiger, issues of poaching and smuggling tiger and its body parts.

Conduct feasibility survey for the need to have cooperative agreements between enforcement agencies and transport companies (air, rail, bus, freight, express courier)

Organize awareness interactions with the transport media on the illegal trade issue.

Review the current strengths of the antipoaching capacity of the PAs such as human resources (number of scouts, guard posts and the protection unit); physical facilities (field gear, vehicles, elephants, communication systems, reporting systems); intelligence network (reporting, database on poachers and smugglers, coordination with the authorities of forest, police, custom, postal service etc.); and financial aspects (government budget, incentives, rewards, emergency fund, conservation fee) and others

Conduct regular training programs for the antipoaching units

Equip the antipoaching units with the field gear and basic equipment (binoculars, communication sets, GPS, kitchen sets etc)

Procure physical resources to enhance antipoaching activities, such as four wheel drive vehicle, raft, motorboat, elephant, motorcycle, bicycles etc.

Train DNPWC professional staff to take responsibility as a tiger authority

Conduct series of thematic training workshops for the key individuals and/or civil servants-such as district administrators, customs officials, postal workers, security personnel, etc. regarding threats to tigers, illegal trade, and the identification of tiger parts.

Study on the feasibility of mobilizing buffer zone community based organizations including youth groups in antipoaching operations

Prepare case studies on the arrested poachers and smugglers to find out the socio-economic and psychological factors and alternatives to the wildlife crimes (such as poverty, unemployment, temptation, compulsion etc.)

4.2 Strengthen antipoaching efforts

Harmonize (review, gap analysis, consistency, complement) anti-poaching efforts together with Rhino Conservation Action Plan

Prepare antipoaching operation plans at the tiger conservation landscape level

Review the existing management plans for the protected areas including buffer zones from the perspective of tiger conservation

Conduct orientation training and Anti- Poaching Training for Army (or in joint with A/P units) programs for the protection unit deployed in the protected areas.

Review the post-conflict scenario for tiger conservation

Prepare/update guidelines on reporting, valuation and authentication of the tiger related incidents for direct compensation to the affected people

Establish a network of candid informers that will eventually lead to arrest poachers and smugglers who handle tiger body parts.

Review and Amend the NPWC Act Increase the prevailing minimum ceiling of the punishment against wildlife crimes as per the discretionary power of quasi-judicial under NPWC Act

Organize interaction meetings with the civil societies to discuss on enhancing political commitment in combating poaching and illegal trade.

Conduct advocacy and lobbying activities during strategic events (wildlife week, environment day, biodiversity day, regular campaigns) at a high political level as a means of awareness to garner political will to address tiger conservation, poaching and illegal trade.

Conduct feasibility survey of establishing a sustainable mechanism of providing appropriate incentives for the informers

Organize interaction meetings at the community levels to finalize on the mechanism of incentives

Establish an endowment fund for incentives Re-establish Anti-poaching Units Restore Security Guard Posts Buffer Zone Community Training to support A/P units Establish Dialogue with Minister of Forests and Soil Conservation and/or Police Headquarter to develop Kathmandu based Investigation Cell CITES/Wildlife Crime Training for Police, Customs, DNPWC, MFSC etc Post-Poaching/Investigation Training for Selected Police, Customs, DNPWC, MFSC, etc Human Rights Training

4.3 Enhance public awareness programs

Conduct nature conservation workshops and seminars, to provide basic

knowledge; increase awareness-for game scouts, forest guards, rangers, and officers of their role in tiger and biodiversity conservation.

Bring out public notice on the importance of tigers, and legal fines against the tiger related offenses in the buffer zones and potential areas of illegal trades

Incorporate tiger conservation information and fines against tiger related offenses in the school level textbooks in the buffer zones Install kiosks on the importance of tigers, and legal fines against the tiger related offenses at the major tourist arrival- departure locations such as airports, visitors information centers, immigration offices, protected areas entry fee collection centers etc.

Design, produce and distribute educational materials (posters, booklets, websites) based on the scientific background of tigers (ecological importance, balance in nature etc), cultural values (Bagh Bhairav, Namo Buddha, Dasain festival etc), and messages of social leaders and celebrities

Prepare national communications plan for promoting tiger conservation with support of private sector communications experts.

2.2.5 Objective 5. Transboundary Cooperation

Enhance trans boundary cooperation for combating illegal trade in wildlife, maintaining ecological

integrity in the tiger landscapes, and promoting tiger tourism.

Issues

Administration

The protected areas authorities in the two sovereign countries have different working styles and power of attorney. They are unable to officially meet and exchange information without formal approval of the central/federal government bodies.

At places there are border disputes creating additional obstacles for wildlife conservation matters.

Wildlife issues (illegal trade, transient, migration etc) are rarely priority agenda in the border coordination meetings.

The present governmental structure does not allow DNPWC authorities, or other governmental agencies, to accept foreign funds, without first passing through bureaucratic hurdles.

There is unanimity on the issues of wildlife conservation including tiger right from the central to the local levels. However, the transboundary initiatives are beyond the scope and limitations of the field level authorities.

Ecology and international boundary

Tiger habitats are not connected between India and Nepal properly, either through protected areas or national forest lands; thus, tiger management units may extend across international borders.

Wildlife species including tigers have not free and unobstructed movements along these corridors linking the two countries.

In order to maintain viable tiger populations, cooperation between neighboring countries is necessary.

Tiger conservation is ultimately a global issue, one that requires support from both local and international agencies and research institutions.

Tigers have been the symbol of marketing for the tourism entrepreneurs operating business in the tiger

landscapes. Even before the creation of national parks, tiger tourism has been a flourishing business in Chitwan. However, there are observations that tourism did not actually contribute significantly towards protected area management or enforcement.

Tiger sightings in Nepals tiger landscapes are very promising, yet potential are under utilized.

Strategies

Strengthen transboundary cooperation at the central and field levels to complement the efforts of controlling poaching of wildlife and smuggling of wildlife body parts.

Maintain ecological integrity of the wildlife habitats focusing on the tigers and the other flagship species that used to cross international borders.

Promote tiger tourism that will benefit the local communities and eventually be a conservation strategy for tigers and their prey base.

Activities

5.1 Strengthen transboundary cooperation

Prepare guidelines for holding trans boundary meetings at the field levels. This will include identification of issues, alternatives solutions, commitments on the part of Nepal.

Exchange annual reports, newsletters and other relevant documents between the field level authorities.

5.2 Maintain ecological integrity

Develop regional strategies for monitoring illegal wildlife trade along the borders with India and China.

Organize regional media tours on tiger conservation.

Prepare protocol for joint research activities on the transient wildlife species that frequently cross the international borders.

Organize interaction meetings with the South Asian Association for Regional Cooperation (SAARC) secretariat to explore the possibility of using SAARC

as a forum for wildlife conservation, antipoaching and control of illegal trade in wildlife.

Include Tiger and other conservation agendas in the district level Joint Indo- Nepal Friendship meetings.

Establish and ensure habitat connectivity for tigers in the following six zones in India-Nepal TAL Valmiki-Chitwan zone, Suhelwa and Katernia Ghat Wildlife Sanctuary Bardia NP, Dudhwa (Belrayan Range) Basanta Forest, Kishanpur WLS, Sharada River, Lagga Bagga Shuklaphanta, Shuklaphanta East, Churiya Hills (Talla Pani) Maha Kali (S h a r a d a) a n d Champawat Forest Division.

Co-ordination between India and Nepal

to improve the habitat condition for tiger and prey species.

- a. Persuade Indian Government to activate community forestry program in and around Valmiki TR to reduce pressures on Chitwan NP and vice versa.
- b. Gather more information on forest and wildlife north of Suhelwa in Nepal.

- c. Bardia Katernia Ghat zone Pressure from Nepal side, east of Geruwa River on Nishangada range of Katernia Ghat, Survival of Katernia Ghat WL Sanctuary.
- d. Basanta Dudhwa (Belrayan) Creation of the corridor.
- e. Kishanpur, Sharada, Laggabagga Work with Indian Government to control poaching and dependency on the forest.
- f. Suklaphanta East Sharada, wildlife use of the area . On Indian side Nandhour-Ladhiya Conservation Reserve and Nandhour Valley NP.

5.3 Promote tiger tourism

Review tourism plans from the perspectives of tiger tourism.

Assess impacts of existing tourism facilities in PAs.

Train the local guides on tiger tracking and monitoring who will also be accompanying with the visitors as appropriate.

Prepare a marketing strategy for tiger tourism in the tiger landscapes (e.g. Adopt a tiger scheme).

2.2.6 Logical Framework

Goal	Objectively Verifiable Indicator ^s	Means of Verification	Assumptions
<p>Preserve, recognize, restore, and increase the effective land base that supports the Royal Bengal tigers (<i>Panthera tigris tigris</i>) in Nepal, in order to maintain a viable tiger population</p> <p>Purposes</p> <p>1. Tiger and Prey Information: Establish sound scientific information base for management of tigers and their prey base.</p> <p>2. Habitat management: Maximize high quality, well connected tiger habitat using best management practice across the entire terai arc landscape</p> <p>3. Conflicts Resolution: Minimize tiger human conflicts</p> <p>4. Anti-poaching and Anti-trafficking operations: Protect the tigers and their prey base from poaching, retaliatory killing and illegal trade.</p> <p>5. Transboundary cooperation: Enhance transboundary cooperation for combating illegal trade in wildlife, maintaining ecological integrity in the tiger landscapes, and promoting tiger tourism.</p>	<ul style="list-style-type: none"> Tiger population in Nepal maintained at 350 - 375 individuals XX ha of critical tiger habitats outside protected All breeding tigers will be recorded through camera trap and other surveys Population trend of prey base maintained or increased in PAs and critical tiger habitats outside PAs Increase in suitable habitat or prey base under effective management (CF, BZ, Collaborative, LF, protected forest) 50% Decrease in retaliatory killing of Tigers with respect to baseline of 2006 50% decrease in events of tiger human conflicts with respect to baseline of 2006 Decrease in number of poaching and smuggling incidents as a result of illegal trade control measures Number of voluntary information leading towards arrest of poacher and smugglers increased Joint regular transboundary efforts (meetings, information sharing) increased 	<ul style="list-style-type: none"> Census Report Office Report GIS data Progress reports Field Research Report Office record Species monitoring data Tourists feedbacks Meeting minutes 	<ul style="list-style-type: none"> No big scale calamities occur {flood, epidemics} Political stability and security situation remain normal

^sThe time frame applies for five years during 2007-2011, unless specified.

1. Tiger and Prey Information

Result / Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
<p>1.1 Enhance knowledge and information base</p> <ul style="list-style-type: none"> • Compile the available information on tigers and prey species in Nepal • Develop a rigorous protocol for tiger and prey base monitoring • Conduct sign survey for habitat occupancy pattern and change in those for tigers and prey base once every three years • Conduct variety of survey on human disturbance impact ; village information survey on tigers and other information • Conduct high skill scientific survey by universities and research institutions • Capacity building of PAs staffs and conservation NGOs, universities, buffer zone user groups and other civil society institutions • Develop feedback mechanism for PAs/forest management for critical tiger habitat • Improve the existing physical infrastructure and equipment in PAs for Tiger and prey base 	<ul style="list-style-type: none"> • Central database on scientific information of tigers operational and updated • At least one scientific studies conducted annually • Increased number of regular monitoring and studies by trained human resource • At least one tiger expert trained and retained in each partner conservation organization • At least 10 sets of functional survey and monitoring equipments maintained in each protected areas 		

2. Habitat Management

Result / Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
2.1 Develop landscape approach <ul style="list-style-type: none"> • Upgrade the central GIS lab • Organize capacity building programs • Restore vegetation and water hole • Manage the grassland habitats and waterholes • Monitor habitat quality • Update digital base maps 	<ul style="list-style-type: none"> • 50%habitat in Barandabar, Khola and Bosanto forest corridor restored • Regulations and guidelines required for forest corridor management formulated 		
2.2 Develop alternative resource <ul style="list-style-type: none"> • Manage grasslands • Construct/maintain cattle pool • Construct/maintain fire lines • Construct/maintain watchtower • Plant indigenous tree species • Provide grant facilities 	<ul style="list-style-type: none"> • Area of grasslands in the protected areas increased • Number of illicit grazing animals decreased 		
2.3 Strengthen coordinated efforts <ul style="list-style-type: none"> • Conduct coordination meetings • Prepare operational guidelines for community forests • Review/integrate tiger conservation • Prepare operational plans for local communities. • Establish and operate veterinary services • Arrange study tours for the community based organizations 	<ul style="list-style-type: none"> • Tiger related activities included in the forest management plans in TAL districts 		

3. Conflicts Resolution

Result / Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
3.1 Develop alternatives for natural resource base <ul style="list-style-type: none"> Identify/hand over community forests Restore the degraded forests Prepare operational plans for community forests Develop community plantations 	<ul style="list-style-type: none"> Area of community forests, restoration of degraded forests and plantation increased by x hectare 		
3.2 Develop safety measures <ul style="list-style-type: none"> Conduct awareness meetings Erect signs of warning Monitor tigers around the human activity areas Take a 'man-eater' tiger under control 	<ul style="list-style-type: none"> Number of human and livestock incidents decreased by at least 50% 		
3.3 Develop a community based mechanism of compensation <ul style="list-style-type: none"> Review conservation policies Establish community funds Establishment of relief fund Establish the Help Desk Establish Field Rescue Team 	<ul style="list-style-type: none"> Compensation mechanism in place 		
3.4 Develop a community awareness program <ul style="list-style-type: none"> Conduct seminars and interactive programs Conduct interaction meetings Develop a curriculum for school Develop audiovisual programs Make tiger documentary films and exhibits Develop information centers Develop community plantations Publicize on tourism and biodiversity Prepare guidelines and awareness materials on toxics Encourage people to develop/manage sewage/irrigation canals 	<ul style="list-style-type: none"> Local participation in tiger conservation 		

4. Anti-poaching and Anti-trafficking operations

Result / Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
<p>4.1 Strengthen institutional network</p> <p>Trainings:</p> <ul style="list-style-type: none"> • Conduct CITES implementation training for the management and scientific authorities • Conduct regular training programs • Train the professional staff of DNPWC • Conduct training workshops for customs officials, postal workers, police, etc <p>Meetings:</p> <ul style="list-style-type: none"> • Participate in the meetings, conferences and seminars • Conduct transboundary meetings • Conduct coordination meetings <p>Study, Survey, Reports:</p> <ul style="list-style-type: none"> • Prepare updated reports • Maintain records of incidents • Study on mobilizing buffer zone community • Prepare case studies on poachers and smugglers • Prepare a status report • Conduct feasibility survey on cooperation of transport companies • Organize awareness interactions with the transport media • Review the current strengths of the anti-poaching capacity • Equip the anti-poaching units • Procure physical resources • Identify key customs 	<ul style="list-style-type: none"> • Functional network for illegal trade network in place 		

Result / Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
4.2 Strengthen anti-poaching efforts <ul style="list-style-type: none"> Conduct orientation training programs for the protection unit Organize interaction meetings with the civil societies Organize interaction meetings Prepare guidelines on reporting, valuation and authentication Conduct feasibility survey Review the existing management plans Prepare anti-poaching operation plans Establish a network of candid informers Review the existing NPWC Act Conduct advocacy and lobbying activities Review the post-conflict scenario Establish an endowment fund for incentives 	<ul style="list-style-type: none"> Public participation in anti-poaching efforts increased by at least 10% 		
4.3 Enhance public awareness programs <ul style="list-style-type: none"> Conduct workshops and seminars Incorporate tiger conservation in school textbooks Design, produce and distribute educational materials Install clocks Bring out public notice 	<ul style="list-style-type: none"> Number of voluntary information leading towards arrest of poachers and smugglers increased 		

5. Transboundary Cooperation

Result / Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
5.1 Strengthen transboundary cooperation <ul style="list-style-type: none"> • Prepare guidelines on transboundary meetings • Exchange annual reports, newsletters and other relevant documents 	<ul style="list-style-type: none"> • Frequency of meetings and number of participants increased 		
5.2 Maintain ecological integrity <ul style="list-style-type: none"> • Organize interaction meetings with SAARC • Organize regional media tours • Develop regional strategies for monitoring illegal wildlife trade • Prepare protocol for joint research activities 	<ul style="list-style-type: none"> • GTF support to Nepal increased 		
5.3 Promote tiger tourism <ul style="list-style-type: none"> • Train the local guides • Review tourism plans • Prepare a marketing strategy 	<ul style="list-style-type: none"> • Number of tiger visitors increased 		

2.3 Business Plan

2.3.1 Human resources

DNPWC is organized with its Headquarters in Kathmandu and field offices in the 14 protected areas. It is led by the Director General with the support of the Deputy Director General and the seven section chiefs. The sections of Administration, Account and Computer are headed by the Gazetted Class III officers under the direct supervision of the Director General, and the technical sections of Management, Monitoring and Evaluation, Planning, Ecology and Conservation Education are headed by the Gazetted Class II officers under the direct supervision of the Deputy Director General. Although all the sections have their respective responsibilities towards tiger conservation in one way or another, the Ecology Section is considered to be primarily responsible for the task.

The human resources of the DNPWC are 1,050 personnel of whom 41 are engaged in the headquarters, and the rest 1,011 are deputed in the 14 field offices. The total number of the field staff in the tiger range protected areas is 543 including 14 officers, 312 nongazetted staff and 217 hattisares.

Similarly, the Government of Nepal has deployed over 3,900 Nepal Army personnel in 11 protected areas, and their strength is over 1,700 men in the four tiger range protected areas (Table 4).

Under the umbrella of the buffer zone system, over 487,000 buffer zone residents are spread in three municipalities and 74 Village Development Committees (VDC) in ten District Development Committees (DDC). They are organized into various user committees and

user groups (Table 5). These community based organizations will be mobilized where applicable as outlined under various activities of the tiger action plan.

The Tiger Action Plan will be implemented under the framework of the current management plans of the protected areas. The existing human resources of the government authorities and the partner organizations such as NTNC, IUCN, WWF have been considered adequate to implement the programs as outlined in the action plan.

However, capacity enhancement of both the government authorities and the buffer zone communities will be promoted as explained under various activities.

2.3.2 Financial requirements

DNPWC had over Rs17 million budget for

the year 2004/2005, of which 28 percent (Rs4,890,000) was for development activities, and the remaining (Rs12,398,422) for general administrative cost. The average annual revenue generated at the headquarters for the period 2000-2005 was over Rs11 million.

The Chitwan NP generated average annual revenue of nearly Rs45 million compared to its annual budget of Rs15.6 million. Among the four protected areas, Parsa WR generated only nearly Rs400,000 annual revenue which comes out to be only 10% of its annual budget (Table 6).

2.3.3 Physical resources

Under the respective management plans, various activities that can be grouped into five major programs, namely conservation, habitat

Table 4. Staff Positions in the Tiger Habitat Protected Areas

SN	Protected Area	Civil Administration				Nepal Army
		Gazetted	Non Gazetted	Hattisare	Total	
1	Parsa WR	2	41	32	43	239
2	Chitwan NP	6	135	63	141	792
3	Bardia NP	3	89	33	92	478
4	Shuklaphanta WR	2	47	24	49	239
5	Total	13	312	152	325	1,748

Source: DNPWC 2003, 2006

Table 5. Buffer Zone Communities in the Tiger Habitat Protected Areas

SN	Protected Area	Year	Area ^{sq.m}	Districts	VDCs	Population	Households	Biodiversity Trust (Rs)
1	Parsa WR	2005	298.17	3	11	43,228	7,228	4,030,820
2	Chitwan NP	1996	750.0	4	37	223,260	36,193	5,894,636
3	Bardia NP	1996	328.0	2	17	120,000	11,504	3,616,353
4	Shuklaphanta WR	2004	253.4	1	12	100,953	17,006	3,985,200
5	Total-		1619.67	10	77	487,441	71,931	17,527,009

Source: DNPWC 2006

Table 6. Annual Budget, Expenditure and Annual Average Revenue (in Rupees)

Protected Areas	Annual Budget 2004/2005	Expenditure (2004/2005)	Average Annual Revenue (2000-2005)	Percent of Revenue/ Budget
DNPWC Headquarters	17,288,422	16,061,422	11,485,378	66
Chitwan NP	15,600,000	15,597,000	44,974,109	288
Bardia NP	8,975,000	8,718,000	5,149,444	57
Shuklaphanta WR	6,400,000	5,689,000	1,119,514	17
Parsa WR	3,845,000	3,661,000	395,557	10

Since the fiscal year 2001-2002, the revenue generation has been declining in the tiger protected areas (Table 7) as well as in the DNPWC headquarters.

Table 7. Revenue Generation in the Tiger Habitat Protected Areas (Rs)

SN	Protected Area	2000-01	2001-02	2002-03	2003-04	2004-05
1	Parsa WR	354,153	258,501	421,860	563,698	379,575
2	Chitwan NP	74,302,801	38,887,119	30,831,199	40,060,770	28,137,909
3	Bardia NP	9,821,784	4,376,586	2,777,655	3,710,147	182,186
4	Shuklaphanta WR	2,419,215	1,552,950	631,871	523,770	469,765
5	Total	87,197,953	45,075,156	34,662,585	44,858,385	29,169,435

management, species management, religious area management and infrastructure development. The special activities include Buffer Zone Management, Participatory Conservation Program, Terai Arc Landscape, and Tourism for Rural Poverty alleviation Program. In general, overall protected areas management is geared towards conservation of endangered species like tiger. Summary of the programs with proposed budget that are identified in the specific protected areas management plans are given in the Annex 2.

2.3.4 Partners identification

The Department of National Parks and Wildlife

Conservation (DNPWC) is the major stakeholder for tiger conservation programs.

The other major government agency that is involved in the field activities is the Department of Forests. Similarly, NTNC has been involved in various aspects of tiger conservation especially research and antipoaching programs ever since it was established in 1982 under the legislative act. One of the prime roles of the Nepal Army deployed in the protected areas is to protect the wildlife including tigers. The other government agencies that are indirectly involved are district administration, police, custom etc.

In all the tiger range protected areas, Buffer zone has been declared, and consequently community based organizations have been organized (Table 5). Apart from the user groups organized under the Buffer zone system, the local youths have also formed various clubs and nongovernmental bodies to protect tiger and other wildlife in their neighborhood.

Apart from the PA personnel and representatives, there are numerous potential stakeholders within the country. They include tourism entrepreneurs (hoteliers, lodge owners, nature guides), development organizations personnel (members, project staff), and teachers and students in the fields of forestry, biological science etc.

There are three major institutions namely the Institute of Forestry in Pokhara and Hetauda, the Institute of Agriculture and Animal Sciences in Rampur, and the Natural History Museum in Swayambhu, Kathmandu. These institutions can be strategic partners to jointly develop and conduct research programs. In fact, Natural History Museum is the scientific authority of CITES in the country.

Since the beginning of the modern conservation history of the country, DNPWC has been receiving generous supports from various conservation organizations worldwide. It has been realized that it is necessary to streamline the supports of partners and at the same time enhance strategic partnership for the symphonic actions and synergetic results in conservation.

The major organizations that are involved in conservation programs of the tiger range protected areas and their scopes are as follows:

DFID (Department for International Development) /SNV (Netherlands Development Organization) /UNDP: revise management plan and prepare buffer zone management plan and tourism plan and support buffer zone program

Frankfurt Zoological Society: Gharial breeding centre

GEF (Global Environment Facility) /UNDP: biological corridor linking CNP, ICDPs in CNP buffer zone

ITNC: antipoaching, tiger monitoring

IUCN: CITES implementation, World Heritage Site monitoring, wetland policy, and capacity building

NTNC: staff training, community development, research in CNP, BNP, SWR (Shuklaphanta Wildlife Reserve) and elsewhere

London Zoological Society: community development in CNP

Smithsonian Institute: wildlife research UNDP: community development and conservation in CNP

UNESCO (United Nations Economic, Scientific and Cultural Organization) World Heritage Support is there for renovation of Kasara Darbar and developing it as a Conservation Education Centre

WWF: wildlife conservation in TAL

Save The tiger fund, Washington DC

US Fish and Wildlife Department

The countries affiliated with the CITES, IUCN and other conservation conventions are also potential stakeholders for tiger conservation efforts in Nepal.

2.3.5 Coordination mechanism

Coordination for tiger conservation has been conceived at three levels: protected areas, Terai Arc Landscape, and center. The coordination mechanism designed in the protected area management plans will be the basis for coordinating programs and actions for tiger conservation. The protected areas offices will also coordinate with their respective buffer zones.

The TAL strategy will be considered as the basis for coordination at the landscape level.

The Ecology Section of the DNPWC will be the key player for this level of coordination works.

At the central level, the MFSC/DNPWC will play a key role in coordinating the line ministries for mobilizing sector services such as forests, police, custom etc. Coordination with the international organizations, research academies, media, donors and the protected areas will also be the responsibility of the MFSC/DNPWC (Table 8). The Director General of the representative of DNPWC will be the facilitator to maintain central level coordination.

2.4 Budget

The total budget for the action plan for the period of five years is estimated to be US \$ 1,150,000 of which 39% will be spent for remuneration, and 16% for equipment and 12 % for human resources development, 14% for construction, 11% for travel and 8% for the office running cost (Chart 1). In terms of activities, 31% budget has been set aside for antipoaching and anti-trafficking operations, 33% in conflict resolutions, 18% habitat management, 12% tiger and prey information and 6% transboundary cooperation (Chart 2). In the first year the total amount will be US\$201,000, and US\$178,000 in the fifth year. The maximum amount US\$291,000 has been allocated in the second year (Chart 3). Detail breakdown by each activity is given in the Annex 3.

It is revealed from the figures that the total average annual revenue of the four protected areas (SWR, BNP, CNP and PWR) amounts to approximately Rs52

million. Of this, the buffer zone communities receive 50% under the buffer zone policy. The remaining revenue (Rs26 million) goes to the national treasury. The total average annual budget set aside by the government for these four protected areas is approximately Rs35 million. Thus, the revenue and budget gap is over Rs9 million per year. However, the amount invested in the buffer zone directly or indirectly helps support tiger conservation. Considering this scenario, it is clear that additional sources of funding will be required for the implementation of the tiger action plan.

Considering the areas of interests and scopes (Subchapter 2.3.4), donors and international nongovernmental organizations could be considered the potential sources of funding. The private sectors such as tourism entrepreneurs and business houses could be involved various activities of tiger conservation of tiger conservation.

The local governments (DDCs and VDCs) as well as the Buffer Zone organizations will be equally potential sources of funding.

Table 8. Coordination Mechanism

Level of coordination	Protected Areas	Landscape Level	Center
Key Players	NP/WR Offices	Ecology Section of DNPWC	MFSC/DNPWC
Partners	Protection unit, BZ Institutions through BZMC, Range posts, Guard Posts, district line agencies, respective DDCs, district line agencies, projects and NGOs	CNP, BNP, SWR and PWR, Regional forest directorates Central Western, Mid-Western and Far-Western Development Regions, TAL office, regional level projects	Departments of Forests, Police, Customs, International organizations, Research academies, Nepal Army, Media, Donors
Frequency	Weekly, monthly	Trimesterly	Six-Monthly
Main agenda	Daily and weekly updates, field monitoring, procurement, construction, maintenance, field budget and programs, mail runners, field staff issues	Trimester updates, regional programs, DDC programs and budget, regional priority, government circulars, public awareness, coordination	Six-monthly updates, national budget and program, staff issues, national priority, donors policy, media coverage, supervision, coordination, government circular

Chart 1 : Budget Distribution by Line Items

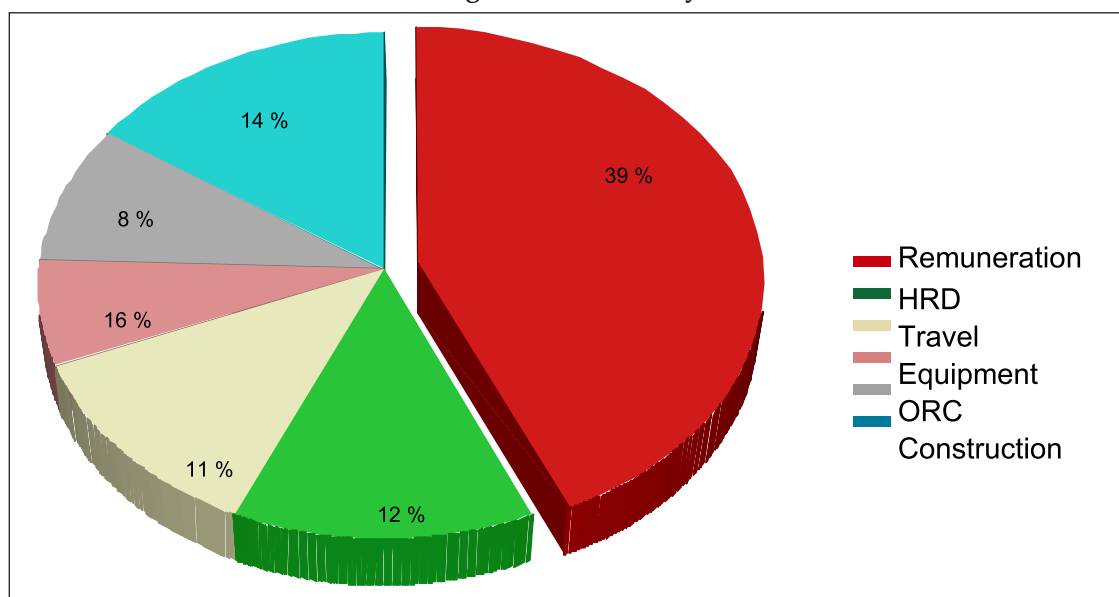


Chart 2 : Budget Distribution by Major Activities

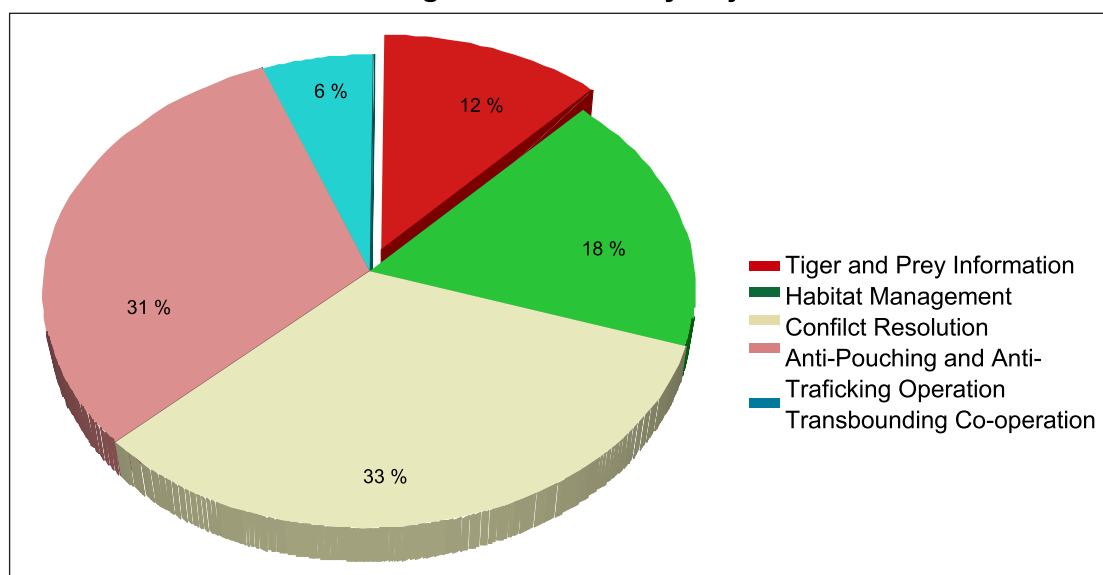
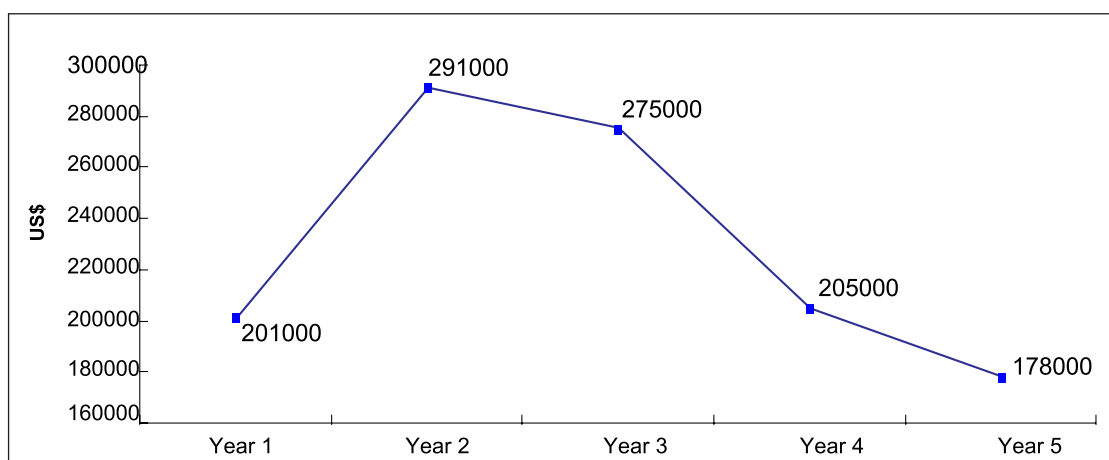


Chart 3 : Yearwise Budget Distribution (in US\$)



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ANNEXES

Annex 1: Natural History of the Tiger

Typical Characteristics

Tigers are one of the largest living cats; great range in size between sub-species and sexes. Male can be 3 meters long and weigh around 200 kg. Tigers are normally solitary, except for females with cubs. Tigers are territorial and occupy relatively large habitats: size usually depends on the prey density. Lifespan of tigers in the wild is not well known, but some have lived up to 17 years.

Breeding Habits

Mating takes place all year round. Gestation is around 103 days and an average litter is two or three cubs. Cubs reach independence between 18 and 28 months. Females begin breeding at age 3 and continue until age 9 or 10. They usually reproduce every two years. Males start to breed when they are four or five years old.

Prey

Tigers feed predominately on large deer species and wild boar. Occasionally, they will kill larger species such as wild cattle, elephant and rhino calves.

They are also opportunistic and will kill monkeys, birds, reptiles and fish as well as more unusual prey such as crocodiles and leopards.

Males have been known to kill cubs fathered by other tigers.

Distribution

Tigers have existed on the Asian sub-continent since prehistoric times. Various records and descriptions about tigers are found in century-old literature and monuments. The tiger is revered in many cultures and religions of the world. It is the carrier of the Goddess Durga in the Hindu religion. Beautiful murals depicting tigers are found in many, century-old Hindu temples and Buddhist monasteries.

Of the eight tiger subspecies found in the world, the Royal Bengal Tiger (*Panthera tigris tigris*) is found on the Indian sub-continent - i.e., the countries of Bangladesh, Bhutan, India, Western Myanmar, and Nepal (Table

1). This subspecies accounts for approximately 60 percent of all the subspecies remaining in the world today; it, therefore, has the best chance of long-term survival.

Until the 1950s, tigers were found all along the forests of lowland Nepal, South of the Himalayan Range. Tiger distribution, in Nepal, is not documented for elevations higher than the Churia Hills (Siwalik) i.e., approximately 1500 m.; although its presence is recorded above 4000 m. in Bhutan (McDougal and Tshering 1998). Absence of the tiger, in Nepal, from higher elevations, may be attributed to: (1) the loss and fragmentation of its habitat, (2) high human density and its resulting pressure on the forest, and (3) depletion of the natural prey base.

Currently, the tiger distribution is more or less restricted to the protected areas, and the adjoining forests. There are still some forest areas, outside protected areas, however, where tigers still occur. Conservation of these forests is important for maintaining the available land base for tigers, and for maintaining the corridors between habitats for their dispersal.

When tiger census surveys are conducted, local people are interviewed to verify field results. Confusion sometimes occurs because, in many places in Nepal, both tigers and leopards are called by the same word, bagh. These animals can be differentiated easily, however, based on their body size and coat pattern. The tiger has black stripes on its body and face, against a pale, yellowish coat. Stripe patterns are distinctive in every tiger. The leopard is smaller than the tiger, and has spots on its coat, which is also a pale, yellowish color.

Size

The tiger, the largest of the cats, is the ultimate land predator. It is capable of killing animals

several times its own size. The average size of a male Bengal tiger is slightly less than three meters; that of a female is about 2.5 m. The average weight of a male tiger is 180-230 kg., rarely exceeding 250 kg.; whereas, the female weighs about 135-185 kg. (Prater 1971).

Habitat

The tiger is a territorial animal. It occupies a relatively large habitat, depending on the availability of the prey species. Its ideal habitat includes forests, with tall alluvial grasslands that have water. Prime habitat provides sufficient cover for concealment, for stalking its prey, and for hiding its kills.

The tiger is the top predator in the food pyramid of an ecosystem. As such, it is also an indicator of the health of that ecosystem. The tiger is an opportunistic hunter, preying upon animals of all sizes, ranging from the adult Gaur (*Bos gaurus*), to the Langur (*Presbytes entellus*), to birds. To be more economical, however, it normally preys upon large ungulates, weighing on average between 50 - 100 kg. (McDougal and Tshering 1998, WWF 1998). The tiger will occasionally kill elephant and rhino calves. (Males have been known to kill cubs sired by other male tigers, to ensure their territorial superiority and genetic inheritance.) A tiger makes 40 to 50 kills a year, representing approximately 3,000 kg. of prey (McDougal and Tshering 1998).

In Nepal, specifically, the tiger preys upon a wide variety of prey species, including the Sambar deer (*Cervus unicolor*), swamp deer (*C. duvauceli*), spotted deer (*Axis axis*), hog deer (*Axis porcinus*), barking deer (*Muntiacus muntjac*), and wild pig (*Sus scrofa*). The Sambar deer is the most preferred prey species (Seidensticker and McDougal 1993).

Domestic livestock are also preyed upon, if they are found in the tiger habitat. In sub-optimal habitat, where natural prey is limited, tigers can survive, occasionally, by preying upon domestic livestock, as a supplement to their diet of natural prey. Tigers eventually disappear from areas where natural prey is depleted, even though livestock is available as an alternative prey.

Tigers rarely approach human settlements. A normal tiger always avoids contact with human beings. They do not constitute a part of the tiger's natural prey. Hunger, though, is the

most likely factor that overrides the tiger's aversion to man (McDougal 1987). There are certain circumstances when a tiger will kill human beings. The incidence of man-eating cases has been associated with: an incapacitated tiger; the escalation of competition among males; a disturbance in the natural predator-prey balance, due to increased human interference; tigers pushed to a marginal habitat; and dispersing individuals. There are many man eating cases that are without any clear explanations.

Social Dynamics

The tiger is a solitary animal. The most frequent social interaction is between a female and her young. An adult male and female are associated briefly, for 2-3 days, for mating. This association fades, once the cubs are born. Adults of the same sex rarely associate.

Female tigers compete for resources, whereas males compete for females. Females establish and maintain resource-based territories, large enough to maintain themselves and to raise their offspring. Both tiger density and the home range size are directly related to the habitat quality (availability of prey and cover). In prime habitat, which contains an abundance and variety of ungulates such as the alluvial grasslands of CNP, BNP, and SWR-the home range of a female tiger may be only 20 km², or even less (Smith 1993). In the Russian Far East, however, a female requires 450 km² (Miquelle, D.G., et al 1999).

The territorial size for female tigers is also influenced by the territorial turnover rate. When an old female dies, its vacant territory is often occupied by a young female (usually one of her daughters). Otherwise, females holding the territory in the adjoining area, may expand their territory to include the vacant area. The female maintains a mutually exclusive, non overlapping territory; whereas, a male tiger's home range may encompass the home ranges of two to seven adult females. Tigers may defend their territories from intruders by fighting and chasing them away. In general, they defend their territories by spraying urine (scent) on trees and bushes; and by marking their traveling route (by making mark more heavily at their territorial boundaries, rather than in the interior of their territories. Spraying and scraping are used interchangeably, depending on the habitat types. Scrapes are common in the

grasslands, where there are very few trees for urine spray; whereas, in a forested area, urine spray on a tree stump is more common (Smith et al. 1989).

Population Dynamics

Tigers have a polygamous mating system. Mating takes place all year round; many tigers prefer, however, to mate after the rains. The gestation period is short, only 102-105 days (i.e., 15-16 weeks). The litter size is normally three. Cubs are generally born between the months of February and May. A female with small cubs keeps a low profile; the cubs spend most of their time in and around the liar. When the cubs are about 6 months old, they start accompanying their mother on her hunting trips.

Cub mortality, during that first year, reaches almost 34 percent; whereas, during the second year, the mortality lowers to 17 percent (Smith and McDougal 1991). Consequently, when females with cubs are recorded in the wild, generally, there are just two cubs accompanying their mother.

Male tigers attain maturity at the age of four years, while females start breeding at three years of age. In prime habitat, a tigress may give birth to cubs every two years, until she is ten years old. The average reproductive life of a female is just about six years; whereas, that of male is less than three years. The life span of a tiger in the wild is estimated to be less than 20 years (WWF 1998).

Dispersal

Cubs become independent of their mother, between 19 and 28 months (Smith 1993). At this age, these cubs, or sub-adults, leave their natal area and attempt to seek areas for establishing their own territories. This is the most critical and dangerous period for their survival. The mortality rate for dispersing sub-adult males is 40 percent in CNP.

Generally, male sub-adults travel long distances from their natal areas. Females, on the other hand, settle adjacent to their mother; the latter often shifting her territory slightly, to accommodate her daughters. Even if territory is not available near their mother, female tigers disperse shorter distances than males, and rarely settle in marginal habitat.

The shrinkage of habitat limits the dispersal opportunities for tigers. Many of the protected areas in the Terai have already reached saturation, with a high density of residents. This situation causes intense competition for areas that contain the best breeding habitat. Consequently, frequent fights erupt between

individuals of the same sex, particularly males. Hence, the turn-over rate becomes very rapid, shortening the breeding lives in a population (McDougal and Tshering 1998).

While seeking a place to settle, dispersing male sub-adults must pass through areas already occupied by territorial males, and are

often pushed to marginal habitat on the periphery of the parks. Due to this high competition among males, and the unavailability of suitable habitat, these dispersing male sub-adults are likely to kill livestock, as part of their diet. This increases livestock depredation, which in turn, puts the tiger in direct conflict with the local people. The resulting villager retaliation may eventually lead to the poisoning of the livestock carcass, causing the death of the tiger.

Legal Status

Considering its endangered status, the tiger is listed in Appendix I of CITES (Convention on International Trade of Endangered Flora and Fauna), which bans international trade of the tiger or its parts. The tiger is also protected by Nepal's National Parks and Wildlife Conservation Act 2029, and is listed in its Appendix I. According to the Act, the penalty for a person-involved in the poaching of a tiger, or in the trading of its parts-is a fine of Rs. 50,000 - 100,000, or imprisonment of 5- 15 years, or both. Despite such stringent penalties, some poaching and trade in tiger parts is still taking place, because of the high demand for tiger parts in the international market.

The bones of an adult male tiger may weigh up to 15 kg., and those of a female about 10 kg. In an international market in the Far East, tiger bones may fetch a thousand dollars a kilogram (McDougal and Tshering 1998). All parts of the tiger-such as its bone and skin;

and some of its organs, such as its penis, canine teeth, and claws-have a market, due to certain traditional beliefs that have no scientific evidence. It is difficult to track down a tiger-poaching case in the field, because nearly all of the parts are taken by the poachers; whatever remains can be disposed of easily.

The establishment of anti-poaching units (APUs) in protected areas, with the cooperation of local people and various organizations, have curtailed the rate of poaching and trade in tiger parts. The provision of a reward to informants-whose information leads to the apprehension of culprits involved in such illegal activities-has been effective. The APUs in Nepal are supported by the International Trust for Nature Conservation (ITNC) and the WWF Nepal Program.

Annex 2:

Summary Programs and Budget in the Tiger Range Protected Areas

Shuklaphanta Wildlife Reserve and Buffer Zone

(Amount in thousands NRs.)

Program Activities	Cost
Biodiversity Conservation	
Species Conservation Activities (6)	12,250
Habitat Management Activities (8)	32,390
Anti Poaching Operation Activities (5)	13,830
Human Resource Development Activities (7)	2,565
Conservation Education Activities (9)	4,930
	66,015
Buffer Zone Development	
Community Development Activities (7)	21,645
Community Forest Management Activities (7)	3,520
Skill Development & Income Generating Activities (9)	3,100
Institutional Development (7)	3,215
Extension Program Activities (2)	1,080
Alternate Energy Promotion Activities (2)	14,100
Women Development & Empowerment Activities (8)	4,640
	49,610
Eco-Tourism Management	
Ecotourism Promotion Activities (6)	5,685
	5,685
Infrastructure Development	
Infrastructure Development Activities (14)	12,550
Infrastructure development to Hattisar Activities (8)	4,820
	17,370
Reserve Management	
Fulfill vacant positions	44,480
Recruit additional staff	23,910
	68,390
Operation Modalities and Evaluation	2,595

Bardia National Park and Buffer Zone

(Amount in thousands NRs.)

Management Plan 2001-2005		Total Cost
1.	Human Resource Development	45,000,000
2.	Infrastructure and Equipment	
	2.1 Building construction	18,000,000
	2.2 Building upgrade and renovation	300,000
	2.3 RTCPA operation and maintenance	300,000
	2.4 Electrification	300,000
	2.5 Water supply	700,000
	2.6 Road and Trails	8,000,000
	2.7 Equipment	10,000,000
	2.8 Transportation	10,000,000
3.	Ecological information	
	3.1 Baseline information	500,000
	3.2 Research through RTCPA	20,000,000
4.	Development Projects	500,000
5.	Encroachment of government land	200,000
6.	Natural Resource management	500,000
7.	Extension of Buffer zone	200,000
8.	Park people relation	15,000,000
9.	Antipoaching operation	10,000,000
10.	Information dissemination	500,000
11.	Corridor connectivity	15,000,000
12.	Park zonation	1,000,000
13.	Monitoring and Evaluation	500,000
14.	Review and update of management plan	1,000,000
Total		157,500,000

Tourism Plan 2001-2006	Total Cost
1. Attraction Management Programs	14,500,000
2. Tourism Facilitation Programs	48,300,000
3. Community Benefit Programs	12,700,000
Total	75,500,000

Chitwan National Park and Buffer Zone

(Amount in thousands NRs.)

	Total Cost
Park Management	
Management Zones	420
Grassland Habitat Conservation	16,784
Wetland Habitat Conservation	5,820
Forest Habitat Conservation	5,720
Wildlife Species Conservation	18,810
Cultural Heritage Conservation	3,215
Conservation Education	14,470
Resource Sharing and Access	1,550
Law Enforcement	12,810
Institutional Strengthening	189,492
Habitat Management	50,876
Physical Infrastructures and Logistics	70,278
Coordination and Inter-sector linkages	10,410
Research and Development	12,740
Monitoring and Evaluation System	5,340
Tourism Management	8,640
Total	427,325

Barandabhar Forest Corridor

Buffer Zone	1,720
Grassland	1,750
Wetland	3,230
Wildlife	1,770
Fringe Area Management	2,720
Community Development and Income Generation	3,975
Tourism Development	900
Support to Institutional Strengthening	2,075
Sub total	17,590
Program Administration Cost (20% of Program Cos)	3,518
Total	21,108

Buffer Zone Management	Total	Park Management	Others
Community Development	44,042.513	17,986.988	26,055.525
Conservation Program	43,552.096	17,793.988	25,758.108
Income Generating	17,668.442	11,835.992	5,832.450
Conservation Education	8,497.746	5,881.496	2,616.250
Sub total	113,760.797	53,498.464	60,262.333
Program Administration	5,375.000	5,375.000	-
Total	119,135.797	58,873.464	60,262.333

Parsa Wildlife Reserve and Buffer Zone

(Amount in thousands NRs.)

Wildlife Habitat Conservation	
Activities	Total Cost
Reserve Boundary Demarcation	550
Resettlement of human encroaches	10,075
Strengthening habitat protection	16,660
Waterhole management	2,220
Forest habitat management in the Reserve	—
Grassland management	1,570
Habitat conservation in BZ, corridor	3,450
Sub-total	34,825
Species Conservation	
Baseline Survey and action plan	6,250
Establish wild life welfare services	1,730
Minimize environmental hazards	170
Mgmt Research and Information	4,765
Sub-total	12,915
Institutional Capacity Enhancement	
Reserve infrastructure enhancement	9,700
Skill enhancement of Reserve staff	4,400
Enhancing Habitat capacity	6,175
Strengthening BZ institutions	10,920
Inter-sector linkages	1,100
Gender main streaming and women	1,930
STC empowerment	505
Conservation education & interpretation	4,975
Involvement of public and private sector	125
Monitoring and Evaluation	1,450
Sub-total	41,280
Buffer Zone Management/Community Development	
Ownership development	1,000
Alternative resource development	3,790
Livelihood improvement	1,510
Minimizing crop damage	1,950
Alternative to forest resources	2,095
Infrastructure development	5,750
Ecotourism development	7,145
Sub-total	23,240
Office and Staff Management	
a. Reserve office and Staff mgmt.	47,200
b. Habitat office and staff mgmt.	15,625
Sub-total	62,825
Total	175,085

Annex 3: Programs and Budget Breakdown for the Tiger Conservation

Line Items Summary Budget

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.1 Objective 1: Tiger and Prey Information	25000	26000	22000	35000	17000	10000	135000
2.2.2 Objective 2: Habitat Management	26000	40000	16000	28000	17000	85000	212000
2.2.3 Develop landscape approach	9000	21000	9000	18000	8000	25000	90000
2.2.4 Develop alternative resource	7000	3000	0	0	6000	55000	71000
2.3 Strengthen coordinated efforts	10000	16000	7000	10000	3000	5000	51000
2.3.3 Objective 3: Conflicts Resolution	199000	42000	76000	114000	35000	72000	375000
3.1 Develop alternatives for natural resource base	36000	0	16000	20000	0	0	36000
3.2 Develop safety measures	25000	1000	10000	5000	5000	4000	25000
3.3 Develop a community based mechanism of compensation	6000	9000	5000	10000	7000	30000	67000
3.4 Develop a community awareness program	102000	22000	22000	29000	16000	13000	162000
3.5 Database Management and Research	30000	10000	20000	50000	7000	25000	145000
2.2.4 Objective 4: Anti-poaching and Anti-trafficking Operations	358000	79000	65000	80000	60000	74000	358000
4.1 Strengthen institutional network	223000	42000	37000	51000	40000	53000	223000
4.2 Strengthen anti-poaching efforts	91000	28000	17000	17000	14000	15000	91000
4.3 Enhance public awareness programs	44000	9000	11000	12000	6000	6000	44000
2.2.5 Objective 5: Transboundary Cooperation	66000	20000	18000	9000	11000	9000	66000
5.1 Strengthen transboundary cooperation	19000	12000	3000	2000	1000	1000	19000
5.2 Maintain ecological integrity	20000	5000	7000	5000	9000	5000	20000
5.3 Promote tiger tourism	17000	2000	8000	2000	2000	2000	17000
Grand Total	674000	207000	197000	273000	140000	279000	1150000

Yearly Summary Budget

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.1 Objective 1: Tiger and Prey Information	16000	16000	35000	26000	16000	139000
2.2.2 Objective 2: Habitat Management	14000	70000	51000	41000	36000	212000
2.2.1 Develop landscape approach	4000	28000	24000	17000	17000	90000
2.2.2 Develop alternative resource	5000	8000	8000	15000	5000	71000
2.2.3 Strengthen co-ordinated efforts	5000	24000	9000	9000	4000	51000
2.2.3 Objective 3: Conflicts Resolution	72000	92000	100000	67000	44000	375000
3.1 Develop alternatives for natural resource base	0	16000	20000	0	0	36000
3.2 Develop safety measures	1000	10000	5000	5000	4000	25000
3.3 Develop a community based mechanism of compensation	20000	15000	13000	11000	8000	67000
3.4 Develop a community awareness programme	22000	22000	22000	16000	13000	102000
3.5 Database Management and Research	29000	29000	33000	35000	19000	145000
2.2.4 Objective 4: Anti-poaching and Anti-trafficking Operations	79000	65000	80000	60000	74000	358000
4.1 Strengthen institutional network	42000	37000	51000	40000	53000	223000
4.2 Strengthen anti-poaching efforts	28000	17000	17000	14000	15000	91000
4.3 Enhance public awareness programme	9000	11000	12000	6000	6000	44000
2.2.5 Objective 5: Transboundary Cooperation	20000	13000	9000	11000	8000	66000
5.1 Strengthen transboundary cooperation	12000	3000	2000	1000	1000	19000
5.2 Maintain ecological integrity	5000	7000	5000	8000	5000	30000
5.3 Promote tiger tourism	3000	8000	2000	2000	2000	17000
Grand Total	231000	291000	275000	205000	178000	1150000

Line Items Summary Budget Breakdown for objective 1. Tiger and Prey

Activities (Amount in US Dollars)		Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.1 Objective 1. Tiger and Prey Information base		25000	26000	22000	39000	17000	10000	139000
1.1 Enhance knowledge and information base		19000	23000	16000	27000	13000	0	98000
• Develop a protocol for tiger and prey base monitoring		1000	1000	1000	0	1000	0	4000
• Develop minimum standard code to maintain and standardize information for tiger and its preys		1000	2000	1000	0	1000	0	5000
• Develop a priority list of tiger related research works		1000	1000	1000	0	1000	0	4000
• Conduct studies on the population dynamics of tiger and prey species		2000	3000	1000	5000	1000	0	12000
• Continue camera trap monitoring of tiger in the TCUs		2000	2000	2000	5000	1000	0	12000
• Conduct tiger survey by looking for tiger signs, ungulate pellets, deer browse, response of the local people		2000	2000	2000	5000	1000	0	12000
• Conduct survey for presence and absence of tigers		1000	2000	1000	2000	1000	0	7000
• Conduct prey base survey to estimate relative abundance		2000	2000	2000	5000	1000	0	12000
• Maintain the tiger database using the computer		2000	2000	1000	5000	1000	0	11000
• Explore for the cooperation on tiger research with the academic institutions		1000	2000	1000	0	2000	0	6000
• Review the current management plans from the perspective of tiger and prey base conservation		2000	2000	1000	0	1000	0	6000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Develop a project in the TCLs to enhance understanding of dispersed corridors and the survival of dispersing tigers outside protected areas 	2000	2000	2000	0	1000	0	7000
1.2 Strengthen human and physical resources	6000	3000	6000	12000	4000	10000	41000
<ul style="list-style-type: none"> Conduct on the job training for the protected area personnel on tiger and prey base monitoring 	2000	2000	2000	2000	1000	0	9000
<ul style="list-style-type: none"> Improve the existing physical infrastructure of protected area management on Tiger monitoring 	1000	0	1000	0	1000	10000	13000
<ul style="list-style-type: none"> Equip the existing biodiversity database focusing on tiger and prey base for all tiger outputs 	1000	0	1000	10000	1000	0	13000
<ul style="list-style-type: none"> Feasibility survey for developing tiger overhangs and alternative captive management facilities 	2000	1000	2000	0	1000	0	6000

Yearly Detail Budget Breakdown for Objective 1 Tiger and Prey Information

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.1 Objective 1. Tiger and Prey Information	16000	46000	35000	26000	16000	139000
1.1 Enhance knowledge and information base	15000	38000	17000	14000	14000	98000
• Develop a protocol for tiger and prey base monitoring	4000	0	0	0	0	4000
• Develop minimum impact code to maintain undisturbed environment for tiger and its prey	0	5000	0	0	0	5000
• Develop a priority list of tiger related research works	4000	0	0	0	0	4000
• Conduct studies on the population dynamics of tiger and prey species	0	6000	0	6000	0	12000
• Continue camera trap monitoring of tiger in the TCUs	0	3000	3000	3000	3000	12000
• Conduct tiger survey by looking for tiger signs, ungulate pellets, deer browse responses of the local people	0	3000	3000	3000	3000	12000
• Conduct survey for presence and absence of tigers	4000	3000	0	0	0	7000
• Conduct prey base survey to estimate relative abundance	0	0	6000	0	6000	12000
• Maintain the tiger database using the camera traps	3000	2000	2000	2000	2000	11000
• Explore for the cooperation on tiger research with the academic institutions	0	3000	3000	0	0	6000
• Review the current management plans from the perspective of tiger and prey base conservation	0	6000	0	0	0	6000
• Develop a project in the TCUs to enhance understanding of dispersal corridors and the survival of dispersing tigers outside protected areas	0	7000	0	0	0	7000
1.2 Strengthen human and physical resources	1000	8000	18000	12000	2000	41000
• Conduct on-the-job training for the protected area personnel on tiger and prey base monitoring	1000	2000	2000	2000	2000	9000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Improve the existing physical infrastructure of protected area management on tiger monitoring	0	3000	10000	0	0	13000
• Equip the existing biodiversity database focusing on tiger and prey base for efficient outputs	0	0	3000	10000	0	13000
• Feasibility survey for developing tiger orphanage and alternative captive management facilities	0	3000	3000	0	0	6000

Line Items Detail Budget Breakdown

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.2 Objective 2: Habitat Management	26000	40000	16000	28000	17000	85000	212000
2.2.1 Develop landscape approach	9000	21000	9000	18000	8000	25000	90000
<ul style="list-style-type: none"> Jogrode the central GIS lab in DN-PWC and link with the field-based labs 	2000	2000	1000	10000	2000	5000	22000
<ul style="list-style-type: none"> Organize, in cooperation with NTNC-BCC, capacity building programs for the protected area and forestry personnel 	2000	15000	2000	2000	2000	0	20000
<ul style="list-style-type: none"> Reassess vegetation and water habitats in the geographical connections and forest corridors 	1000	0	1000	1000	1000	10000	14000
<ul style="list-style-type: none"> Manage the grassland habitats and warholes to maintain a healthy population of tiger prey species 	1000	0	1000	1000	1000	10000	14000
<ul style="list-style-type: none"> Monitor habitat quality, both potential and priority 	2000	2000	2000	2000	1000	0	9000
<ul style="list-style-type: none"> Develop digital base maps 	1000	2000	2000	2000	1000	0	8000
2.2 Develop alternative resource	7000	3000	0	0	6000	55000	71000
<ul style="list-style-type: none"> Manage grasslands in the protected areas 	1000	1000	0	0	1000	5000	8000
<ul style="list-style-type: none"> Construct/maintain cattle pool to control livestock grazing in the tiger habitats 	1000	0	0	0	1000	5000	7000
<ul style="list-style-type: none"> Construct/maintain fire lines for fire control 	1000	0	0	0	1000	10000	12000
<ul style="list-style-type: none"> Construct/maintain watch tower for habitat inspection 	1000	0	0	0	1000	10000	12000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Plan/Indigenize the sites in the open areas or implement the enrichment plan at one of the degraded forest areas. 	2000	1000	0	0	1000	10000	14000
<ul style="list-style-type: none"> Provide grant facilities to the local residents for a tomatoes in lieu of stall-feeding of livestock, such as biogas plants, purchasing buffaloes, farming dairy communities. 	1000	1000	0	0	1000	15000	18000
2.3 Strengthen coordinated efforts	10000	16000	7000	10000	3000	5000	51000
<ul style="list-style-type: none"> Conduct coordination meetings of the protected area managers and forest officials on identifying priority and potential tiger habitats and implementing adaptive management interventions 	2000	3000	2000	0	1000	0	6000
<ul style="list-style-type: none"> Prepare operational guidelines for the user groups and committees of the buffer zone and community forests or the habitat management activities in the potential tiger habitats, such as grazing control, sewage control and garbage management 	2000	2000	1000	0	0	0	5000
<ul style="list-style-type: none"> Review/integrate tiger conservation in forest management plans 	2000	2000	1000	0	0	0	5000

Yearly Detail Budget Breakdown for Objective 3

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
• Prepare operational plans for the restored areas by involving local communities.	2000	2000	1000	0	0	0	5000
• Establish and operate veterinary services for the livestock in the buffer zones	000	000	0	15000	000	5000	19000
• Arrange study tours for the representatives of the community based organizations to the sites of successful forest management teaching towards tiger habitats	1000	5000	2000	0	1000	0	10000

Yearly Detail Budget Breakdown for Objective 2 Habitat

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.2 Objective 2.1 Local Management	14000	70000	51000	41000	26000	212000
2. Develop landscape approach	7000	28000	27000	17000	17000	92000
<ul style="list-style-type: none"> Upgrade the central GIS lab in DNPWC and in < with the field-based labs Organize, in cooperation with NINCC-JCC, capacity building programs for the protected area and forestry personnel Restore vegetation and water hole in the geographical connections and forest corridors Manage the grassland habitats and waterholes to maintain a healthy population of tiger prey species. Monitor habitat quality, both potential and priority 	0	15000	7000	0	0	22000
	3000	5000	5000	5000	5000	23000
	0	2000	4000	4000	4000	14000
	0	2000	4000	4000	4000	14000
	1000	2000	2000	2000	2000	9000
<ul style="list-style-type: none"> Update digital base maps 	0	2000	2000	2000	2000	8000
2.2 Develop alternative resource	5000	18000	18000	15000	15000	71000
<ul style="list-style-type: none"> Manage grasslands in the protected areas 	0	2000	2000	2000	2000	8000
<ul style="list-style-type: none"> Construct/maintain cattle pool to control livestock grazing in the tiger habitats Construct/maintain fire lines for fire control Construct/maintain watch tower for better inspection Plant indigenous tree species in the open areas or implement the enrichment plantation of designated forest areas. 	0	4000	3000	0	0	7000
	0	3000	3000	3000	3000	12000
	0	3000	3000	3000	3000	12000
	2000	3000	3000	3000	3000	14000

Activities (Amount in US Dollars)		Year 1	Year 2	Year 3	Year 4	Year 5	Total
<ul style="list-style-type: none"> Provide incentives to the local residents to alternatives to lion or stall feeding of livestock, such as buying goats, purchasing buffaloes, joining dairy cooperatives. 		3000	3000	4000	4000	4000	18000
	2.3 Strengthen coordinated efforts	5000	2000	9000	5000	4000	51000
<ul style="list-style-type: none"> Conduct coordination meetings of the protected area managers and forest officials on identifying priority and implement tiger habitats and implement education management interventions Secure operational guidelines for the user groups and communities of the buffer zone and community forests on the habitat management activities in the potential tiger habitats, such as grazing control, average control and garbage management Review/Integrate tiger conservation in forest management plans Secure operational plans for the restored areas by involving local communities. 		1000	2000	2000	2000	1000	8000
		0	5000	0	0	0	5000
		0	5000	0	0	0	5000
		0	5000	0	0	0	5000
<ul style="list-style-type: none"> Establish and provide veterinary services to the livestock in the buffer zones 		2000	5000	5000	5000	1000	18000
<ul style="list-style-type: none"> Arrange incentives for the representatives of the community based organizations to the sites of successful forest management lending towards tiger habitats 		2000	2000	2000	2000	2000	10000

Line Items Detail Budget Breakdown for Objective 3 Conflict

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.3 Objective 3. Conflicts Resolution	42000	52000	29000	16000	21000	70000	230000
3.1 Develop alternatives for natural resource base	12000	12000	8000	0	4000	0	36000
<ul style="list-style-type: none"> Identify and hand over community forests in the buffer zones 	3000	3000	2000	0	1000	0	9000
<ul style="list-style-type: none"> Restore the degraded forests in the buffer zone by artificial or natural regeneration 	3000	3000	2000	0	1000	0	9000
<ul style="list-style-type: none"> Prepare operational plans for the buffer zone community forests for sustainable harvest of natural resources 	3000	3000	2000	0	1000	0	9000
<ul style="list-style-type: none"> Develop community plantations, by mobilizing local resources and labor, so that local people need not collect their fodder and firewood from tiger habitats. 	3000	3000	2000	0	1000	0	9000
3.2 Develop safety measures	5000	8000	4000	1000	2000	5000	25000
<ul style="list-style-type: none"> Free signs of warning to the presence of the major fights of ways, resource collection sites and shrines 	1000	1000	1000	0	0	5000	8000
<ul style="list-style-type: none"> Conduct awareness meetings at the local level during tiger marketing seasons 	2000	5000	1000	0	1000	0	9000
<ul style="list-style-type: none"> Monitor tigers around the human activity areas 	1000	1000	1000	0	0	0	3000
<ul style="list-style-type: none"> Take a "non-enter" tiger under control immediately 	1000	1000	1000	1000	1000	0	5000
3.3 Develop a community based mechanism of compensation	6000	9000	5000	10000	7000	30000	67000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Review conservation policies to incorporate compensation schemes 	1000	2000	1000	0	0	0	4000
<ul style="list-style-type: none"> Establish minimum by laws for the families of tiger victims. 	0	2000	1000	0	2000	15000	20000
<ul style="list-style-type: none"> Establish the Help Desk and appoint responsible staff 	1000	1000	0	0	1000	0	3000
<ul style="list-style-type: none"> Establish Field Rescue Team equipped with vehicles, communication sets and treatment gear 	2000	2000	2000	10000	2000	0	18000
<ul style="list-style-type: none"> Establishment of relief fund 	0	0	0	0	1000	15000	16000
<ul style="list-style-type: none"> Explore for the community based human and livestock insurance, wildlife incidents 	2000	2000	1000	0	1000	0	6000
3.4 Develop a community awareness program	19000	23000	12000	5000	8000	35000	102000
<ul style="list-style-type: none"> Conduct seminars and interest free programs, to emphasize on the co-dependency of humans and the Terai ecosystem; i.e., the health of such ecosystems is important, not only for biodiversity, but also for sustaining the ecosystem services, upon which local people and development depend. 	2000	5000	2000	0	1000	0	10000
<ul style="list-style-type: none"> Develop a curriculum for school children, which portrays tigers as part of the ecosystem, rather than as an object for human exploitation. 	3000	3000	1000	0	1000	0	8000
<ul style="list-style-type: none"> Develop audiovisual programs, for local people, which focus on tiger biology; they should be entertaining, as well as educational. 	5000	1000	2000	0	1000	0	9000

Activities (Amount in US Dollars)		Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> • Develop information materials, where problems faced by tigers are publicized, information should be in the form of photos or display cases in local languages. • Encourage people, at the community level, to develop and manage sewage and irrigation canals. 		2000	3000	2000	5000	1000	15000	28000
		1000	2000	1000	0	1000	0	5000
	• Make tiger documentary films and exhibit in awareness program	2000	1000	1000	0	1000	10000	15000
<ul style="list-style-type: none"> • Rationalize the fact that a strong economic link, between tourism and horticulture, benefits both local people and conservation efforts. 		1000	3000	1000	0	0	0	5000
	• Prepare guidelines and awareness materials on the sales, distribution and application of toxics such as pesticides, insecticides, poisons etc.	2000	2000	1000	0	1000	10000	16000
	• Conduct interaction meetings with the government line agencies (agriculture, forest, livestock, drug administration), nongovernment and private sectors at the grassroots level on the control of sales, distribution and application of toxic materials such as pesticides, insecticides, poisons etc.	1000	3000	1000	0	1000	0	6000

Yearly Detail Budget Breakdown for Objective 3 Conflict

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.3 Objective 3. Conflicts Resolution	43000	63000	67000	32000	25000	230000
3.1 Develop alternatives for natural resource base	0	16000	20000	0	0	36000
• Identify and hand over community forests in the buffer zones	0	4000	5000	0	0	9000
• Restore the degraded forests in the buffer zone by artificial or natural regeneration	0	4000	5000	0	0	9000
• Prepare operational plans for the buffer zone community forests for sustainable harvest of natural resources	0	4000	5000	0	0	9000
• Develop community plantations, by mobilizing local resources and labor, so that local people need not collect their fodder and firewood from tiger habitats.	0	4000	5000	0	0	9000
3.2 Develop safety measures	1000	10000	5000	5000	4000	25000
• Erect signs of warning to the passerby in the major rights of ways, resource collection sites and shrines.	0	2000	2000	2000	2000	8000
• Conduct awareness meetings at the local level during tiger mauling seasons	1000	2000	2000	2000	2000	9000
• Monitor tigers around the human activity areas	0	1000	1000	1000	0	3000
• Take a 'man-eater' tiger under control immediately	0	5000	0	0	0	5000
3.3 Develop a community based mechanism of compensation	20000	15000	13000	11000	8000	67000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<ul style="list-style-type: none"> • Rescue/rehabilitation activities to unharmed/compensated animals 	4000	0	0	0	0	4000
<ul style="list-style-type: none"> • Establish community funds for the families of tiger victims. 	4000	4000	4000	4000	4000	20000
<ul style="list-style-type: none"> • Establish the Help Desk and appoint rescuee life staff 	3000	0	0	0	0	3000
<ul style="list-style-type: none"> • Establish Field Rescue Team equipped with vehicles, communication and treatment 	5000	5000	5000	3000	0	18000
<ul style="list-style-type: none"> • Establishment of relief fund 	2000	3000	3000	4000	4000	16000
<ul style="list-style-type: none"> • Expense for the community based human and livestock insurance against wildlife incidents 	2000	3000	1000	0	0	6000
3.4 Develop a community awareness program	22000	22000	29000	16000	13000	102000
<ul style="list-style-type: none"> • Conduct seminars and interactive programs, to emphasize on the co-existence of humans and the Tiger mangroves i.e., the healthy state ecosystem is important, not only for biodiversity, but also for sustaining the ecosystem processes, upon which local people are dependent. 	2000	2000	2000	2000	2000	10000
<ul style="list-style-type: none"> • Develop a curriculum for school children, which emphasizes tiger as part of the ecosystem, rather than an object for human exploitation. 	2000	2000	2000	2000	0	8000
<ul style="list-style-type: none"> • Develop outdoor school programs, for local people, which focus on tiger biology; they should be entertaining as well as educational. 	1000	2000	2000	2000	2000	9000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<ul style="list-style-type: none"> Develop information centers, where problems faced by tigers are publicized; information should be in the form of photo- or video-cards in local languages. 	5000	10000	10000	3000	0	28000
<ul style="list-style-type: none"> Encourage people, at the community level, to develop and manage sewage and irrigation canals. 	1000	1000	1000	1000	1000	5000
<ul style="list-style-type: none"> Make tiger documentary films and exhibits in awareness program 	5000	0	5000	0	5000	15000
<ul style="list-style-type: none"> Publish the fact that a strong economic link, between tourism and biodiversity, benefit both local people and conservation efforts. 	1000	1000	1000	1000	1000	5000
<ul style="list-style-type: none"> Programs to deliver and awareness material on the uses, distribution and application of toxic substances, pesticides, insecticides, poisons etc. 	3000	4000	4000	5000	0	16000
<ul style="list-style-type: none"> Conduct interaction meetings with the government line agencies (e.g. agriculture, forest, drug, tourism, irrigation, non-government and private sectors) at the grassroots level on the control and application of toxic substances such as pesticides, insecticides, poisons etc. 	2000	0	2000	0	2000	6000

Line Items Detail Budget Breakdown for Objective 4 Anti-poaching and Anti-trafficking

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations							
4.1 Strengthen institutional network							
<ul style="list-style-type: none"> Conduct CITES implementational training for the management and scientific authorities, government officers of the custom, police, and other relevant agencies. <p>The topics will include identification of wildlife and their derivatives especially tiger body parts, forensic procedures, national and international laws on the control of illegal trade and poaching.</p>	67000	127000	61000	42000	36000	25000	358000
	40000	76000	41000	37000	29000	0	223000
<ul style="list-style-type: none"> Conduct transboundary meetings with the neighboring countries focusing on the cooperation for the control of illegal trade in wildlife and their derivatives. 	5000	10000	2000	2000	1000	0	20000
	3000	6000	6000	0	2000	0	17000
<ul style="list-style-type: none"> Prepare updated reports for the national, regional and international meetings pertinent to CITES, GTF, IUCN, TRAFFIC, WCPA, WCO and others as appropriate. 	5000	2000	2000	0	1000	0	10000
<ul style="list-style-type: none"> Participate in the national, regional and international meetings, conferences and seminars that are pertinent to the control of illegal trade and poaching. 	2000	2000	10000	0	1000	0	15000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Maintain records of incidents related to poaching, illegal trade, translocation etc on tiger and other wildlife species. 	2000	2000	2000	0	1000	0	7000
<ul style="list-style-type: none"> Identify key customs for CITES enforcement 	2000	2000	2000	0	1000	0	7000
<ul style="list-style-type: none"> Prepare a study report on the rights and duties of stakeholders who are directly or indirectly responsible for the protection of tigers in the wild. 	2000	1000	1000	0	1000	0	5000
<ul style="list-style-type: none"> Conduct coordination meetings to review on the status of tigers in the wild as well as on the issues of poaching of tigers and smuggling tiger body parts 	2000	2000	1000	0	1000	0	6000
<ul style="list-style-type: none"> Conduct feasibility survey for the need to have cooperative agreements between enforcement agencies and transport companies (air, rail, bus, freight, express courier) 	2000	1000	1000	0	1000	0	5000
<ul style="list-style-type: none"> Organize awareness interactions with the transport media on the illegal trade issue. 	1000	2000	1000	0	1000	0	5000
<ul style="list-style-type: none"> Review the current strengths of the anti-poaching capacity of the protected areas such as human resources (number of scouts, guards posts and the protection unit); physical facilities (if old gear, vehicles, elephants, communication systems, reporting systems); intelligence network (reporting, database on poachers and smugglers, coordination with the authorities of forest, police, 							

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> • Custom, out of service (O/S), and financial aspects government budget, incentives, records, emergency fund, conservation fees and others • Conduct a gap training program for the out-reaching units on techniques of intelligence work, use of equipment and other relevant fields. • Equip the out-reaching units with the field gear and basic equipment (binoculars, communication etc, GPS, kitchen etc.) • Provide physical resources to enhance out-reaching activities, such as four wheel drive vehicles, off, movement, elephant, motorcycle, bicycle etc. • Train DNFWC professionals staff to take responsibility as a tiger authority • Conduct a series of training workshops for the key individuals involved in all services such as tiger census officials, patrol workers, etc. etc. regarding threats to tigers, illegal trade, and its identification in tiger parks. • Study on the feasibility of mobilizing tiger zone community based organizations including youth groups in out-patrol operations 	2000 2000 0 2000	2000 10000 1000 1000 10000	2000 2000 0 2000 2000	0 5000 15000 0	1000 2000 5000 1000	0 0 0 0	7000 21000 21000 22000 15000
	2000	5000	1000	0	1000	0	9000

Activities (Amount in US Dollars)		Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Prepare mass studies on the arrested poachers and smugglers to find out the socio-economic and psychological factors and alternatives to the wildlife crimes (such as poverty, unemployment, terrorism, corruption etc.) 	4.2 Strengthen enforcement efforts	3000	7000	2000	0	2000	0	5000
		20000	35000	17000	5000	3500	10000	91000
<ul style="list-style-type: none"> Prepare outreach/engaging operation plans of the tiger conservation landscape level 		2000	2000	2000	0	1000	0	7000
<ul style="list-style-type: none"> Review the existing management plans for the protected areas including buffer zones from the perspective of tiger conservation 		2000	2000	1000	0	0	0	5000
<ul style="list-style-type: none"> Conduct orientation training programs for the protection unit deployed in the protected areas. 		2000	15000	2000	0	1000	0	21000
<ul style="list-style-type: none"> Review the post-conflict scenario for tiger conservation 		2000	1000	2000	0	0	0	5000
<ul style="list-style-type: none"> Prepare guidelines on reporting, valuation and authentication of the tiger related incidents for direct compensation to the affected people 		2000	1000	2000	0	0	0	5000
<ul style="list-style-type: none"> Establish a network of local informers that will eventually lead to arrest poachers and smugglers who hunt a tiger body parts. 		2000	5000	2000	5000	1000	0	15000
<ul style="list-style-type: none"> Review the existing NPWC Act in respect to the changing national and international perspectives so that criminals and potential criminals will be grossly discouraged. 		1000	1000	0	0	0	0	2000

Activities (Amount in US Dollars)		Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Organize in-country meetings with the civil societies to discuss on enhancing political commitment in combating poaching and illegal trade. Conduct advocacy and lobbying activities during strategic events (wildlife week, environment day, biodiversity day, regular campaigns) or a high political level as a means of awareness to garner political will to address tiger conservation, poaching and illegal trade. 		1000	2000	0	0	0	0	3000
		2000	6000	2000	0	0	0	10000
<ul style="list-style-type: none"> Conduct feasibility survey of establishing a sustainable mechanism of providing appropriate incentives for the informants Organize interaction meetings of the community levels to finalize on the mechanism of incentives Establish an endorsement time for incentives 4.3 Enhance public awareness programs <ul style="list-style-type: none"> Conduct nature conservation workshops and seminars, to provide basic knowledge in-trees awareness to government, forest guards, rangers, and officers of their role in tiger and biodiversity conservation. 		1000	1000	1000	0	0	0	3000
		1000	2000	0	0	0	0	3000
		1000	1000	0	0	0	10000	12000
		7000	12000	6000	0	4000	15000	44000
		2000	5000	2000	0	1000	0	9000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
<ul style="list-style-type: none"> Bring our public notice on the importance of tigers, and legal fines against the tiger related offenses in the buffer zones and potential areas of illegal trades 	0	1000	1000	0	1000	0	3000
<ul style="list-style-type: none"> Incorporate tiger conservation information and fines against tiger related offenses in the school level textbooks in the buffer zones Post talks on the importance of tigers, and legal fines against the tiger related offenses at the major tourist arrival-departure locations such as airports, visitors information centers, immigration offices, protected areas entry fee collection centers etc. 	1000	2000	1000	0	0	0	4000
<ul style="list-style-type: none"> Design, produce and distribute educational materials (posters, booklets, websites) based on the scientific background of tigers (ecological importance, balance in nature etc), cultural values (Bhag Bhairav, Namo Buddhre, Dasain festival etc), and messages of social leaders and celebrities 	2000	2000	1000	0	1000	10000	16000
	2000	2000	1000	0	1000	5000	11000

Yearly Detail Budget Breakdown for Objective 4 Antipoaching and Anti-trafficking Operation

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations	79000	65000	80000	60000	74000	358000
4.1 Strengthen Institutional network	42000	37000	51000	40000	53000	223000
<ul style="list-style-type: none"> Conduct CITES implementation training for the management and scientific authorities, government officers or the custom, police, and other relevant agencies. The topics will include identification of wildlife and their derivatives especially tiger body parts, forensic procedures, national and internal and laws on the control of illegal trade and poaching. Conduct transboundary meetings with the neighboring countries focusing on the cooperation for the control of illegal trade in wildlife and their derivatives. Prepare updated reports for the national, regional and international meetings pertinent to CITES, CTF, IUCN, TRAFFIC, WCPA, WTO and others as appropriate. Participate in the national, regional and international meetings, conferences and seminars that are pertinent to the control of illegal trade and poaching. 	4000	4000	4000	4000	4000	20000
	2000	3000	4000	4000	4000	17000
	2000	2000	2000	2000	2000	10000
	3000	3000	3000	3000	3000	15000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<ul style="list-style-type: none"> Maintain records of incidents related to poaching, illegal trade, confiscation etc on tiger and other wildlife species 	2000	1000	1000	1000	2000	7000
<ul style="list-style-type: none"> Identify key customs for CITES enforcement 	3000	0	2000	0	2000	7000
<ul style="list-style-type: none"> Prepare a status report on the rights and duties of stakeholders who are directly or indirectly responsible for the protection of tigers in the wild. 	2000	0	2000	0	1000	5000
<ul style="list-style-type: none"> Conduct coordination meetings to review on the status of tigers in the wild as well as on the issues of poaching of tigers and smuggling tiger body parts. 	2000	0	2000	0	2000	6000
<ul style="list-style-type: none"> Conduct feasibility survey for the need to have cooperative agreements between enforcement agencies and transport companies (air, rail, bus, freight, express courier) 	1000	1000	1000	1000	1000	5000
<ul style="list-style-type: none"> Organize awareness interactions with the transport medium for legal trade issues 	1000	1000	1000	1000	1000	5000
<ul style="list-style-type: none"> Review the current strengths of the anti-poaching capacity of the protected areas such as human resources (number of scouts, guard posts) and the protection (physical facilities (field gear, vehicles, elephants, communication systems, 						

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
reporting systems); intelligence network inspiring, delouse on poachers and smugglers, coordination with the authorities of forest, police, custom, postal service etc.); and financial aspects ligament budget, incentives, rewards, emergency fund, conservation fee) and others	2000	0	2000	0	5000	7000
<ul style="list-style-type: none"> Conduct regular training programs for the outpoaching units on techniques of intelligence works, use of equipment and other relevant issues. 	3000	4000	4000	5000	5000	21000
<ul style="list-style-type: none"> Equip the anti-poaching units with the field gear and basic equipment (binoculars, communication sets, GPS, kitchen sets etc) 	1000	5000	5000	5000	5000	21000
<ul style="list-style-type: none"> Procure physical resources to enhance anti-poaching activities, such as four wheel drive vehicle, raft, motorboat, elephant, motorcycle, bicycles etc. 	2000	5000	5000	5000	5000	22000
<ul style="list-style-type: none"> Train DNPWC professional staff to do resource billing as a tiger authority 	5000	0	5000	0	5000	15000
<ul style="list-style-type: none"> Conduct a series of training workshops for the key individuals and/or civil servants such as customs officials, postal workers, police, etc. regarding threats to tigers, illegal trade, and the identification of tiger parts. 	3000	4000	4000	5000	6000	22000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<ul style="list-style-type: none"> Study on the feasibility of mobilizing buffer zone community based organizations including youth groups in anti-poaching operations Prepare case studies on the treated areas and smugglers to find out the socio-economic and psychological factors and alternatives to the wildlife crimes (such as poverty, unemployment, land issue, corruption etc.) 	2000	2000	2000	2000	000	9000
4.2 Strengthen anti-poaching efforts						
<ul style="list-style-type: none"> Prepare anti-poaching action plans in the tiger conservation landscape level 	28000	17000	17000	14000	15000	91000
<ul style="list-style-type: none"> Review the existing management plans for the protected areas including buffer zones from the perspective of tiger conservation 	2000	0	2000	0	0	7000
<ul style="list-style-type: none"> Conduct orientation training programs for the protection unit deployed in the protected areas. 	3000	3000	4000	5000	6000	21000
<ul style="list-style-type: none"> Review the post-conflict scenario for tiger conservation 	5000	0	0	0	0	5000
<ul style="list-style-type: none"> Prepare guidelines on reporting, valuation and identification of the tiger related incidents for direct compensation to the affected people 	2000	2000	1000	0	0	5000
<ul style="list-style-type: none"> Establish a network of candid informants that 						

Activities (Amount in US Dollars)		Year 1	Year 2	Year 3	Year 4	Year 5	Total
will eventually lead to arrest poachers and smugglers who handle tiger body parts.		3000	3000	3000	3000	3000	15000
<ul style="list-style-type: none"> Review the existing NPWC Act in respect to the managing national and international perspectives so that criminals and potential criminals will be grossly discouraged. 		0	2000	0	0	0	2000
<ul style="list-style-type: none"> Organize interaction meetings with the civil societies to discuss on enhancing political commitment in combating poaching and illegal trade. 		1000	0	1000	0	1000	3000
<ul style="list-style-type: none"> Conduct industry and following activities during strategic events (wild life week, environment day, biodiversity day, regular campaigns) at a high official level as a means of awareness to garner political will to address tiger conservation, poaching and illegal trade. 		2000	2000	2000	2000	2000	10000
<ul style="list-style-type: none"> Conduct feasibility survey of establishing a sustainable mechanism of providing appropriate incentives for the informers 		3000	0	0	0	0	3000
<ul style="list-style-type: none"> Organize interaction meetings at the community levels to finalize on the mechanism of incentives 		3000	0	0	0	0	3000
<ul style="list-style-type: none"> Establish an endowment fund for incentives 		2000	3000	3000	4000	0	12000

Activities (Amount in US Dollars)		Year 1	Year 2	Year 3	Year 4	Year 5	Total
4.3 Enhance public awareness programs		9000	11000	12000	6000	6000	44000
<ul style="list-style-type: none"> Conduct nature conservation workshops and seminars, to provide basic knowledge, increase awareness-for game scouts, forest guards, rangers, and officers of their role in tiger and biodiversity conservation 		2000	2000	2000	2000	2000	10000
<ul style="list-style-type: none"> Bring out public notice on the importance of tigers, and legal fines against the tiger related offenses in the buffer zones and cultural areas of illegal trades 		1000	0	1000	0	1000	3000
<ul style="list-style-type: none"> Incorporate tiger conservation information and fines against tiger related offenses in the national level textbooks in the buffer zones 		1000	1000	1000	1000	0	4000
<ul style="list-style-type: none"> Install kiosks on the importance of tigers, and legal fines against the tiger related offenses at the major tourist and disturbance areas such as airports, visitors in forest centers, immigration offices, protected areas entry fee collection centers etc. 		2000	6000	6000	1000	0	15000
<ul style="list-style-type: none"> Design, produce and distribute educational materials (posters, booklets, websites) based on the scientific background of tigers (ecological importance, balance in nature etc., cultural values/Bagh Shu raw, Name Suddha, Design festival etc.) and messages of social leaders and celebrities 		2000	2000	2000	2000	3000	11000

Line Items Detail Budget Breakdown for Objective 5 Transboundary Cooperation

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.5 Objective 5. Transboundary Cooperation	15000	22000	15000	0	14000	0	66000
5.1 Strengthen transboundary cooperation	3000	6000	2000	0	8000	0	19000
<ul style="list-style-type: none"> Prepare guidelines for holding transboundary meetings at the field levels. This will include identification of issues, alternatives solutions, commitments on the part of Nepal 	1000	1000	0	0	0	0	2000
<ul style="list-style-type: none"> Exchange annual reports, news letters and other relevant documents between the field level authorities 	0	0	0	0	5000	0	5000
<ul style="list-style-type: none"> Organize an international symposium on tiger will be convened in Nepal in second half of April 2007 	2000	5000	2000	0	3000	0	12000
5.2 Maintain ecological integrity	7000	8000	11000	0	4000	0	30000
<ul style="list-style-type: none"> Develop regional strategy for monitoring legal wildlife trade along the borders with India and China. 	2000	2000	3000	0	1000	0	8000
<ul style="list-style-type: none"> Organize regional media focus on tiger conservation Prepare program for joint research activities on the birds and wildlife species that frequently cross the international borders. 	1000	2000	5000	0	1000	0	9000
<ul style="list-style-type: none"> Organize informal meetings with the South Asian Association for Regional Cooperation (SAARC) secretariat to explore the possibility of using 	2000	2000	1000	0	1000	0	6000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
SAAAC as a forum for wildlife conservation, enforcement and control of illegal trade in wildlife	2000	2000	2000	0	1000	0	7000
5.3 Promote tiger tourism	5000	8000	2000	0	2000	0	17000
<ul style="list-style-type: none"> Review tourism plans from the perspectives of tiger tourism Train the local guides on tiger tracking and monitoring who will also be accompanying with the visitors as appropriate Promote marketing strategy for tiger tourism in the tiger landscapes (e.g. Adopt a tiger scheme). 	1000	1000	0	0	0	0	2000
	2000	5000	1000	0	1000	0	9000
	2000	2000	1000	0	1000	0	6000

Yearly Detail Budget Breakdown for Objective 5 Transboundary Cooperation

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.5 Objective 5. Transboundary Cooperation	20000	18000	9000	11000	8000	65000
5.1 Strengthen transboundary cooperation	12000	3000	2000	1000	1000	19000
<ul style="list-style-type: none"> Prepare guidelines for holding transboundary meetings at the field levels. This will include identification of issues, alternatives solutions, commitments on the part of Nepal. 	10000	0	000	0	0	2000
<ul style="list-style-type: none"> Exchange annual reports, newsletters and other relevant documents between the field level authorities 	1000	1000	1000	1000	1000	5000
<ul style="list-style-type: none"> Organize an international symposium on tiger will be convened in Nepal in second half of April 2007 	10000	2000	0	0	0	12000
5.2 Maintain ecological integrity	5000	7000	5000	8000	5000	30000
<ul style="list-style-type: none"> Develop regional strategies for monitoring illegal wildlife trade along the borders with India and China. 	0	4000	0	4000	0	8000
<ul style="list-style-type: none"> Organize regional media tours on tiger conservation 	3000	0	3000	0	3000	9000
<ul style="list-style-type: none"> Prepare protocol for joint research activities on the transient wildlife species that frequently cross the international borders. 	2000	0	2000	0	2000	6000
<ul style="list-style-type: none"> Organize interaction meetings with the South Asian Association for Regional Cooperation (SARC) secretariat to explore the possibility of using SARC as a forum for wildlife conservation, anti-poaching and control of illegal trade in wildlife 	0	3000	0	4000	0	7000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
5.3 Promote tiger tourism	3000	8000	2000	2000	2000	17000
<ul style="list-style-type: none"> Review tourism plans from the perspectives of tiger tourism 	2000	0	0	0	0	2000
<ul style="list-style-type: none"> Train the local guides on tiger tracking and monitoring who will also be accompanying with the visitors as appropriate 	1000	2000	2000	2000	2000	9000
<ul style="list-style-type: none"> Prepare a marketing strategy for tiger tourism in the tiger landscapes (e.g. Adopt a tiger scheme). 	0	6000	0	0	0	6000

Plan prepared with the support from
WWF Nepal



STRATEGY FOR CONSERVATION OF THE AUMER TIGER IN THE RUSSIAN FEDERATION



Ministry of Natural Resources and Environment
of the Russian Federation

STRATEGY FOR CONSERVATION OF THE AMUR TIGER IN THE RUSSIAN FEDERATION

**Ministry of Natural Resources and Environment
of the Russian Federation**

Strategy for conservation of the Amur Tiger in the Russian Federation approved by the Ministry of Natural Resources and Environment (order No. 25- p of 2 July 2010)

The Strategy has been formulated in line with the recommendations given in the Strategy for Conservation of Rare and Endangered Animal, Plant and Fungi Species that was approved by the Russian Ministry of Natural Resources, Order No. 323 of 6th April 2004.

The Strategy was developed by a working group that comprised V. Rozhnov (Chairman), T. Aramileva, V. Gaponov, Y. Darman, Y. Zhuravlev, A. Kostyria, V. Krever, V. Lukarevsky, S. Naydenko, D. Pikunov, I. Seryodkin, J. A. Hernandez-Blanco and V. Yudin.

During the preparation of the Strategy, a number of recommendations that were suggested by Y. Alekseenko, V. Aramilev, S. Aramilev, T. Arzhanova, S. Bereznyuk, Y. Dunishenko, P. Fomenko, M. Hotte, O. Krever, S. Christie, A. Kulikov, D. Miquelle, V. Solkin and A. Vrisch were taken into account.

The draft of the Strategy was approved by the participants of the International Science and Practice Conference The Amur Tiger in North-East Asia: Conservation Issues in the 21st Century that took place in Vladivostok on 15th-17th March 2010 and the Mammal Section of the Commission on Rare and Endangered Animal, Plant and Fungi Species of the Ministry of Natural Resources and Environment (order No. 11 of 7 June 2010).

Translation: Yulia Kuleshova and Philip Johnson.

Photo credit: Valery Maleev, Vasiliy Solkin, Igor Zhorov, Vladimir Filonov

ISBN 978-5-9902432-1-7 ISBN 978-5-9902432-1-7



Ministry of Natural Resources
and Environment
of the Russian Federation



Severtsov Institute
of Ecology
and Evolution



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INTRODUCTION

The Amur tiger (*Panthera tigris altaica*) is the world's northernmost subspecies of tiger. It is the largest cat species in Asia and, at one time, was widely distributed throughout the continent. Most of the other tiger subspecies are endangered, but thanks to measures taken during the second half of the 20th Century, particularly from 1993 to 2003, the Amur tiger is not threatened with imminent extinction.

Nevertheless, continued habitat degradation caused by human activity, together with poaching and the illegal trade in tiger parts and derivatives, are grounds for serious concern for the destiny of the subspecies. Approximately 95% of the entire Amur tiger population lives within the Russian Far East, in particular in the Primorsky Region and the southern part of Khabarovsk Region. Russia, therefore, shoulders the main responsibility for conserving this large predator species.

The tiger is at the peak of the food web, a key element of which is the coniferous/ broadleaf forest that is found in the southern part of the Russian Far East. Preserving viable populations of the Amur tiger in its natural habitat is integrally linked to the conservation of complete natural forest ecosystems that are in themselves essential to the survival of mankind itself.

The need to protect the Amur tiger in the Russian Far East is provided for in current legislation. The Amur tiger is listed in the Red Data Book of the Russian Federation. Its protection is enshrined by a number of federal laws (eg. Law On Environmental Protection, Law On Wildlife and Law On Specially Protected Natural Areas) and also by international agreements (ie. Convention on Biological Diversity (CBD) and Convention on International Trade in Endangered Species, (CITES)). The Russian Federation is party to both of these international conventions. In addition, tiger conservation measures are listed in, amongst other documents, the Decree of the Government of the Russian Federation On the Conservation of the Amur Tiger and Other Rare and Endangered Wildlife Species within Primorsky and Khabarovsk Regions, No. 795 of 7 August 1995, and the Ministry of Natural Resources' Conservation Strategy for Rare and Endangered Species of Animals, Plants and Fungi, No. 323 of 6 April 2004.

The first Amur Tiger Conservation Strategy for Russia was approved by the Ministry of Environmental

Protection and Natural Resources more than 14 years ago on 24 June 1996. It was aimed at summarizing half-a-century's experience in protection and research, formulating key principles and outlining a comprehensive set of activities for the long-term conservation of the tiger. The implementation of the above-mentioned strategy from 1997 to 2008 resulted in the retention of the general trend in the Amur tiger population. This was similar to the mid-1990s when the number of animals was generally stable, but experiencing a gradual growth in number and expansion in the tiger's range. At present, the tiger occurs over a large part of the forested areas of Primorsky and southern Khabarovsk Regions. The peripheral areas of tiger habitat on the left bank of the Amur River, which includes the Lesser Hingan and the area of land to the north-north-west and upriver to the Zeya Reservoir, began to recover. Nowadays, two to three tigers are encountered each year in the Jewish Autonomous and Amur Regions.

Compared to the situation that existed in the 1990s, the status of the Amur tiger population has changed in several ways. Relatively flat areas with little forest cover that were developed for agriculture have been lost from the tiger's range, the Sikhote-Alin and Eastern Manchurian mountains have effectively become separated from one another and the overall tiger population is declining. The socioeconomic situation within Russia has also changed. Together, these changes all lead to the necessity for developing an updated conservation strategy for the Amur tiger in Russia.

In this updated version of the strategy, special attention is being paid to the following areas:

- extending the set of activities that will effectively protect the Amur tiger, its habitat and its main prey species (the set of activities is not limited to just the protection of the tiger itself)
- reducing the degradation of Amur tiger habitat by introducing best practices and improving forest and wildlife management
- strengthening civil and criminal penalties for poaching and the illegal possession of and trade in Amur tiger parts
- providing incentives to encourage small businesses within local communities that support tiger conservation
- improving population monitoring systems for the Amur tiger.

In order to secure the long-term conservation of the Amur tiger, therefore, special measures are required to ensure the well-being of the tiger population and to take into consideration the increasing level of human impacts on ecosystems in the Russian Far East.

1. GOAL AND OBJECTIVES OF THE STRATEGY

1.1 Overall goal of the Strategy

The overall goal of this new strategic document is to identify mechanisms which help to conserve a viable population of Amur tigers within the Russian Federation that numbers no less than 500 individual animals and which possesses the maximum genetic diversity possible.

1.2 Principal objectives of the Strategy

To achieve the goal of this Strategy, the principal objectives are:

- to conserve the existing Amur tiger population
- to identify mechanisms which conserve the Amur tiger population whilst taking into account the growing impact of humans on the ecosystem
- to minimize the negative impacts of humans on the Amur tiger population.

2. SYSTEMATICS OF THE AMUR TIGER

2.1 Russian, English and systematic nomenclature

Amur or Ussuri Tiger, Siberian or Amur Tiger, *Panthera tigris altaica* Temminck, 1844.

2.2 Taxonomic status

- Class Mammalia
- Order Carnivora
- Family Felidae
- Genus *Panthera*
- Species *Panthera tigris* Linnaeus, 1758
- Subspecies *Panthera tigris altaica* Temminck, 1844.

3. DISTRIBUTION OF THE AMUR TIGER IN RUSSIA

The former range of the Amur tiger in Russia extended up to the 50°-51°N latitudes. In the early-19th Century, one could encounter tigers in the Amur, Jewish Autonomous, Primorsky and

Khabarovsk Regions. Intensive and unregulated hunting resulted in a decline in the total population number from the early-19th Century to the late-1930s. This was accompanied by a fragmentation of its range. On the left bank of the Amur River, the core area of its permanent range remained only in the Lesser Hingan. By 1916, tigers had disappeared from the eastern slopes of the Sikhote-Alin. Small groups of tigers still occurred along the western macro-slopes of the Sikhote-Alin in the Khor, Bikin, Greater Ussurka and Ussuri River basins, as well as in some parts of the Black Mountains and on the left bank of the Amur River within the Kyra and Urmi River catchments. In the 1940s, the distribution of the tiger within the Sikhote-Alin, its main habitat, became fragmented.

In 1947, a blanket ban on the hunting of the Amur tiger was introduced. It succeeded in halting the long-lasting decline in numbers of tigers and stabilizing the population. Isolated population groups gradually began to recolonise suitable available habitats, but the distribution of the tiger remained scattered. From the mid-1960s until the mid-1980s, population numbers increased steadily in all areas south of the Amur River. The tiger recolonised almost all of the suitable habitats within its former range and the population in Sikhote-Alin consolidated into one unified population. The population of tigers in the Eastern Manchurian Mountains, however, remained cut off. From the mid-1980s until the early-1990s in the northern Sikhote-Alin, tigers settled within habitats in which they either didn't occur before, or were formerly extremely rare, such as the Samarga, Nyelma, Botchi and Kopi River catchments. The recolonisation by tigers over the larger part of its range remained relatively stable.

The results of the censuses conducted in 1996 and 2005 showed that tigers occurred within all of the forested area within its range. The largest part of the tiger's range in Sikhote-Alin recovered its contiguity and is now no longer fragmented. Since 2000, the range of the Amur tiger has begun to extend northwards and westwards. Evidence suggests that an independent population is currently establishing itself within the Jewish Autonomous Region. The population that established itself in the north-eastern part of Sikhote-Alin and in neighbouring areas of the Botchinsky Nature Reserve is becoming increasingly stable.

At present, the total size of the Amur tiger range in Russia approaches 180,000 km².

Distribution of the Amur Tiger in the Russian Far East in 2005

- 12 km buffer zone around tiger footprints
- 6 km buffer zone around tiger footprints



Figure 1: Distribution of the Amur tiger in Russia as indicated in the 2005 Census.

From the south-western Primorye, tigers gradually spread into the neighbouring provinces of Jilin and Heilongjiang in China and helped to stabilize the third main grouping of tigers, namely, that living in the Eastern Manchurian Mountains. Research conducted for many years in the western and south-western parts of the Amur tiger's range suggests that, in recent years, the movement of tigers between the mountainous forests in Russia and China has become regular. The protection of the south-western and western populations of the tiger and wild ungulates, along with their habitats, therefore requires special attention.

4. NUMBER OF AMUR TIGERS IN RUSSIA

Since the early-1940s, the number of Amur tigers has been recorded in a special register. In 1959, the first field census of Amur tigers was undertaken and followed a specially-developed methodology. This methodology was later improved and used during the 1978/79, 1984/85 and 1995/96 censuses. It was also used during a monitoring program that was undertaken in specific pilot areas from 1997 to 2004.

At the same time, with every new census, coverage improved and methods for data collection and processing were standardized. Identification of footprints was carried out by experienced trackers drawn from wildlife managers, foresters, rangers and

professional hunters, each of whom had monitored their areas for a long time. This allowed for the collection of objective information on Amur tiger population numbers.

In order to design, standardize and implement state censuses for the Amur tiger in its natural habitat and for the long-term monitoring of the sub-species at federal and regional levels, the Methodical Recommendations for Conducting and Organisation of the Amur Tiger Census in the Russian Federation, No. 63, was approved by the Ministry of Natural Resources on 15 March 2005. This document, which was based on methods that were tested during previous censuses and monitoring programs, helps guide the annual monitoring undertaken in selected areas and the full census of tigers that is conducted every 10 years.

Over the last century, the population number of Amur tigers in the Russian Far East has exhibited a variety of trends, with population decline, stabilization and growth occurring over different periods of time and at varying rates. Analysis of the population dynamics of the Amur tiger operating over the last 150 years shows that the most important factor affecting tiger numbers is human impact (Figure 2).

At the end of the 19th Century in the southern region of the Russian Far East, the Amur tiger was a commonly-hunted species. Intensive hunting,

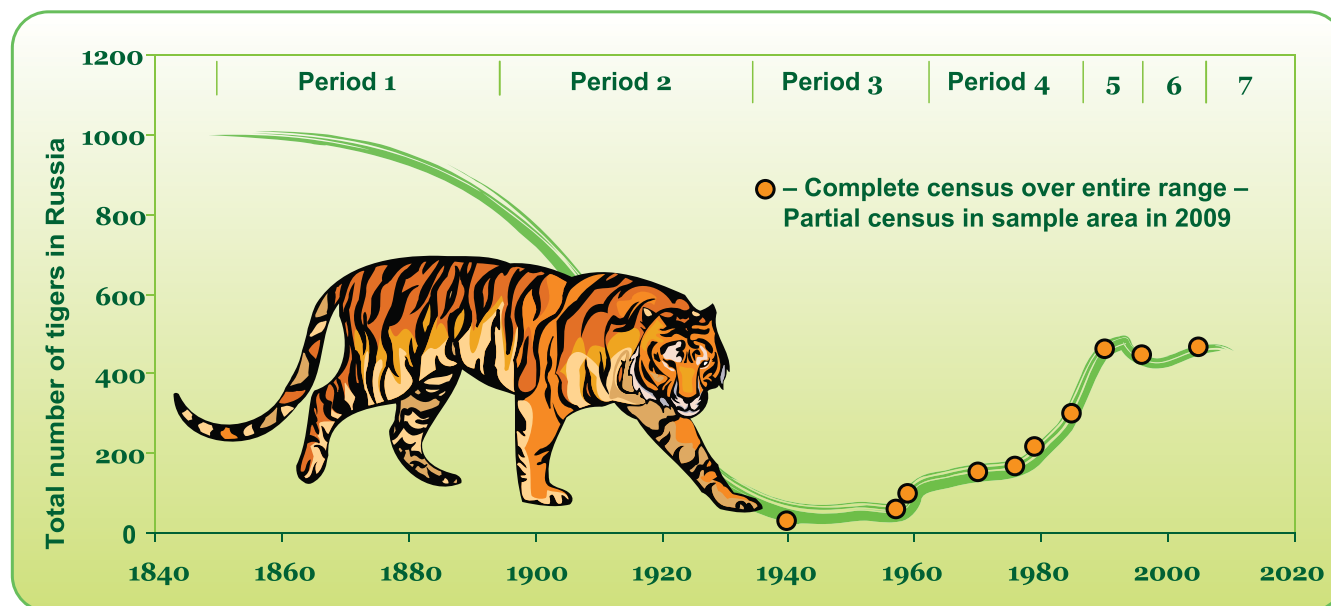


Figure 2: Amur tiger population numbers from 1850. Full censuses conducted from 1940 are shown. Before 1940, estimates of population number have been made based on the size of suitable habitat and the presumed density of prey species at the time.

accompanied by the destruction of its habitat, resulted in a sharp decline in numbers during the first half of the 20th Century. This decline and the fragmentation of the tiger's range continued until the late-1930s when the subspecies teetered on the edge of extinction. After the introduction of the hunting ban in 1947, as well as the partial then full prohibition on the removal of live kittens from the wild, the predators started to reappear in remote and undeveloped areas and population numbers began to gradually recover.

Analysis of the censuses carried out in 1970s showed that population growth and colonization of new habitats by tigers occurred mostly in peripheral areas in the northern part of its former range. The results of the censuses conducted in the 1980s and early-1990s confirmed a further growth in population numbers and the size of the tiger's range. The 2005 census indicated that during the beginning of the present century the population number stabilized somewhere between 428 and 502 individuals, including between 97 and 109 kittens (comprising 71 to 77 tigers in Khabarovsk Region and 357 to 425 individuals in Primorsky Region).

5. BIOLOGY OF THE AMUR TIGER AND PREREQUISITES FOR CONSERVATION

5.1 Biology and reproduction rate

Tigers evolved in tropical Asia and gradually spread northwards. Settling in the area now found in the Russian Far East, a separate sub-species, the Amur tiger, evolved. The Amur tiger lives on the northern boundary of the species' range where it experiences extremes in natural conditions. Together with human impact, these determine the tiger's relationship with the environment and limit its number and distribution.

The Amur tiger is one of the largest subspecies of tiger and only the Bengal tiger competes with it in size and weight. A male Amur tiger can measure up to 220 cm in body length, while a female varies in body length from 165 to 182 cm. The heaviest tiger recorded living in the wild was 250 kg. The average weight of adult females is 120 kg, while that of males is between 165 and 180 kg. Compared to other subspecies, the Amur tiger has dense and relatively long hair.

Genetic analysis of the Amur tiger population shows that, in Russia, the minimal genetically effective population size is low and amounts to only 35 animals. This is 14 times smaller than the actual

population number. Research has shown that two genetically distinct groups of Amur tigers exist within the Russian part of its range. These are the Sikhote-Alin and south-western population groups, both of which are separated from one another by extensive development along the Razdolnayar River. Individual tigers, however, cross over from one group to another. Although low genetic diversity is common in large cat populations, this fact requires special attention with the conservation of the Amur tiger. This is largely because a significant decline in population number can result in considerable genetic loss and irreversible degradation of the subspecies. The south-western population of the Amur tiger in particular requires special attention because of its small size.

The Amur tiger exhibits both solitary and group behaviour (eg. females with cubs). Adult individuals are territorial and mark their territories to indicate their presence. Radio-tracking has shown that the average-sized territory for a male tiger is 1,380 km², while that for a female is 400 km². Up to six adult female territories can be found within one resident male's territory, while the territories of same gender adults usually overlap slightly. Frequenting permanent trails and possessing the habits of returning to their kills and revisiting territorial marks, as well as other territorial behavioural traits, make the Amur tiger vulnerable to poaching. The Amur tiger possesses the largest territories of all tiger subspecies, largely due to the low density of prey within its range. Growth in Amur tiger populations, therefore, is impossible without increasing the density of prey species.

The Amur tiger census that was conducted in 2004/05 indicated the following population structure. Approximately 39% of all the tigers counted were adult males, while 25% were adult females. Twenty-two percent (22%) were cubs under the age of 1.5 years, while 6% of tigers were adolescents aged from 1.5 to 3 years. Another 7% of the tigers could not be classified as belonging to any of the above groups and were either adult or adolescent females, or cubs of indeterminate gender.

The lifespan of the Amur tiger is usually no longer than 20 years. The tiger can breed when it reaches 3.5 to 4 years old and pregnancy normally lasts 95 to 100 days. Cubs can be born during any season, but most often in summer. Litter size is from 1 to 5 cubs, while the average litter numbers 2.5 cubs. For the first 1 to 2 months, cubs do not leave their den. A den usually consists of a hollow in a rocky slope and is located on

the upper portion of a north-facing slope. This slope is usually no less than 20%, making it difficult for humans to reach. How well the female tiger selects the den site often determines how safe the litter will be and the subsequent breeding success. The identification and protection of such sites, therefore, is especially important in conserving the Amur tiger.

Young tigers start to become independent from 15 to 22 months (the average is 18.8 months). After the family group breaks up, young males disperse and can move long distances. Young females, on the other hand, usually remain within their mother's territory or in a neighbouring area. As a result of this dispersal, the Amur tiger is able to settle in vacant territories. This plays an important role in the subspecies' distribution and expansion of its range. The average interval between litters is 26.5 months. If females lose their litter during the first few months, this average drops to 11 months. The reproductive rate, which also takes into account cub mortality, is 0.6 to 0.7 cubs for each female per year. If one takes the reproductive age of females as being from 3.5 to 14 years, the average female reproductivity during its whole lifespan is 12.1 cubs, while only 6.5 to 7.3 cubs reach the age of one year.

Relatively late reproductive age, low fecundity, a long interval between litters and a high mortality rate amongst young and breeding adults all make the Amur tiger a vulnerable subspecies that is not able to restore its population size following any significant decline in numbers. Furthermore, adverse changes in the condition of the tiger's habitat can also result in a sharp decline in population number. Providing conditions are favourable, however, reproduction can allow for growth in population numbers as well as permit, as has happened in the past, the gradual recovery of populations following significant declines.

The only natural enemy of the Amur tiger is the brown bear. Adult male brown bears can attack female and young tigers with the intention of eating them. Brown and Himalayan bears also scavenge on tiger kills and can chase tigers off their kill. This means that tigers have to kill additional prey.

Understanding the causes of tiger mortality is central to the formulation of an effective conservation strategy for the Amur tiger. Research indicates that a large proportion of deaths amongst Amur tigers is due to human-related causes. The presence of roads within tiger territories represents a particularly serious threat as the majority of animals killed are

shot by poachers travelling along the roads in vehicles. It is also a common occurrence for tigers to be run over by vehicles. Natural mortality amongst Amur tigers is not commonly recorded. Data clearly demonstrate that one of the first priorities to be addressed in Amur tiger conservation must be the combating of poaching.

5.2 Habitat requirements

Within the Russian part of its range, the Amur tiger prefers cedar pine/broadleaf forest and oak forest and, to a lesser extent, broad-leaf and riparian forests. The principal parameters that determine the quality of Amur tiger habitat are the suitability of the habitat for the tiger's main prey items and the degree of human impact. The most suitable habitats for ungulates in the southern part of the Russian Far East are the same types of forest that are favoured by the tiger. Therefore, taking into consideration the close link between predator and prey, the most effective way of conserving the Amur tiger is to manage ungulate habitats on a scientific basis.

The key locations for Amur tiger conservation are clearly those selected from areas that are favoured by both the tiger and its prey. Conservation of forests where Korean cedar pine and Mongolian oak occur will help to stabilize the tiger's existence in Russia. Over-exploitation of these forests and their destruction through wildfires will result in the loss of feeding grounds for those animals that are potential prey for Amur tigers. It will also lead to further contraction and fragmentation of the tiger's range and seriously threaten the existence of the predator itself.



The other important factor in the tiger's conservation is the preservation of those riparian forests that have been affected most by humans. Tigers regularly use forested rivers and mountain valleys as migration corridors and hunting grounds. This is because such areas are important for concentrations of prey species during winter, especially during those winters when high snowfall is experienced.

In general, relatively low biotopic selectivity amongst Amur tigers has allowed for a contiguous spatial distribution of the tiger throughout highly varied forest mosaics.

5.3 Diet and predatory behaviour

The Amur tiger feeds on a wide range of species. However, the tiger prefers ungulates whose size is equal to or exceeds that of itself. Four species of ungulates, namely, wild boar, red deer, roe deer and sika deer, are the main prey items for tigers. In different parts of the tiger's range, the proportion of these prey species in the tiger's diet depends on their population density. In addition, and especially during periods when there is no snow, the Himalayan and brown bear also contribute significantly to the tiger's diet, as do badger and raccoon dog. The fact that the Amur tiger does not have a limited hunting preference means that it can switch between prey items and has a greater ability to survive in different habitats.

To satisfy its energy needs and depending on its geographical location, the Amur tiger requires between 50 and 70 large ungulates per year, along with other smaller prey items and bears. The reproductive capacity of the majority of tiger prey species does not exceed 15 to 25% a year. Therefore, exploitation of ungulates as game species should take into consideration the needs of tigers that live within hunting management units. The well-being of the Amur tiger is considered to be secure if the number of large ungulates occurring within the tiger's range is between 400 and 500 individuals. Such a density of ungulates does not occur everywhere. Monitoring data shows that population numbers of all tiger prey species are declining and that carrying capacities are steadily decreasing. This is because, among other reasons, natural habitats are being degraded.

Additional factors that negatively affect ungulate population numbers include the unpredictability of pasture production prior to winter and the fact that more and more winters now experience abnormal amounts of snowfall. Populations suffer the most

damage when these events occur together.

If the Amur tiger experiences a shortage of natural prey, it can supplement its diet by killing and eating livestock. It does this by leaving the forests and entering human settlements. This situation leads to conflict between tigers and humans that can result in tigers being shot illegally and/or the need to catch and remove them.

This confirms the need for proactive measures to be taken to stabilize and then significantly increase the number of prey items for the Amur tiger.

5.4 Interaction with humans

Compared to other species, the Amur tiger is not as aggressive towards humans. Usually, a tiger that comes across a human will try to avoid direct contact and leave. Even 'problem' tigers that have lived close to human settlements for a long time and regularly visit them to take livestock normally try to avoid people. Humans encountering tigers is not common, but when they do it is very rare for the predator to show aggression. Nonetheless, a potential threat does exist and in some cases tigers do attack.

Most tigers that attack people are either injured by humans, or are sick or emaciated. A study on tiger attacks on people showed that 57% of attacks involved tigers that had been injured by humans, 14% related to tigers sporting injuries of uncertain cause and 21% involved tigers that were sick or emaciated. Amur tiger poaching, therefore, is not only the main cause of the predator's mortality, but is also one of the main causes of conflicts between the tiger and humans.

The Amur tiger can become aggressive when it has been chased or when it encounters a human unexpectedly, but also when it defends its prey or cubs. Human death from Amur tigers occurs very rarely. In the last 40 years within Russia, 16 fatal cases have been recorded. Between 2001 and 2010, 19 cases of tiger attack were recorded that resulted in two people dying and 12 people being injured. The majority of these attacks were as a result of people provoking tigers to attack.

The most common type of conflict, representing 57% of total recorded conflicts, is when tigers attack livestock. On average in Russia, 30 head of livestock and domestic animals are killed each year by tigers, the majority of these being dogs and about five cases involving large horned livestock. This is about ten

times less than in other countries.

Other conflicts arise as a result of poaching, vehicles colliding with tigers and people coming across orphaned cubs in the wild. Every year, especially during winter, a number of cubs lose their mothers and are unable to live independently. Some of them fall into the hands of humans. Consequently, the issue of reintroducing tigers that have been raised by humans back into the wild becomes very problematic.

Only if proactive measures aimed at providing favourable natural conditions are in place and if local residents are given guidance on how to behave within the predator's home range, it should be possible to ensure a sustained and peaceful coexistence between the Amur tiger and humans and to minimise conflict situations and their negative consequences.

6. LIMITING FACTORS

The occurrence of the Amur tiger is determined by both natural (abiotic phenomena, natural enemies and competitors and prey availability) and human factors. Human factors and impacts on the Amur tiger can be divided into two main groups, namely, direct (eg. poaching and the necessary removal of tigers) and indirect (eg. forest fires, logging, extension of road networks, increase in human population density, hunting activities, etc).

6.1 Direct factors and impacts

Direct impacts include the killing of Amur tigers by poachers, the need to shoot tigers when they attack and also general disturbance to the tiger in its habitat.

The most significant factor threatening the existence of the Amur tiger in Russia is its direct destruction. As studies have shown, 72 to 83% of tiger deaths are caused by humans, most of those by poaching, while natural mortality contributes only 17 to 28% of total deaths.

6.1.1 Retrospective review of Amur tiger removal from the wild in Russia

Data on the removal from the wild of the Amur Tiger in the Russian Far East are limited and patchy and of an ad hoc nature.

At the end of the 19th Century in the southern Far East of Russia, the Amur tiger was the usual animal hunted and up to 100 individuals were shot each year.



This intensive hunting of tigers, resulting from the desire for hunting trophies, led to a sharp decline in the population number during the early-20th Century. At that time, only about 60 individuals were shot each year. At the same time, uncontrolled hunting resulted in the disappearance of the Amur tiger from a larger part of the southern Primorye. Between 1920 and 1945, encounters with the Amur tiger became very rare. In 1947, a full ban on Amur tiger hunting was introduced. Even after the ban, however, the shooting of tigers continued. Up until 1957, between 7 and 8 tigers were shot each year, the majority of them being females defending their cubs and those that were killed when cubs were removed live.

6.1.2 Removal of animals from the wild for educational and scientific purposes

After the introduction of the hunting ban in 1947, the capture of cubs only took place to satisfy the needs of zoos, circuses and zoological experts. Up until 1955, between 7 and 11 tigers were captured. The total number of captured cubs between 1947 and 1956 was 41, but only in the Primorsky Region. In 1956, a full ban was introduced on the removal of young tigers from the wild, including for expert purposes. After that, orphaned tigers were removed from nature and placed in zoos much less often.

At present, the use of wildlife species listed in the Russian Red Data Book, including the Amur tiger, is regulated by two Decrees of the Government of the Russian Federation, namely, On Approval of the Regulations of Removal from the Wild Animals Species listed in the Red Data Book of the Russian

Federation, excluding Aquatic Animals, No. 13 of 6 January 1997 and On Issuing Licences for Trading Animal Species listed in the Red Data Book of the Russian Federation, No. 156 of 19 February 1996.

Decree No. 156 states, among others things, that keeping Red Data Booklisted animals in captivity is only permitted for purposes of conservation and reproduction in artificial habitats and for scientific and educational reasons. Their release back into the wild is also allowed for conservation purposes and/or for replenishing natural populations.

Removal of animals from the wild can only be carried out after permission has been granted by the Federal Supervisory Natural Resources Management Service. This permission is in line with the Administrative Regulation of the Service that carries out the State's function relating to the removal of wildlife species listed in the Red Data Book. This was approved by the Order of the Ministry of Natural Resources, No. 123 of 30 April 2009, which was registered (Registration No. 14115) by the Ministry of Justice on 22 June 2009.

6.1.3 Illegal removal of animals from the wild

Up until the late-1980s in the Russian Far East, illegal removal of Amur tigers from the wild took place only occasionally, usually when animals approached human settlements or attacked domestic animals, but also by hunters during the normal hunting season. At the same time, trading in tiger skins and other tiger products was either very difficult or practically impossible. From the early-1990s, however, the illegal removal of tigers became much larger in scale. This was due to reduced control by policing organisations, borders opening, firearms becoming more accessible, the illegal trade in tiger parts increasing to satisfy a greater demand from Chinese traders and wealthy Russians and a difficult economic environment that caused people to look to other sources of income. Nowadays, the reasons for the illegal removal of tigers remain much the same. The exact number of animals removed, however, is not really known, but in the opinion of experts the actual number is still quite significant and will affect the tiger's ability to survive.

In addition to the removal of the Amur tiger from the wild for trade purposes, there are other reasons for its illegal shooting.

- Intentional shooting of tigers to be rid of a competitor within hunting grounds. When

hunting for ungulates, hunters commonly consider the Amur tiger to be a direct competitor and therefore view the predator as an enemy. After fear for their own safety, the concern that tigers will adversely affect ungulate populations is the second reason given by respondents when answering the question "why tigers do not need protection". Although the presence of the Amur tiger helps keep the wolf population from expanding and limiting the ungulate population further, hunters still consider tigers in their hunting grounds to be a direct threat to their source of income. Up until the 1990s, a dead tiger did not have any monetary value and if a hunter shot a tiger for any reason the carcass would most likely be left in the forest.

- Intentional shooting of tigers when they attack domestic animals. Although Amur tigers are sometimes shot in response to them killing livestock, this is not a major problem in the Russian Far East as most livestock is kept indoors overnight. At the beginning of the present century, no more than about five head of livestock being killed by tigers each year was recorded in Primorsky Region. Most often than not, tigers kill domestic dogs, this making up 55% of all attacks on domestic animals. When an injured or problem tiger enters a village looking for food, chained dogs offer very easy prey.
- Unintentional shooting of tigers when people accidentally encounter them and view them as a threat. The number of accidental encounters with Amur tigers gives an indication of the risk posed to local communities. Nevertheless, the total number of cases of attack on humans by tigers remains low. During a 40-year period, tigers injured less than one person a year and caused one human death every two years. Even these figures are considered too high as a large number of incidents that took place during the 1990s resulted from unsuccessful poaching attempts that caused tigers to attack humans. Around 60% of those tigers attacking people carried old injuries, mostly bullet wounds, inflicted earlier by humans. Consequently, more than half of the incidents in which people were either killed or injured by tigers were, in effect, caused by humans themselves.

6.1.4 Necessary shooting of problem Amur tigers

Between 1985 and 2005, special permission was granted to shoot 58 tigers, an average of 2.8 tigers

per year. The reasons for issuing such permission were mostly linked to tigers taking livestock or attacking people. Between 1985 and 1990, the number of tigers shot for these reasons was much higher – during the winter of 1986, for instance, 15 tigers were shot. Following the establishment in 1999 of the “problem tiger group” within the Tiger Special Patrol Team, the number of permissions given for shooting troublesome tigers dropped.

6.1.5 Disturbance factors

The Amur tigers that are most susceptible to disturbance factors are those living in areas where there is intensive logging of forests all year round. Clearfelling is normally accompanied by the blazing of an extensive network of roads and tracks that deliver plant and equipment to loggers and transport out the felled trees. Consequently, these areas become accessible to people who visit the forests to collect various natural products and to hunt and fish. These forest tracks are also willingly being used by Amur tigers. In doing so, however, they put themselves at risk of being shot by vehicle-borne poachers. The situation is aggravated by the fact that tigers, but especially males, commonly throw caution to the wind when they encounter people and come out into the open. Extension of such road networks, therefore, sharply increases the risk of tigers being killed. Furthermore, the extension and improvement of the road networks help large numbers of hunters to gain access to their hunting grounds during winter. In some areas in the south of Primorsky Region, the number of people hunting ungulates is so high that it doesn't give the tiger much chance to remain unnoticed and undisturbed. People in the area commonly remove tiger kills that they come across. This means that the tiger has to expend more energy on hunting. In areas of low ungulate population density during winter, this can lead to tigers starving. This is of particular danger to female tigers with cubs. During autumn, a serious disturbance factor for the Amur tiger is posed by people collecting Korean cedar pine cones. In years of good harvest, such people enter the forests in their thousands, including specially protected natural areas. Local development, forest logging and the expansion and improvement of road networks, therefore, open up access to remote habitats and significantly increase the disturbance factors for Amur tigers.

6.1.6 Spread of contagious diseases

A number of contagious diseases can cause deaths

amongst both adult and young tigers and also decrease fertility amongst breeding pairs. Considering the low genetic diversity within the Amur tiger population (and consequently its high vulnerability to various diseases) as well as the low reproduction rate, the spread of viral and protozoan diseases can represent a threat to the secure existence of the Amur tiger. Tigers can contract a number of contagious diseases through both contact with other tigers and by eating infected animals, especially other predators such as badgers, raccoon dogs, bears and lynx. A threat to the Amur tiger also exists through contact with dogs and, to a lesser extent, cats. Both can act as carriers of a number of diseases that are dangerous to tigers.

6.2 Indirect factors and impacts

Among the forms of indirect human impact affecting populations of the Amur tiger, the most significant are those relating to the reduction in size of habitats that results from economic development, including clear-felling, and to inappropriate game management that undermines the food resource for tigers. The effect of adverse factors can be aggravated by unfavourable climatic conditions, such as occasional heavy snowfalls that force ungulates to migrate in large numbers up and down slopes. During years of heavy snowfall, the food resource for Amur tigers declines sharply and it may take many years for it to recover. As a result, tiger mortality from starvation and poaching increases and in some years can reach catastrophic levels.

6.2.1 Changes in natural habitat

One of the main reasons why the population status of the Amur tiger is worsening is the loss and transformation of its habitats that has mainly resulted from economic development within the area. During the 20th Century, however, habitat degradation was apparently not the most important factor affecting the Amur tiger population. The main period when the population was recovering (ie. from the 1950s until the 1980s) coincided with the intensive logging of forests within Sikhote-Alin. However, this logging did not have much impact on the population recovery process. Nowadays, the influence of habitat degradation on tigers is becoming more significant because road networks are being extended, Korean cedar pine nuts are being extensively harvested, Mongolian oak is being logged and ash and other tree species within key riparian forests are being intensively cut. As a result, the size of habitat suitable for the Amur tiger is contracting and the quality of the habitat for

ungulates is declining. This means that the habitat supports fewer animals. Because habitat degradation is taking place, the importance of those protected areas in which ungulate densities are high and poaching is under control has increased significantly. Sufficient size of protected areas and the existence of ecological corridors between them are important prerequisites for ensuring the conservation of healthy tiger populations with minimal negative impact from poaching and habitat degradation.

6.2.1.1 Economic development impacts

Russia's economic development programs for the foreseeable future pay special attention to the Russian Far East. In particular, these include the Socio-Economic Development Strategy for the Far East and the Baikal Region for the Period Up Until 2025, No. 2094-r, which was approved by the Decree of the Russian Government on 28 December 2009, and the Federal Special Purpose Program Economic and Social Development of the Russian Far East and Trans-Baikal Region for the Period Up Until 2013, No. 480 of 15 April 1996.

Primorsky Region, which comprises 2.7% of the entire area of the Russian Far East and which contains most of the Amur tiger range, is home to 30% of the entire human population in the Russian Far East. According to the census conducted in 2002, the human population density within the region at the time was 12.2 persons per km², while the average population density in the Russian Far East was 1.1 persons per km². Compared with other regions within the overall tiger range in Asia, however, the habitat of the Amur tiger within the Primorsky and Khabarovsk Regions remains much less populated by humans.

A large portion of the river valleys and plains where the Amur tiger and ungulates were most abundant before development took place is now occupied by human settlements and farmland. As a result, the Amur tiger has been forced to move to less suitable habitats which are also less productive for ungulates. This makes the tiger even more susceptible to adverse human impacts.

At the same time, the Amur tiger can adapt to practically all forms of development within an area, providing the natural resources are managed sustainably. An exception, however, is where mining is involved.

The main reason for deterioration in habitat quality for the tiger caused by development is the

accompanying reduction in food availability. Within Primorye and Priamurye, tracts of forest where Amur tiger habitat still exist are repeatedly affected by the clearing of trees and forest fires. With every year, the food resource for ungulates subsequently declines. To maintain the number of Amur tigers as well as of other large predators, a high and stable number of wild ungulates is required. This can only be assured if sufficient food resources are available.

Several existing and planned large development projects could affect the status of the Amur tiger's habitat.

One of them is the construction of the Eastern Siberia – Pacific Ocean oil pipeline. This is planned to pass through Amur tiger habitat in the southern part of Sikhote-Alin. The pipeline itself, its associated infrastructure and the oil refinery, as well as the immediate areas around them, will adversely affect the territories of between 35 and 40 adult tigers.

Another project is the construction of the Sakhalin-Khabarovsk-Vladivostok gas pipeline and refinery. The pipeline will adversely affect tiger habitats along its entire length, but primarily in the south-western part of Priamurye. The entire project was given the 'green light' by a State Environmental Impact Assessment. However, the pipeline's route will cut through the Leopardovy Federal Nature Refuge and the Strel'nikov Ecological Corridor, a protected area of regional importance in the Khabarovsk Region.

Road construction projects are of distinct danger to tiger populations as they cause fragmentation of their habitats, raise the disturbance factor and increase the number of tiger deaths on highways. Elevated and unvegetated road embankments and 1.5 to 2.0 m-high safety barriers on both sides of the roads will make such highways impassable for most animals.

Thus, the planning and implementation of socio-economic development projects and programs in the Russian Far East, all necessary to improve the quality of life and welfare of people in the region and the country as a whole, must take into account the need to minimise negative impacts on the Amur tiger and its habitats (ie. preventing habitats from fragmenting and contiguous populations from breaking up into small isolated groups that are not able to survive for long).

6.2.1.2 Hunting and game management impacts

The larger part of the Amur tiger's range is located in

areas where hunting is permitted and where game species are managed for the purposes of hunting. At the same time, the most important factors in such areas for maintaining healthy populations of Amur tigers are keeping the number of ungulates at a certain level and meeting the legislative requirements on the protection of Red Data Booklisted animals. This is only possible when hunting resources, together with their habitats, are sustainably managed and protected. However, the following issues run counter to this:

- Management of hunting and the protection of hunting resources are seriously hampered by the current restructuring of relevant state institutions. State supervision and the control of hunting are made difficult because the number of hunting management units has risen sharply, while at the same time the number of state hunting inspectors remains critically low.
- The provisions within existing legislation on hunting and the protection of hunting resources make it very difficult for state inspectors to lodge violations and provide the necessary evidence. Control of hunting, as provided for in Article 41 of the Federal Law On Hunting and Protection of Hunting Resources, does not take place because staff members in hunting management units have not been granted the legal right to lodge violations. Consequently, they are not adequately able to legally protect the resources they are responsible for.
- When regulations and by-laws on hunting and the protection of hunting resources are being drafted and/or offtake quotas are being set, the food requirements of the Amur tiger, the necessity to maintain healthy populations of ungulates and the changes that occur in ungulate habitats due to forest fires and logging activities are all not taken into account. There is an urgent

need to introduce a new approach to regulating the use of wildlife resources.

- When effective wildlife management takes place within hunting management units, the carrying capacity of habitats increases. This results in an increase in ungulate numbers. Being the main prey items for the Amur tiger, this has a beneficial effect on the predator. However, when effective wildlife management is not forthcoming, the stability of ungulate populations is not assured. The number of ungulates fails to satisfy the food requirements of tigers and the predator begins to counter the objectives of hunting management units, thereby causing hunters to become more opposed to tigers.

6.2.1.3 Forest management impacts

Forest management is aimed primarily at increasing the productivity of forests and also at improving the quality of habitats for animals living in them, including ungulates and the Amur tiger. At the same time, however, the intensity of forest logging has increased significantly and has resulted in growing negative impacts on the Amur tiger and its habitat.

- The largest impact on the tiger and its prey from forest management makes itself felt through the construction of forestry infrastructure, such as roads, tracks, storage areas, etc. Networks of forest tracks help poachers gain better access to tigers and their prey. In areas with dense forest track networks, hunting pressure is higher and both ungulate and tiger densities are lower. The mandatory closing of such roads once logging operations have been completed is one of the most important steps to achieving effective tiger conservation.
- In areas where Korean cedar pine and mature oak trees are cut, ungulates find much less food. This is because both cedar pine nuts and acorns



are important food items. Logging must only be allowed if some areas of old-growth forest within each forestry unit are left untouched and if a full ban on the logging of Korean cedar pine is imposed.

- The level of illegal logging has grown significantly. The quantity of illegally cut timber logged over the last seven years was between 50 and 60% of the amount of timber that was cut legally. Over the same period, however, the number of staff responsible for controlling and supervising state forests decreased significantly.
- The incidence of forest fires has increased, this being the result of not following fire safety and prevention measures during and after logging operations. The following factors contribute to increased incidence of forest fires:
- tailings and waste material resulting from logging operations are not removed, so providing additional combustible material
- after logging operations, more sunlight let into the lower forest strata leads to the drying out of forest floor cover and topsoil
- forest roads and tracks provide easier access to humans, thereby increasing the risks of accidental and deliberately-lit forest fires.
- Protection against forest fires is no longer adequately carried out by forest logging companies.

7. STATUS OF AMUR TIGER PROTECTION

The Amur tiger is one of the most valuable animals in Russia's genetic diversity. Russia was the first country to develop a legislative base for Amur tiger conservation. A complete ban on hunting the tiger was introduced in 1947. The Amur tiger was listed in the USSR Red Data Book back in 1978 and again in the Russian Red Data Book in 1997.

To both protect rare and endangered wildlife species, including the Amur tiger, within Primorsky and Khabarovsk Regions and fulfil Russia's obligations to the 1992 Convention on Biological Diversity, a Decree (No. 795) On the Conservation of the Amur Tiger and Other Rare and Endangered Species within Primorsky and Khabarovsk Regions was approved by the Russian Government on 7 August

1997. At about the same time on 8 July 1997, the Federal Special Purpose Program on the Conservation of the Amur Tiger was also approved by the Government. Earlier, in 1996, the first Amur Tiger Conservation Strategy for Russia was approved by the Ministry of Natural Resources.

7.1 Conservation legislation

7.1.1 Principal international agreements and conventions

The Amur tiger is an endangered subspecies belonging to the VU A3c category in the Red Data Book of the International Union for the Conservation of Nature (IUCN). This means that the subspecies belongs to a vulnerable taxon whose population number within three generations (45 years) will drop by 30% due to contraction of its range and a decline in the quality of its habitat. The following international agreements exist to help conserve and reestablish rare and endangered species, including the Amur tiger:

- Convention on Biological Diversity (Rio de Janeiro, 5 June 1992) – ratified by Russian Federal Law (No. 16-FZ) on 17 February 1995. This Convention provides for the conservation of biological resources, both in situ and ex situ, as well as for their sustainable use.
- Convention on International Trade in Rare and Endangered Species (CITES) (Washington, 3 March 1973) – the Amur tiger is listed in Annex 1 of CITES. This provides for strict regulation on the export and import of the tiger for commercial purposes.
- The Protocol between the Russian Federation and People's Republic of China on Protection of the Tiger (Beijing, 10 November 1997).

7.1.2 National legislation

7.1.2.1 Listing in Red Data Books

The Amur tiger is listed in the Russian Red Data Book as a Category 2 subspecies, ie. a species continually declining in number which can become endangered if unfavourable factors continue as they are. The removal from the wild of animals listed in the Russian Red Data Book, including the Amur tiger, is regulated by the Decree of the Russian Government On Approval of the Regulations of Removal from the Wild Animals Species listed in the Red Data Book of the Russian Federation, excluding Aquatic

Animals, No. 13 that was approved on 6 January 1997.

According to the above-mentioned regulations, the removal of the Amur tiger from the wild is allowed for purposes of their conservation, monitoring of their population status, regulating their population number, ensuring the health of their population, maintaining human health safety, removing threats to human life and preventing epizootic diseases from spreading to livestock and other domestic animals.

The Administrative Regulation of the Federal Supervisory Natural Resources Management Service was approved by the Order (No. 123) of the Ministry of Natural Resources on 30 April 2009 and registered (Registration No. 14115) by the Ministry of Justice on 22 June 2009.

The trade in animals listed in the Russian Red Data Book, including the Amur tiger, is regulated by the Decree (No. 156) On Issuing Licences for Trading Animal Species listed in the Red Data Book of the Russian Federation that was approved on 19 February 1996.

The trade in Amur tigers is only allowed based on permission being granted by the Federal Supervisory Natural Resources Management Service and is in line with the Administrative Regulation of the Service that carries out the State's function relating to the issuing of licences for trading in animal species listed in the Red Data Book. This was approved by the Order (No. 4) of the Ministry of Natural Resources on 15 January 2008, which was registered (Registration No. 11154) by the Ministry of Justice on 13 February 2008.

Guidelines for Calculating the Monetary Value of Damage to Animal Species Listed in the Russian Red Data Book and to Other Animal Species Not Subject to Hunting or Fishing and Their Habitats were approved by the Order (No. 107) of the Ministry of Natural Resources on 28 April 2008 and registered (Registration No. 11775) by the Ministry of Justice on 29 May 2008.

The Amur tiger is listed in the Red Data Books of four Russian provinces, namely, the Primorsky, Khabarovsk, Amur and Jewish Autonomous Regions.

7.1.2.2 Legislation in the Russian Federation

In Russia, the conservation and use of animal species, including the Amur tiger, and their habitats are

covered by a number of laws and by-laws, the most important of these being:

- Federal Law On Environmental Protection, No. 7-FZ of 10 January 2002
- Federal Law On Animal Species, No. 52-FZ of 24 April 1995
- Federal Law On Specially Protected Natural Areas of 14 March 1995.

The conservation and use of animal species and their habitats are also covered by a number of other acts and decrees of the Russian Government and departmental sublaws relating to natural resource use, as well as by acts relating to other branches of law (eg. civil, criminal and administrative legislation).

The most important act relating to the conservation of animals is the Federal Law On Animal Species. It covers conservation and use of animal species in general, as well as more specifically the protection and rehabilitation of their habitats to ensure conservation of biological diversity, the sustainable use of its components, the provision of conditions for the long-term survival of animals, the conservation of the genetic diversity of wild animals and other forms of protection for animal species as a part of nature. This Law states that wild animal species within Russia are the property of the State. The Law also defines a list of measures to be carried out to conserve the habitats of wild animals, including rare and endangered species (particularly through establishing protected areas), and provides for the protection of areas that are necessary for animals to complete their life cycles (ie. breeding, raising young, feeding, resting, migrating, etc.). In such areas, certain types of economic development and activities can be banned or restricted in both time and nature of implementation.

The Law specifies the responsibilities and powers of state authorities in wildlife conservation, including those responsibilities that have been delegated by federal authorities to regional authorities and the specific powers of regional authorities and local governments. The Law provides for the rights of individuals and legal entities to question how the responsibilities are being implemented, to undertake their own conservation activities and to assist in the implementation of relevant state programs. The Law identifies the agencies responsible for the state administration of the conservation of animals and the conservation and rehabilitation of their habitats and defines the main principles.

To ensure the conservation of animal species and their habitats, the Law established the requirement to conduct state censuses of wild animals and record how the animals are used, to maintain a state inventory and conduct state monitoring of animal species and to implement state conservation programs.

In addition, the Law states that it is an obligatory requirement to conduct a state environmental impact assessment prior to any development decision being taken that may affect animal species and their habitats.

The Law states that rare and endangered animal species must be listed in the Russian Red Data Book and respective regional Red Data Books. Any activities that can lead to their death, decline in their numbers or damage to their habitats are prohibited. Legal entities and individuals who carry out economic activities within areas where such animals occur are responsible for their conservation. The Law also states that the use of and trade in listed rare and endangered animal species, as well the keeping of them in captivity and their release back into the wild, can only be legally done if the required permission has been granted.

Numerous by-laws and departmental regulations make up a considerably well-developed legal base for administrative authorities and law enforcement agencies to work in the field of conservation of rare and endangered animal species. They also provide a regulatory mechanism with relatively well-defined jurisdictions and separation of duties between federal and regional authorities.

The effectiveness of this generally well-developed system, however, is hindered by the low efficiency in law enforcement and by gaps and deficiencies in some areas with regards legal instruments and regulations.

For example, the Russian Administrative Code sets out the penalties for destroying rare and endangered animals and plants that are listed in the Russian Red Data Book, or which are protected by international agreements. In addition, any action or inaction that leads to the death, decline in numbers or damage to habitats of animals, as well as to the destruction of plants, collection, removal and keeping in captivity, purchase, sale and postage of rare and endangered animals without the necessary permission being obtained or the conditions being complied with, or if other required procedures have

not been followed, will be punished under administrative law.

At the same time, there are no legal provisions to penalise legal entities or individuals for assisting in the placement of announcements on the Internet relating to the sale of tiger skins or purchasing the products of illegal hunting.

Article 20 of the Federal Law On Animal Species requires a state environmental impact assessment to be carried out prior to a decision being made on whether or not any development project that may affect animal species and their habitats goes ahead. Article 24 of the same Law states that actions that may lead to the death, decline in numbers or damage to habitats of animals listed in the Red Data Book are prohibited.

However, as stated by the Federal Law On Environmental Impact Assessment, No. 174-FZ of 23 November 1995, if any development project which may affect the environment is planned to take place outside of protected areas, the continental shelf, exclusive economic zones, inland seas, Russian territorial waters and their adjacent zones, or if such projects do not fall within a special purpose program, a state environmental impact assessment is not required. Consequently, there are no legal grounds to prohibit such developments even if they may negatively affect the habitat of the Amur tiger.

Taking into account the requirements of the above-mentioned Law On Animal Species, it is necessary that the documentation relating to any construction project that is planned to take place within Amur tiger habitat must be subjected to an environmental impact assessment to ensure that it complies with environmental requirements.

7.2 Protected area conservation

At present, an area of approximately 36,000 km² within the range of the Amur tiger (ie. 20% of its total range) falls within protected areas. Ten percent (10%) of this area consists of protected areas of federal importance (Table 1).

The establishment of transboundary migration corridors with special protection regimes to ensure free movement of animals is being planned. In addition, planning is also being directed at establishing protected areas where traditional forms of natural resource use are to be maintained. These areas will be developed and managed along with

Table 1. List of protected areas where key tiger habitats are protected

Name of Protected Area	Area (hectares, 000)	Regions and districts of Russia
FEDERAL NATURE RESERVES (Zapovedniks)		
Primorsky Region		
Kedrovaya Pad	18,045	Khasansky
Lazovsky	120,998	Lazovsky
Sikhote-Alinsky	401,428	Terneisky, Dalnegorsky, Krasnoarmeisky
Ussuriysky	40,432	Ussuriysky, Shkotovsky
Khabarovsk Region		
Bolshekhkhtsirsky	45,439	Khabarovsk
Botchinsky	267,380	Sovetsko-Gavansky
Komsomolsky	64,413	Komsomolsky
NATIONAL PARKS		
Primorsky Region		
Zov tigra (Call of the Tiger)	82,152	Chuguevsky, Olginsky, Lazovsky
Udege Legend	88,600	Krasnoarmeisky
Khabarovsk Region		
Anyuisky 429,370 Nanaisky		
FEDERAL NATURE REFUGES (Zakazniks)		
Primorsky Region		
Leopardovy	169,429	Khasansky, Nadezhdinsky, Ussuriysky
Khabarovsk Region		
Khekhtsir	56,000	
REGIONAL NATURE REFUGES (Zakazniks)		
Primorsky Region		
Berezovyi	60,000	Chuguevsky
Vasil'kovsky	34,000	Olginsky
Verkhnebikinsky	746,482	Pozharsky
Poltavsky	119,000	Ussuriysky, Oktyabrsky
Taezhny	29,000	Krasnoarmeisky
Black rocks	12,400	Dalnegorsky
Losiny	26,000	Terneisky
Goraly	4,749	Terneisky
Tikhy	12,600	Anuchinsky
Khabarovsk Region		
Mataisky	114,400	Im. Lazo
Birsky	53,300	Bikinsky
Chukensky	219,700	Im. Lazo
Mopau	54,000	Vaninsky
NATURE PARKS		
Khabarovsk Region		
Vyazemsky	33,000	Vyazemsky
Khoso Khoso	123,100	Komsomolsky
ECOLOGICAL CORRIDORS OF REGIONAL IMPORTANCE		
Khabarovsk Region		
Strelnikov	8,100	Bikinsky
Manominsky	34,300	Nanaisky
Nelminsky	36,700	Sovetsko-Gavansky
Khutinsky 77,480 Vaninsky		

local communities in order to reach a compromise between tiger conservation and sustainable community development.

At the same time, however, an integrated spatial system of protection for the whole Amur tiger habitat, which takes into consideration the important ecological role of the tiger, is not yet in place. Up until now, when a particular category of protected area was selected and the regime for tiger protection was put in place, the importance of habitats for Amur tiger conservation was not always taken into account.

The conservation of the tiger inside protected areas within its key habitat range, in particular the Leopardovyy Federal Nature Reserve and the Birskey, Mataisky, Taezhny and Verkhnebikinsky Regional Nature Refuges, is inefficient. This is because clear-felling operations are still taking place within these areas.

One of the key issues for the conservation of the Amur tiger is the optimization of land use in areas lying beyond protected areas.

7.3 Captive breeding

Zoos play an invaluable role in attracting broad public attention to issues relating to tiger conservation. They also raise awareness about the need to protect these animals in the wild.

A significant proportion of funds generated by zoos goes towards the conservation of tigers around the world.

Zoos are sources of valuable scientific data and practical experience. New combinations of anaesthetics were developed and tested in zoos, after which they could then be used in research studies on tigers in the wild. Some important indicators that assist in determining the age of animals, such as the condition of teeth and the weight of individuals, were first studied and then later used in the field. Photographs of tiger skin patterns and blood samples taken from captive zoo animals are being used in taxonomic research studies. Studying DNA taken from the faeces of captive tigers helps to develop methods for counting tigers in the wild. Zoo-based training programs have been of great help to local veterinarians, especially when they work with wild tigers that have to be placed in captivity or conduct post mortems.

Tigers were amongst the first animals for which special captive management programs were developed. These include the Tiger Species Survival Plan (SSP) in North America, which was developed in 1982, and the European Program for Amur Tiger Breeding (Tiger Europäische Erhaltungszucht Programme (EEP)), which was established in 1985 in both Europe and Russia. The EEP has been jointly coordinated by Moscow Zoo and the Zoological Society of London (ZSL). Analysis of the present-day situation was conducted to determine whether or not Russia and other post-Soviet countries have sufficient numbers of Amur tigers to independently manage their collective zoo population. It showed that the successful implementation of a long-term project on breeding the Amur tiger requires one overall management program covering all captive tigers.

The present-day captive population of Amur tigers was formed during the early-1950s and originates from 57 founder individuals. As of now, the combined population of tigers housed in the 91 zoos that make up the EEP numbers 268 tigers (127 males and 141 females). Of this total, 67 tigers (31 males and 36 females) are being kept in 29 zoos that belong to the Euro-Asian Regional Associations of Zoos and Aquariums (EARAZA). Many Russian and other post-Soviet zoos are members of this Association. The combined zoo population falling under the North American Tiger SSP of the American Zoo and Aquarium Association (AZA) presently consists of 131 Amur tigers (54 males and 77 females) housed within 48 zoological institutions within North America.

The total number of Amur tigers in captivity is comparable to the present number of tigers living in the wild. Whether or not all these captive tigers are of pure genetic stock, however, has still to be determined. If need be, captive tigers can be used to reinvigorate the genetic stock of the wild population. Among all the countries falling within the tiger's range, Russia has the best and most efficient system in place for regulating the interface between captive and wild populations. From the mid-1990s, Russia has followed a principle of determining if any orphaned or injured tigers can be released back into the wild, or if they have to be incorporated into the zoo population. Only those individuals whose condition does not allow them to be released into the wild and who are young enough to be able to adapt to captive conditions become candidates for inclusion in the international breeding program for tigers. Zoos that participate in Amur tiger breeding programs provide the facilities necessary to look after them. Present policy favours placing tigers removed from

the wild in Russian zoos, providing these zoos have the required facilities. If this is not possible, the tigers are shipped to other zoos participating in the EEP, with Moscow Zoo and the EEP coordinator for the Amur tiger being involved in the process.

Since the zoo population was founded, the inflow into zoos of tiger orphans from the wild has expanded the founding genetic stock and increased the genetic diversity of the captive population. Indeed, some genetic lines that have disappeared entirely from the wild genome are now only preserved within the zoo population. This makes the importance of captive populations even greater.

At present in Russia, there is no necessity for reintroducing captive-bred Amur tigers back into the wild. In the future, however, replenishment of the wild population and the reintroduction of lost genes may become desirable. Such activities are not of first priority in the short-term conservation plans for the Amur tiger, but they can be considered as options if there is evidence of genetic weakening through inbreeding within the existing wild population. The Amur tiger is characterized by having the lowest genetic diversity of all tiger subspecies remaining in the wild. Therefore, there is a continuous need to monitor and assess the genetic wellbeing of the wild population.

Using all ways and means available, the management of zoo populations of the Amur tiger will continue to provide as much support as possible to those projects aimed at conserving populations of the subspecies in the wild. It will also continue to maintain a genetic reserve of the subspecies in case a need to use it arises in the future.

8. PRIORITIES FOR CONSERVING THE AMUR TIGER

Conservation of the Amur tiger population can only be assured by implementing a set of activities that are aimed at conserving the animal itself, protecting its habitat and protecting the animals that make up its food source. These activities must take into account the special biological features of the subspecies' boreal existence as well as the lessons learnt from past years.

There are two main tasks necessary for conserving the Amur tiger population. These are removing the causes of the decline in population number and minimizing the negative impacts that lead to the contraction and degradation of those habitats that are



suitable for tigers. It is in these two areas where priority activities must be focused.

8.1 Developing international collaboration

Although the Russian Federation presently carries the main responsibility for the conservation of the Amur tiger in the wild, the future of this sub-species also depends on the status and condition of the tiger population and its habitat in neighbouring countries, specifically the People's Republic of China and North Korea. Small populations of Amur tigers in border areas of China are apparently supplemented by individuals who cross over from Russia. Appearances of tigers in the northern parts of North Korea have also been recorded. Without uniting the efforts of neighbouring countries, it is not possible to assess the level of habitat degradation and the potential for restoring the Amur tiger's natural range. It is also not possible to determine a size for the entire Amur tiger population that can be sustained in the wild. Uniting global efforts will help foster the exchange of information and ideas and increase the possibility of being able to conserve not only the subspecies but also the entire tiger species.

The necessity of enhancing international collaboration in conserving and studying the Amur tiger is governed by a number of factors, first and foremost of which is the trans-boundary nature of human-related impacts. Inter-state cooperation, both within the region and beyond, is worthwhile developing in the following directions:

- Participation in the Global Tiger Initiative which

was announced by the World Bank provides a platform for international collaboration. Coordinated planning of activities in tiger conservation is a task that requires concentrating the efforts of all tiger range countries. The main objectives of the Global Tiger Initiative are:

- to increase the effectiveness of tiger conservation activities through the exchange of experience and information
- to improve the enforcement of conservation law through exchanging experience and international cooperation in combating the illegal cross-border trade in products derived from tigers and other rare and endangered animals species
- to decrease the demand for tiger products by inter alia conducting public awareness campaigns amongst consumers in those countries where tiger products are being used in traditional medicine and where there is also a demand for tiger skins
- to raise the effectiveness of tiger habitat protection
- to develop incentives for supporting tiger conservation at local level
- to develop and improve innovative mechanisms for funding tiger conservation activities, eg. developing mechanisms for joint funding of conservation projects by using carbon credits to compensate for carbon retention, or by paying for environmental services.
- Establishment of international transboundary protected areas for the conservation of the Amur tiger and the Far East leopard.
- Coordination of activities to stop the illegal export and trade of products that are derived from the illicit hunting of tigers and other rare animals. Of special importance is collaboration with China. On a local level, it is worthwhile for the customs services of the Russian Federation and neighbouring provinces in China to work together and exchange information on the cross-border movement of illegal animal products. It is also worthwhile for the respective state institutions to exchange information on illegal international trading routes in both countries.
- Coordination of research programs and cooperation between Amur tiger experts from different countries. Of special importance is the

development of a joint methodology for monitoring Amur tigers in Russia and China. This will enable study results from both countries to be properly compared.

- Continuation of collaboration in the management of captive Amur tiger populations within the EEP, European Association of Zoos and Aquaria (EAZA) and the North American Tiger SSP of the AZA

It is important to collaborate with international non-government conservation organisations, charitable foundations and other non-government bodies. Such collaboration helps to raise additional funding, exchange ideas, draw on best international experience and undertake joint work between Russian and foreign experts in the fields of conservation and research within the entire range of the Amur tiger.

8.2 Improving legislation

To increase the effectiveness of Russian conservation law and law enforcement for the conservation of the Amur tiger, it is recommended:

- ensuring that the provisions of Russian law are used to penalize individuals for processing illegally-obtained Amur tiger skins
- formulating regulations to penalize individuals and legal entities for providing Internet space to place announcements relating to the sale of Amur tiger skins and body parts and for purchasing illegally-obtained Amur tiger parts, as well as to penalize those individuals who place such announcements
- enhancing administrative penalties for killing Amur tigers by introducing amendments to Article 8.35 of the Russian Administrative Code (ie. Removal of Rare and Endangered Species of Animals and Plants) by adding the storage and transportation of the Amur tiger, its body parts and derivatives to the list of activities subject to penalty. The severity of the penalty for individuals must be increased – instead of “from 1,000 to 2,500 roubles”, it should read “from 2,000 to 5,000 roubles.” Confiscation of any vehicle used for transporting tiger parts must also be provided for
- enhancing penalties for the illegal removal and transportation of the Amur tiger, its body parts and derivatives over the Russian customs border

by introducing the following amendments and additions to the Russian Criminal Code: · in Part 2 of Article 188 on smuggling, extend the term “Contraband” and the list of items and objects for which the transport across customs borders are prohibited by adding the words “animals and plants listed in the Russian Red Data Book, their body parts and derivatives” immediately after the words “strategically important goods and valuable cultural objects which are subjected to special regulations for transporting across Russian customs borders” · in Article 258, introduce penalties as for illegal hunting for the illegal transport of animals that are subject to a full hunting ban, as well as their body parts and derivatives. Such an amendment would be entirely in line with the requirements of Part 2 of Article 57, entitled On Penalties for Violating the Law Relating to Hunting and Conservation of Hunting Resources, of the Federal Law On Hunting and Conservation of Hunting Resources and on Introducing Amendments into Some Russian Legal Acts, No. 209-FZ of 24 July 2009

- introducing amendments and additions to the Federal Law On Environmental Impact Assessment, No. 174-FZ, and ensuring that the documentation relating to any construction project planned to take place within Amur tiger habitat is subjected to an environmental impact assessment
- formulating and approving Regulations of Trade of Products Derived from Hunted Animals
- adding Korean cedar pine to the List of Tree and Bush Species Prohibited for Logging, No. 162, approved by the Russian Government on 15 March 2007
- restricting logging in Amur tiger habitats within those forests containing Korean cedar pine by introducing amendments to:
- Paragraph 12 of the Regulations for Logging that were approved by the Order of the Ministry of Natural Resources, No. 184 of 16 July 2007, by changing the part referring to the Korean cedar pine to the following wording: “With the exception of cutting down dead or damaged trees, it is not permitted to log those forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any

other dominant tree species in the stand’s composition”

- Paragraph 51 of the Regulations for Logging by adding the following wording: “When clear-cutting is conducted, Korean cedar pine and Manchurian nut trees should be left within seed stock trees, tree groves and forest strips”
- the Forest Management Guidelines that were approved by Order No. 31 of the Ministry of Natural Resources on 6 February 2008 by inserting guidelines on identifying nut forests, ie. those forests containing one or more Manchurian nut trees, forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand’s composition”
- reducing the logging quota in mature oak forests found within Amur tiger habitats by updating the valuation of forests containing Mongolian oak, updating permitted quotas on logging Mongolian oak and incorporating the relevant changes in forest management plans and forestry regulations in Primorsky and Khabarovsk Regions
- setting aside specially protected forest areas within Amur tiger key habitats that are in line with Paragraph 3b of Article 102 of the Russian Forest Code and which are based on recommendations on how to exploit forests within tiger habitats that were developed by the Far East Forestry Research Institute
- introducing a ban on all forms of logging in the Leopardovy Federal Nature Refuge by amending the Refuge’s proclamation which was approved by the Order (No. 110) of the Ministry of Natural Resources on 22 April 2009
- introducing a ban on all forms of logging in the Birsky, Mataisky, Tazhny and Verkhnebikinsky Regional Nature Refuges by amending their respective proclamations
- introducing necessary amendments to forest management plans in Primorsky and Khabarovsk Regions that relate to the ban on all forms of logging within the Birsky, Mataisky, Tazhny and Verkhnebikinsky Regional Nature Refuges and reconsidering the forest lease agreements that

have been entered into with companies conducting logging operations within these protected areas, as well as assigning to those companies instead forest plots located outside the nature refuges

- assigning legal status to categories of regional protected areas, thereby ensuring their special protection and restricted land use for purposes of protecting Amur tiger habitats and optimizing the protected area system in Russia
- amending hunting regulations and quotas to take into account the need to maintain healthy populations of prey items for tigers and the changes that take place in ungulate habitats that are linked to forest fires and logging
- extending rights and responsibilities of local governments to ensure forest fire prevention and to regulate those periods when individuals can visit forests
- envisaging further improvement in federal and regional legislation and the development of departmental regulations relating to the conservation of the Amur tiger.

8.3 Improving the protected area network

A large number of activities relating to protected area establishment that were in line with the earlier Amur Tiger Conservation Strategy for Russia (approved by the Ministry of Natural Resources in 1996) was accomplished within the Federal Special Purpose Program Conservation of the Amur Tiger. This Program was approved by the Decree (No. 843) of the Russian Government on 8 July 1997.

The protected area network within the range of the Amur tiger is made up of protected areas of various categories and importance. These include state nature reserves (zapovedniks), national parks, state nature refuges (zakazniks) of federal and regional importance and other types of protected area with specially designated land uses, such as buffer protection zones, protection forests and ecological corridors of regional importance. The protected areas help to guard the Amur tiger against poaching and to maintain high densities of ungulates. They also help tigers of all ages to survive and assist in raising their breeding success rate. Nevertheless, taking into account that individual Amur tigers need large territories, protected areas need to be increased in size as much as possible. In addition and

to increase the effectiveness of protected areas, they should be connected by ecological corridors where possible.

To optimize the protected area system, it is necessary:

- to ensure the effective functioning of the Kedrovaya Pad Federal Nature Reserve and the Leopardovy Federal Nature Refuge by:
- developing management plans for both protected areas with the necessary funding being allocated from the federal budget
- taking steps to establish a single protected area (called the 'Leopard Land National Park') that would incorporate both the Kedrovaya Pad and Leopardovy protected areas, as well as a necessary expansion in size of the total area under protection
- to establish a Russia-China transboundary protected area that would on the Russian side incorporate the 'Leopard Land National Park', formed through the fusion of the Kedrovaya Pad and Leopardovy protected areas, and on the Chinese side incorporate the Hunchun protected area
- to enhance protection in the Ussuriysky Federal Nature Reserve by:
- granting to its rangers all the rights of state inspectors
- establishing a buffer zone adjacent to the Reserve that restricts certain types of land use
- securing UNESCO Biosphere Reserve status for both the core Ussuriysky Federal Nature Reserve and the adjacent buffer zone that would also incorporate parts of the Orlinoe State Experimental Hunting Management Unit and the Training/ Experimental Forestry Management Unit belonging to the Ministry of Agriculture
- to establish a federal protected area that would preserve traditional forms of land use along the Bikin River
- to establish a regional nature refuge (zakaznik) within the Strelnikov mountain range in Primorsky Region by way of compensating for the building of a pipeline between Khabarovsk and Vladivostok

- to establish ecological corridors of regional importance linking protected areas in the key tiger habitats that have management regimes that reduce the negative impacts on tiger habitats, such as clear-felling and road construction
- to incorporate within federal and regional protected area spatial plans all the proposed protected areas of varying categories and importance, so ensuring that the most important habitats for both the Amur tiger and its food source are protected.

8.4 Increasing the effectiveness of Amur tiger conservation outside of protected areas

The effectiveness of Amur tiger conservation outside of protected areas, including success in preventing and combating poaching, depends considerably on state support from federal and regional authorities, as well as action from nongovernment organisations.

Strengthening of Amur tiger conservation outside of protected areas can only be effective if it is conducted in a systematic way and in line with the laws of the Russian Federation. It must also be based on the joint and coordinated activities of the Ministry of Natural Resources, the Federal Supervisory Natural Resources Management Service as well as the Service's regional offices, Federal Security Service including the 'border guard service', transport police and other authorized regional bodies and interested authorities, as well as local communities.

To raise the effectiveness of Amur tiger conservation and to ensure the protection of its habitats outside of protected areas, it is advisable:

- to develop and implement an integrated system of protecting Amur tiger habitats that takes into account their ecological importance to the tiger population
- to introduce restrictions on some forms of economic activity within the most important tiger habitats. This includes restricting forest logging by introducing a moratorium on the logging of Korean cedar pine, limiting logging in other forests containing Korean cedar pine and restricting the logging of mature oak trees
- to reduce negative impacts of forest logging on Amur tiger and ungulate populations by making

it obligatory for lessees of forest plots (specifically unlimited lease agreements) to include a special section, entitled "managing forest tracks", within the construction and exploitation of forest infrastructure part of their forest development plans. This is to ensure that forest tracks are blocked off with barriers and are closed down after logging has been completed

- to enhance the control and supervision over the implementation of responsibilities that have been delegated to regional authorities concerning forest utilisation, protection, conservation and the planting of forests
- to undertake activities aimed at avoiding the creation of 'problem' tigers and the subsequent necessity to shoot them
- to provide for the effective tiger conservation operations of special authorities responsible for the protection and the control and regulation of the use of wild animals and their habitats, including the Tiger Special Patrol Team, by allocating sufficient funding from the federal budget
- to develop and implement long-term federal and regional programs on restoring populations of wild ungulates within the Amur tiger range that would include inter alia providing special care to ungulates during extreme winters with high snowfall and outbreaks of disease
- to develop a strategy and action plan for game management within Russia, as well as specific game management strategies and action plans for Primorsky and Khabarovsk Regions
- to provide economic incentives for hunting management units where Amur tigers occur, including attracting investment and raising other non-budget funding
 - to conduct thorough control over the status of wild populations and domestic animals and to screen all dead and captured Amur tigers and other predators for various diseases
- to minimize the uncontrolled movement of domestic animals
- to conduct thorough veterinary examinations of animals intended for release back into the wild that also include detailed risk assessments

- to oblige road construction companies to build tunnels, overpasses and underpasses for wild animals in order to reduce the chances of them colliding with vehicles
- to ensure that perishable information on the illegal trade in tiger skins and body parts is collected timeously and with the help of local residents
- to identify instances of transporting illegally-obtained Amur tiger parts and to establish control over the illicit markets by locating offers for Amur tiger skins on the Internet and through other media
- to block channels of illegal trade and export in Amur tiger skins and other body parts
- to significantly increase the level of fines for transporting and storing Amur tiger body parts
- to inform local residents of the fact that the Amur tiger is a Red Data Booklisted animal and about the consequences to individuals for illegally obtaining and trading in the species and its body parts
- to help attract investment in order to develop small businesses within the settlements located in taiga and to create jobs for unemployed local residents, thereby removing some of the economic causes of poaching. When regional socio-economic development programs are prepared, preference should be given to those initiatives and projects that have minimal impact on the environment and the Amur tiger.

8.5 Scientific research

The conservation of biological diversity, including rare and endangered species, requires up-to-date scientific knowledge and the innovative application of that knowledge. Although up until now the biology and ecology of the Amur tiger have been studied well enough, many specific features of the tiger's biology within the Russian Far East have still to be studied in detail. This includes cub mortality, distribution, tiger ecology in peripheral areas of its range, disease, interaction with ungulates, etc.

Research on the Amur tiger can involve a variety of costly activities that utilise, for example, aircraft, satellite tracking, remote sensing, etc. The whole issue of Amur tiger conservation also impinges upon

the interests of all users of natural resources. It is therefore necessary to ensure that collaboration takes place between ministerial and academic scientific research institutes and their branches within the Russian Far East. Effective implementation of scientific research programs should be based on international partnerships. These will help to ensure that scientific ideas and current experience are exchanged, the implementation of joint research programs involving Russian and foreign expertise takes place and that a certain level of funding is secured.

The development and implementation of scientific research programs on the Amur tiger must take into account the following focus areas of research:

- the present-day distribution of the Amur tiger, its population dynamics and the mapping of tiger distribution to produce a baseline database the total population number of the tiger, its range boundary, the distribution and density of the population in different parts of the tiger's range, the gender and age structure of the population and the condition of the tiger's food supply
- a partial census (ie. a monitoring program) is conducted annually along selected routes within sample areas that represent the whole system of enumeration areas used during complete censuses. Since the winter of 1997/98, partial censuses have been conducted in 16 sample areas within Primorsky and Khabarovsk Regions.

The main objective of a partial census is to identify the principal parameters of the tiger population living within sample areas to provide annual indicators of population number dynamics, reproductive status and condition of the food supply and habitat for the whole tiger population. Data collected during a partial census constitute the core component of long-term monitoring programs and provide the basis for making conservation decisions and for selecting the time when full censuses are conducted. Complete and partial censuses are based on a similar methodology. Partial censuses include a longer and more detailed list of parameters necessary to identify trends within the Amur tiger population, the tiger habitats and food resources and other influencing factors.

4 1
The fundamental principle of census design and implementation is continuity and consistency in methodology and the analysis of the data obtained.

Monitoring of the Amur tiger population addresses the following parameters:

- population number dynamics and its annual trends
- gender, age, spatial and social structure of the population and trends
- reproductive rates and trends
- spatial distribution and population density
- seasonal and daily migrations
- physiological condition of individuals, including physical and reproductive parameters.

The monitoring of Amur tiger habitats includes not only the recording of environmental factors but also the forecasting of possible habitat changes at ecosystem level. Such changes should be monitored in the following way:

- recording changes that affect habitats
- recording the contraction and/or transformation of habitats resulting from economic activities.

Over the last 12 years, the monitoring program has proved how effective it is in gathering unique and objective information on the Amur tiger population. The information collected is essential for developing adequate and practical activities for long-term tiger conservation. As such, the monitoring program needs to be continued. Present experience suggests, however, that the monitoring of the Amur tiger population can be improved in the following ways:

- improving the methodology for conducting censuses within the entire tiger range by using innovative methods that allow for more precise assessment of population numbers
- adding the health condition of the population and the population's genetic structure to the list of parameters to be monitored
- standardizing the methodology for counting ungulate populations within the tiger's range
- providing access through the Internet to the results of the monitoring programs.



8.7 Prevention and resolution of conflicts

The Amur tiger range in Russia incorporates large areas that are under economic development. Tiger habitat frequently lies adjacent to settlements, industrial areas and other economically developed land. Intensive economic development taking place within tiger habitat requires measures to be undertaken that prevent or resolve conflicts arising between tigers and humans. 42 An important factor in successfully resolving conflicts between tigers and humans is how quickly an expert can reach the place where the conflict has arisen. After assessing each conflict, decisions made on how to resolve them must take into account the type of conflict involved, the tiger's gender and age and the animal's condition and behaviour. The main and most preferable methods of resolving a conflict are closely monitoring the situation, chasing the animal away, keeping it in captivity for some time and translocating it to a suitable habitat and location elsewhere. The possibility of capturing and radio-tagging individual tigers opens up the options available for resolving the conflict. Putting down a problem animal can only be considered when a real threat to human life arises that cannot be avoided in any other way. In order to prevent conflicts, it is advisable:

- to maintain the population number of tiger prey items at a stable level that supports both the predators and the needs of hunters, whilst still remaining within the limits of maintaining a sustainable and healthy prey population

- to develop a mechanism for compensating owners of domestic animals (including reindeer farmers) for damage caused by tigers in those cases where the loss of domestic animals was not related to them being kept in unsafe conditions
- to prepare an information handout that recommends certain human behaviour to follow when entering or living within Amur tiger habitats and when encountering a predator. Also, to ensure that local residents and hunters (eg. when issuing hunting licences) are informed about recommended behaviour to follow when encountering a tiger in order to avoid conflicts from arising. To resolve conflicts in a timely and effective manner, it is advisable:
- to ensure effective operations of special authorities responsible for the protection and the control and regulation of the use of wild animals and their habitats, including the Tiger Special Patrol Team, by providing necessary equipment and training programs and by securing sufficient funding from the state budget
- to develop a mechanism of decision-making and responsive action for resolving conflicts that takes into account the type of conflict involved, the tiger's gender and age and its condition and behaviour, as well as other circumstances. In such a mechanism, it is advisable to consider handing animals deemed not suitable for release back into the wild over to the European Program for Amur Tiger Breeding (EEP)
- to identify and introduce in practice the most efficient methods for driving tigers away
- to undertake radio-tagging and satellite-tracking of 'problem' tigers
- to ensure the establishment of an Amur Tiger Rehabilitation Centre that would look after and raise orphaned tiger cubs with the intention of eventually releasing them back into the wild and that would temporarily house captured tigers. As a first step, a project concept, workplan and budget need to be formulated⁴³
- to ensure that veterinary examinations are carried out on captured problem tigers, that uniform post-mortems are conducted on deceased animals and that standardized methods of collecting biological samples from captured and deceased animals and analysing them for possible diseases

are employed.

8.8 Public awareness and education

One of the most important elements in Amur tiger conservation is developing amongst local residents and the public-at-large an understanding and acceptance of the tiger being part of our national heritage and a unique natural feature of world importance. In addition, it is important to elevate personal responsibility of people to follow relevant recommendations and necessary restrictions and raise personal aspirations to willingly take part in conservation activities. The principal criteria for evaluating the effectiveness of working with local residents and the public-at-large are the harbouring of a positive attitude towards Amur tiger conservation and the willingness amongst people to support and take part in conservation activities. A decline in the number of cases of poaching relating to tigers, a growing number of volunteers taking part in conservation campaigns and limiting economic development in order to meet the conservation needs of tigers would all help to testify to the success of Amur tiger conservation activities. To ensure effective long-term conservation of the Amur tiger, it is necessary:

- to instill amongst local residents an understanding of the important role that Russia plays in conserving the world's population of the Amur tiger
- to promote amongst people living within the Amur tiger's natural range a tolerance towards the tiger and an understanding of the need for its conservation
- to develop and carry out promotion campaigns for different target groups within the tiger range that are aimed at creating a positive image of the predator as a symbol of nature in the region
- to help raise the level of professional knowledge amongst decision-makers and natural resource managers, including hunting management unit staff
- to ensure wide distribution amongst local communities of information handouts on behaviours to be followed when people are within the tiger range and what to do when a tiger is encountered

- to help preserve the spiritual and cultural traditions of indigenous peoples and to promote traditional knowledge, rituals and practices that support conservation and which show a respectful attitude towards the Amur tiger
- to help local residents recognise the need for protecting large tracts of cedar pine/broad-leaved forests and the importance of nature reserves and national parks in conserving tigers and other unique natural values in the Russian Far East, as well as develop in peoples' minds an aversion towards poaching
- to help develop public oversight and ensure that reliable information is disseminated to the public-at-large
- to help support those hunting management units that manage their ungulate populations whilst taking into account the needs of the Amur tiger, as well as those other nature management

operations that use natural resources in an environmentally-sustainable manner and help conserve both tiger habitats and food resources

- to popularize to the public-at-large the results of current scientific studies on Amur tiger ecology.

9. PARTNERS IN THE IMPLEMENTATION OF THE STRATEGY

Effective implementation of the Conservation Strategy for the Amur Tiger in Russia requires continued collaboration between state authorities, research and other institutions relevant to wildlife conservation and the public sector. It also requires the active support and involvement of the public-at-large.

The main onus of responsibility for the effective conservation of the Amur tiger in Russia lies with state authorities.



ACTION PLAN UP UNTIL 2020 FOR THE STRATEGY FOR CONSERVATION OF THE AMUR TIGER IN THE RUSSIAN FEDERATION

Developing international cooperation		Outputs	Timeline	Responsible parties on the part of the Russian Federation*
1. Developing international cooperation				
<p>1.1 To take part in the Global Tiger Initiative in order to improve coordination of international activities in tiger conservation.</p>		<ul style="list-style-type: none"> National program on recovering tiger population numbers that would be part of the Global Tiger Initiative. 	2010	Ministry of Natural Resources and Environment (MoNR); Rosprirodnadzor; Ministry of Foreign Affairs (MoFA); Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; WWF; Russian Academy of Sciences (RAS)
	<p>1.2 To continue trans-boundary collaboration on Amur tiger conservation between Russia & China.</p>			

<p>1.2.1 To maximize work under the Agreement between the Governments of Russia & China on Collaboration in Environmental Protection (Beijing, 27 May 1994) & the Protocol between the Russian Federation & the People's Republic of China on Protection of the Tiger (Beijing, 10 November 1997).</p>	<ul style="list-style-type: none"> • Joint workshops, conferences & other meetings on tiger conservation. Resolutions of bilateral meetings attended by researchers & technical & other experts. • Exchange of information & data on research, technologies, practices, policy, legislation, regulations & other issues. • Exchange visits of researchers & other experts. • Agreed action plans for collaboration on various issues concerning tiger conservation. 	<p>2011-2020</p>	<p>MoNR; Rosprirodnadzor; Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; RAS, WWF and other NGOs</p>
<p>1.2.2 To enhance collaboration between state institutions at various levels & scientific, international & nongovernmental organizations (NGOs) in order to facilitate finding mutually acceptable solutions to the most important tiger conservation issues & to establish a Russia-China expert working group on tiger conservation which would include representatives from state, research, international & NGOs that would be able to provide rapid responses to up-to-date information on changes taking place in tiger populations & habitats & suggest ways of resolving developing problems.</p>	<ul style="list-style-type: none"> • Resolution on establishing a Russia-China expert working group on tiger conservation. • Annual scheduled meetings of the working group & extraordinary meetings if the need arises. 	<p>2011</p>	<p>MoNR; Rosprirodnadzor; Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; RAS, WWF and other NGOs</p>

1.2.3 To ensure regular dialogue between regional authorities to effectively stop illegal trade in the tiger, its parts & derivatives as well as other animals, exchange perishable information on violations, abnormal weather climatic conditions & emergency situations caused by pollution that may lead to the death of wild animals, disseminate information & campaign.	<ul style="list-style-type: none"> • Agreements between regional authorities of Russia & China (Khabarovsk Region & Heilongjiang Province, Primorsky Region & Jilin Province) on conservation of the tiger, its habitats & food resources. 	2011-2020	MoNR; Rosprirodnadzor; Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; RAS, WWF and other NGOs
1.2.4 To strengthen collaboration in studies on the tiger & other wild animals & their habitats by establishing direct scientific & technical links between Russian & Chinese organizations, research institutions, universities & applied research & manufacturing companies.	<ul style="list-style-type: none"> • Direct agreements between Russian & Chinese institutions on collaborating in science & technology that would allow for fundamental & applied research to be undertaken, results to be applied, environmental monitoring to be conducted & scientific & technical information to be exchanged, as well as joint Russia-China programs & projects with participating third-party countries to be initiated. 	2011-2015	MoNR; Rosprirodnadzor; Ministry of Education & Science (MoES); universities; ministerial research institutes; IUCN Species Survival Commission (SSC); RAS, WWF and other NGOs
1.2.5 To establish a Russia/China transboundary protected area which would incorporate the Russian Kedrovaya Pad State Nature Reserve & Leopardov Federal Nature Refuge.	<ul style="list-style-type: none"> • Inter-governmental agreement between Russia & China on the establishment of the trans-boundary protected area. • Additional entry in the List of Actions for the Concept of Cross-border Collaboration in the Russian Federation No. 907-r) approved by the Government of Russia on 3 July 2003. 	2013-2015	MoNR; Rosprirodnadzor; MoFA, Primorsky Regional Administration, RAS, WWF and other NGOs

1.2.6 To establish a Russia/China transboundary protected area which would include the projected Russian regional nature refuge on the Strelnikov mountain range in the Khasansky District of Primorsky Region & a protected area in Jilin Province in neighbouring China. This new protected area would assist tiger & other wild animals movement across the border.	<ul style="list-style-type: none"> • Inter-governmental agreement between Russia & China on the establishment of the trans-boundary protected area. • Additional entry in the List of Actions for the Concept of Cross-border Collaboration in the Russian Federation (No. 907-т) approved by the Government of Russia on 3 July 2003. 	2012-2014	MoNR; Rosprirodnadzor; MoFA; Primorsky Regional Administration, RAS, WWF and other NGOs
1.2.7 To establish a Russia/China trans-boundary protected area in the Black Mountains-Chanbaishan area.	<ul style="list-style-type: none"> • Inter-governmental agreement between Russia & China on the establishment of the trans-boundary protected area. • Additional entry in the List of Actions for the Concept of Cross -border Collaboration in the Russian Federation (No. 907-т) approved by the Government of Russia on 3 July 2003. 	2013-2015	MoNR; Rosprirodnadzor; MoFA; Primorsky Regional Administration, RAS, WWF and other NGOs
.3 To strengthen collaboration between Khabarovsk Region & Heilongjiang Province in China on conservation of the Amur tiger, its food resources & habitats.	<ul style="list-style-type: none"> • Memorandum on cooperation between Khabarovsk Region & Heilongjiang Province in China. 	2011-2015	MoNR; Rosprirodnadzor; MoFA; Khabarovsk Regional Administration, RAS, WWF and other NGOs

1.4 To create a mechanism of collaboration between Russia, China & North Korea in order to enhance collaboration on tiger conservation.	<ul style="list-style-type: none"> • Joint workshops & other meetings on tiger conservation; final documents of meetings held in which experts & representatives from Russia, China & North Korea participated. 	2015-2020	MoNR; Rosprirodnadzor; MoFA; WWF and other NGOs
1.5 To strengthen coordination between the customs authorities of Russia, China, North & South Korea in order to stop illegal export & trade in tiger parts & derivatives, as well as body parts & derivatives of other rare & endangered animals.	<ul style="list-style-type: none"> • Appeal of the Ministry of Natural Resources to relevant customs authorities. • International seminar. 	2011-2012	MoNR; Federal Customs Service (FCS); SSC; WWF and other NGOs
1.6 To ensure international cooperation in the conservation of the tiger & other wild animals & their habitats between research institutes, universities, applied research & manufacturing companies, public organizations & experts.	<ul style="list-style-type: none"> • International research program on the tiger, other wild animals & their habitats. • Conferences & other meetings on tiger conservation; final documents of those meetings. • Exchange of information & materials on research, technology, production, policy, legislation, regulation & other issues on tiger conservation. • Exchange visits of scientists & other experts. 	2013-2020	MoNR; Rosprirodnadzor; MoES; universities; ministerial research institutes; SSC; RAS, WWF and other NGOs

1.7 To prepare & approve a program for exchanging experience in Amur tiger conservation between experts from Russia, China & North Korea.	<ul style="list-style-type: none"> • Program for international seminars to exchange experiences in Amur tiger conservation. 	2015	MoNR; Rosprirodnadzor; Primorsky Regional Administration; SSC; WWF and other NGOs
1.8 To continue collaboration in the management of captive Amur tiger populations between the European Program for Amur Tiger Breeding (EEP), European Association of Zoos & Aquaria (EAZA) & the North American Tiger Species Survival Plan (SSP) of the American Zoo & Aquarium Association (AZA).	<ul style="list-style-type: none"> • Annual reports on activities completed under the EEP, EAZA & the North American Tiger SSP of the AZA. 	2010-2020	MoNR; Rosprirodnadzor; Moscow Zoo
2. Improving legislation			
2.1 To develop, approve & implement regional programs on the Amur Tiger Conservation Strategy for Russia.	<ul style="list-style-type: none"> • Primorsky Regional Program for the Implementation of the Amur Tiger Conservation Strategy for Russia. • Khabarovsk Regional Program for the Implementation of the Amur Tiger Conservation Strategy for Russia. 	2011-2015	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
2.2 To ensure legal protection of Amur tiger habitats within cedar pine/ broad-leaved & oak forests.			
2.2.1 To add Korean cedar pine to the List of Tree & Bush Species Prohibited for Logging.	<ul style="list-style-type: none"> • Draft decree of the Russian Government on introducing amendments & additions to Decree No. 162 that was approved by the Russian Government on 15 March 2007. 	2010-2012	MoNR; Rosprirodnadzor; WWF

<p>2.2.2 To restrict logging within Amur tiger habitats in those forests containing Korean cedar pine.</p>	<ul style="list-style-type: none"> • Draft order of the Ministry of Agriculture on introducing amendments to Paragraph 12 of the Regulations for Logging that were approved by the Order of the Ministry of Natural Resources, No. 184 of 16 July 2007, by changing the part referring to the Korean cedar pine to the following wording: "With the exception of cutting down dead or damaged trees, it is not permitted to log those forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand's composition." • Draft order of the Ministry of Agriculture on introducing amendments to Paragraph 51 of the Regulations for Logging that were approved by the Order of the Ministry of Natural Resources, No. 184 of 16 July 2007 by adding the following wording: "When clear-cutting is conducted, Korean cedar pine & Manchurian nut trees should be left within seed stock trees, tree groves & forest strips." • Draft order of the Ministry of Agriculture on introducing amendments to Forest Management Guidelines that were approved by Order No. 31 of the Ministry of Natural Resources on 6 February 2008 by inserting guidelines on identifying nut forests, ie. those forests containing one or more Manchurian nut trees, forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand's composition. 	<p>2010-2012</p> <p>MoNR; Rosprirodnadzor; WWF and other NGOs</p>
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2.2.3 To reduce the logging quota in mature oak forests found within Amur tiger habitats by updating the valuation of forests containing Mongolian oak, updating permitted quotas on logging Mongolian oak & incorporating the relevant changes in forest management plans & forestry regulations in Primorsky & Khabarovsk Regions.	<ul style="list-style-type: none"> • Forest management plans for Primorsky & Khabarovsk Regions. • Forestry regulations for Primorsky & Khabarovsk Regions. 	2010-2012	Rosleskhoz; MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF
2.2.4 To set aside specially protected forest areas within Amur tiger key habitats that are in line with Paragraph 3b of Article 102 of the Russian Forest Code & which are based on recommendations on how to exploit forests within tiger habitats that were developed by the Far East Forestry Research Institute.	<ul style="list-style-type: none"> • Set of documents required to set aside specially protected forest areas within key habitats of the Amur tiger. • Draft ministerial act regulating the setting aside of specially protected forest areas. 	2010-2015	Rosleskhoz; MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF
2.2.5 To extend rights & responsibilities of local governments to ensure forest fire prevention & to regulate those periods when individuals can visit forests.	<ul style="list-style-type: none"> • Amendments to the Federal Law On the General Principles of Organization of Local Government in the Russian Federation, No. 131-FZ of 13 October 2003, specifying the responsibilities of local governments to ensure the prevention of forest fire & to regulate those periods when individuals are allowed to visit forests. 	2010-2015	Rosleskhoz; Primorsky & Khabarovsk Regional Administrations; WWF

2.2.6 To extend rights & responsibilities of local governments to ensure forest fire prevention & to regulate those periods when individuals can visit forests.	<ul style="list-style-type: none"> • Amendments to the Federal Law On the General Principles of Organization of Local Government in the Russian Federation, No. 131-FZ of 13 October 2003, specifying the responsibilities of local governments to ensure the prevention of forest fires & to regulate those periods when individuals are allowed to visit forests. 	2010-2015	Rosleskhoz, Primorsky & Khabarovsk Regional Administrations; WWF
2.2.7 To establish a comprehensive list of regional protected area categories in the Russian Federation & their respective special protection regimes in order to ensure the conservation of Amur tiger habitats & to optimize the existing system of regional protected areas.	<ul style="list-style-type: none"> • Draft laws of Primorsky, Khabarovsk & Jewish Autonomous Regions on introducing amendments into their respective legal acts on protected areas of regional importance. • Draft laws of Primorsky, Khabarovsk & Jewish Autonomous regions providing for categories of protected areas, such as ecological corridors. 	2010-2015	Primorsky, Khabarovsk & Jewish Autonomous Regional Administrations; WWF
2.2.8 To develop guidelines for calculating the monetary value of damage to animal species listed in the regional Red Data Books & their habitats.	<ul style="list-style-type: none"> • Draft Guidelines for Calculating the Monetary Value of Damage to Animal Species Listed in the Regional Red Data Books & Their Habitats. 	2012-2015	Primorsky & Khabarovsk Regional Administrations
2.3 To ensure legal safeguards are in place in order to maintain healthy populations of tiger food prey items.			

2.3.1 To develop a strategy & action plan for game management within Russia.	<ul style="list-style-type: none"> • Draft strategy & action plan for game management within Russia. 	2010-2013	MoNR
2.3.2 To develop strategies & action plans for game management within Primorsky & Khabarovsk Regions.	<ul style="list-style-type: none"> • Draft strategies & action plans for game management in Primorsky & Khabarovsk Regions. 	2012-2015	Primorsky & Khabarovsk Regional Administrations
2.3.3 To ensure the maintenance of healthy populations of tiger prey items that take into account the needs of hunters.	<ul style="list-style-type: none"> • Amendments to regulations & quotas that take into account the need to maintain healthy populations of prey items for tiger. 	2010-2012	MoNR; Primorsky & Khabarovsk Regional Administrations
2.3.4 To introduce a system of differentiated hunting quotas for ungulates.	<ul style="list-style-type: none"> • Amendments to relevant articles of the Russian Administrative Code. 	2010-2013	WWF; Rosprirodnadzor
2.3.5 To introduce a ban on the hunting of ungulates within their breeding areas or in those areas where ungulate population numbers have declined drastically.	<ul style="list-style-type: none"> • Relevant draft decrees made by respective regional administrations. 	2010-2013	MoNR; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.3.6 To reduce negative impacts of forest logging on Amur tiger & ungulate populations by making it obligatory for lessees of forest plots (specifically unlimited lease agreements) to include a special section, entitled "managing forest tracks", within the "construction & exploitation of forest infrastructure" part of their forest development plans. This is to ensure that forest tracks are blocked off with barriers & are closed down after logging has been completed.	<ul style="list-style-type: none"> • Relevant amendments to forest development plans. • Relevant amendments to plans for construction & exploitation of forest infrastructure that would ensure the inclusion of a special section on managing forest tracks & their closing down after logging has been completed. 	2010-2020	MoNR; Rosleskhoz; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs

2.3.7 To establish a buffer zone adjacent to the Ussuriysky Federal Nature Reserve that restricts certain types of land use from taking place within Amur tiger habitats.	<ul style="list-style-type: none"> • Draft Decree of the Russian Government on establishing a buffer zone adjacent to the Ussuriysky Nature Reserve. 	2010-2015	MoNR; Ministry of Justice (MoJ); Primorsky Regional Administration; WWF
2.4 To strengthen the combat against poaching & the illegal trade in tiger skins & other derivatives.			
2.4.1 To ensure that the provisions of Russian law are used to penalize individuals for processing illegally-obtained Amur tiger skins.	<ul style="list-style-type: none"> • Results of checking up on how the relevant law provisions are being used. 	2010-2020	Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.4.2 To formulate regulations to penalize individuals & legal entities for providing space on the Internet in order to place announcements relating to the sale of Amur tiger skins & body parts & for purchasing illegally-obtained Amur tiger parts, as well as to penalize those individuals who place such announcements.	<ul style="list-style-type: none"> • Amendments to relevant articles in the Russian Administrative Code. 	2010-2012	MoNR; MoJ; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.4.3 To enhance administrative penalties for killing Amur tigers by adding the storage & transportation of the Amur tiger, its body parts & derivatives to the list of activities subject to penalty, & also by increasing the size of penalties & providing for confiscation of any vehicle used for transporting tiger parts.	<ul style="list-style-type: none"> • Draft Federal Law on introducing amendments to Article 8.35 of the Russian Administrative Code (ie. Removal of Rare & Endangered Species of Animals & Plants) that provides for the inclusion of storage & transportation of the Amur tiger, its body parts & derivatives to the list of activities subject to penalty & increases the size of penalties for individuals – instead of “from 1,000 to 2,500 roubles”, it should read “from 2,000 to 5,000 roubles” & also allow for the confiscation of any vehicle used for transporting tiger parts. 	2010-2012	MoNR; MoJ; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs

<p>2.4.4 To enhance penalties for the illegal removal & transportation of the Amur tiger, its body parts & derivatives over Russian customs borders by introducing the following amendments & additions to the Russian Criminal Code:</p> <ul style="list-style-type: none"> • extend the term “Contraband” & the list of items & objects for which the transport across customs borders are prohibited • introduce penalties as for illegal hunting for the illegal transport of animals that are subject to a full hunting ban, as well as their body parts & derivatives. <p>The latter amendment would be entirely in line with the requirements of Part 2 of Article 57, entitled On Penalties for Violating the Law Relating to Hunting & Conservation of Hunting Resources, of the Federal Law On Hunting & Conservation of Hunting Resources & on Introducing Amendments into Some Russian Legal Acts, No. 209-FZ of 24 July 2009.</p>	<ul style="list-style-type: none"> • Draft Federal Law on introducing amendments to Part 2 of Article 188 of the Russian Criminal Code on smuggling that provides for the extension of the term “Contraband” & the list of items & objects for which the transport across customs borders are prohibited by adding the words “animals & plants listed in the Russian Red Data Book, their body parts & derivatives” immediately after the words “strategically important goods & valuable cultural objects which are subjected to special regulations for transporting across Russian customs borders.” • Draft Federal Law on introducing amendments to Article 258 of the Russian Criminal Code that provides for penalties as for illegal hunting for the illegal transport of animals that are subject to a full hunting ban, as well as their body parts & derivatives. 	<p>2010-2011</p>	<p>2010-2015</p> <p>MoNR</p>
<p>2.4.5 To formulate & approve Regulations of Trade of Products Derived from Obtaining Species Listed in the Russian Red Data Book.</p>	<ul style="list-style-type: none"> • Draft Regulations of Trade of Products Derived from Obtaining Species Listed in the Russian Red Data Book. 		

<p>2.4.6 To empower all rangers (regardless of whom they are employed by) to be able to enforce antipoaching regulations.</p>	<ul style="list-style-type: none"> • Draft regional laws on introducing amendments into relevant regional laws on administrative violations relating to protection, control & regulation of wild animal species & their habitats covered by Paragraph 14, Part 5 of Article 28.3 of the Russian Administrative Code. • Lists of officials empowered to draw up charges on administrative violations in accordance with regional legislation. 	<p>2010-2013</p>	<p>MoNR; MoJ; Rosprirnodnadzor; Primorsky & Khabarovsk Regional Administrations</p>
<p>2.4.7 To increase penalties for the unauthorized entry into hunting grounds whilst in the possession of firearms, traps & other hunting equipment, or accompanied by hunting dogs or falcons, or in the possession of a kill. In order to do this, the listed actions should be defined by the law as being considered as a part of hunting per se. In 2009, changes made to the definition of the term "hunting" made the carrying of unloaded or cased firearms during unauthorized entry into hunting grounds, or entry into hunting grounds during periods when hunting was banned, not subject to prosecution. This fact severely hindered the work of rangers in combating the poaching of ungulates.</p>	<ul style="list-style-type: none"> • To introduce amendments to Paragraph 5 of Article 1 of the Federal Law On Hunting & Conservation of Hunting Resources & on Introducing Amendments into Some Legal Acts of the Russian Federation by stating that entry into hunting grounds whilst in possession of firearms, traps & other hunting equipment, or whilst in the company of hunting dogs or falcons, or whilst in possession of a kill or carrying a cased firearm when travelling on a public road are all defined as hunting. 		

2.4.8 To ensure enforcement of Article 41 of the Federal Law On Hunting & Hunting Resources on Introducing Amendments into Some Legal Acts of the Russian Federation, specifically that part which relates to initiating charges against suspected poachers by rangers on behalf commercial game farms acting as legal entities or by individual entrepreneurs (eg. lessees of hunting grounds).	<ul style="list-style-type: none"> • Amendments to the Russian Administrative Code & regional administrative codes to empower rangers working on commercial game farms to initiate charges against suspected poachers. • Amendments to the lists of officials empowered to initiate charges against suspected poachers that add to these lists rangers working on commercial game farms. 	2010-2011	MoNR; MoJ
2.4.9 To ensure strict control is exerted over those individuals who are repeatedly charged with violations against hunting regulations, to withhold permission from such individuals to possess firearms or to hunt, to ensure the registration of such individuals in databases & to provide for the efficient exchange of information to track repeat offenders.	<ul style="list-style-type: none"> • Regional databases on those individuals who violate conservation laws. 	2010-2012	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.4.10 To define the unauthorized possession of a firearm as a crime.	<ul style="list-style-type: none"> • Amendments to the Russian Criminal Code defining the unauthorized possession of a firearm as being a crime. 	2010-2012	MoNR; MoJ; Rosprirodnadzor; WWF and other NGOs
2.5 To enhance the interaction between nature resource users & conservation organizations in order to efficiently address sustainable nature management issues within the Amur tiger range.			

2.5.1 To ensure permanent interaction & information exchange between nature resource users & conservation organizations.	<ul style="list-style-type: none"> Multi-party agreements between nature resource users & conservation organizations. 	2010-2020	Rosprirodnadzor; Primorsky Regional Administration; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky Region; WWF and other NGOs
2.5.2 To ensure that the documentation relating to any construction project planned to take place within Amur tiger habitat is subjected to an environmental impact assessment.	<ul style="list-style-type: none"> Draft federal law on introducing amendments & additions to the Federal Law On Environmental Impact Assessment, No. 174-FZ of 23 November 1995 that provides for the carrying out of an environmental impact assessment on documentation relating to any construction project that is planned to take place within Amur tiger habitat. State environmental impact assessment reports. 	2010-2020	MoNR; MoJ; Rosprirodnadzor; WWF and other NGOs
2.5.3 To provide for independent environmental impact assessments to be carried out for any development project or other project using nature resources that may affect the Amur tiger population & its habitat.	<ul style="list-style-type: none"> Independent environmental impact assessment reports. 	2010-2020	Authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky Region; Rosprirodnadzor; WWF; RAS;

2.5.4 To establish a group of experts to undertake environmental impact assessments (EIAs), including independent EIAs, where they relate to tiger conservation – the group would also incorporate members of the Working Group on Amur Tiger Conservation	<ul style="list-style-type: none"> List of experts. 	2010-2011	Rosprirodnadzor; Tiger Special Patrol Team; RAS, WWF and other NGOs
2.5.5 To prepare a draft proposal on how to provide tax advantages to those legal entities & individuals who make donations towards the conservation & rehabilitation of biodiversity within the Primorsky & Khabarovsk Regions.	<ul style="list-style-type: none"> Draft proposal on providing tax advantages to legal entities & individuals 	2010-2011	Primorsky & Khabarovsk Regional Administrations
3. Improving the protected area network			
3.1 To establish an effective & functional protected area system within the Amur tiger's range			
3.1.1 To incorporate proposed protected areas of varying categories within the Federal Protected Area Spatial Plan in order to ensure that the most important habitats for both the Amur tiger and its food source are protected.	<ul style="list-style-type: none"> Draft Federal Protected Area Spatial Plan that incorporates both newly-proposed federal protected areas as well as extensions to existing protected areas within the Amur tiger's range. 	2010-2012	MoNR; Rosprirodnadzor; WWF

3.1.2 To incorporate proposed protected areas of varying categories within regional protected area spatial plans in order to ensure that the most important habitats for both the Amur tiger & its food source are protected & to also incorporate tiger conservation objectives within the regional spatial development plans for Primorsky & Khabarovsk Regions.	<ul style="list-style-type: none"> • Draft regional protected area spatial plans that incorporate proposed regional protected areas falling within the Amur tiger's range. 	2010-2011	Primorsky & Khabarovsk Regional Administrations; WWF
3.1.3 To ensure the effective functioning of the Kedrovaya Pad Federal Nature Reserve & Leopardov Federal Nature Refuge by drawing up management plans for both protected areas, with the necessary funds being allocated from the federal budget.	<ul style="list-style-type: none"> • Management plan for Kedrovaya Pad Federal Nature Reserve. • Management plan for Leopardov Federal Nature Refuge. • Necessary funding allocated from the federal budget. 	2010-2012	MoNR; Kedrovaya Pad Federal Nature Reserve; WWF and other NGOs
3.1.4 To establish a single protected area (called the 'Leopard Land National Park') that would incorporate both the Kedrovaya Pad & Leopardov protected areas, as well as a necessary expansion in size of the total area under protection.	<ul style="list-style-type: none"> • Draft set of documents necessary for establishing a single protected area (called the 'Leopard Land National Park') that incorporates both the Kedrovaya Pad & Leopardov protected areas, as well as a necessary expansion in size of the total area under protection. • State Environmental Impact Assessment statement for the documentation on the proposed establishment of the 'Leopard Land National Park'. • Development & Management Plan for 'Leopard Land National Park'. 	2012-2013	Kedrovaya Pad Federal Nature Reserve; WWF and other NGOs

<p>3.1.5 To improve protection in the Ussuriysky Federal Nature Reserve by:</p> <ul style="list-style-type: none"> • granting to its rangers all the rights of state inspectors • establishing a buffer zone adjacent to the Reserve that restricts certain types of land use • securing UNESCO Biosphere Reserve status for both the core Ussuriysky Federal Nature Reserve & the adjacent buffer zone that would also incorporate parts of the Orlinoye State Experimental Hunting Management Unit & the Training/Experimental Forestry Management Unit belonging to the Rosleskhoz 	<ul style="list-style-type: none"> • Draft decree on establishing a buffer zone adjacent to the Ussuriysky Federal Nature Reserve. • Set of documents necessary for securing UNESCO Biosphere Reserve status for both the core Ussuriysky Federal Nature Reserve & the adjacent buffer zone that would also incorporate parts of the Orlinoye State Experimental Hunting Management Unit & the Training/Experimental Forestry Management Unit of the Rosleskhoz 	201-2015	MoNR; Rosleskhoz, Ussuriysky Federal Nature Reserve; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
<p>3.1.6 To establish a federal protected area that would preserve traditional forms of land use along the Bikin River.</p>	<ul style="list-style-type: none"> • Set of documents necessary for proclaiming a federal protected area along the Bikin River. • Draft decree of the Russian Government on establishing a federal protected area along the Bikin River. 	2010-2015	MoNR; Primorsky & Khabarovsk Regional Administrations; WWF
<p>3.1.7 To establish a regional nature refuge (zakaznik) within the Strel'nikov mountain range in Primorsky Region as a form of compensation for the building of a pipeline between Khabarovsk & Vladivostok.</p>	<ul style="list-style-type: none"> • Set of documents necessary for proclaiming a regional nature refuge (zakaznik) within the Strel'nikov mountain range in Primorsky Region. • Draft decree of the Governor of Primorsky Region on establishing a regional nature refuge (zakaznik) within the Strel'nikov mountain range. 	2011-2015	Primorsky Regional Administration; WWF

3.1.8 To establish the Solnechnye Gory & Yuzhno-Primorsky nature parks in Primorsky Region.	<ul style="list-style-type: none"> • Set of documents necessary for establishing the Solnechnye Gory & Yuzhno-Primorsky nature parks in Primorsky Region. • Draft decrees of the Governor of Primorsky Region on establishing the Solnechnye Gory & Yuzhno-Primorsky nature parks. 	2011-2015	Primorsky Regional Administration; WWF
3.1.9 To establish regional protected areas (nature parks) in the Samarga River basin	<ul style="list-style-type: none"> • Set of documents necessary for establishing nature parks in the Samarga River basin in Primorsky Region. • Draft decrees of the Governor of Primorsky Region on establishing nature parks in the Samarga River basin. 	2011-2015	Primorsky Regional Administration; WWF
4. Increasing the effectiveness of Amur tiger conservation outside of protected areas			
4.1 To develop an integrated Amur tiger habitat protection system takes into account their ecological importance to the tiger population.			
4.1.1 To identify the most important natural features for both the tiger and its prey (eg. natural salt licks) in order to give them protected status, eg. introduce land use restrictions within the most important tiger habitats, including logging restrictions amongst others.	<ul style="list-style-type: none"> • Analytical review of Amur tiger population status based on results of the 1995/96 & 2004/05 censuses. • Proposals for an integrated system for protecting Amur tiger habitats that takes into account the habitats' ecological importance to the tiger population. 	2010-2012	MoNR; Rosprirodnadzor; RAS, WWF and other NGOs

4.1.2 To establish ecological corridors of regional importance that link those protected areas within key tiger habitats which employ management regimes that reduce the effects of negative impacts, such as clear-felling & road construction, on tiger habitats.	<ul style="list-style-type: none"> • Proposed system of ecological corridors of regional importance. • Set of documents necessary for establishing ecological corridors of regional importance linking protected areas in key tiger habitats. • Draft decrees of the Governors of Primorsky & Khabarovsk Regions on establishing ecological corridors of regional importance. 	2011-2020	Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
4.1.3 To develop a management plan for an ecological corridor that links the main Amur tiger population in Sikhote-Alin with the isolated population in south-west Primorye.	<ul style="list-style-type: none"> • Draft management plan for the ecological corridor. 	2011-2015	Primorsky Regional Administration; RAS, WWF and other NGOs
4.1.4 To develop a management plan for an ecological corridor that links the Amur tiger populations in south-west Primorye & the Pogranichny Range.	<ul style="list-style-type: none"> • Draft management plan for the ecological corridor. 	2011-2015	Primorsky Regional Administration; RAS, WWF and other NGOs
4.1.5 To enhance the control & supervision over the implementation of responsibilities that have been delegated to regional authorities concerning forest utilisation, protection, conservation & the planting of forests.	<ul style="list-style-type: none"> • Results of auditing conducted by special authorities of Primorsky & Khabarovsk regions on the protection, control & management of wild animals & their habitats & on forest utilisation, protection, conservation & the planting of forests on how the responsibilities delegated to the regional authorities are implemented. 	2010-2020	MoNR; Rosprirodnadzor

4.1.6 To enhance fire prevention the ability to combat forest fires within Amur tiger habitats.	<ul style="list-style-type: none"> Alarm system is developed. Local residents are trained. Anti-fire infrastructure is improved. 	2010-2015	Rosleskhoz; Ministry of Emergency (MoE); MoNR; Rosprirodnadzor; WWF and other NGOs
4.1.7 To ensure the rehabilitation of damaged Amur tiger habitats through a special program of forest restoration.	<ul style="list-style-type: none"> Action plan on forest restoration. 	2010-2020	Rosleskhoz; MoNR; Rosprirodnadzor; WWF
4.1.8 To provide for the construction of special wildlife crossings across highways to reduce incidences of wild animals being run over by vehicles.	<ul style="list-style-type: none"> Projects for constructing wildlife crossings (underpasses & overpasses). 	2012-2015	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF
4.2 To ensure non-destructive nature resource use within Amur tiger habitats that has minimal impact on the environment & the Amur tiger.			
4.2.1 To introduce through voluntary forestry certification, as stipulated by the Forest Stewardship Council (FSC), sustainable forestry practices within tiger habitat covering an area of no less than 3 million hectares and to add tiger conservation to the list of effectiveness indicators within the voluntary forestry certification scheme.	<ul style="list-style-type: none"> Proceedings of workshops. Mechanism for introducing sustainable forestry practices is developed. Action plan to help introduce voluntary forestry certification. 	2010-2012	Rosprirodnadzor; Primorsky Regional Administration; RAS, WWF and other NGOs
4.2.2 To implement pilot ecotourism projects within Primorsky & Khabarovsk Regions as alternatives to other forms of economic development.	<ul style="list-style-type: none"> Pilot ecotourism projects in Primorsky & Khabarovsk Regions. Tours developed & advertised. 	2012-2018	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs

4.2.3 To create a 'safari-park' within tiger habitat in order to help develop ecotourism & to conduct scientific research.	<ul style="list-style-type: none"> • Draft set of documents necessary for establishing a 'safari-park'. • Draft regional act for establishing a 'safari-park'. 	2011-2015	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
4.2.4 To create incentives for small business development in order to combat unemployment & so reduce poaching.		2011-2020	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
4.2.5 To develop a program & action plans that encourage amongst local residents non-destructive uses of nature resources that have minimal impact on the environment & the Amur tiger by: <ul style="list-style-type: none"> • involving local residents in ecotourism development within Primorsky & Khabarovsk Regions • supporting local residents in the development of businesses relating to sustainable forestry & game farming 	<ul style="list-style-type: none"> • Actions plans on the involvement of local residents in ecotourism development in Primorsky & Khabarovsk Regions. 	2011-2015	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
4.3 To maintain high population numbers of Amur tiger prey species			
4.3.1 To develop a long-term federal program on restoring populations of wild ungulates within the Amur tiger's range that would include inter alia the provision of special care to ungulates during extreme winters with high snowfall & outbreaks of disease.	<ul style="list-style-type: none"> • Draft long-term federal program on restoring populations of wild ungulates within the Amur tiger's range. 	2010-2012	MoNR; Rosprirodnadzor; RAS, WWF and other NGOs

4.3.2 To develop regional programs on restoring populations of wild ungulates within the Amur tiger's range in Primorsky & Khabarovsk Regions.	<ul style="list-style-type: none"> • Draft regional programs on restoring populations of wild ungulates within the Amur tiger's range in Primorsky & Khabarovsk Regions. 	2010-2012	Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; RAS, WWF and other NGOs
4.3.3 To provide economic incentives to hunting management units where Amur tigers occur, including attracting investment & generating other forms of non-budget funding. This should include the testing of special game management practices aimed at increasing ungulate population numbers within pilot hunting management units.	<ul style="list-style-type: none"> • Reports on special game management practices that have been undertaken. 	2012-2020	Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; WWF and other NGOs
4.4 To ensure veterinary monitoring of the Amur tiger population.			
4.4.1 To conduct thorough monitoring of wild animal populations & domestic animals & to screen all dead or captured Amur tigers & other predators for various diseases.	<ul style="list-style-type: none"> • Monitoring activities. 	2010-2020	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
4.4.2 To conduct thorough veterinary examinations of animals intended to be released back into the wild that are also accompanied by detailed risk assessments.	<ul style="list-style-type: none"> • Veterinary examination reports. 	2010-2020	MoA; Primorsky & Khabarovsk Regional Administrations

4.4.3 To undertake a vaccination program for domestic pets & feral dogs & cats to prevent possible outbreaks of disease. Vaccinations must be carried out against the following diseases: viral feline leukemia, caliciviral infection, herpes, chlamydiosis, feline panleukopenia, feline rabies, leptospirosis, canine distemper, canine parvovirus & canine rabies.	<ul style="list-style-type: none"> • Vaccination program. 	2010-2020	MoA; Primorsky & Khabarovsk Regional Administrations
4.4.4 To establish a centre within the Primorsky Agricultural Academy for conducting post-mortem examinations of dead tigers.	<ul style="list-style-type: none"> • Legal act establishing the Primorsky Agricultural Academy as the only centre in which post-mortem examinations of dead tigers are conducted. 	2010	Rosprirodnadzor; MoA; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
4.4.5 To provide training for local veterinarians in order to expose them to modern veterinary techniques relating to wildlife conservation.	<ul style="list-style-type: none"> • Training programs. • Seminars. • Trained experts. 	2011-2020	Rosprirodnadzor; MoA; Primorsky & Khabarovsk Regional Administrations; NGOs
4.5 To improve the effectiveness of anti-poaching efforts.			
4.5.1 To conduct annual training courses for state wildlife conservation & protected area inspectors on registering law violations, inspection procedures & drawing up charges according to the Russian Administrative Code & to provide necessary training for newly-enrolled state inspectors as well as improve the qualifications of other inspectors.	<ul style="list-style-type: none"> • Reports. 	2010-2020	Primorsky & Khabarovsk Regional Administrations; WWF

4.5.2 To ensure that perishable information on the illegal trade in tiger skins & body parts is collected timeously & with the help of local residents.	<ul style="list-style-type: none"> • Up-to-date intelligence. • Reports. 	2010-2020	Tiger Special Patrol Team; Ministry of Internal Affairs (MoIA)
4.5.3 To identify incidences of transporting illegally-obtained Amur tiger parts by monitoring illicit markets in order to locate offers for Amur tiger skins on the Internet & through other forms of media.	<ul style="list-style-type: none"> • Up-to-date intelligence. • Reports. 	2010-2020	Tiger Special Patrol Team; FCS
4.5.4 To block channels of illegal trade in & export of Amur tiger skins & other body parts in conjunction with branches of the Customs service.	<ul style="list-style-type: none"> • Up-to-date intelligence. • Reports. 	2010-2020	Tiger Special Patrol Team; FCS; Primorsky & Khabarovsk Regional Administrations
4.5.5 To conduct multi-stakeholder meetings, workshops & seminars, as well as to provide other forms of dialogue between authorities, commercial companies & conservation NGOs, in order to discuss economic development plans & spatial planning so that the conservation needs of the Amur tiger are taken into account.	<ul style="list-style-type: none"> • Proceedings of meetings. 	2010-2020	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; Tiger Special Patrol Team; RAS, WWF and other NGOs
4.5.6 To prepare reviews on applying Russian administrative regulation practices for state wildlife conservation & protected area inspectors in order to raise their professional level & to improve the effectiveness of their work. The reviews would take into account changes in the law & court procedures.	<ul style="list-style-type: none"> • Review documents. 	2010-2020	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; protected areas; RAS, WWF and other NGOs

5. Scientific research			
<p>5.1 To produce a baseline database with information on the present-day distribution of the Amur tiger, its population dynamics, biology, ecology & habitat condition, as well as information on populations of the tiger's main prey species.</p>	<ul style="list-style-type: none"> • Database structure. • Database interface. • Data entered into database. * The Tiger Special Patrol Team was designated as being responsible for maintaining this database by a special order of Rosprirodnadzor. 	2010-2020	Tiger Special Patrol Team; RAS, WWF and other NGOs
<p>5.2 To develop & implement scientific research programs on the following focus areas:</p> <ul style="list-style-type: none"> • present-day distribution of the Amur tiger, its population dynamics & the mapping of tiger distribution to produce a baseline database • role of natural & human-related factors on the population dynamics & changing habitats of the Amur tiger • identification of key breeding sites for the Amur tiger • definition of the population structure of the Amur tiger using molecular genetics & other modern methods • gender, age structure & other demographic indicators of a population & also the spatial & temporal distribution of animals relating to gender, age & environmental factors (eg. studying spatial population structure, movement & spatial behaviour) • interaction between the Amur tiger & other predators • diet & food availability & the distribution & population dynamics of principal prey items in different parts of the Amur tiger's range • reproductive biology of the Amur tiger • veterinary examination of individual Amur tigers from the wild to monitor for diseases (eg. distemper, toxoplasmosis, pyroplasmiasis, etc) • development of scientific-based methodology & a program for the rehabilitation & future release back into the wild of orphaned tiger cubs. 	<ul style="list-style-type: none"> • Scientific research programs. • Reports on results of scientific research. 	2010-2015	Tiger Special Patrol Team, RAS, WWF and other NGOs

5.3 To continue studies on the spatial & behavioural structure of the population using modern technologies & methods, including satellite tracking & remote sensing.	• Reports on results of scientific research.	2010-2015	RAS, WWF and other NGOs, Tiger Special Patrol Team
5.4 To continue studies on the impact of wildfires on ungulate populations in areas where numbers have dropped significantly and also on the restoration of Amur tiger habitats.	• Reports on results of scientific research.	2010-2015	RAS, WWF and other NGOs, Tiger Special Patrol Team
5.5 To continue studies on the genetic status of Amur tiger populations within its range in Russia using molecular genetics	• Reports on results of scientific research.	2011-2020	RAS, WWF and other NGOs, Tiger Special Patrol Team
5.6 To continue studies on how tiger behaviour develops so that they become part of a methodology for rehabilitating orphaned tiger cubs.	• Draft guidelines for the rehabilitation of orphaned tiger cubs.	2011-2015	RAS; NGOs
5.7 To continue to develop approaches aimed at minimizing the risk of conflict arising between Amur tigers & humans.	• Reports on results of scientific research.	2011-2020	RAS, WWF and other NGOs
5.8 To continue studies & work aimed at building up a bank of genetic material that includes: <ul style="list-style-type: none"> • the development of a method for collecting the sex organs of recently deceased tigers • the collection of gametes (ie. sperm & eggs), skin & muscle tissues from live animals using low-impact methods of sampling (eg. endoscopy, electroejaculation, biopsy). 	• Reports on results of scientific research.	2011-2020	RAS; NGOs

6. Monitoring the Amur tiger population			
<p>6.1 To establish a single centre that is managed by the Tiger Special Patrol Team for the storage & processing of monitoring data on the Amur tiger population.</p>	<ul style="list-style-type: none"> • The Tiger Special Patrol Team has responsibility for developing & maintaining the monitoring centre for the Amur Tiger as stated in Paragraph 3 of the Ministry of Natural Resources Order No. 63 of 15 March 2003. 	2010-2020	Rosprirodnadzor; Tiger Special Patrol Team
<p>6.2 To improve the methodology for conducting censuses within the entire tiger range by using innovative methods that allow for more precise assessment of population numbers by adding information on the health condition of the population & the population's genetic structure to the list of parameters to be monitored.</p>	<ul style="list-style-type: none"> • Monitoring results. 	2010-2020	Rosprirodnadzor; Tiger Special Patrol Team
<p>6.3 To standardize the methodology for counting ungulate populations within the Amur tiger's range.</p>	<ul style="list-style-type: none"> • Standardized methodology for counting ungulate populations. 	2011-2015	MoNR; Rosprirodnadzor; Tiger Special Patrol Team
<p>6.4 To ensure the monitoring of Amur tigers within selected areas.</p>	<ul style="list-style-type: none"> • Monitoring results, including those obtained using a new method applied within selected areas. 	2010-2020	MoNR; Tiger Special Patrol Team; RAS, WWF and other NGOs
<p>6.5 To establish a working group on the monitoring of the Amur tiger that would fall under the auspices of the Far East Rosprirodnadzor.</p>	<ul style="list-style-type: none"> • Decree issued by the Far East Rosprirodnadzor on establishing a working group on Amur tiger monitoring & listing its membership. 	2011	Rosprirodnadzor

6.6 To provide access to results of the monitoring programs through the Rosprirodnadzor website.	<ul style="list-style-type: none"> Information on Rosprirodnadzor website. 	2011-2020	Rosprirodnadzor
7. Preventing and resolving conflicts			
7.1 To maintain the population number of tiger prey items at a stable level that supports both the predators & the needs of hunters, whilst still remaining within the limits of maintaining a sustainable & healthy prey population.	<ul style="list-style-type: none"> Results of censuses of tiger prey species (winter migration counts etc.) 	2010-2020	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; Tiger Special Patrol Team
7.2 To develop a mechanism for compensating owners of domestic animals (including reindeer farmers) for damage caused by tigers in those cases where the loss of domestic animals was not related to them being kept in unsafe conditions.	<ul style="list-style-type: none"> Draft guidelines on compensating owners of domestic animals for damage caused by tigers. Application form to enable farmers to apply for compensation 	2011-2020	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; WWF
7.3 To prepare an information handout that recommends certain human behaviour to follow when entering or living within Amur tiger habitats & when encountering a predator and to ensure that local residents & hunters (eg. when issuing hunting licences) are informed about recommended behaviour to follow when encountering a tiger in order to avoid conflicts from arising. In addition, to recommend conditions in which to safely house domestic animals.	<ul style="list-style-type: none"> Information handout. Information disseminated through TV & other media. Information materials. 	2010-2015	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF

7.4 To provide necessary equipment for the Tiger Special Patrol Team to drive away or capture & immobilize large predators & to ensure that the qualifications of staff are improved through special training programs.	<ul style="list-style-type: none"> • Staff of the Tiger Special Patrol Team are trained & necessary equipment is provided. 	2010-2013	Tiger Special Patrol Team; WWF
7.5 To identify & introduce in practice the most efficient methods for driving tigers away & to ensure local residents living within tiger habitats are provided with self-protection devices (eg. pepper sprays, signal flares).	<ul style="list-style-type: none"> • Local residents equipped with self-protection devices. 	2010-2020	Tiger Special Patrol Team; WWF
7.6 To undertake the radio-tagging of tigers.	<ul style="list-style-type: none"> • Report containing information on tiger movements. 	2010-2020	Tiger Special Patrol Team; WWF
7.7 To ensure the establishment of an Amur Tiger Rehabilitation Centre that would look after & raise orphaned tiger cubs with the intention of eventually releasing them back into the wild as well as temporarily house captured tigers.	<ul style="list-style-type: none"> • Concept, work plan & budget for the establishment of an Amur Tiger Rehabilitation Centre. • Decree on establishing an Amur Tiger Rehabilitation Centre. 	2011-2020	Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; WWF
7.8 To ensure that veterinary examinations are carried out on captured problem tigers, uniform post-mortems are conducted on deceased animals & standardized methods of collecting biological samples from captured & deceased animals & analysing them for possible diseases are employed.	<ul style="list-style-type: none"> • Post-mortem reports. • Standardized methods of collecting biological samples from captured & deceased animals & analysing them for possible diseases. 	2011-2020	Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; WWF

8. Public awareness and education			
<p>8.1 To promote amongst local residents a tolerance towards the tiger & an understanding of the need for its conservation & also to instill an understanding of the important role that Russia plays in conserving the world's population of the Amur tiger.</p>			
<p>8.1.1 To develop & carry out promotion campaigns for different target groups within the tiger range that are aimed at creating a positive image of the predator as a symbol of nature in the region</p>	<ul style="list-style-type: none"> • Information disseminated through the media. 	<p>2010-2020</p>	<p>MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs</p>
<p>8.1.2 To undertake the following activities:</p> <ul style="list-style-type: none"> • to publish information in regional & district media on the tiger & its biology, ecology & habitat • to produce environmental radio & television programs on the Amur tiger, conduct competitions within the media for the best program & produce a series of educational programs on rare plant & animal species in Primorsky & Khabarovsk Regions • to develop & maintain a regional website on Amur tiger conservation • to produce & broadcast televised musical promos on Amur tiger conservation 	<ul style="list-style-type: none"> • Information presented or published. 	<p>2010-2020</p>	<p>MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs</p>

<p>8.1.2</p> <ul style="list-style-type: none"> • to educate local residents through radio & television about the damage caused by poaching & the efforts being employed to combat it • to place in the children's sections of district newspapers quizzes & answers on conservation • to produce films & videos promoting the conservation of rare & endangered species & to persuade film crews from the best federal, regional & foreign film & television companies, as well as school film-making clubs, to make amateur & professional documentaries & show them on local television • to develop, produce & distribute information & promotional leaflets, brochures, field guides, badges, stickers, postcards, souvenirs & other materials with an Amur tiger theme • to develop, produce & erect billboards, information boards & banners featuring either pictures drawn by children from local neighbourhoods or photographs taken by professional photographers • to place conservation messages on aircraft, ships & vehicles used for transporting both local residents & tourists • to promote Amur tiger conservation by placing advertisements in shops, restaurants & other food outlets • to organize a handicrafts competition with an Amur tiger theme • to illustrate in comic strip form recommendations on behaviours to follow when encountering a tiger & giving phone numbers to call in case of incidents or environmental crimes. 		<ul style="list-style-type: none"> • Information presented or published. 	
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8.1.3 To liaise regularly with the local media (municipal & district), including the electronic media, make available popularized information on a regular basis & provide opportunities for feedback by conducting discussions, surveys, contests, quizzes, etc.	<ul style="list-style-type: none"> • Information distributed through the media. 	2010-2020	Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
8.1.4 To inform local residents about the fact that the Amur tiger is listed in the Red Data Books of Russia & the Primorsky, Khabarovsk, Amur & the Jewish Autonomous Regions and of the penalties that apply for illegally obtaining Amur tigers and their body parts & derivatives.	<ul style="list-style-type: none"> • Information materials. 	2010-2011	Tiger Special Patrol Team; WWF
8.1.5 To present information to local residents on tiger ecology, the conservation needs of the tiger & its prey, the inadmissibility of poaching, the behaviour that people should follow when within the tiger's range & what to do when a tiger is encountered. The information should be presented by the environmental education & communication departments of protected areas.	<ul style="list-style-type: none"> • Publication of information through various protected area media. • Information placed on protected area websites. • Information available in natural history museums, visitor centres, outdoor information boards, etc. 	2010-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
8.1.6 To develop eco-trails ('tiger trails') within national parks & nature reserve buffer zones that help promote conservation awareness amongst people living within the tiger's range.	<ul style="list-style-type: none"> • Information placed along ecological trails (eg. information boards, handouts, etc). 	2010-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs

<p>8.1.7 To establish, replenish & update exhibitions in nature museums & libraries that take into account current developments in museum & library management and use such methods as mobile & static exhibitions of photographs, artwork, children's drawings & projects, posters, essays & school projects, all on the theme of Amur tiger conservation & the role that the tiger plays in the cultures of indigenous peoples living in the southern part of the Russian Far East.</p> <p>To improve ways of interacting with visitors.</p> <p>To establish groups of volunteer lecturers within museums & libraries in order to raise awareness amongst people about the conservation needs of the Amur tiger.</p>	<ul style="list-style-type: none"> • Up-to-date exhibitions in nature museums & libraries. • Groups of volunteer lectures 	2010-2020	<p>MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs</p>	
<p>8.1.8 To organize educational programs for various age groups that focus on recommended human behaviour & rules for keeping domestic animals within the ranges of the tiger & other large predators, on fire safety in the forest & on survival in the taiga.</p>	<ul style="list-style-type: none"> • Public awareness & knowledge about human behaviour & rules for keeping domestic animals within the ranges of the tiger & other large predators, on fire safety in the forest & on survival in the taiga. 	2010-2020	<p>Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; WWF</p>	

8.1.9 To conduct seminars & round-table meetings aimed at raising public awareness about legal regulations, including the Russian Criminal Code, so helping to combat environmental crime, including the shooting of rare & endangered species; to hold meetings between conservation authorities & local residents living within the tiger's range in order to explain those areas of the Russian Criminal Code that relate to illegal hunting & the regulations governing the removal of animals listed in the Russian Red Data Book.	<ul style="list-style-type: none"> • Information handouts on the conservation of the Amur tiger & its habitat. 	2020-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.1.10 To conduct sociological surveys to identify the attitude of various population groups towards the Amur tiger & its conservation & to inform the public-at-large about the results.	<ul style="list-style-type: none"> • Questionnaires. • Publicising of survey results 	2020-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2 To ensure that environmental education & awareness activities on Amur tiger conservation are conducted for children.			
8.2.1 To incorporate current environmental issues into mandatory training courses for teachers.	<ul style="list-style-type: none"> • Programs for mandatory teacher training courses that include current environmental issues. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.2 To incorporate environmental education programs which explain the ecological role of tigers in Ussuri taiga ecosystems into school curricula in the Primorsky & Khabarovsk Regions.	<ul style="list-style-type: none"> • School curricula. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments

8.2.3 To include issues on recommended human behaviour to follow when within the tiger's range in 'life safety' lessons that are given at those secondary schools in Primorsky & Khabarovsk Regions that are located within tiger habitats.	<ul style="list-style-type: none"> • School curricula. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.4 To produce special guidelines, textbooks, programs & training aids relating to tiger ecology & conservation for schools.	<ul style="list-style-type: none"> • Special guidelines, textbooks, programs & training aids. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.5 To erect educational boards with information on the ecology of the Amur tiger within schools.	<ul style="list-style-type: none"> • Information boards. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.6 To organize the following environmental education activities within schools: <ul style="list-style-type: none"> • arrange a schools contest to develop an Internet-based environmental newsletter • organize a trade-fair for children's works that are themed on the Amur tiger • arrange for children's presentations & the screening of films made by children to be given at parents' meetings held at schools • provide support for children's environmental theatre/studios • arrange for the screening of documentaries on the Amur tiger & other Red Data Book-listed species for children & follow these up with discussions. 	<ul style="list-style-type: none"> • Information provided. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments

8.2.7 To organize extra-curricular environmental education activities for children, such as summer camps, research expeditions, field schools & various environmental education projects, & to use role playing, contests & other forms of games.	<ul style="list-style-type: none"> • Information provided. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.8 To organize an annual regional Day of the Tiger, district, city & regional olympiads, children's art & photographic competitions, festivals, celebrations, gatherings, etc.	<ul style="list-style-type: none"> • Information provided 	2010-2020	Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.2.9 To create, using the Primorsky Institute of Advanced Training for Educators as a base, regional audio & video libraries on tiger conservation that can be used to: <ul style="list-style-type: none"> • produce & broadcast children's radio & television programs • produce & broadcast environmental games, fairytales & plays with Red Data Book-listed animals (including the Amur tiger) acting as main characters • inform the public-at-large through radio & television about the current state of the Amur tiger population, emergencies relating to adverse impacts on tiger habitats & actions being undertaken by authorities to address emerging threats against the Amur tiger • produce & distribute bulletins providing information on the monitoring of tiger populations • produce & distribute educational materials, posters, children's comics & information handouts all about the Amur tiger. 	<ul style="list-style-type: none"> • Information provided. 	2010-2020	Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs

8.3 To ensure that educational & awareness-raising activities on Amur tiger conservation take place amongst students.				
8.3.1 To develop & introduce environmental programs into the curricula of universities & other higher education institutions & to organize lectures by representatives from conservation authorities & NGOs. To incorporate information on the conservation of the Amur tiger & other wildlife species living in the southern part of the Russian Far East into the curricula of universities in Primorsky & Khabarovsk Regions & to show video documentaries to students.	<ul style="list-style-type: none"> • Curricula of universities & other higher education institutions. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs	
8.3.2 To organize special seminars, training courses, round-table meetings & science-into-practice conferences.	<ul style="list-style-type: none"> • Proceedings of special seminars, training courses, roundtable meetings & science-into-practice conferences. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs	
8.3.3 To publish student newsletters & bulletins on tiger conservation.	<ul style="list-style-type: none"> • Student newsletters & bulletins. 	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs	

8.3.4 To organize activities for student conservation movements & volunteers.	• Activity reports.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.4 To provide basic & advanced training courses for experts in Amur tiger conservation.			
8.4.1 To organize seminars & training courses for game farm managers & lessees of hunting grounds in order to share best practices from pilot hunting management units.	• Proceedings of seminars & training courses.	2010-2020	Primorsky & Khabarovsk Regional Administrations

* - Abbreviations used:

AZA - American Zoo & Aquarium Association;
 EAZA - European Association of Zoos & Aquariums;
 EEP - European Program for Amur Tiger Breeding (Tiger Europäische Erhaltungszucht Programme);
 EIA - Environmental Impact Assessment;
 FCS - Federal Customs Service;
 FSC - Forest Stewardship Council;
 IUCN - International Union for Conservation of Nature;
 MoA - Ministry of Agriculture, MoE - Ministry of Emergency;
 MoES - Ministry of Education & Science;
 MoFA - Ministry of Foreign Affairs;
 MoIA - Ministry of Internal Affairs;
 MoJ - Ministry of Justice;

MoNR - Ministry of Natural Resources;
 NGO - non-government organisation;
 RAS - Russian Academy of Sciences;
 Rosprirodnazor - officially known as the Federal Supervisory Natural Resources Management Service;
 SSC - IUCN Species Survival Commission;
 SSP - North American Tiger Species Survival Plan;
 UNESCO - United Nations Educational, Scientific & Cultural Organization;
 WWF - World Wide Fund for Nature.

Thailand Tiger Action Plan 2010-2022



Thailand Tiger Action Plan 2010-2022

Department of National Parks, Wildlife and Plant Conservation
Ministry of Natural Resources and Environment
Thailand

"Turning the tide of extinction of wild Tiger, changing the way we treat the world for our future generations."

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61 Phahonyothin Road, Chatuchak, Bangkok 10900, Thailand

First published 2010

Front Cover:

Female tiger in Huai Kha Khaeng Wildlife Sanctuary.

Photographer:

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Inside front cover double page:

Tiger in Huai Kha Khaeng Wildlife Sanctuary.

Photographer:

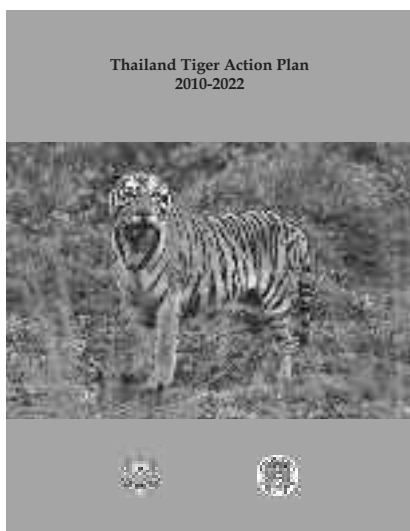
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Inside back cover double page:

Tiger with a gaur killed in Huai Kha Khaeng Wildlife Sanctuary.

Photographer:

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ABBREVIATIONS AND ACRONYMS

ASEAN-WEN	ASEAN Wildlife Enforcement Network
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CC	Community Committee
DNP	Department of National Parks, Wildlife and Plant Conservation
DP-KY	Dong Phrayayen – Khao Yai Forest Complex
GEF-5	Global Environment Facility for Biodiversity
GPS	Global Positioning System
GTI	Global Tiger Initiative
HKK	Huai Kha Khaeng Wildlife Sanctuary
HKK-TY	Huai Kha Khaeng and Thung Yai Narasuan Wildlife Sanctuaries
IUCN	International Union for Conservation of Nature
KNR	Khao Nang Rum Wildlife Research Station
KY-TL	Khao Yai and Thap Lan National Park
MIST	Spatial Management Information System
MoU	Memorandum of Understanding
NGOs	Non Government Organizations
NP	National Park
NTFPs	Non Timber Forest Products
PAAO	Protected Area Administration Office
PAC	Protected Area Committee
PAs	Protected Areas
REDD	Reducing Emissions from Deforestation and Forest Degradation in developing countries.
Smart Patrol System	The implementation of a suite of components necessary for effective law enforcement including strategic planning, adequate training and staffing levels, equipment and other resource needs, standardized law enforcement monitoring protocols, and full integration of law enforcement monitoring data into the adaptive management cycle.
Tenasserim-WEFCOM	Tenasserim-Western Forest Complex
Thailand-WEN	Thailand Wildlife Enforcement Network
WCS	Wildlife Conservation Society
WEFCOM	Western Forest Complex
WS	Wildlife Sanctuary
WWF	World Wild Fund for Nature



Message
from
His Excellency Mr. Abhisit Vejjajiva,
Prime Minister of the Kingdom of Thailand

This year is the year of tigers. We all recognise that tigers face a very real threat of extinction as a result of a variety of factors ranging from habitat loss and prey depletion to poaching. This is a challenge not only for tigers but also for biodiversity conservation and for human welfare – a challenge coming from our misperception in the past, that nature's bounty is unlimited and thus can be freely exploited. Now we know that nature is not limitless, and both tigers and humans suffer if free and unlimited exploitation is allowed to continue.

In January 2010, Thailand hosted the 1st Asia Ministerial Conference to strengthen political will on tiger conservation and help political leaders from tiger range countries define bold programs to avert the threat of extinction. The Royal Thai Government fully support the recovery of this threatened species through the development of smart infrastructure and land use, empowerment of communities in and around tiger landscapes, improvement of wildlife law enforcement and governance, building professional capacity, and seeking innovative financing for tiger conservation. Thailand has incorporated all these commitments into our new National Tiger Action Plan, and we are confident that it will contribute to regional and global efforts to conserve the tiger.

As we work together to accomplish this important task, we will be remembered as part of a generation that championed, protected, and initiated the conservation of tigers and our entire global natural capital that is part of our planet's life-supporting system.

Thailand looks forward to working with our neighbours and the international community to achieve this goal. The wild tiger is already in crisis – this may be our last chance to save it.

A handwritten signature in black ink, appearing to read 'A. Vejjajiva'.

(Abhisit Vejjajiva)
Prime Minister of the Kingdom of Thailand



FORWARD

Tigers are not only incredibly magnificent creatures and important icons of our national and regional Asian heritage but are also essential parts of our forest ecosystem. A loss of wild tigers is a barometer for the health of ecosystem across the region. Nevertheless, tigers are currently under a serious threat of extinction due to an increase of poaching, habitat loss, and prey depletion which adversely affects the whole ecosystem. On the verge of extinction, tiger conservation has gained a momentum in Thailand since the last decade. In 2004, during my first tenure as the Minister of Natural Resources and Environment, Thailand launched the first Tiger Action Plan that government agencies

and partners have used as the guidance to save the tiger. Since then, Thailand has played a pivotal role and has made several significant developments in tiger conservation. In this regard, the Department of National Parks, Wildlife and Plant Conservation (DNP) has worked closely with international conservation organizations to establish and implement an international standard patrol system, known as the Smart Patrol System, in the core area of Thailand's Western Forest Complex (WEFCOM). The system has become a model to other tiger range countries that are striving toward improving their protection systems for tigers.

On the illicit cross border trade front, Thailand has been a hub for ASEAN Wildlife Enforcement Network (ASEAN-WEN) in order to fight against organized international wildlife crime, including tigers. In January 2010, Thailand proudly hosted the 1st Asia International Ministerial Conference on Tiger Conservation at Hua Hin, Prachuap Khiri Khan province. At this international conference, the Ministry of Natural Resources and Environment initiated the establishment of the Regional Tiger Conservation and Research Centre at Huai Kha Khaeng Wildlife Sanctuary, the core area of WEFCOM. The Thai models against tiger extinction have provided vital experiences and knowledge exchange to other neighbouring countries for rebuilding tiger populations.

As saving wild tiger is at the very heart of the conservation and biodiversity agenda, I would like to present Thailand's new Tiger Action Plan. With dedication, determination, and collaboration, I am strongly convinced that Thailand will succeed the goal of doubling the wild tiger population by the next Year of the Tiger in 2022. Finally, I would like to thank the hard work and collaborative support from an alliance of governments, international organizations, civil society, and other dedicated partners which significantly help Thailand averting the threat of tiger extinction and contributing to global tiger conservation.

A stylized, handwritten signature in black ink, appearing to read 'Suwit Khunkitti'.

(Suwit Khunkitti)
Minister of Natural Resources and Environment



FORWARD

Thailand is one of the fast growing economies in Southeast Asia. The trade-off, however, is that the current forest cover is 28% of the country area, which is among the lowest in the region. Fortunately, Thailand began establishing wildlife and national park laws and a protected area system almost 50 years ago. The current protected area system covers about 18% of the country area, and the Thai government has already invested in establishment and running of 123 national parks and 58 wildlife sanctuaries. Besides protection of landscapes and their depending wildlife species, the government also undertakes various interventions including nature education, alternative livelihood, and

wildlife crime suppression.

Despite the significant efforts and investments, the recent rigorous monitoring systems have revealed that wild tigers are surviving in recoverable numbers only in protected landscapes with a strong history of protection, especially in areas with active park guards and good patrol systems. The on-going intensive population monitoring program has revealed that only one landscape, the Tenasserim-Western Forest Complex (Tenasserim-WEFCOM) can be counted as a “tiger source site”. More than 100 adult tigers have been photographed in this landscape over the last 5 years. Tenasserim-WEFCOM is about 25,000 km² on Thailand’s side, and with habitat in Myanmar this is a globally important tiger landscape. The core area is also a world heritage site.

Another landscape that can qualify as a “potential source site” based on camera-trapping evidence is Dong Phrayayen-Khao Yai Forest Complex (DP-KY); also a world heritage site. About 8 adult tigers have been photographed from this 6,100 km² landscape. These two represent the landscapes with the greatest potential for tiger recovery in Thailand.

The success of the 12-year plan of wild tiger recovery is very much dependent on: strengthening landscape-scale conservation interventions in these two landscapes; rigorous research and monitoring; transboundary conservation ties being strengthened to effectively control cross-border trade; and law and policy reforms to support the efforts to reach the vision and goals as stated in the action plan.

(Chote Trachu)
Permanent Secretary
Ministry of Natural Resources and Environment
Thailand



PREFACE

As the Director General of the Department of National Parks, Wildlife and Plant Conservation with the main responsibility to protect and manage the nation's natural heritage, especially wildlife and its ecosystem, I am pleased with this new Tiger Action Plan. The new plan will be used effectively as guidance to implement the conservation intervention and monitoring programs to reach the goal of increasing the tiger population by 50 percent in priority landscapes together with other landscapes in Thailand by the next tiger year in 2022.

There are many challenges and threats to the tiger that we have to overcome in order to be successful. The most important threats are poaching of the tiger and their prey in our national parks and wildlife sanctuaries, habitat destruction, and illegal wildlife trade. We must deal with these problems with better tools and approaches. In Thailand, the tiger population only exists in a healthy number in Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries. This is not only because our managers and park rangers have been dedicated and brave in protecting tigers, but also because they have been inventive and adopting new concepts and tools in conservation. It has been clearly proved that science-based conservation and management is a very effective approach to save such an endangered species as tigers. The successful model needs scaling up to the whole Western Forest Complex landscape and other potential tiger landscapes. On the international cooperation front the Department of National Parks, Wildlife and Plant Conservation will continue working with partners to reduce trafficking in international wildlife trade that is threatened tigers and other wildlife in the region.

The Department of National Parks, Wildlife and Plant Conservation stands firm in our duty to protect tigers and other wildlife. We are also pleased to work with local and international partners to implement Thailand Tiger Action Plan. Together, I am strongly convinced that we can save and restore wild tigers and other endangered and threatened wildlife and their habitats for the benefits of our future generations.

A handwritten signature in dark ink, appearing to read 'S. Arunnopparat'.

(Sunan Arunnopparat)
Director General
Department of National Parks, Wildlife and
Plant Conservation

ACKNOWLEDGMENTS

The Department of National Parks, Wildlife and Plant Conservation wishes to thank government organizations, Non Government Organizations (NGOs), and conservationists who participated in the process of formulating the Tiger Action Plan.

This plan honors the memory of the late Dr. Saksit Treedeej, former Permanent Secretary of Ministry of Natural Resources and Environment, for his efforts in developing this plan and his leadership for tiger conservation in Thailand.

For reviewing and commenting on the draft of this action plan, DNP would like to thank the participants from government sectors, universities, NGOs, and civil society who attended the Wildlife Conservation Day meeting at Faculty of Forestry, Kasetsart University, in 2009.

This action plan has been also reviewed and revised through a series of meetings, including the national consultation on National Tiger Recovery Plan. The action plan has benefited greatly from the contributions of the individuals who participated in the national consultation process.

DNP acknowledges the contribution made by many individuals and is grateful to the following people assisting in the compilation the information, preparation, and publication of this action plan: Dr. Theerapat Prayurasiddhi, Deputy Director General, Royal Forest Department, Mr. Chatchawan Pisdamkham, Director of Wildlife Conservation Office, Dr. Ronasit Maneesai, Dr. Saksit Simcharoen, Dr. Dave Smith, Ms. Belinda Steward Cox, Mrs. Achara Simcharoen, Mr. Somphot Duangchantrasiri, Dr. Rungnapar Pattanavibool, Mr. Sompoch Maneerat, Ms. Peeranuch Dulkul Kappelle, Ms. Umpornpimon Prayoon, Mr Supagit Vinitpornsawan, Dr. Prateep Duengkae, Dr. Nantachai Pongpattananurak, Dr. Narit Bhumpakphan, Dr. Vijak Chimchome, Dr. Sompoad Srikosamatara, Ms. Mayuree Umponjan, Ms. Angella Smith, Ms. Waraporn Hirunwatsiri and Dr. Andrey V. Kushlin from the World Bank, Mr. Keshav Varma and Dr. Anand K. Seth from GTI, and Mr. Mahendra K. Shrestha from Save the Tiger Fund. Special thanks also go to Dr. Anak Pattanavibool, Director of WCS Thailand, for the long hours he put into creating the wonderful work found throughout the action plan. Dr. Peter Cutter, WWF coordinator, for his help in compiling comments and put his tireless insistence on developing the initial draft of the action plan, and Ms Budsabong Kanchanasaka, DNP tiger scientist, for her energetic and great effort to formulate this action plan.

Finally, funding for publishing this action plan was generously provided by DNP Wildlife Conservation Office.



EXECUTIVE SUMMARY

Classified as endangered on the IUCN Red List of Threatened Species (IUCN 1996 amended by Cat Specialist Group 2001), the tiger is facing widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. Across its range, a significant number of local populations have gone extinct in the last 25 years and many others are on the verge of extinction. Although tigers in Thailand face similar threats to those in other range countries, tigers still occur within several parts of the country. The largest population occurs in one area near the Thailand/Myanmar border, the Western Forest Complex, with the highest densities occurring within the Hui Kha Khaeng and Thung Yai Naresuan Wildlife Sanctuaries, Thailand's first Natural World Heritage site. There are two areas where the latest surveys have shown the status of potential source sites. One is the Kaeng Krachan Forest Complex to the south of the Western Forest Complex along the Tenasserim Range next to the Myanmar border. Another is the Dong Phrayayen – Khao Yai Forest Complex, also a Natural World Heritage site, near the Cambodian border. The recent country wide surveys for tigers have revealed that tigers occur at very low densities in other parts of the country. After Thailand's first Tiger Action Plan, several important developments with the focus on tiger conservation have happened and become exemplified for the regional and global tiger conservation communities.

In 2004, the Department of National Parks, Wildlife, and Plant Conservation issued Thailand's first official tiger action plan. In the years since then, Thailand has increased tiger conservation efforts and has undertaken more rigorous enforcement, monitoring, and research efforts—especially at the tiger source site in Western Thailand. These efforts include the Smart Patrol System for rigorous patrol and law enforcement monitoring, advanced tiger and prey population monitoring systems as important management response indicators, and increased ecological research to better understand tiger ecology and biology under a Southeast Asian environment. As a result, Thailand is now regarded as a leader in tiger conservation under best practice, science, and policy with much to contribute to the global tiger conservation effort.

Central challenges in the coming years are to (1) ensure that current protection and monitoring systems are sustained in source and potential source sites, (2) expand these systems to cover the whole priority landscapes including the Western Forest Complex – Tenasserim and Dong Phrayayen – Khao Yai Forest Complexes, and (3) establish the systems in other sites and landscapes where tigers still occur.

Thailand is pleased to present this twelve year revision of Thailand's National Tiger Action Plan produced in consultation with other government agencies, academics, and non-governmental organizations.

This plan consists of two parts. The first is a review of the ecology and conservation status of tigers in Thailand and a discussion of the conservation challenges that tigers face. The second part is a detailed description of the visions and goals, recommended actions for achieving those goals, details indicators, means of verification, and the anticipated timeframe for each action. This section also details a specific strategy for implementing the plan.

The goals and associated actions for achieving them are arranged under the following five themes:

- 1) Strengthening direct conservation action and enforcement
- 2) Building capacity based on successful models
- 3) Strengthening monitoring, research, and information management
- 4) Promoting education, awareness, and public participation
- 5) Strategic financing for tiger conservation.

Accompanying each goal are one or more key points meant to provide the rationale and context for recommended actions.

The success of this plan rests on the effective implementation of the recommended actions through an adaptive management process of periodic evaluation and modification of goals and actions. Adaptive management recognizes that learning is a part of management. To this end, a dedicated Tiger Conservation Committee will be formed and entrusted with ongoing evaluation and implementation of the plan.

Section 1: Background and Context

INTRODUCTION

The tiger, *Panthera tigris*, is one of the world's most magnificent animals. Classified as endangered on the IUCN Red List of Threatened species (IUCN 1996 amended by Cat Specialist Group 2001) the tiger faces widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. In the last 25 years, a significant number of populations have gone extinct across the species' range and many others are on the verge of local extinction.

Tigers in Thailand face similar threats to those in other range states and both the range and number of tigers have continued to decline in Thailand due to direct poaching of tigers driven by a thriving illicit commercial wildlife trade, poaching of tiger's prey driven by local demands on wild meat as delicacy, and land encroachment within and around protected areas driven by a mixture of inefficient law enforcement and land use.

However, tigers still occur in many protected areas in different parts of the country. Unfortunately tigers in most areas exist in a vulnerable condition with populations far below a viable level. It is clear that only one landscape stands out as the stronghold of the largest tiger populations in Thailand and, perhaps, Southeast Asia. That landscape is the Western Forest Complex situated along the Tenasserim mountain range, beside the Thailand-Myanmar border. The highest density of tigers are at the core of WEFCON within the Huai Kha Khaeng and Thungyai Naresuan Wildlife Sanctuaries (HKK-TY), a Natural World Heritage site.

Since the last Tiger Action Plan published in 2004, important interventions and monitoring of tiger populations have been undertaken in WEFCON and some other protected areas along the Tenasserim. The government of Thailand, under the leadership of the Department of National Parks, Wildlife and Plant Conservation, and together with other local and international partners, has modernized the patrol and monitoring systems in wildlife sanctuaries and national parks within Tenasserim – WEFCON landscapes. Such systems have been incorporated into this action plan in the hope of scaling up the systems to safeguard and recover wild tigers in existing and potential tiger landscapes in Thailand.

This plan represents a substantial revision of Thailand's first Tiger Action Plan published in 2004 (Tunhikorn *et al.* 2004). Key additions and changes include:

- Several new goals and actions that make up the heart of the plan
- An explicit specification of a 12 year time horizon for the plan
- Formulation of the plan as a mechanism to provide strategic guidance for tiger
- conservation in Thailand (rather than detailed operational prescriptions)
- A revised "Status of Tigers in Thailand" that reflects recent work to determine the occurrence, relative abundance, and absolute abundance of tigers at the national and site levels
- A call for the formation of a National Tiger Conservation Committee in charged with actively guiding the implementation of the plan via frequent evaluation and detailed annual planning.

The Department of National Parks, Wildlife and Plant Conservation led the revision process with inputs from and consultation with other government agencies, academic institutions, NGOs, and individuals representing the private sector and civil society. Its goal is to inspire a change in the way tiger conservation is viewed in Thailand and to guide the actions of a diverse stakeholder community at a critical time for tiger conservation.

This document consists of two parts. The first reviews the ecology and conservation status of tigers in Thailand and includes a discussion of the conservation challenges facing tigers in Thailand. The second part describes the goals of the plan and recommends actions for achieving those goals.

Actions are divided into the following five themes:

1. Strengthening direct conservation action and enforcement
2. Building capacity based on successful models
3. Strengthening monitoring, research, and information management
4. Promoting education, awareness, and public participation
5. Strategic financing for tiger conservation.

To provide context and rationale for actions, a number of key "Opportunities and Challenges" are identified for each goal.

To be successful, this plan will need significant commitment from a wide range of stakeholders, political resolve from the Thai government, and a renewed interest among Thai citizens.



Why is it Important to Save the Tiger?

Tigers, as the largest carnivores, have an important functional role in Thailand's forest ecosystems.

- Tigers prey upon large mammals, but their role is greater than the animals they eat.

The entire ungulate community has evolved in response to tigers. Hence the loss of tigers in an area has cascading effects on the ecosystems where they have become extinct.

As the top predator in the landscapes where they occur, tigers require extensive habitats and thus serve as an indicator of the integrity and health of wild ecosystems and as an umbrella for the conservation of many other species and the last remaining large forested landscapes in Asia.

Enhancing and saving the natural ecosystems required by tigers provides many benefits to humans, including:

- Water delivery for agriculture, industry, and household use
- Maintenance of forest cover to moderate climate change and maintain local climate regimes
- Preservation of biodiversity to enhance long-term ecosystem stability
- Protection of wild areas that provide irreplaceable aesthetic resources and opportunities for spiritual renewal for an increasing urban human population.

For millennia, the tiger has played a significant role in cultural and spiritual aspects of nearly every Asian society. Today, people throughout the world are inspired by the tiger's grace, beauty, and power. If wild tigers disappear from the earth, an important part of our culture and society will go with them.

In support of the King's "sufficient economy" initiative, Thailand is committed to the sustainable use and conservation of the country's natural resources. Tigers can serve as an inspirational icon for this critical endeavor.

Key Stakeholders in Tiger Conservation in Thailand

To be successful, tiger conservation in Thailand must be a national effort involving government agencies, non-governmental organizations, the private sector, the academic community, and the citizens of Thailand. This plan, rather than assigning responsibilities to specific agencies and individuals, is meant to provide strategic guidance to a diverse and growing collection of actors with a stake in tiger conservation.

The **Ministry of Natural Resources and Environment** is responsible for environmental and biodiversity policy and planning. The **Department of National Parks, Wildlife and Plant Conservation** is the lead implementing agency for tiger conservation. The DNP receives its mandate from the Wildlife Protection and Preservation Act A.D.1960 (1992 Amendment) and the National Park Act A.D.1961. Its main responsibilities include:

- managing activities within the forests and

protected area system in Thailand

- implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- suppressing illegal wildlife trade within the country conducting educational outreach to the citizens, business leaders, and government organizations of Thailand.

Under the Ministry, the **Department of Environmental Promotion** and the **Royal Forest Department** also have important roles in protecting biodiversity and educating the public about conservation. The **Ministry of Agriculture and Cooperatives** has policies on livestock husbandry adjacent to protected areas which have a direct impact on tiger and prey populations. Promotion of irrigation and burning of agricultural residue influences watersheds and forests within protected areas.

The **Ministry of Interior** supervises provincial governors and district and sub-district officials. These senior government officials have a strong impact on conservation through their influence on road building and tourism development near protected areas.

The **Ministry of Tourism and Sports**, through wise promotion of ecotourism in cooperation with local villagers and the DNP, has a crucial role to play in providing economic incentives for communities to embrace tiger conservation and protect the landscapes that support tigers.

The **Ministry of Education** has an important role to ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels and also to support research that contributes to our understanding of tiger ecology.

The **Royal Thai Police** has an important role to enforce the law related to wildlife and other natural resources. The police have the **Natural Resources and Environmental Crime Suppression Division** investigating and enforcing illicit wildlife trade throughout the country. The **Border Patrol Police** have also supported DNP in training park rangers working in protected areas and conducting joint patrols along the border areas.

The **Thai Customs Department** is in charge of all the check points at the airports, seaports, and border areas around the country.

The **Royal Thai Army** is responsible for the management of some natural areas and represents an important training resource.

The **Office of Attorney General** is in charge of processing court cases related to wildlife and natural resources. It has district provincial offices throughout the country.

Provincial Government Offices can play a critical role in guiding and managing conservation work in their respective provinces.

Conservation NGOs, such as **WCS-Thailand**, **WWF Thailand**, **Freeland Foundation**, **Seub Nakhasathien Foundation**, have long supported tiger conservation activities in Thailand and often serve as a mechanism for ensuring that diverse stakeholders have a genuine voice in the conservation process. In many cases, NGOs have served as a conduit for new approaches and techniques, especially with tiger conservation, from around the world. NGOs raise funds for conservation projects, develop educational programs and publicize the plight of the tiger, support the government's efforts, fund ranger training and research, and act as watchdogs.

Community Leaders and Citizen Groups organized to address issues related to natural resources and the environment have an important contribution to make to the conservation of the tiger in Thailand.

They represent the public will. Citizen support and participation in decision making is still modest and needs to be expanded.

Universities contribute to tiger conservation by providing formal training and field experience, by managing and directing important research programs, and by encouraging the formal dissemination of research and lessons learned through academic conferences, the scientific literature, and other mechanisms. **Kasetsart University**, **Mahidol University**, and **King Mongkut's University of Technology Thonburi** in particular are the main universities in Thailand that produce wildlife and conservation biologists to serve in many conservation organizations, including DNP.

Privates Companies such as the **Petroleum Authority of Thailand Exploration and Production Public Company Limited** has provided funding for research equipment and supported tiger research efforts such as the Tiger Project at Khao Nang Rum Wildlife Research Station.

Individual Thai Citizens will ultimately determine where tiger conservation ranks on the list of national priorities. Active engagement with the public is thus essential if tiger conservation efforts are to succeed over the long term.

The Natural History of the Tiger

The tiger is the world's largest cat species with wild populations occurring from the far east of Russia to the rainforests of Indonesia. Tigers are largely solitary and territorial; they represent the top of the food chain in all areas where they occur.

Although wild tigers have historically been grouped into subspecies, conservation and genetic management objectives support a stronger emphasis on populations and metapopulations. For example, the geographical distribution of tigers in South Asia represents a continuous decline from the southern tip of India north and eastward through northeast India. The Indochinese tiger extends from Myanmar and southern Yunnan through Laos, Vietnam, Cambodia to the Isthmus of Kra in Thailand. Each subspecies is composed of discrete, largely isolated populations. Many of these populations are small and threatened, so to ensure a future for tigers it is crucial to maintain the land base that supports the remaining few large populations remaining. As few as 3,000 to 3,500 tigers remain globally and only about 1,000 in SE Asia. We must treat every population of tigers as unique and worthy of our best conservation efforts.

For tigers to survive in the wild, they must have sufficient water, cover, and, most importantly, abundant large mammal prey weighing more than 50 kgs. On average, tigers make 40 - 50 kills a year when there is sufficient large prey available (Chunderwat *et al.* 1999; Karanth and Nichols 2002; Seidensticker and McDougal 1993; Sunquist 1981). A study of tiger prey in western Thailand found that tigers consume mostly banteng and sambar, and to a lesser degree gaur, wild boar and barking deer (Petdee 2000). Opportunistically, tigers also attack and eat bears, tapir, young elephants, primates, porcupine, and even peafowl (Petdee 2000; Prayurasiddhi 1997).

Densities of principal prey species influences tiger densities in several ways. As prey densities decline, breeding female ranges become larger, dramatically reducing the number of such females that an area can support. For instance, the size of female home ranges in productive South Asian forests and grassland is 10-20 km², whereas in the Russian Far East it is as large as 200-400 km² (Karanth and Sunquist 2000; Miquelle *et al.* 1999; Sunquist 1981).

A long-term study of tigers in Huai Kha Khaeng Wildlife Sanctuary in Thailand has shown that male tigers have home range sizes between 220-291 km² and female home ranges are between 63-78 km² (Simcharoen pers. Comm; Simchareon *et al.* 2007). The objective of this study is to determine tiger carrying capacity based on the size of female home ranges in relation to prey abundance. Five females and 3 males have been collared with satellite GPS transmitters to determine the size of home ranges and habitat use patterns. These intensive studies are complimented by an extensive long term camera trapping study in Huai Kha Khaeng, Thung Yai East, and Thung Yai West wildlife sanctuaries.

Tigers moving through an area usually leave overt and distinctive evidence of their presence including tracks, scrapes, and claw marks on trees. Tigers also spray urine on trees and deposit urine and feces on the ground (usually in association with visibly distinctive hind paw scrapes). These scent marks leave an unmistakable odor that may last for several days. Together, these visual and olfactory cues help tigers communicate the boundaries of their territory to other tigers and a range of other species (Smith *et al.* 1989).

Of the many sounds a tiger is capable of emitting, the most likely to be heard is the awesome moaning, 'aa-oo-mh, aa-oo-mh', used during the mating season. This call carries over considerable distances, attracting the resident male to the estrous female. Other vocalizations, which may be heard at close range, include low growling, snarling and coughing grunts. The roar of a tiger is unforgettable in any circumstance.

When tigers mate, they usually remain together for 2 - 5 days, copulating every 15 - 20 minutes day and night. After 102 - 105 days, the female dens in dense vegetation and produces on average 3 cubs. During the first 2-3 days after birth, the female remains at the den for up to 23 hours a day; she gradually leaves for longer periods until the den is abandoned when the cubs are about 2 months old. For the next 2-3 months, the female moves the cubs from place to place, but they still remain hidden most of the day.

Until the cubs are several months old, the cubs go to a kill only after the prey animal has been dispatched by the mother (Smith 1993). By 6 - 7 months of age the cubs begin to accompany their mother on hunts, but the final stalk and kill is by the mother alone. At 11-13 months the cubs' milk canines begin to protrude, pushed out by the emerging adult canines that are fully erupted at 16-17 months. Even though they have

the “equipment” to kill prey at this point, young tigers require 2 - 3 additional months to learn to kill efficiently on their own. During this time, they gradually become independent from the mother, but continue to hunt within the security of her territory. During the years of her life when she is reproductively active, a female will typically give birth from 19 - 24 months after her previous litter is born. Two months later, when she and the cubs abandon the den site, aggression between the female and her previous litter marks the onset of dispersal of the older offspring. The young leave the territory where they were born and raised and face the most critical period in their lives over the next few months of early independence.

Approximately 60% of young males and 40% of females die during this dangerous dispersal period (Smith 1993).

Tigers are territorial. Females protect their area from others of the same sex; males, which have territories overlapping those of 2-7 females, do likewise. Dispersing young face a gauntlet of resident animals guarding their territories and are often forced to reside temporarily in suboptimal habitat at the edge of protected areas where they may come into conflict with humans and their livestock. For females, the dispersal stage usually lasts about 1 year. About 40-50% of daughters settle next to their mother, who will often shift her territory slightly to accommodate a daughter. However, by the time the daughter is fully established as a resident, there is little overlap with her mother’s territory.

For males, the task of establishing a breeding territory is more arduous and dangerous. It may take more than 2 years and involve a series of aggressive encounters with resident males which can lead to serious, even incapacitating wounds and sometimes even death.

Unlike in South Asia, where violent and sometimes lethal encounters between humans and tigers are not uncommon, Thailand has few records of aggressive interactions between humans and tigers. The most recent cases of direct human tiger conflict are two cases in Khao Yai National Park: one resulting in the death of a human and a tiger (in 1976) and the other resulting injuries to a human and subsequent killing of the tiger (in 1999). In both cases, the tigers involved were old, had damaged teeth, and were suffering from debilitating wounds that prevented them from pursuing and killing their usual prey.

Livestock depredation occurs regularly, but not



nearly at the frequency experienced in much of South Asia. A few cases of the killing of tigers involved in livestock depredation by local villagers have also been recorded.

Threats to the Tiger

The most significant challenges to tiger survival in Thailand are the same as those faced throughout the species’ range: habitat degradation and poaching of prey and tigers. Poaching of tiger prey is primarily driven by an active commercial trade in wildlife to satisfy growing demands by restaurants. Direct poaching of tigers is expected to increase in areas where tigers exist and is driven by the traditional medicine market and ritual demands for amulets.

The gradual conversion of forest cover loss over this past century has resulted in fragmented forest habitat in Thailand that has created isolated tiger populations. Many of these populations are too small to have long-term viability unless current habitat is protected, the amount of habitat increased, and habitat fragments connected by corridors (Smith *et al.* 1998; Wikramanayake *et al.* 1998).

Prey depletion is another important threat to tigers (Karanth and Sunquist 1995). Poaching of prey species is intensive in many protected areas in Thailand. In large portions of many of the protected areas where tigers still occur, there is little or no sign of prey species. Reversing the decline of prey populations within otherwise suitable habitat is crucial not only for the tiger, but also for the ecosystems in which it occurs.

In the early 1990s, tiger poaching increased dramatically throughout the tiger’s range. In 2005 the world was shocked with the report that tigers were extinct from Sariska National Park, one of India’s

prime tiger reserves. This story brought the problem to the attention of the global public, but the response did not match the growing threat and tiger populations continued to decline. Only about a year later, another of India's premier tiger reserves, Panha National Park, also reported that tigers had been wiped out. Since then, reports of similar trends have become all too common.

In Thailand in March 2010, at least 3 tigers were found dead from poisoning in the interior of Huai Kha Khaeng Wildlife Sanctuary, the site of Thailand's highest tiger densities. While the poachers were confronted by a research team at the scene of the crime, they were able to escape arrest and take with them various parts of a poisoned tiger.

The above examples indicate that tigers are a protection dependent species. Protection at site and landscape levels is imperative if tigers and their prey

are to be saved and recovered. Recent scientific findings reveal that existing protection quality in many protected areas in Thailand is not enough to save them. The inefficiency in patrols and lack of law enforcement and monitoring systems is considered a impediment to tiger conservation in Thailand. The system needs to be modernized and the support to park rangers needs significant improvement.

Several other significant factors hinder the survival of the tiger. One is a lack of commitment to using rigorous techniques for estimation of many tiger population parameters. Without baseline data on tiger populations there is no way to measure the success of management efforts. Another gap is the lack of a broad-based awareness and support for tiger conservation. The full support of the people of Thailand and cooperation across institutions and jurisdictional boundaries is vital to securing a sufficient land base for tigers in Thailand.



The Status of Tigers in Thailand

To provide an overview of tiger status in Thailand, the Wildlife Research Division of the Department of National Parks, Wildlife and Plant Conservation conducted sign surveys in 149 terrestrial protected areas from 2004 to 2007 (Kanchanasaka et al. 2010). The results of these surveys were combined with data from several other completed and ongoing studies, providing an accurate estimate of the occupancy and estimated numbers of tigers in Thailand. Sources of data used in this compilation can be found in the Appendix.

Tiger status surveys employed 2 main approaches, (1) searching for signs of tigers over 11,411 km² of likely tiger travel routes and (2) surveying by using camera traps to record photos of tigers carried out over 3,000 km² within eight protected areas (Appendix 3 and 4). Both survey approaches focused on the routes most likely used by tigers in given areas such as dirt roads, animal trails, human footpaths, dry riverbeds, and ridgelines.



Track survey data were summarized as the proportion of 500 meter sections walked in which tiger tracks were encountered at least once. Camera trap data were analyzed using capture-recapture techniques to generate estimates of the density of tigers within given survey areas.

To the best of our knowledge, tigers in Thailand occur strictly within the boundaries of existing protected areas. In order to express the status of tiger occurrence at the national level, we applied the following criteria at the resolution of individual protected areas (Table 1):

Conclusion

In Thailand, tigers occur in 25 of 188 terrestrial protected areas from the southern border with Malaysia to the far north near the borders with Laos and Myanmar. Nine of twenty five protected areas have moderate to high tiger density, and only two of these nine protected areas have a high density of tigers. Currently tigers occur in 10 of 17 recognized terrestrial forest complexes. 6 of 10 forest complexes



Kwanchai Waitanyagarn

Table 1 Rules applied to map tiger status at the resolution of individual protected areas in Thailand. The satisfying of any abundance rule was considered sufficient to apply that status class to a particular area.

Assessment Method & Definitions (Status assigned based on highest class satisfied by any method)			
Status Class	Density Estimate from Capture – Recapture Camera Trap Data	Sign Encounter Rate Index	Other
Tigers occur in relatively high abundance	Estimated density 2.7 – 2.1 tiger/100 km ²	Proportion of 500 m segments surveyed with tiger sign ≥ 14	In some areas that have information on tiger abundance from both sign surveys and camera trap surveys, we use the information from camera trap
Tigers occur in moderate abundance	Estimated density between 1 tiger / 100–150 km ² segments surveyed with and 1.4–0.8 tiger/100 km ²	Proportion of 500 m segments surveyed with tiger sign between 8.3 and 3.7	
Tigers occur in low abundance tiger sign ≤ 2	Estimated density 1 tiger / 250–300 km ²	Proportion of 500 m segments surveyed with tiger sign ≤ 2	Evidence for tiger occurrence in this area is irrefutable but is insufficient to establish anything but presence in this protected area
Substantial survey effort indicates that tigers do not occur in these areas	No tigers encountered after 500 trap-nights in sites representing optimal tiger habitat for this protected area	No tigers encountered after at least 10 km of sign survey effort in sites representing optimal tiger habitat for this protected area	
Protected area without surveying		This area contains less potential tiger habitat and sign surveys have not taken place	No record of tiger occurrence over the last 10 years

support low densities of tigers, and one (Western Forest Complex) has a core area with a high tiger density (Huai Kha Khaeng Wildlife Sanctuary) while the other three forest complexes (Khaeng Krachan Forest Complex, Dong Phrayayen-Khao Yai Forest Complex (DP-KY), and Hala-Bala Forest Complex) support moderate tiger densities. During 2008 and 2009, Thailand's tiger biologists from Khao Nang Rum Wildlife Research Station conducted camera trap surveys in Huai Kha Khaeng and Thung Yai Wildlife Sanctuary documenting photo-captures of 39 and 14 individual tigers respectively. Based on the results and the sign surveys summarized above, biologists have reached a consensus conclusion that there are likely 190-250 tigers remaining in Thailand (Appendix 2).

Along the Thai-Myanmar border, the Western Forest Complex and the Khaeng Krachan Forest Complex both support significant tiger subpopulations that are connected by extensive intact forests in Myanmar. Together, these areas can support one of the largest tiger populations in the world.

Best Practices for Tiger Conservation

In order to succeed in its goals for tiger conservation, Thailand must continue to draw on lessons learned from past efforts. It is important to critically evaluate what has contributed to successful conservation of tigers in areas where they still occur and to identify what has led to their decline or extinction in other areas.

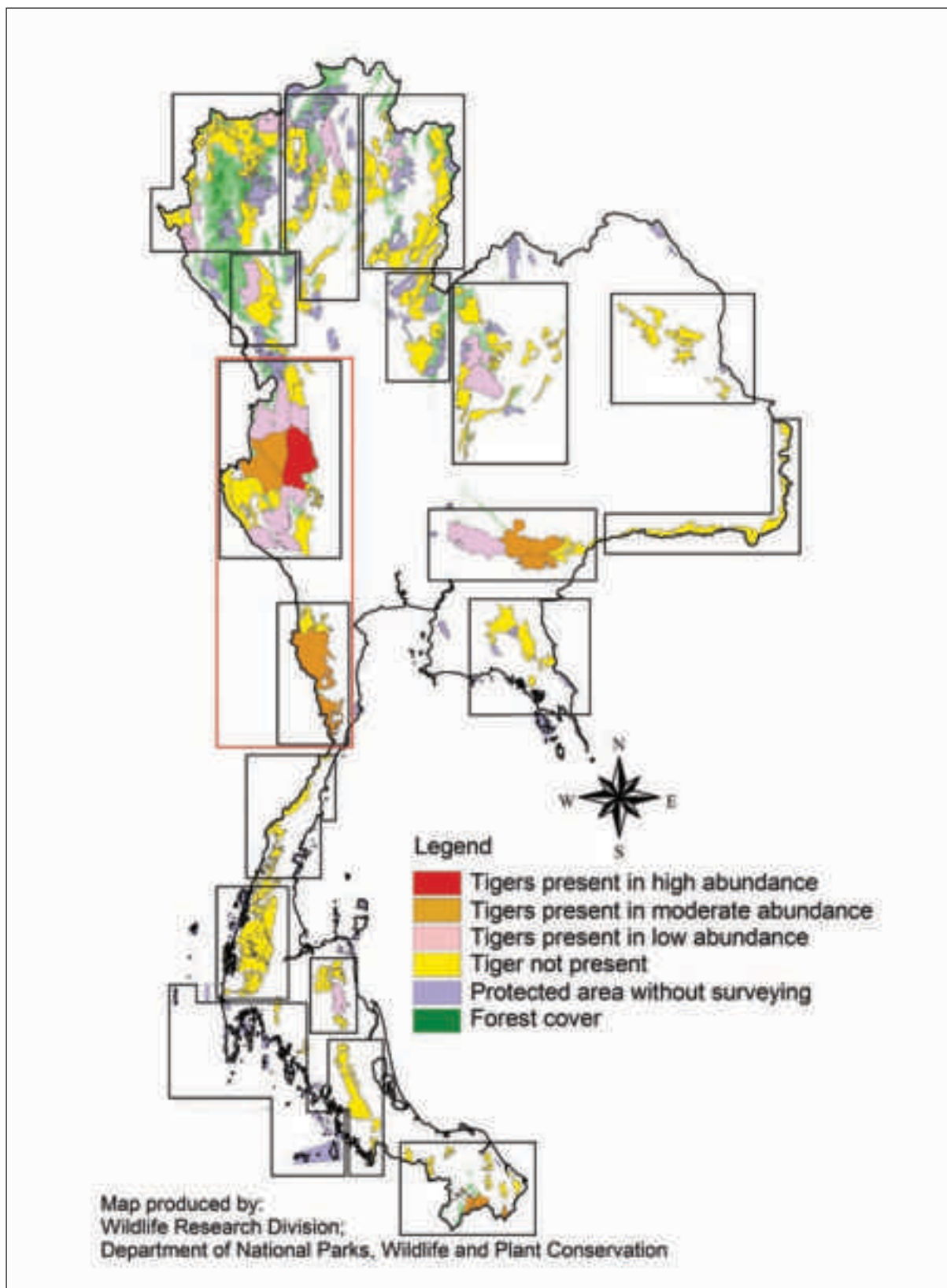


Figure 1 Map showing relative tiger abundance in Thailand. Boxes indicate forest complex management units (Prayurasiddhi *et al.* 1999). The red box indicates the Tenasserim-WEFCOM Tiger Landscape, the only area where tigers occur in high abundance.



The Huai Kha Khaeng Wildlife Sanctuary (HKK) is the location of Thailand's highest measured tiger densities and represents a unique conservation success story in the region. HKK has experienced highs and lows in protection quality. Past observations made by researchers and managers indicated that populations of tigers and their prey species were lower than current levels. Gun shots could be heard everywhere deep inside HKK. Relocations of villages inside HKK more than 20 years ago have given tigers and other wildlife a safer space. Strict protection is the key to controlling poaching in the area. The recovery of tigers and prey has recently been sped up by a modernized protection system, and HKK is now one of the most progressive and systematic tiger and prey management systems in the region.

Another unique development was the application of landscape scale management based on ecosystem management practice. The Western Forest Complex Ecosystem Management Project (WEFCOM 2004) has significantly raised the importance of landscape scale conservation by advocating four main actions including (1) improving protection by training park

rangers and strengthening coordination among protected areas, (2) adopting science-based management, (3) establishing provincial conservation fora, and (4) strengthening conservation awareness for local communities.

This management concept is the key to developing further programs to strengthen management, monitoring, research, and partnerships within WEFCOM. Following the WEFCOM ecosystem management project, a tiger focus conservation project, started in Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries since 2005, has given a best-practice management model to protect tigers and their prey. This model includes high impact interventions and monitoring systems at various levels.

Management and Monitoring at Site Level:

- **Smart Patrol System:** Smart Patrol System is a systematic patrol that maximizes the power of information to guide the patrol planning. It currently uses MIST (Spatial Management Information System) as a platform. Park rangers under this system collect important information such as patrol routes, patrol coverage, patrol intensity, points of threats, points of key wildlife species, etc. The information is displayed on maps and in tables. Information reported and discussed among the park rangers and managers is brought to the monthly patrol leader meeting. This results in high morale and self esteem among park rangers. Tigers and prey have subsequently been better protected and are recovering.
- **Intensive long-term monitoring of tigers using camera trapping and capture-based models:** Tiger population monitoring is an integral part of the management scheme for tiger conservation. Since 2005 an annual systematic camera trapping program covering about 1,000 km² sample area has revealed a density of about 2-3 tigers per 100 km² and has shown it is stable. Between 7-12 new tigers were captured annually. Camera trapping in Thung Yai Wildlife Sanctuaries has alternated yearly between Thung Yai East and Thung Yai West Wildlife Sanctuaries.

Management and Monitoring at the Landscape Level:

- **Wildlife crime units and wild meat restaurant database:** These are a major intervention to control the demands of wild meat from outside Huai Kha Khaeng Wildlife Sanctuary and other protected

areas adjacent to HKK. A wildlife crime unit was established at the Protected Area Administration Office (PAAO) 12 (Nakornsawan Province) to gather information and enforce wildlife law outside WEFKOM. The unit also gathers information from the wildlife crime web-based database, created for the public to inform them about places around WEFKOM where there is suspected trading of illegal wildlife and wild meat. The tracking of illegal wild meat has become more systematic and enforcement has become more focused.

- **Public campaign with the focus on communities around Huai Kha Khaeng Wildlife Sanctuary:** A focused campaign using the tiger as an iconic species has been launched with strong support from local sub-district administration offices and schools. It focuses on wild meat restaurants, local schools, and communities adjacent to Huai Kha Khaeng Wildlife Sanctuary. The campaign uses the

manual “Teachers for Tigers” to work with local schools. This focused campaign has gained clearer and stronger support from local communities for the work to save tigers in HKK and WEFKOM.

- **Occupancy survey:** To survey tigers within WEFKOM, a landscape occupancy monitoring system has been adopted. DNP researchers have worked with support from NGO partners to conduct a systematic survey of WEFKOM in 2010-2011 and plan to repeat this every 3-4 years. The teams walk along the designated grid cells looking for tiger tracks and signs. The monitoring system allows for an understanding of the patterns of tiger distribution in WEFKOM landscape and indicates any changes in tiger behaviour resulting from management activities.

The Department of National Parks, Wildlife and Plant Conservation has begun to scale up the model to eight other wildlife sanctuaries and five national parks.



Section 2: Action Plan

Dome Pratumtong

Vision

By 2022 tigers have recovered and thrive in the priority landscapes managed under high standard interventions and monitoring systems, and Thailand has become a strong support for international collaborations on tiger and wildlife conservation and protected area management in Southeast Asia.

Goals

2-year goals

- High-standard monitoring interventions and monitoring systems established and functioning in Tenasserim-WEFCOM and DP-KY landscapes.
- Tiger occurrence status established at all additional potential tiger landscapes.
- The system to monitor captive tigers strengthened and standardized with clear penalties in place for violations.

5-year goals

- Effective management systems in place in the Tenasserim-WEFCOM and DP-KY landscapes.
- Key tiger threats in the priority landscape show a clear decline.
- Important tiger ecology (e.g., home-range variation) in the priority landscapes very well understood and used to guide management.
- Tiger populations stabilized or increased in Tenasserim-WEFCOM and DP-KY landscapes and possibility for re-establishing in other areas explored.

12-year goals

- To increase tiger populations of Thailand by increasing the populations in the Tenasserim – WEFCOM and DP-KY landscapes by 50%, and reestablish populations in other potential tiger landscapes such as Phu Khew – Nam Nao
- Forest Complex and Klong Saeng – Khao Sok Forest Complex.

ACTION PLAN OBJECTIVES

**Priority Action 1:
Strengthening direct
conservation action and
enforcement**

**Priority Action 2:
Building capacity based
on successful models**

**Priority Action 3:
Strengthening monitoring,
research, and information
management**

**Priority Action 4:
Promoting education,
awareness, and
public participation**

**Priority Action 5:
Strategic financing for
tiger conservation**

Action Plan Objectives

For the 5 priority actions mentioned in Section 1, 19 objectives are identified. Activity details of the objectives are described in detail in the next section.

Priority Action 1: Strengthening direct conservation action and enforcement

Objective 1: Promote conservation efforts at the scale of entire populations (e.g., forest complex and associated corridors)

Objective 2: Provide long-term support for tiger habitat restoration activities

Objective 3: Ensure that the government policy of protecting tiger habitat from development threats, as committed to in the Hua Hin declaration, is followed

Objective 4: Encourage community participation and cooperation in protected area conservation activities

Objective 5: Support local communities in developing sustainable economies that reduce dependence on forest resources

Objective 6: Facilitate international cooperation in tiger conservation efforts

Objective 7: Strengthen national laws, policies, and enforcement of tiger related crimes

Objective 8: Support national and international efforts to manage captive tigers responsibly

Priority action 2: Building capacity based on successful models

Objective 9: Establish a Regional Tiger Conservation and Research Center at Huai Kha Khaeng Wildlife Sanctuary

Objective 10: Ensure national training capacity can deliver high quality tiger conservation training at all levels

Priority action 3: Strengthening monitoring, research, and information management

Objective 11: Monitor tiger and prey populations in priority landscapes

Objective 12: Maintain long-term tiger and prey ecology research in priority landscapes

Objective 13: Ensure that relevant information for tiger conservation is well managed and available to inform strategy and planning

Priority action 4: Promoting education, awareness, and public participation

Objective 14: Convey tiger conservation-related messages to a diverse Thai public, policy-makers, and politicians

Objective 15: Ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels

Objective 16: Ensure that co-benefits of tiger landscape conservation are understood and appreciated

Priority action 5: Strategic financing for tiger conservation

Objective 17: Identify the costs of effective tiger conservation, current expenditures, and efficiency of these expenditures

Objective 18: Make use of large scale funding opportunities such as Global Environment Facility for Biodiversity (GEF) 5, REDD, and other programs to fund tiger conservation efforts

Objective 19: Develop sustainable funding mechanisms



Activities to Achieve the Objectives

Activities to achieve the objectives are very important part of this action plan to guide the implementation and evaluation processes. To ease the use of the action plan, activities are grouped hierarchically under the objectives for each of the 5 priority actions. Under each objective, key challenges and opportunities are outlined. Activities that respond to or address these challenges and opportunities are then described. The expected outcome, duration, and location of the activities are also addressed under each objective.

Priority Action 1: Strengthening direct conservation action and enforcement

Objective 1: Promote conservation efforts at the scale of entire populations (e.g., forest complex and associated corridors)

Challenge: Conservation efforts at the landscape scale are the most important in tiger conservation and recovery, but the majority of areas still lack efficiency and the necessary broad oversight.

Opportunity: Systematic management and enforcement systems under the Smart Patrol System inside the core area of Tenasserim - WEFCON and the wildlife crime units operating outside the protected area have become a model for Thailand in striving for the recovery of wild tigers.

Expected outcome: The real landscape protection cost, actions, and activities to stop bleeding and to recover wild tigers are understood and adopted at the policy level.

Duration and locations: 12 years, Tenasserim - WEFCON as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 1: Strengthen and standardize the "MIST-based Smart

Patrol System" in protected areas of current tiger source and potential source sites, including Tenasserim - WEFCON and DP-KY.

Activity 2: Increase the number of competent park ranger teams patrolling in each protected area of priority landscapes up to the level that can effectively secure tigers and their prey.

Activity 3: Strengthen wildlife crime units and informant networks around Tenasserim - WEFCON and DP-KY to suppress local demands of wild meat and illegal wildlife trade and help apprehend wildlife criminals around protected areas.

Activity 4: Work with district attorneys and judges to ensure substantial punishments on wildlife crimes against tigers and large ungulates.

Activity 5: Overhaul the park ranger system to a higher living and working standard, and provide rewards and incentives to encourage patrolling (e.g., patrolling budgets) and other significant morale boosting programs such as performance-based promotions.

Activity 6: Apply landscape-scale ecological and development models for tiger conservation and engage stakeholders in development sectors (i.e., roads, oil and gas, mining, power) to minimize and mitigate impacts in sectoral activities on tiger habitats.

Objective 2: Provide long-term support for tiger habitat restoration activities

Challenge: Many areas in tiger landscapes and potential landscapes are suitable for tiger recovery, but have low ungulate densities due to poaching.

Opportunity: Recovery of wild ungulates as tiger prey and habitat

management in the tiger source site has started to help recovery tiger prey and finally tigers.

Expected outcome: Habitat is suitable for other wildlife species and native biodiversity is restored.

Duration and locations: 12 years, Tenasserim – WEFOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 7: Promote use of controlled burning in potential and manageable parts of priority landscapes to maintain grassland for ungulate recovery.

Activity 8: Prevent and suppress fires effectively in evergreen forest areas in priority landscapes to provide good cover and watersheds for tigers and wildlife.

Amonrat Wongwai

Activity 9: Strengthen the reintroduction program of ungulate prey with the ex-situ succeeded species (i.e., sambars, eld's deer, hog deer) in suitable habitats.

Activity 10: Maintain natural and existing artificial water sources that benefit tigers and ungulates especially during drought periods in priority landscapes.

Activity 11: Establish a system to control invasive species (e.g., *Lantana camara*, *Mimosa pudica*) in priority landscapes.

Activity 12: Identify priorities for corridor and habitat restoration.

Objective 3: Ensure that the government policy of protecting tiger habitats from development threats, as committed to in the Hua Hin declaration, is followed



Challenge: Large development projects (e.g., highways, dams) are under development and with new proposals often suggested.

Opportunity: Public disapproval of environmental impacts of large scale development projects such as roads and dams is high in many sectors of Thai society.

Expected outcome: Tiger habitats in priority landscapes are intact and connectivity is maintained.

Duration and locations: 12 years, Tenasserim – WEFOM as the tiger source site and DP-KY as the potential source site.

Dome Pratumtong

Activities necessary to accomplish this objective:

Activity 13: Ensure that no major infrastructure development occurs in core tiger habitats.

Activity 14: Ensure that infrastructure development in corridors and buffer zones conform with Smart Green Infrastructure designs to ensure minimal impact to tiger habitats and maintain landscape connectivity.

Objective 4: Encourage community participation and cooperation in protected area conservation activities

Challenge: Community participation

and cooperation processes are still weak in substance on the link with wildlife conservation.

Opportunity: Protected area committees have been set up in many protected areas to be a platform for participation and cooperation.

Expected outcome: Communities appreciate value of wildlife and help save them.

Duration and locations: 12 years, Tenasserim – WEFCom as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 15: Strengthen and build wildlife conservation networks around the priority landscape to enhance tiger and wildlife conservation in the priority areas.

Activity 16: Provide Protected Area Committees (PAC) and Community Committees (CC) with quality information (e.g., data from Smart Patrol System) on which to base threat reduction decisions and activities.

Objective 5: Support local communities in developing sustainable economies that reduce dependence on forest resources

Challenge: Many local communities living inside and around protected areas of tiger landscape are still using natural resources, especially poaching, in an unsustainable rate.

Opportunity: Wildlife ecotourism can generate a significant alternative income for local communities if managed properly and effectively.

Expected outcome: Improved livelihoods and reduced poverty for local people.

Duration and locations: 12 years,



Tenasserim – WEFCom as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 17: Link communities with agricultural science institutes and agencies to promote agro-forestry in buffer zone areas around priority landscapes to reduce collection of Non Timber Forest Products (NTFPs) inside Protected Areas (PAs).

Activity 18: Develop wildlife-based ecotourism with concrete benefit sharing with communities in appropriate areas in and around PAs.

Objective 6: Facilitate international cooperation in tiger conservation efforts

Challenge: Tiger trade at the international level impacts the populations at the site and landscape levels.

Opportunity: CITES check points are an example of an effective approach to control wildlife trade near the border. ASEAN-WEN also helps strengthen enforcement cooperation among neighboring countries to fight wildlife crimes.

Expected outcome: A stronger international network to fight wildlife crime.

Duration and locations: 12 years, CITES Check points, airports, sea ports.

Activities necessary to accomplish this objective:

Activity 19: Strengthen enforcement capacity of Thailand's CITES programs with better interagency-collaboration and stronger protocols and impact monitoring systems on wildlife trade.

Activity 20: Strengthen and sustain capacity of ASEAN-WEN.

Activity 21: Strengthen bi-lateral cooperation with Cambodia, Laos, Malaysia and Myanmar for transboundary enforcement and monitoring and research.

Supol Pittayasaku

Objective 7: Strengthen national laws, policies, and enforcement of tiger related crimes

Challenge: Enforcement and punishment of wildlife crimes are not strong enough to significantly reduce illegal activities on tigers and wildlife.

Opportunity: The Wildlife Reservation and Protection Act and National Park Act have been in place for Thailand for 50 years as the main laws to protect tigers and their habitats.

Expected outcome: Wildlife crimes are given priority at the policy level.



Duration and locations: 12 years, National level.

Activities necessary to accomplish this objective:

Activity 22: Strengthen enforcement on wildlife crime under the Wild Animal Reservation and Protection Act B.E.2535 (1992) to make sure that convicted offenders receive the highest penalty of Wildlife Laws and related legislations.

Activity 23: Strengthen Thailand Wildlife Enforcement Network (Thailand- WEN) information sharing capacity.

Activity 24: Strengthen investigative capacity and judiciary effectiveness in wildlife crime cases.

Activity 25: Strengthen communication campaigns on wild tiger conservation.

Activity 26: Memorandum of Understanding (MoU) with military, police, Ministry of Interior, Ministry of Education to be strengthened and implemented for better collaboration and training for enforcement.

Objective 8: Support national and international efforts to manage captive tigers responsibly

Challenge: Legal and illegal tiger zoos in Thailand are becoming a challenge for the government to control illegal tiger trade.

Opportunity: DNP has started using the tiger stripe database to control tigers in the zoos and is trying to curb illegal tiger trade.

Expected outcome: Public at large have a better understanding of the difference between wild tiger conservation and illegal captive tiger business that harms tiger conversation.

Duration and locations: 12 years, places with illegal captive tigers, zoos, and amusement parks.

Activities necessary to accomplish this objective:

Activity 27: Design and enforce the control programs for captive breeding of tigers in legal tiger zoos with a captive tiger database of individual tracking records.

Activity 28: Discourage illegal activities involving captive tigers, using effective public campaigns which highlight the impacts of tiger conservation.

Activity 29: Public campaigns showing the difference between wild & captive tiger conservation.

Priority action 2: Building capacity based on successful models

Objective 9: Establish a Regional Tiger Conservation and Research Center at Huai Kha Khaeng Wildlife Sanctuary

Challenge: High standard curricula and efficiency in international collaborations are important to run a regional training center.

Opportunity: The Smart Patrol System and tiger and prey population monitoring and research programs in WEFCOM have long been in operation and of good enough quality to contribute to tiger conservation and research in the Southeast Asian region.

Expected outcome: The skills of tiger conservation and research are being shared in the region by using the facility in WEFCOM as one of the best places to encounter tiger signs, tracks, and tiger prey in Southeast Asia.

Duration and locations: 12 years, Huai Kha Khaeng Wildlife Sanctuary.

Activities necessary to accomplish this objective:

Activity 30: Designate staff and design an administrative structure to run the center with shared experiences and administrations.

Activity 31: Ensure that the training center has sufficient facilities and equipment to provide high quality training in management, enforcement, and research to serve both Thailand and the region.

Activity 32: Establish technical and enforcement-related curricula that will prepare participants to meet protected area management standards.

Objective 10: Ensure national training capacity can deliver high quality tiger conservation training at all levels

Challenge: Numbers and capacity of trainers to conduct high quality training courses on tiger conservation at the national level are still limited.

Opportunity: High standard trainings with tiger conservation focus have existed in Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries for many years.

Expected outcome: The quality of trainers and trainees are improved with high standard courses.

Duration and locations: 12 years, Tenasserim – WEFCON as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 33: Strengthen the local instructor capacity for conducting training courses for tiger research and conservation for Thai and international audiences.

Activity 34: Establish a national standard as sufficient resources for tiger conservation training.

Priority action 3: Strengthening monitoring, research, and information management

Objective 11: Monitor tiger and prey populations in priority landscapes

Challenge: Populations of tigers and prey in the core areas of priority landscapes need intensive monitoring systems with up-to-date technologies to be able to speak with confidence on population trends.

Opportunity: The rigorous population monitoring systems of tigers and prey have been run in the core area of WEFCON for many years with collaborative support.

Expected outcome: The success of tiger conservation activities can be strongly linked to the target, which is the occurrence of tigers and their prey.

Duration and locations: 12 years, Tenasserim-WFCON as the tiger source site and DP-KY as the potential source site and other protected areas for a nation-wide survey.

Activities necessary to accomplish this objective:

Activity 35: Maintain and establish high standard annual population monitoring systems for tigers and their prey in tiger sources and potential source sites in the priority landscapes.

Activity 36: Establish landscape scale occupancy monitoring systems for tigers and prey throughout the two priority landscapes.

Activity 37: Implement a nationwide survey and reporting system on tigers and prey occurrence based on scientific methods.

Objective 12: Maintain long-term tiger and prey ecology research in priority landscapes

Challenge: Understanding the dynamics of tiger biology and ecology in different habitats and landscapes is very important for tiger conservation and restoration.

Opportunity: Huai Kha Khaeng Wildlife Sanctuary is the only site in Southeast Asia with intensive long-term tiger research by a strong research team.

Expected outcome: Managers and conservation scientists have better understanding of how tigers use the landscapes, monitor inbreeding depression, and track the source of tigers and tiger parts confiscated from illegal trade.

Duration and locations: 12 years, Tenasserim-WFCON as the tiger source site and DP-KY as the potential source site and other protected areas for a nationwide survey.

Activities necessary to accomplish this objective:

Activity 38: Strengthen long-term tiger ecology study in priority

landscapes, especially to determine maximum densities that can be supported in the landscapes to meet recovery targets.

Activity 39: Determine genetic structure of wild tigers at the population level and of captive tigers.

Khao Nang Rum Wildlife Research Station, WCS-Thailand Program

Objective 13: Ensure that relevant information for tiger conservation is well managed and available to inform strategy and planning

Challenge: Relevant information for tiger conservation is mostly scattered and has not been efficiently used to inform managers.

Opportunity: Information on tiger conservation in WEFCOM has been advanced and well organized over the last 5 years and the Wildlife Conservation Office of DNP has established an information center at the headquarters in Bangkok to be a center for smart patrol database.

Expected outcome: The government of Thailand has a high quality central database to cooperate with other organizations on tiger conservation.

Duration and locations: 12 years, DNP headquarters in Bangkok.

Activity necessary to accomplish this objective:

Activity 40: Develop information structure that facilitates compilation of national tiger related data for improvement of tiger conservation.

Priority action 4: Promoting education, awareness, and public participation

Objective 14: Convey tiger conservation-related messages to a diverse policy makers, and politicians.

Challenge: Most Thai public and policy makers do not perceive tigers as national pride and symbol as elephants.

Opportunity: Tiger can be used as an iconic species if promoted properly



and if enough information on the situation of tigers in WEFCOM is available to motivate public and other sectors in the community.

Expected outcome: Thai society gives strong support for tigers and wildlife conservation and natural resource management.

Duration and locations: 12 years, schools and communities around WEFCOM and DP-KY landscapes and Thai society at large.

Activities necessary to accomplish this objective:

Activity 41: Public campaigns on wild tiger conservation in local schools and communities around priority landscapes using innovative tools and impact monitoring system.

Activity 42: Deliver the message of tiger conservation through mainstream media channels.

Activity 43: Produce quality publications that contain information on tigers and their roles in the ecosystem to the public.

Objective15: Ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels

Challenge: Unlike elephants, the story of the tiger's ecological and cultural significance has not been incorporated in any curriculum at any educational level.

Opportunity: Enough information is now available about tigers and their significance to Thailand's ecological system to be part of the curriculum at many levels.

Expected outcome: The government of Thailand has a high quality central database to cooperate with other organizations on tiger conservation.

Duration and locations: 12 years, national level.

Activity necessary to accomplish this objective:

Activity 44: Work with the Ministry of Education to include specific tiger-related learning goals in both primary and secondary standard curricula.

Objective16: Ensure that the co-benefits of tiger landscape conservation are understood and appreciated

Challenge: The ecosystem services and benefits to society that accrue specifically from tiger landscapes and potential tiger landscapes in Thailand have not been widely acknowledged.

Opportunity: Reliable techniques to quantify ecosystem service values have been used and the results can lead to greater attention from policy makers and other sectors in society. *WCS-Thailand Program*

Expected outcome: More support for tiger conservation from other sectors of the society.

Duration and locations: 12 years, national level.

Activity necessary to accomplish this objective:

Activity 45: Quantify ecosystem service values and use the information to communicate the broader values of tiger conservation landscapes.

Priority action 5: Strategic financing for tiger conservation

Objective17: Identify the costs of effective tiger conservation, current expenditures, and efficiency of these expenditures

Challenge: All current tiger and potential tiger sites and landscapes in Thailand still do not have



sufficient budgets and manpower to conserve and recover wild tigers.

Opportunity: There are examples of tiger conservation costings from other tiger range countries and other successful projects that can be used to estimate the costs of tiger conservation in Thailand.

Expected outcome: The real cost of wild tiger conservation is understood and the budget is increased.

Duration and locations: 12 years, national level.

Activity necessary to accomplish this objective:

Activity 46: Baseline study of protected area costs and efficiency of current expenditures.

Objective18: Make use of large scale funding opportunities such as GEF 5, REDD, and other programs to fund tiger conservation efforts

Challenge: Large scale funding sources such as GEF-5, REDD, and others are not tiger-focused enough to provide funding; addressing too many non-impact activities can detract energy and resources from true tiger conservation and recovery; and the government processes associated with developing large scale funding opportunities takes a long time to go through the government process.

Opportunity: If prepared properly and funded, large scale funding sources can sustain important activities until results of impacts are known.

Expected outcome: Opportunity for funding is expanded

Duration and locations: 12 years, Tenasserim-WFECOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 47: Utilize GEF-5 programmatic funding opportunity to secure additional national funding for tiger landscape conservation support.

Activity 48: Develop full REDD+ funding strategy for the Dawna Tenasserim landscape.

Objective19: Develop sustainable funding mechanisms

Challenge: Tiger conservation and recovery take a long time before results start to be seen and in many areas funding sustainability is the key problem that has led to failure.

Opportunity: In Thailand the government budget is the most sustainable mechanism for tiger conservation and recovery. However, the budget allocation and expenditure systems need to be

overhauled under good governance, which is transparent and monitorable.

Expected outcome: Opportunity for funding is expanded and sustained.

Duration and locations: 12 years, Tenasserim-WFECOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 49: Identify potential payment for ecosystem services mechanism and develop pilot projects to demonstrate their values.

Activity 50: Establish a trust fund for conservation activities in priority landscapes.

Activity 51: Enhance ecotourism opportunities in and around tiger landscapes and ensure that revenues flow more directly to tiger conservation efforts.



Policy Change to Support the Objectives

To accomplish Thailand Tiger Action Plan, related agencies should implement following actions:

- Develop policies on promotion, salaries and social security systems for protected area staff and park rangers
- Encourage policy makers to develop policies on career paths for superintendents of protected areas (national parks and wildlife sanctuaries) for effectiveness and continuity of the work quality
- Up list tigers to the reserved species under the Wild Animal Reservation and Protection Act B. E. 2535 (1992)
- Strengthen enforcement of wildlife crime under the Wild Animal Reservation and Protection Act B.E.2535 (1992) to make sure that convicted offenders receive the highest penalty of Wildlife Laws and related legislations.

Action Plan Implementation

To be successful in recovering wild tiger populations following the vision, goals, priority actions, objectives, and activities mentioned in this plan, the Ministry of Natural Resources and Environment needs to set up a National Tiger Conservation Committee. The members of the committee should come from government agencies, education institutes and NGOs involved with tiger conservation and recovery under the action plan. This committee will have the following activities:

1. Meet annually to review progress of the National Tiger Action Plan as follows:



- Review progress of key activities, objectives and goals of priority actions with focusing on the tiger source site landscape of Tenasserim-WEFCOM and potential site landscape of DP-KY
 - Evaluate the effectiveness of activities under each priority action
 - Adjust and adapt approaches to fulfill the objectives and priority actions
 - Set up progress targets and a timetable of key activities
 - Consult with experts and scientists on progress toward tiger population goals
 - Prepare information for upcoming meetings on tiger conservation.
2. Convene an annual meeting with stakeholders to report the progress of the action plan.
 3. Produce and circulate an annual tiger conservation report.



APPRECIATIVE REMARKS

for

Political Leadership on Tiger Conservation in Thailand

H. E. SUWIT KHUNKITTI

Minister of Natural Resources and Environment

H.E. Suwit Khunkitti is a well renowned public figure in Thai society who has served the country in various important public service and ministerial positions, including Deputy Prime Minister. He has been a prominent conservationist in Thailand for many years, having received the 1995 Best Conservationist award from the Siam Environmental Society. More recently, he was the recipient of the 2009 J. Paul Getty Award for Conservation Leadership, which was deeply appreciated by those who served under him. Since then, the international community has supported his policies to strengthen tiger and wildlife conservation in local and international arenas.

Thailand's first Tiger Action Plan was launched by H.E. Khunkitti during his first term as Minister of Natural Resources and Environment in 2004. This plan directed Thailand to work in cooperation with government, academic, and NGO partners to improve the conservation of tigers and other wildlife. The ASEAN Wildlife Law Enforcement Network (ASEAN-WEN) also was the initiative from his broad vision by working closely with ASEAN countries to suppress the cross-border trade of wildlife in CITES CoP13.

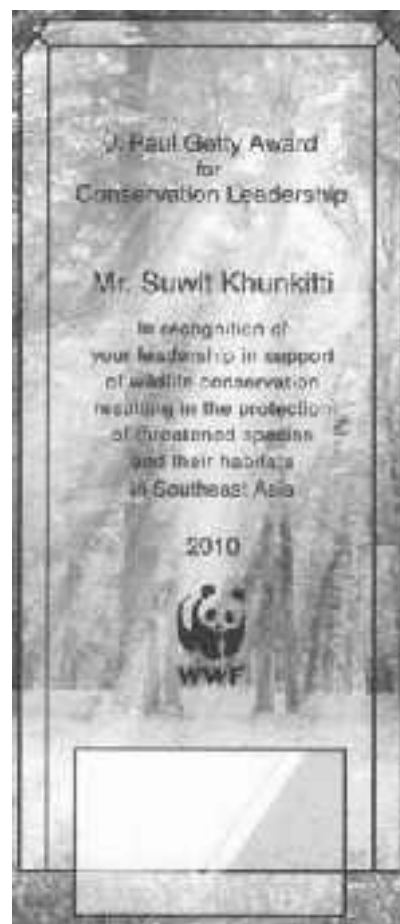
Since returning to MoNRE as minister in 2009, H.E. Khunkitti has given strong support to the Global Tiger Initiative (GTI) and overseen the hosting of two important international tiger conservation meetings – which represent two important recommendations; The Pattaya Manifesto on Combating Wildlife Crime in Asia and Hua Hin Declaration on Tiger Conservation as a result of a ministerial conference on tiger conservation. From these gatherings came clear directives for greater efforts in the area of international cooperation to achieve stated goals in tiger conservation.

Thus, under H.E. Khunkitti's leadership, Thailand is now an active member of the global tiger conservation community. Its recent commitments include measures to increase by more than 50% the tiger populations in priority tiger-source sites; the

establishment of the Regional Tiger Conservation and Research Center in Huai

Kha Khaeng Wildlife Sanctuary; and the strengthening of ASEAN-WEN, including its expansion to include the greater Asia region.

The 2nd Thailand Tiger Action Plan you are holding is another important outcome of H.E. Khunkitti's leadership. On behalf of the people working for wildlife, from policy-level down to park rangers battling wildlife crimes at the frontline, the Department of National Parks, Wildlife and Plant Conservation would like to give its sincere appreciation to H. E. Suwit Khunkitti for his leadership in tiger conservation in Thailand.

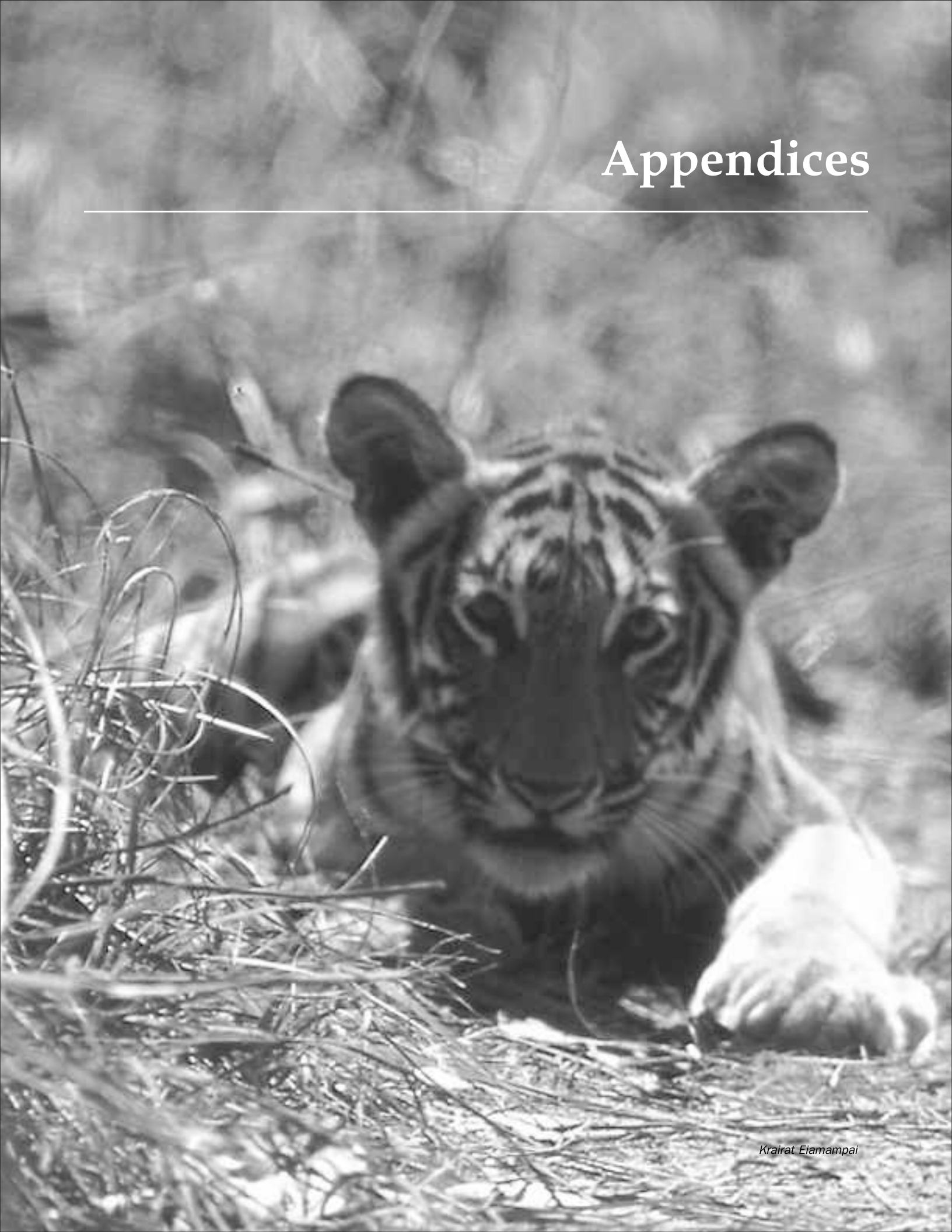


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Appendices





Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions

	Action	Indicator	Means of Verification			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	Strengthening direct conservation action and enforcement																
1.1	Promote conservation efforts at the scale of entire tiger populations (e.g., forest complexes and associated corridors)																
1.1.1	Strengthen and standardize “Smart patrol system” in protected areas of current tiger source and potential source sites, including Tenasserim – WEFCON and DP-KY.	Numbers of protected areas with MIST-based smart patrol system; patrol efforts (patrol days, patrol distance, patrol coverage); threat distribution and trend	Monthly reports; meeting minutes	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.1.2	Increase the number of competent park ranger teams patrolling in each protected area of priority landscapes up to the level that can effectively secure tigers and their prey.	Numbers of park rangers in HKK-TY and KY-TL.	Protected area budget and human resources; transparent system of hiring park rangers	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.1.3	Strengthen wildlife crime units and informant networks around Tenasserim – WEFCON and DP-KY Forest Complex to suppress local demands on wild meat and illegal wildlife trade and help apprehend wildlife criminals around protected areas.	Numbers of wildlife crime units in PAAO 1, 3, 7, 12, 14; data quality in wildlife trade database; enforcement cases	Monthly reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.1.4	Work with district attorneys and judges to ensure substantial punishment on wildlife crime against tigers and other large ungulates.	Proportion of cases resulting in conviction; balance applications of penalty ranges	Conviction reports; police reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.1.5	Overhaul the park ranger system to a higher living and working standard, and provide rewards and incentives to encourage patrolling (e.g., patrolling budgets) and other significant morale boosting programs such as performance-based promotions.	Better performance-based compensation and promotion; increase in base salaries and benefits; funds for ranger welfare in priority landscapes	Job performances; regular protected areas reports submitted to DNP	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.1.6	Apply landscape-scale ecological and development models for tiger conservation and engage stakeholders in development sectors (i.e., roads, oil and gas, mining, power) to minimize and mitigate impacts in sectoral activities on tiger habitats.	Numbers of management approaches and development models applied at the landscape scale	DNP reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action		Indicator		Means of Verification		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.2 Provide long-term support for tiger habitat restoration activities																	
1.2.1	Promote use of controlled burning in potential and manageable parts of priority landscapes to maintain grassland for ungulate recovery.	Areas for control burned; changes in ungulate use of the burned areas	Maps and areas managed using fires	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.2.2	Prevent and suppress fires effectively in evergreen forest areas in priority landscapes to provide good cover and watersheds for tigers and wildlife.	Areas with fire controlled	Satellite image reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.2.3	Strengthen the reintroduction program of ungulate prey with the ex-situ succeeded species (i.e., sambar, eld's deer, hog deer) in suitable habitats.	Species, numbers, and locations; numbers of reintroduced animals surviving after reintroductions; breeding success	Reintroduction plan; monitoring system; breeding and reintroduction reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.2.4	Maintain natural and existing artificial water sources that benefit tigers and ungulates especially during the drought periods in priority landscapes.	Numbers of water sources; demonstrated increase in prey numbers	Report on monitoring results of wildlife use of water sources and salt licks	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.2.5	Establish a system to control invasive species (e.g., <i>Lantana camara</i> , <i>Mimosa pudica</i>) in the priority landscapes.	New areas where invasive species detected	Project surveys; protected areas reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.2.6	Identify priorities for corridor and habitat restoration.	Areas identified for corridor and habitat restoration	Maps of corridors	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.3 Ensure that government policy of protecting tiger habitats from development threats, as committed to in the Hua Hin declaration, is followed																	
1.3.1	Ensure that no major infrastructure development occurs in core tiger habitats.	Numbers of major development project rejected	Government reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.3.2	Ensure that infrastructure development in corridors and buffer zones conform with Smart Green Infrastructure designs to ensure minimal impacts to tiger habitats and maintain landscape connectivity.	Number of green infrastructure protects in corridors and buffer zones	Government reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action		Indicator	Means of Verification												2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.4	Encourage community participation and cooperation in protected area conservation activities		Wildlife conservation actions participated by members of networks; projects conducted by volunteers																							
1.4.1	Strengthen and build wildlife conservation network around the priority landscape to enhance tiger and wildlife conservation in the priority areas.	Numbers of wildlife conservation network established; numbers and groups of people trained as volunteers													x	x	x	x	x	x	x	x	x	x	x	x
1.4.2	Provide Protected Area Committees (PAC) and Community Committees (CC) with quality information (e.g., data from Smart Patrol System) on which to base threat reduction decisions and activities.	Meeting frequency and resolutions from the meeting; successful cases of participatorial management approaches													x	x	x	x	x	x	x	x	x	x	x	x
1.5	Support local communities in developing sustainable economies that reduce dependence on forest resources		PAs Reports																							
1.5.1	Link communities with agricultural science institutes and agencies to promote agro-forestry in buffer zone areas around priority landscapes to reduce collection of Non Timber Forest Products (NTFPs) inside Protected Areas (PAs).	Incomes from agro-forestry products (eg., bamboo shoots, mushrooms)													x	x	x	x	x	x	x	x	x	x	x	x
1.5.2	Develop wildlife-based ecotourism with concrete benefit sharing with communities in appropriate areas in and around PAs.	Numbers of projects, areas, and activities; revenue flowing to the communities													x	x	x	x	x	x	x	x	x	x	x	x
1.6	Facilitate international cooperation in tiger conservation efforts		CITES Management Authority of Thailand; DNP biannual reports; DNP annual reports and statistics																							
1.6.1	Strengthen enforcement capacity of Thailand's CITES programs with better interagency-collaboration and stronger protocols and impact monitoring systems on wildlife trade.	Transparent permit system; numbers of cases resulting from interagency-collaboration; active responses from CITES checkpoints and interagency collaboration													x	x	x	x	x	x	x	x	x	x	x	x
1.6.2	Strengthen and sustain capacity of ASEAN-WEN.	Enforcement monitoring system; positive response from relevant authorities from ASEAN countries													x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.6.3 Strengthen bi-lateral cooperation with Cambodia, Laos, Malaysia and Myanmar for transboundary enforcement and monitoring and research.	Numbers of collaboration projects, areas, and activities	Biennial reports of CITES Management Authority of Thailand; DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x
1.7 Strengthen national laws, policies, and enforcement of tiger related crimes														
1.7.1 Strengthen enforcement on wildlife crime under the Wild Animal Reservation and Protection Act B.E.2535 (1992) to make sure that convicted offenders receive the highest penalty of Wildlife Laws and related legislations.	Numbers of offenders convicted in a range of penalties	Court decisions; DNP reports; DNP Statistics	x	x	x	x	x	x	x	x	x	x	x	x
1.7.2 Strengthen Thailand-WEN information sharing capacity.	Effective monitoring database on performance; positive responses from relevant authorities; enforcement mechanisms developed; information shared	Thailand-WEN annual reports; reports on enforcement actions	x	x	x	x	x	x	x	x	x	x	x	x
1.7.3 Strengthen investigative capacity and judiciary effectiveness in wildlife crime cases.	Prosecution and conviction cases; increasing success in prosecution of cases; capacity building training held	Court decisions; training materials; DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x
1.7.4 Strengthen communication campaigns on wild tiger conservation.	Wild tiger conservation discussed at meetings; awareness survey; capacity building trainings held	Meeting minutes; campaign materials; awareness survey results	x	x	x	x	x	x	x	x	x	x	x	x
1.7.5 MoU with military, police, Ministry of Interior, Ministry of Education to be strengthened and implemented for better collaboration and training for enforcement.	Numbers of cooperation projects under the MoU; meetings and dialogues to work with military, police, Ministry of Interior, Ministry of Education	MoNRE annual reports	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action		Indicator	Means of Verification												2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.8	Support national and international efforts to manage captive tigers responsibly																									
1.8.1	Design and enforce the control programs for captive breeding of tigers in legal tiger zoos with a captive tiger database tracking records.	Captive tiger database established and run effectively with effective tiger inspection teams.	DNP's reports on status of captive tigers	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.8.2	Discourage illegal activities involving captive tigers, using effective public campaigns which highlight the impacts of tiger conservation.	Effective enforcement on zoos allowed for captive tigers but violating the law; information in the public domain	Enforcement records in DNP annual reports; media pick-ups	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1.8.3	Public campaigns showing the difference between wild & captive tiger conservation.	Strong campaign and clear public understanding on tiger issues; information in the public domain	DNP annual reports; media pick-ups	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Building capacity based on successful models																									
2.1	Establish a Regional Tiger Conservation and Research Center at Huai Kha Khaeng Wildlife Sanctuary																									
2.1.1	Designate staff and design an administrative structure to run the center with shared experiences and administrations.	Clear structure of shared administration established	MoNRE and DNP executive orders	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2.1.2	Ensure that the training center has sufficient facilities and equipment to facilitate high quality training in management, enforcement, and research to serve both Thailand and the region.	Successful pilot training courses delivered; a number of projects participated by tiger range countries	DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2.1.3	Establish technical and enforcement-related curricula that will prepare participants to meet protected area management standards.	A curriculum standard for tiger protected area managers designed and used; a number of protected area managers passed the curricula	DNP executive orders to regulate a curriculum standard on tiger protected areas; DNP Training records	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action		Indicator	Means of Verification												2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.2	Ensure national training capacity can deliver high quality tiger conservation training at all levels																									
2.2.1	Strengthen the local instructors capacity for conducting training courses for tiger research and conservation for Thai and international audience.	Training for trainer courses are well designed and launched	DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2.2.2	Establish a national standard as sufficient resources for tiger conservation training.	National standard is agreed and published	DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	Monitoring, research, and information management																									
3.1	Monitor tiger and prey populations in priority landscapes																									
3.1.1	Maintain and establish high standard annual population monitoring systems for tigers and their prey in tiger sources and potential source sites in the priority landscapes.	System of camera trapping and transect for tiger and prey population monitoring established and annually run with rigorous designs	DNP reports on population monitoring systems	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3.1.2	Establish landscape scale occupancy monitoring systems for tigers and prey throughout the two priority landscapes.	System of occupancy monitoring for tiger and prey established and run	DNP reports on landscape scale occupancy monitoring systems	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3.1.3	Implement a national-wide survey and reporting system on tigers and prey conditions based on scientific methods.	National-wide survey system established and run with rigorous design	DNP reports on a national-wide survey and reporting system on tigers and prey conditions	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3.2	Maintain long-term tiger and prey ecology research in priority landscapes																									
3.2.1	Strengthen long-term tiger ecology studies in priority landscapes, especially to determine maximum densities that can be supported in the landscapes to meet recovery targets.	Tiger and prey ecological studies continued with well designed	Reports and publications on long-term tiger ecology studies	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3.2.2	Determine the genetic structure of wild tigers at the population and of captive tigers.	A systems for collecting tiger scats or hair samples established and run efficiently	Genetic structures existed and updated regularly	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3.3	Ensure that relevant information for tiger conservation is well managed and available to inform strategy and planning																									
3.3.1	Develop information structure that facilitates compilation of national tiger related data for improvement of tiger conservation.	Data consolidated from all tiger protected areas easily accessed and used; mechanisms developed	Information structures existed and updated regularly; published manuals	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
4 Education, awareness, and public participation														
4.1 Convey tiger conservation-related messages to a diverse Thai public, policy makers, and politicians														
4.1.1 Public campaigns on wild tiger conservation in local schools and communities around priority landscapes using innovative tools and impact monitoring system.	Public campaigns on wild tiger conservation designed and used	DNP fact sheets and publications	x	x	x	x	x	x	x	x	x	x	x	x
4.1.2 Deliver the message of tiger conservation through mainstream media channels.	Long-term strategic communication programs developed; publications in magazines or newspapers; public presentations	DNP reports on landscape scale occupancy monitoring systems	x	x	x	x	x	x	x	x	x	x	x	x
4.1.3 Produce quality publications that contain information on tigers and their roles in the ecosystem to the public.	Publications designed and produced among public at large; information in the public domain	Tiger publications; media pick-ups	x	x	x	x	x	x	x	x	x	x	x	x
4.2 Ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels														
4.2.1 Work with Ministry of Education to include specific tiger-related learning goals in both primary and secondary standard curricula.	Tiger conservation and related-topics included in the school curriculum	Reports of the MoU implementation between MoNRE and MoE	x	x	x	x	x	x	x	x	x	x	x	x
4.3 Ensure that the co-benefits of tiger landscape conservation are understood and appreciated														
4.3.1 Quantify ecosystem service values and use the information to communicate the broader values of tiger conservation landscapes.	Ecosystem service values quantified; information in the public domain	DNP ecosystem services publications; media production broadcasted	x	x	x	x	x	x	x	x	x	x	x	x
5 Strategic financing for tiger conservation														
5.1 Identify the costs of effective tiger conservation, current expenditures, and efficiency of these expenditures														
5.1.1 Baseline study of protected area costs and efficiency of current expenditures.	Cost of conservation identified	Study reports	x	x	x	x	x	x	x	x	x	x	x	x
5.2 Make use of large scale funding opportunities such as GEF 5, REDD, other programs to fund tiger conservation efforts														
5.2.1 Utilize GEF 5 programmatic funding opportunities to secure additional national funding for tiger landscape conservation support.	Numbers of proposals submitted	Numbers of proposals funded	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
5.2.2 Develop full REDD+ funding strategy for the Dawna Tenasserim Landscape.	Funding strategy developed; numbers of proposals submitted	Numbers of proposals funded	x	x	x	x	x	x	x	x	x	x	x	x
5.3 Develop sustainable funding mechanisms														
5.3.1 Identify potential payment for ecosystem services mechanism and develop pilot projects to demonstrate their values.	Ecosystem services mechanisms identified; numbers of projects, areas, and activities	Numbers of pilot projects implemented; DNP project reports	x	x	x	x	x	x	x	x	x	x	x	x
5.3.2 Establish a Trust Fund for conservation activities in priority landscapes.	Trust Fund established	Volume and duration of financial support on tiger project	x	x	x	x	x	x	x	x	x	x	x	x
5.3.3 Enhance ecotourism opportunities in and around tiger landscapes and ensure that revenues flow more directly to tiger conservation efforts.	Ecotourism pilot projects developed; proposal submitted	Ecotourism pilot projects tested and applied in and around tiger landscapes	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 2 Estimation of Tiger Population in Thailand Remark: Tiger density in 25 protected areas.

Protected Areas	Area (km ₂)	Abundance			Population
		High	Moderate	Low	
1. Western Forest Complex					
- Huai Kha Khaeng Wildlife Sanctuary	2817	✓			77-59
- Thungyai Naresuan (West) Wildlife Sanctuary	2117		✓		31-16
- Thungyai Naresuan (East) Wildlife Sanctuary	1572		✓		13-9
- Umpang Wildlife Sanctuary	2587			✓	} 27-23
- Mae Wong National Park	896			✓	
- Erawan National Park	530			✓	
- Khuan Si Nakharin National Park	1843			✓	
- Sai Yok National Park	962			✓	
2. Kaeng Krachan Forest Complex					
- Kaeng Krachan National Park	2020*		✓		20-14
- Kui Buri National Park	982		✓		9
3. Dong phayayen–Khao Yai Forest Complex					
- Khao Yai National Park	2260			✓	9-7
- Thap Lan National Park	1805*		✓		} 26-18
- Pang Sida National Park	859		✓		
4. Hala–Bala Forest Complex					
- Bang Lang National Park	289		✓		} 7-5
- Hala Bala Wildlife Sanctuary	422		✓		
5. Phu khieo–Nam Nao Forest Complex					
- Phu–khieo Wildlife Sanctuary	1571			✓	} 10-9
- Nam Nao National Park	975			✓	
6. Doi Phu Kha–Mae Yom Forest Complex					
- Doi Pha Chang Wildlife Sanctuary	583			✓	2
7. Srilanna–Khun Tan Forest Complex					
- Doi Luang National Park	1212			✓	} 6-5
- Khun Chae National Park	287			✓	
8. Lum Nam Pai–Salawin Forest Complex					
- Mae–Yuam Fang Kwa Wildlife Sanctuary	292			✓	} 8-7
- Chiang Dao National Park	1146			✓	
- Salawin National Park	735			✓	
9. Mae Ping–Om Koi Forest Complex					
- Om Koi Wildlife Sanctuary	1226			✓	5-4
10. Khao Luang Forest Complex					
- Khao Luang National Park	596			✓	2
Total					252-189

Tiger Abundance – High

Huai Kha Khaeng Wildlife Sanctuary 2.4 ± 0.32 tiger/100 Km₂ (Khao Nang Rum Wildlife Research Station, 2009)

Tiger Abundance – Moderate

Thungyai Naresuan (West) Wildlife Sanctuary 1.1 ± 0.35 tiger/100 Km² (Khao Nang Rum Wildlife Research Station, 2009)

Thungyai Naresuan (East) Wildlife Sanctuary 0.68 ± 0.15 tiger/100 Km² (Khao Nang Rum Wildlife Research Station, 2009)

Tiger density (other areas) = 1 tiger/100-150 km₂

Tiger Abundance – Low

Tiger density = 1 tiger/250-300 km₂

* estimated protected area excluded the area of human settlement.

Appendix 3 Encounter Rate of Tiger Signs in Thailand's Protected Areas¹ Forest Complex

<hr/>		
<hr/>		
1. Lum Nam Pai-Salawin	2. Salawin National Park	0.5
	3. Mae-Yuam Fang Kwa Wildlife Sanctuary	0.5
<hr/>		
2. Srilanna-Khun Tan	1. Khun Chae National Park	1.1
	2. Doi Luang National Park	1.6
<hr/>		
3. Doi Phu Kha-Mae Yom	1. Doi Pha Chang Wildlife Sanctuary	1.1
<hr/>		
4. Mae Ping-Om Koi	1. Om Koi Wildlife Sanctuary	*
<hr/>		
6. Phu khieo-Nam Nao	1. Nam Nao National Park	0.7
	2. Phu-khieo Wildlife Sanctuary	0.4
<hr/>		
9. Dong phayayen-Khao Yai	1. Khao Yai National Park	0.5
	2. Thap Lan National Park	3.7
	3. Pang Sida National Park	3.9
	1. Khuan Sri Nakharin National Park	0.4
	2. Erawan National Park	0.8
	3. Thungyai Naresuan (West) Wildlife Sanctuary	25.8
	4. Thungyai Naresuan (East) Wildlife Sanctuary	8.3
11. Western	5. Huai Kha Khaeng Wildlife Sanctuary	14.3
	6. Umpang Wildlife Sanctuary	1
	7. Sai Yok National Park	**
	8. Mae Wong National Park	*
<hr/>		
12. Kaeng Krachan	1. Kaeng Krachan National Park	5.2
	2. Kui Buri National Park	1.6
<hr/>		
15. Khao Luang	1. Khao Luang National Park	0.6
<hr/>		
17. Hala-Bala	1. Bang Lang National Park	9.5
	2. Hala Bala Wildlife Sanctuary	4.1
<hr/>		

Remark¹ Data between 2004-2007

* Reported by Park Rangers (2009)

** Data from Camera Trap (2006)

Protected Areas	Study Period	Trap Remark Remark night	No. of Tiger	Estimated Density
1. Huai Kha Khaeng WS ¹ 2009	2010 2731	39 2935 2.39±0.29	39 (KNR,2009)	2.4±0.32 (KNR,pers. Comm.)
2. Thung Yai WS-W ₂ 2009	629	7	1.1±0.35 (KNR,2009)	
Thung Yai WS -E ₂ 2007	629	7	0.68±0.15 (KNR,2009)	
3. Kui Buri NP ₃ 2007	1055	2 ^A 0.8		95%CI=3-10
2009	1458	2 ^A 1		95%CI=4-10
4. Kaeng KraChan NP ₄ 2001	809	4	2.8(SE0.8)	
5. Thap Lan NP ₅ 2008-2010		5552	8	
6. Khao Yai NP ₆ 2003-2006		6172	0	0
7. Klong Saeng WS ₇ 1997-2000		2690	0	0
Dec03-Apr04	528	0	0	
8. Mae Nam Pachi ₈ May-Sep2005	540	0	0	

A “Number of Tiger” reported here are during capture-recapture sampling period, but since 2007 WWF has photographed 9 individual tigers in the park, including 3 cubs.

^{1, 2} - (Khao Nang Rum Research Station, 2009; WCS-Thailand Program, 2007;

WCS-Thailand Program, 2008; WCS-Thailand Program, 2009)

³⁻ (WWF Thailand, 2008)



NATIONAL ACTION PLAN ON TIGER CONSERVATION IN VIETNAM



Song Thanh Nature Reserve

PRIME MINISTER

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom – Happiness

No.: 539/QĐ-TTg

Hanoi, April 16, 2014

DECISION

APPROVING THE NATIONAL PROGRAM ON TIGER CONSERVATION 2014 – 2022

PRIME MINISTER

Pursuant to Law on the Government Organization dated December 25, 2001;
Pursuant to Law on Forest Protection and Development dated December 03, 2004;
Pursuant to Law on Biodiversity dated November 13, 2008;
Pursuant to Decree No. 32/2006/ND-CP dated March 30, 2006 on management of endangered, precious and rare forest flora and fauna;
Pursuant to Decree No. 160/2013/ND-CP dated November 12, 2013 of the Government on criteria to determine endangered, precious and rare species and regimes to manage them;
In consideration of proposal of Minister of Agriculture and Rural Development,

DECIDES:

Article 1. To approve the National Program on Tiger Conservation 2014-2022 (hereafter referred to as “Program”) with following key contents:

I. OBJECTIVES

1. General objectives

Protecting, conserving tiger, its habitat and prey, contributing to preventing the decrease of and gradually recovering, improving and increasing tiger population size until 2022 according to the goals defined in the global tiger conservation program in which Vietnam committed its participation.

2. Specific objectives

a) Phase I (2014-2017):

- Defining prioritized areas for recovery of tiger, its prey and habitat.
- Enhancing management, supervision of tiger rearing activities in the country.
- Improving effectiveness of prevention and punishment of violations of tiger and its prey conservation.
- Enhancing inter-border tiger and nature conservation activities.

b) Phase II (2018-2022):

- Defining all prioritized habitats for tiger conservation.
- Prevention of illegal hunt, trade and use of tiger products and derivatives.
- Enhancing management and conservation of tiger, its prey and habitat in natural environment.
- Preparing and implementing ex-situ tiger conservation programs to return tigers to its natural

habitat

- Establishing a sustainable financial mechanism in natural conservation in general and tiger conservation in particular.

II. SUBJECT AND SCOPE

1. Subject

Activities of domestic and foreign agencies, organizations and individuals related to management, protection and conservation of tiger, its prey and habitat.

2. Scope

- Regarding in-situ conservation, focusing on those areas where tigers are living and which have the potential of tiger recovery at National Parks, Natural Reserves, especially Vu Quang National Park (Ha Tinh province), Pu Mat National Park (Nghe An province), Yok Don National Park (Dak Lak province), Chu Nom Ray National Park (Kon Tum province) and Sop Cop Natural Reserve (Son La province), Song Thanh Natural Reserve (Quang Nam province).
- Regarding legal compliance on tiger conservation, focusing on raising capacity, completing mechanisms, policies and enhancing inter-industry cooperation, international cooperation in preventing illegal hunt, trade, transportation, processing and use of tiger in the country.

III. CONTENTS

1. Defining prioritize areas of tiger conservation

a) Assessment of current situation and defining prioritized areas of tiger conservation are integrated in the contents of other approved and relevant Programs and Strategies such as: Vietnam Forestry Development Strategy 2006-2020, Management Strategy of special-use forests, sea conservation area, inland water conservation area in Vietnam until 2020 with vision to 2030; National Strategy on Biodiversity Conservation until 2020 with vision to 2030;

b) Investigating, researching, assessing feasibility of recovering tigers in areas where tigers are living such as Pu Mat, Vu Quang, Chu Mom Ray, Yok Don National Garden and Sop Cop and Song Thanh Nature Reserve; proposing to construct conservation corridors in tiger's natural habitat;

c) Enhancing examination, control to prevent and minimize activities which have negative impacts on tiger's natural habitat.

2. Formulating observation programs on tiger and its prey population in nature.

a) Developing a set of criteria and indexes for observation and conservation of tiger and its prey in nature;

b) Implementing observation programs on change of tiger and its prey population in prioritized habitat on basis of criteria and indexes approved by competent authorities;

c) Conducting investigation, survey on tiger, its prey and habitat in prioritized areas;

d) Assessing, supervising ecological succession at prioritized habitat of tiger conservation and other potential habitats for tiger conservation;

đ) Implementing scientific research projects on supervising change in wild tiger and its prey population;

e) Conducting researches on transferring and applying advanced scientific solutions in the world on management, protection and supervision of tiger and its prey; encouraging domestic initiatives, technical solutions on management and protection of tiger and its prey.

3. Enhancing management and supervision of tiger breeding for conservation purpose.

a) Investigating, preparing statistics and documents of managing captive tigers in Vietnam; establishing national database system to manage, identify captive tigers (through gene documents, photographs, attachment of electronic chips and marking cards);

b) Developing and applying observation programs at captive tiger rearing facilities in the country;

c) Assessing impacts of tiger captive and breeding activities at rearing facilities on wild tiger conservation;

d) Organizing trainings to strengthen competences, skills to identify, manage captive tigers for managing officers and legal compliance officers of related agencies;

đ) Formulating and implementing research programs on breeding, rearing and conserving tiger and returning tiger to its natural environment; implementing the program of moving, returning and recovering tiger population in habitat of wild tigers, in which legal tiger breeding facilities are encouraged to participate in implementing the Program.

4. Improving effectiveness in prevention and punishment of violations of conservation of tiger and its prey.

a) Reviewing, proposing amendment and supplement of legal regulations on protection of endangered flora and fauna, in which focusing on protection of tiger and its prey to prevent illegal hunt, transportation, capture and use of derivatives from tigers;

b) Formulating documents, training curricula, integrating into regular training programs of related industries;

c) Implementing training programs, supplementary programs to enhance capability of legal compliance officers of tiger conservation in such sectors as public security, customs, market management, border guards; content of trainings focuses on such issues as prevention of illegal trade, transportation of tiger, its derivatives and its prey;

d) Increasing exchange, information sharing and international cooperation in prevention, investigation and dealing with illegal inter-border trade and transportation of tiger;

d) Developing national archive center for tiger database and sample; listing and marking all tiger samples which are being kept at facilities of individuals and organizations such as museum, display center and zoos and preparing management documents.

5. Strengthening communication, improving awareness to prevent illegal use of products made from tiger, its prey and wild animal:

a) Conducting socio-economic, cultural and historical impact assessments on conservation in general and tiger conservation in particular;

b) Investigating market demand and altitude on consuming products made from tiger, its prey and endangered, precious and rare animals;

c) Organize activities to enhance communication capability of news agencies and related parties. Formulating and implementing communication campaigns to raise community awareness to change habit and reduce the demand for products made from tiger in traditional medicine and encourage active participation of community in tiger conservation;

d) Integrating education on wild animals and plants into curriculum at high school education;

đ) Raising awareness of the society on legal regulations related to protection of tiger and its prey.

e) Applying strict management over publication of traditional medicine documents to screen contents related to use guide regarding products made from endangered, precious and rare animals in disease prevention and treatment.

6. Diversifying sources of capital, establishing a financial mechanism suitable to requirements to strengthen tiger conservation:

a) Assessing current resources and potentials for tiger conservation; assessing integration and mobilization of other resources in management, natural conservation at prioritized areas of tiger conservation;

b) Developing effective management mechanism to mobilize, integrate maximum resources into tiger conservation, in which special attention is paid to mechanism of mobilizing fund from private sector, non-governmental organizations and international community for prioritized area of tiger conservation;

c) Managing financial support for conservation of

tiger and endangered animals and plants effectively.

7. To enhance cross-border cooperation with countries sharing the same borders with Vietnam and those in the area and in the world for tiger conservation.

a) To suggest the construction of cross-border tiger conservation areas based on scientific evaluation and the practical situation. To develop mechanisms for cooperation and bilateral action plan between Vietnam - Laos, Vietnam - Cambodia and Vietnam - China in cross-border conservation. To strengthen the fight against cross-border crime in trafficking, illegal transportation of tiger specimens;

b) To promote cooperation in information sharing between Vietnam and bordering countries, countries in the region, organizations and international partners in tiger conservation;

c) To actively participate in and implement international treaties, agreements with member states, international institutions related to the conservation of tigers and other endangered, precious and rare animals, plants such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Global Tiger Forum (GTF), Global Tiger Initiative (GTI), World Bank (WB), International Criminal Police (Interpol), the World Customs Organization (WCO) in the capacity building activities; to mobilize resources to support the conservation, enforcing and sharing related information;

d) To establish at least one cross-border conservation area where tigers are naturally distributed between Vietnam, Laos and Cambodia.

IV. EXPENSES USED FOR THE PROGRAM

1. Funding for the implementation of activities in the national program on tiger conservation will be mainstreamed in the regular budget for activities in forest protection and management, nature conservation, prevention of illicit trafficking of wildlife; plan on protection and development in stage 2011 - 2020; communications and other current programs related to the development of buffer of special-use forests.

2. The ministries, ministerial-level agencies, agencies of the Government and the civil societies organizations shall ensure funds for the implementation of programs, projects and tasks for

biodiversity conservation, environmental protection, forest management and protection, conservation of endangered and rare species, rare from regular state budget under annual plans.

3. People's Committees of centrally administered provinces and cities shall ensure funds from local budgets to implement projects and tasks used for activities within the scope of local management related to nature conservation and management of conservation areas.

4. To encourage and mobilize extra-budgetary funds, financial and technical support from the international community to develop and implement the contents of this program.

V. METHOD OF IMPLEMENTATION

Some main solutions as follows are implemented to achieve the objectives of the program:

1. Planning Solutions

a) Planning on priority areas for tiger conservation is incorporated with the planning of special-use forest system approved by the Prime Minister in Decision No. 218/QĐ-TTg dated February 7, 2014 approving management strategy on special use forest system, marine protected areas, inland water conservation areas by 2020, vision 2030;

b) Period 2014 - 2017: Reviewing the SUF planning for species conservation that identifies priorities given to conservation and restoration of tigers in nature with an estimated area of 500,000 ha;

c) Period 2017 - 2022: On the basis of evaluating the effectiveness of planning in the previous period, make the adjustment of habitat planning for tiger conservation in line with the reality.

2. Policy mechanism solution

a) To develop and issue technical guidelines, regulations and standards of tiger feeding for non-commercial purposes;

b) Period 2014 - 2017: To review, add, modify and complete the policy to attract financial resources, technical assistance to implement the program;

c) Period 2017 - 2022: To continue to review and evaluate the implementation of nature conservation policy; to supplement, amend it in accordance with

the actual implementation in previous period.

3. Solution to mobilize resources

a) To complete the mechanism and enhance coordination between ministries, departments, agencies and local authorities in the implementation of the program, focusing on fighting, preventing and strictly punishing violations of legislation on management and conservation of endangered and rare wildlife;

b) To perform the integration of contents of the program on the strategies, plans, projects, planning schemes on development of industries at central and local levels;

c) To strengthen the capacity of management and law enforcement on the conservation and protection of tigers and their prey;

d) To ensure appropriate funding for the management and protection of tigers, focusing on investment in tiger conservation in the wildlife, fighting, preventing illegal hunting, trafficking and consumption of tiger;

đ) To create a convenient mechanism for organizations, individuals in and outside Vietnam to invest, transfer of technology for the management and conservation of tigers;

e) To suggest and apply new financial mechanisms in accordance with the requirement to invest and support the management and conservation of tigers and their prey.

4. Science and technology solution

a) To give priority to execute the research, transfer and application of advanced science and technology solutions for management, protection and supervision of tigers, tiger prey and ecological processes;

b) To encourage innovation, scientific and technological solutions in water management, conservation and protection of tigers and their prey.

5. Solution to propaganda, education and awareness rising in the society in implementation of the program.

a) To implement the communications program on tiger conservation, integrated with advocacy and dissemination of legal texts on conservation of nature and endangered and rare species;

b) To organize training courses on media for stakeholders, encourage community involvement in education, propaganda of tiger conservation

6. To strengthen international cooperation on tiger conservation.

a) Based on the contents of the program, related local agencies should strengthen cooperation with other countries, especially those with shared borders to enhance effective control of smuggling tiger across borders;

b) To actively participate in and implement international agreements, the mechanism of regional cooperation, the bilateral cooperation related to the management and protection of tigers;

c) To diversify forms of bilateral and multilateral cooperation with countries, international and regional organizations in management and protection of tigers.

Article 2. Implementation

1. Ministry of Agriculture and Rural Development shall be assigned to establish the Steering Committee for implementation of the program with the participation of ministries, departments, branches and People's Committees of the provinces concerned. It shall organize and guide the implementation of the program; chair and coordinate with ministries, branches and localities in effectively implementing the contents of the program, sending annual report to the Prime Minister.

2. Ministry of Planning and Investment shall balance investment fund in accordance with the annual plan for implementation of the program.

3. Ministry of Finance shall guide the mechanism of allocation, management of use, funding the implementation of projects under the provisions of the Law on the State Budget; directing the Customs force, in close collaboration with the relevant agencies to strengthen inspection and control of trade, transport, export or import of illegal tiger specimens.

4. The Ministry of Natural Resources and Environment shall cooperate with Ministry of Agriculture and Rural Development and relevant ministries and departments to perform planning, dissemination of biodiversity conservation and other related activities according to functions and assigned tasks.

5. Ministry of Public Security shall strengthen measures to prevent and combat criminal violations of the law on protection of tigers and other wildlife species protected by law; promote the investigation, detection and definitely handle the illegal trafficking and transportation of tigers and their prey; enhancing coordination, information exchange with international cooperation in the investigation and handling of cases of cross-border trade of tiger specimens and species of animals and other endangered wildlife.

6. Ministry of Health shall research, identify and encourage the use of alternative products for tiger products and protected species in traditional medicine; issuing written guidance to manage and direct the non-use and prohibition of advertisements of species protected by law in disease prevention and treatment by traditional medical.

7. Ministry of Industry and Trade shall direct market management to closely coordinate with relevant agencies in order to strengthen the inspection and control of illegal trade, transport, export or import of tiger specimens.

8. Ministries, ministerial-level agencies, government agencies, boards, branches and People's Committees of provinces and cities directly under the central government, based on the program, build and implement activities of their ministries, branches and localities.

Article 3. This Decision takes effect from the date of signing.

Ministers, heads of ministerial-level agencies, heads of agencies of the government, Chairman of People's Committees of provinces and cities directly under the Central Government, heads of agencies and relevant organizations shall implement this Decision.

Recipients

- Secretary of the Party Central Committee;
- Prime Minister, Deputy Prime Ministers;
- Ministries, ministerial-level agencies, Government agencies;
- People's Committees of provinces and cities directly under the Central Government
- Central Office and the Committees of the Party;
- Office of the General Secretary;
- Office of the President;
- Ethnicity Council and Committees of National Assembly;
- National Assembly Office;
- Supreme People's Court;
- Supreme People's Procuracy;
- National Financial Supervision Committee;
- State Auditor;
- Bank for Social Policies;
- Vietnam Development Bank;
- Central Committee of the Vietnam Fatherland Front;
- Central offices of the unions;
- Office: Chairman, Deputy Chairmen, Assistant to Prime Minister, CEO of e-payment gateway, departments, subordinate units, gazette;
- Archive: office, KTN (3b).

**FOR THE PRIME MINISTER
DEPUTY PRIME MINISTER**



Hoàng Trung Hải

OTHER WTI PUBLICATIONS

A. OCCASIONAL REPORTS

Tribal Territories:

Impact assessment around the Jarawa tribal reserve, middle and south Andaman Islands

Captive Concerns:

Health and management of captive elephants in Jaipur

Jumbo Express:

A scientific approach to understanding and mitigating elephant mortality due to train accidents in Rajaji National Park.

Fair Concern:

Health and management of captive elephants in Sonpur

Elephant in Exile:

A rapid assessment of the human-elephant conflict in Chhattisgarh

Ganesha to Bin Laden:

Human-elephant conflict in Sonitpur district of Assam

Healing Touch:

Health and management of captive elephants at Kaziranga elephant festivals

Dog and Bull:

An investigation into carnivore-human conflict in and around Itanagar Wildlife Sanctuary, Arunachal Pradesh

Against the Current:

Otters in the river Cauvery, Karnataka

Making Way

Securing the Chilla-Motichur Corridor to protect elephants of Rajaji National Park

Silent Stranglers:

Eradication of mimosa in Kaziranga National Park, Assam

Living at the Edge:

Rapid survey for the endangered Ladakh urial (*Ovis vignei vignei*) in Leh district of Ladakh Trans-Himalaya

Search for Spectacle:

A conservation survey of the Phayre's leaf monkey (*Trachypithecus phayrei*) in Assam and Mizoram

Sighting Storks:

Status and distribution of Greater adjutant storks (*Leptoptilos dubius*) in the Ganga and Kosi river floodplains near Bhagalpur, Bihar

Bait and Watch:

Popularization of alternatives to dolphin oil among fishermen for the conservation of the Ganges river dolphin (*Plantanista gangetica*) in Bihar

No Mast Kalandar:

The beginning to the end of dancing with bears

Awaiting Arribadda:

Protection of Olive Ridley turtles (*Lepidochelys olivacea*) and their nesting habitats at Rushikuliya rookery, Orissa

Living with Giants:

Understanding human-elephant conflict in Maharashtra and adjoining areas

Crane Capital:

Conservation strategy for Sarus Crane (*Grus antigone*) habitat in Etawah and Mainpuri Districts, Uttar Pradesh

Deadly Tracks:

A scientific approach to understanding and mitigating elephant mortality due to train hits in Assam

Carnivore Conflict:

Support provided to leopards involved in conflict related cases in Maharashtra

India at the International Whaling commission:

A policy document on India's involvement in the IWC 1981-2003

Hunt for Hangul

Establishing the presence of hangul outside Dachigam National Park, Jammu & Kashmir

B. CONSERVATION ACTION REPORTS**Beyond the Ban:**

A census of Shahtoosh workers in Jammu & Kashmir

Biodiversity, Livelihoods and the Law:

The case of the 'Jogi Nath' snake charmers of India

Goats on the Border:

A rapid assessment of the Pir Panjal markhor in Jammu & Kashmir distribution, status and threats

The Ground Beneath the Waves : (2 Volumes)

Post-tsunami impact assessment of wildlife and their habitats in India

Walking the Bears:

Rehabilitation of Asiatic black bears in Arunachal Pradesh

Mountain Migrants:

Survey of Tibetan Antelope (*Pantholops hodgsonii*) and Wild Yak (*Bos grunniens*) in Ladakh, Jammu & Kashmir, India

Predator Alert:

Attacks on humans by leopard and Asiatic black bear in the Kashmir valley – Analysis of case studies and spatial patterns of elevated conflict

Turning the Tide:

The campaign to save Vhali, the Whale Shark (*Rhincondon typus*) in Gujarat

Gujarat's Gentle Giant

Conservation of Whale Shark (*Rhincondon typus*) in Gujarat

Daring to Restore

Coral Reef Recovery in Mithapur

C. CONSERVATION REFERENCE SERIES**Wildlife Law:**

A ready reckoner - A guide to the Wildlife (Protection) Act 1972

Back to the Wild:

Studies in wildlife rehabilitation

Right of Passage:

Elephant corridors of India

Poisons and the Pachyderm:

Responding to poisoning in Asian elephants – A field guide

Commentaries on Wildlife Law:

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Ecology and conservation of Asian elephants in Kameng elephant reserve, Arunachal Pradesh

Bringing Back Manas:

Conserving the forest and wildlife of the Bodoland Territorial Council

Canopies and Corridors:

Conserving the forest of Garo Hills with elephant and gibbon as flagships

D. OTHERS**Wrap up the trade:**

An international campaign to save the endangered Tibetan Antelope

Tiger Bridge:

Nine days on a bend of the Nauranala

Emergency Relief Network Digest 2005 – 2006**Emergency Relief Network Digest 2006 – 2007****Action Tiger:**

Tiger action plans of 12 tiger range countries

As an animal high on popularity charts, the tiger has fascinated and awed generations for centuries. However, with its range confined to 13 countries today, its distribution has more than halved and so have its numbers. With the tiger facing a serious challenge in its entire distribution range, the Global Tiger Forum has compiled the latest Tiger Action Plans of 13 tiger range states into this third edition of the Action Tiger, giving scientists and conservationists an insight into the strategies adopted by governments to deal with the problem.

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