Cat Project of the Month – June 2008

The IUCN/SSC Cat Specialist Group's website (www.catsg.org) presents each month a different cat conservation project. Members of the Cat Specialist Group are encouraged to submit a short description of interesting projects

Repaint the Stripes: Research-based Sumatran Tiger Conservation in a Multi-use Landscape

A tiger strides on an inundated peat swamp forest in Kerumutan, Riau (Photo WWF_PHKA_VATech/Sunarto).

The island of Sumatra, Indonesia, is home to one of the most threatened subspecies of tigers surviving in the wild: Panthera tigris sumatrae. As part of WWF's intervention and my Virginia Tech's Student Research in Riau Province, this project aims to deliver improved knowledge of the tiger's ecology, which will inform land use and conservation management decisions, and improved security for tigers.

Sunarto has started to focus on cat study and conservation in 2004. At that time, he joined WWF Indonesia as a wildlife biologist. He is also enrolled as a PhD student at Virginia Tech, USA, studying the ecology of Sumatran tigers in the Riau Landscape. Previously, he worked for Conservation International, Wildlife Conservation Society as well as an ICDP Project. With WCS, he lead a team to build and manage the Way Canguk Research Station in BBS National Park. Sunarto is a member of the Cat SG since 2008.

s.sunarto@yahoo.com
submitted: March 2008

Setting up a camera trap in the Tesso Nilo forest (Photo WWF/Sunarto).

Background

Numbers of tigers in Sumatra are believed to have been constantly declining over the last decades. The decline is owing to habitat loss, poaching, and retaliation killings. Sumatran forests, the main habitat for the tiger, have continually been converted to large-scale industrial and agricultural plantations; mainly grow oil palm and acacia trees. Meanwhile, tigers are poached for the international wildlife trade and are often captured after coming into conflict with people.

Riau is the largest province in Sumatra which potentially holds the highest number of Sumatran tigers. It contains several Tiger Conservation Landscapes under different categories (Sanderson et al. 2006). Until the time this project was implemented, however, tiger distribution in the area has not been properly surveyed or mapped. Most information available on tigers in Riau stemmed only from secondary sources generally associated with tiger poaching or conflict with people. Accurate information on tiger presence and distribution in Riau is critical to guiding land-use planning by the governments and private companies which hold large estates of forestland.

To secure tiger populations in the Landscape, the following actions are required:

1. Identification of areas still holding tigers
2. Securing current tiger and prey numbers in core areas through
    a. Protected area establishment and effective management thereof
    b. Monitoring of tiger and prey numbers to facilitate adaptive management
3. Landscape conservation to ensure habitat preservation and connectivity through
    a. Increased awareness of the local communities and decision makers
    b. Increased effectiveness of enforcement efforts
    c. Increased national and local stakeholder support

Staff capacity building in field research data management (Photo Sunarto).

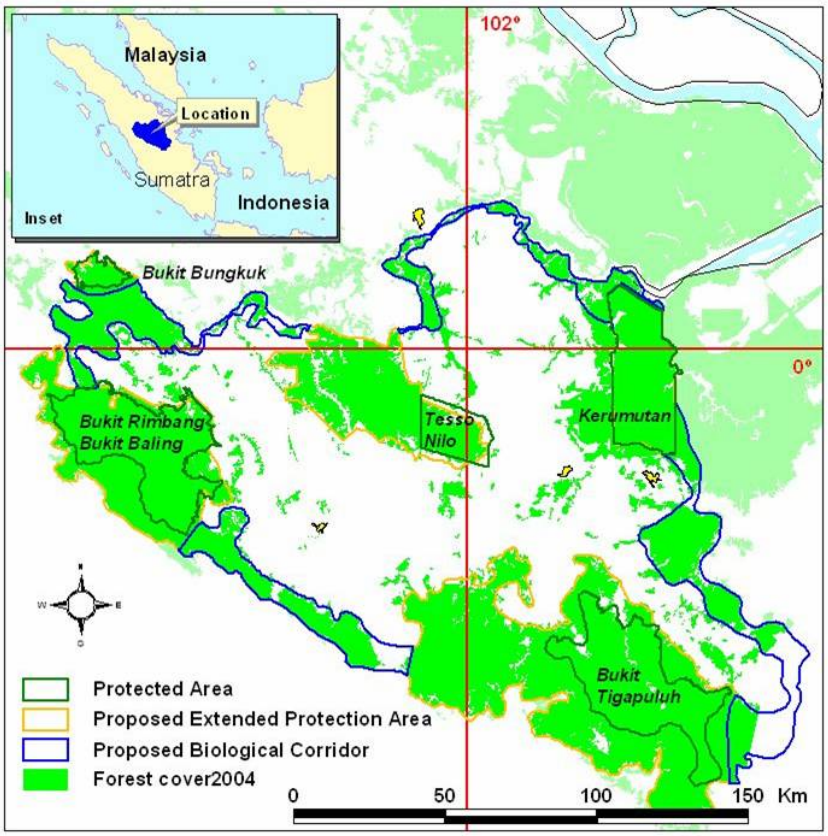
My project focuses on:

1. Identifying areas still holding tigers, estimate the density in major habitats, and predict the probability of occurrence across the landscape.

2. Disseminating research findings for habitat protection, management and restoration, including the development of new protected areas and improved management of tiger habitats.
3. Building local capacity on tiger conservation.

Methods
To reveal the ecological characteristics of tigers in the landscape we used a variety of field techniques which include interviews and ad-hoc surveys to document tiger presence, camera trapping for abundance estimation, and detection-non detection/occupancy estimation to predict the occurrence of tigers.

Identifying areas still holding tigers
Identification of tiger presence in the landscape involved stages of activities. First, potential habitats for tigers are identified, mainly based on the land cover. We considered the remaining forest as the potential habitat. Areas of large forest patches are the target area where tiger presence is to be confirmed. We used different approaches in gathering information on tiger presence which include interviewing authorities and local people, direct survey for tiger sign, as well as camera trapping and other systematic samplings such as occupancy survey.



Map of The Tesso Nilo-Bukit Tigapuluh Conservation Landscape in Southern Riau Province, Sumatra.

Estimating the abundance of tigers using camera traps

We found that in our study area camera traps are only effective for use in forested areas. This was due to high human activities and low probability to capture wildlife in areas outside of forests. We placed 13 equally-spaced possible camera trap sampling blocks, each measuring ca. 128 km^2 in the ca. 17,000 km^2 forests in the Tesso Nilo-Bukit Tigapuluh Conservation Landscape (see map).

To begin with, we selected 4 sampling blocks, representing 3 major habitat types in the landscape, to be covered in the first two year. We covered each sampling blocks with +/- 40 camera traps placed in pairs in about 20 sites. Photographic data generated from camera trapping were mainly used to estimate the density of naturally marked animals such as the tiger, using capture-mark-recapture techniques. For animals which have no natural marking individually, we estimate the relative abundance based on the photographic capture rates.

To estimate the relative abundance of tigers and their prey outside of forest habitat, we used another technique such as the detection-non detection or occupancy survey

Estimating site occupancy to predict the probability of occurrence for tigers and their prey
We conducted this survey as part of a larger initiative to study the tiger and other large mammals in Sumatra. For that, we have adjusted our sampling techniques to comply with the common method. We agreed to use a common grid size of 17x17 km. We designed the sampling technique in such a way that we will be able to analyze the resulting data for both habitat use and occupancy estimations. For the first year of implementing this technique, we selected 20 (twenty) 17x17 km grids using stratified random sampling. WWF (Setiabudi and Budiman 2005) has classified the landscape according to the landcover types which we used to stratify the sampling. The number of 17x17 grids selected was proportionate to the area represented by the respective land cover type in the landscape.

We aimed to set for 40 'transects' in each of 17x17 km grid. In each grid, observations were conducted in segmented transects. Each 'transect' (1000 meter) was divided into ten segments of 100 meter each. Data collection for signs of target animals and environmental variables was conducted at every segment.

We plan to analyze the data at two levels. At the island-wide level, we will combine our data with other parties. For the island or larger landscape level, we will treat the 17x17 grid as the 'site', while each 1 km transect as a sampling occasion. At the smaller area level, we will treat each 1 km transect as the 'site' and the 100 meter segments as 'occasions'. The larger scale analysis is expected to reveal the 'true occupancy' for tigers, while smaller scale can be both tiger's 'habitat use' and 'true occupancy' for smaller animals.


Kusdianto and Harry, tiger research team doing the occupancy survey (Photo Sunarto).

To minimize potential bias, we randomly selected a 2x2 km cell within each 17x17km grid for each team to include in their route of observation transects. If there is more than one team covering the same 17x17 km grids we selected a random cell for each team. To begin a new transect a random direction with a distance of 200 meter from the latest position (e.g. dropping point) or previous transect, was selected. Although the transect started at a random point, the team surveyed areas deemed to have the highest likelihood of finding animal's sign. We intensively searched for tiger and prey sign in areas where we are most likely to detect such sign, such as on forest trails, sand beds, and river banks.

Disseminating research findings for habitat protection and management
We used the research findings to promote the species conservation through better policy, improved awareness, as well as habitat protection and management. To make sure the policy, we supported the development of national conservation strategy and action plan for the tiger. We also advocated the development of human-tiger conflict mitigation protocols. In the development of both documents, our hands-on experiences are used to enrich the document.

Based on the information on tiger presence, we promoted the development, expansion as well as better management of the protected areas. For example, we promoted the expansion of Bukit Tigapuluh National Park and Tesso Nilo National Park to make sure long-term viability of the tiger which otherwise will have no adequate habitat or population to thrive over long-term.

To promote better practices of the private sectors, particularly those who manage lands in the around tiger habitat, we have designed our research and will use the results as a base to develop a guideline to improve the management practices to be more friendly and supportive to tiger conservation.


We supported the Government led development of conservation strategy for Sumatran tiger (Photo Sunarto).

Cobar Hutajulu_local MS student setting up a camera trap (Photo Sunarto).

Building local capacity on tiger conservation
The project aims to build local capacity on tiger conser- vation, specifically in conducted scientific research, as an integral part the program's strategy. The capacity building program includes the support of the project for the team member to pursue higher education at a PhD level (Sunarto, Virginia Teach) and an MS Student (Maju B. Hutajulu, University of Indonesia). In addition, we also created an assistantship scheme for local students to conduct various research related to tiger conservation. We are now financially supporting 10 local students from various higher educational institutions to conduct research on tiger-related issues. The students will use the research as their final thesis. Furthermore, to promote involvement of local students, we also promote the involvement of those who are interested in joining our field activities as volunteers. Currently we have two local students involved as volunteers who join in the field surveys.

Results
Camera Trapping: Abundance estimation
We have systematically sampled using camera traps, up to June 2007, not less than 86 sites located in 4 sampling blocks that represent 3 major habitat types in the landscape. Around 25 percent of the sites, located in Tesso Nilo National Park, were sampled twice, which will enable temporal comparison as a means of biodiversity monitoring. Until early 2007, up to which field data were already properly compiled, we accumulated 13,400 camera trap nights, covered 2,123 km2 of effective sampling area, and obtained 58 independent tiger pictures. We photographed 10 individual tigers under CMR protocols, plus 4 individuals during ad hoc camera trappings. These results constitute the first scientifically based evidence of tiger presence in 4 key forest blocks in Southern Riau. Undeniable evidence of tiger presence serves as an important tool for advocacy to prevent this habitat from being converted.

The first nine individuals of tigers photographed in the Landscape (Photo WWF- PHKA-VT/Sunarto).

Based on our limited sample, having considered the effective sampling areas, we documented that the highest density of adult tigers (individuals/100 km2) was estimated from KRWR (wet flat forests, 1.27 to 5.5), followed by RBWR (hilly forests, 0.92 to 4.03), and TNNP (dry flat forests, 0.64 to 1.4). When we used a different approach of estimating density based on the capture rate (Relative Abundance Index, O'Brien et al. 2003), however, the results were not consistent. With this approach, TNNP was ranked highest with estimate density of 1.392 individual per 100 km2, followed by KRWR (0.055), and RBWR (0.001). The estimates are not robust, hence we considered this provisional. More samples will probably overcome this constraint.

An industrial plantation grows acacia trees adjacent to a tiger reserve: we are working to promote better management practices so that tigers will have wider space in which to roam (Photo Sunarto).

Tiger Distribution Mapping

All forest blocks in TNBTCL provide habitat for tigers. We recorded tiger presence in the four major forest blocks, each of which measured at least 100,000 ha. We produced a map of the landscape showing the different probability that tigers occur in a given point. From the map, we identified six major areas with high probability of tiger occurrence in Southern Riau. Those include Bukit Bungkuk, Rimbang Baling, Tesso Nilo, Bukit Tigapuluh, Kerumutan, and Kampar Peninsula. What's striking from the result of this exercise is the fact that many areas important for tiger conservation are not protected. In addition to a good management of the protected areas, more intensive works to promote the protection of those areas are central in the long-term conservation of the tigers in the landscape.

Promoting Private Sectors' Better Management Practices (BMP)

We are in the process of developing BMP guidelines that will be used by timber and palm oil plantations to promote tiger conservation.

References

O'Brien, T. G., M. F. Kinnaird, and H. T. Wibisono. 2003. Crouching tigers, hidden prey: Sumatran tiger and prey populations in a tropical forest landscape. Animal Conservation 2003 131–139.

Sanderson, E., J. Forrest, C. Loucks, J. Ginsberg, E. Dinerstein, J. Seidensticker, P. Leimgruber, M. Songer, A. Heydlauff, T. O'Brien, G. Bryja, S. Klenzendorf, and E. Wikramanayake. 2006. Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. WCS, WWF, Smithsonian, and NFWF-STF.

Setiabudi, A. Budiman, and M. Stuewe. 2005. Analysis of 2000-2004 Land Use Dynamics in the Tesso Nilo - Bukit Tiga Puluh Conservation Landscape, Riau, Sumatra. Yayasan WWF.

Project Information

Duration:	December 2004 – ongoing
Location (see map):	Sothern Riau Landscape, Sumatra
Sponsor(s):	STF/NFWF, USFWS, Hurvis Family, WWF Network
Project address:	WWF Indonesia - Riau Program Tiger Research Unit Komplex Perkantoran Grand Sudirman, Blok B-1 Jl. Datuk Setia Maharaja, Pekanbaru - Riau Indonesia 28282 Phone : (0761) 855006, Fax : (0761) 35323a
Project leader:	<u>Scientific Advisors:</u> Dr. Sybille Klenzendorf, Director of Species Conservation, WWF-US Dr. Marcella Kelly, Assistant Professor, Virginia Tech <u>Programatic Advisors:</u> Dr. Hadi S. Alikodra, Director of Species Conservation, WWF Indonesia Dudi Rufendi, Manager, Riau Conservation Program, WWF Indonesia <u>Research Coordinator</u> Sunarto, Survey and Monitoring Coordinator, WWF Indonesia & PhD Student, Virginia Tech Email: s.sunarto@yahoo.co
Project website	www.wwf.or.id/tessonilo