

General Conditions for the Conservation of the Leopard in the Caucasus

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For the conservation of the leopard, a highly endangered flagship species of the Caucasus ecosystem, a close cooperation between governmental agencies, non-governmental organisations and scientists on national and international level is needed. The programme implies not only protection of the leopard, but also preserving its habitat and wild prey, and working with various stakeholders from the international level down to local people. Such a complex programme requires well-designed communication and planning. The first step is to compile all available information in a status report to assess the present situation. Then, a range-wide conservation strategy needs to be developed in a participatory process involving all relevant organisations from the range states and international partners. This strategy defines the common goals and provides a framework for the planning of conservation activities in each country. The third step will be the development of national action plans, allowing the involvement of stakeholders and local people and the assignment of concrete tasks to the designated actors.

Panthera pardus saxicolor, the North Persian leopard, is listed as Endangered in the IUCN Red List of Threatened Species (www.redlist.org). Considering the low numbers and fragmented distribution of the species in the Caucasus (Lukarevsky *et al.* 2007a), a regional assessment must conclude that within this eco-region, the species is even Critically Endangered. The six countries sharing the Caucasus range – Russia, Georgia, Armenia, Azerbaijan, Turkey, and Iran – have red-listed the species and/or established protected areas in the leopard habitats (Lukarevsky *et al.* 2007a; Zazanashvili *et al.* 2007). The leopard is the number one focal species in the Ecoregional Conservation Plan for the Caucasus (Williams *et al.* 2006) and considerable efforts for its conservation have been undertaken in recent years (summarised by Zazanashvili *et al.* 2007). According to Lukarevsky *et al.* (2007a), the newest data (or rather the lack of data) indicate a further decline of the population in the most recent years, after some positive signs in the first years of the century. We believe that the information is too inconsistent for such a judgment and that more rigorous monitoring data are urgently needed. But regardless to annual fluctua-

tions in records, the situation of the leopard in the Caucasus is alarming, and more efforts and new initiatives are needed.

The conservation of the leopard in the Caucasus is a particular challenge. The need for huge space for a viable population entails a close cooperation across national and international borders, which is however impeded by the economic and political problems in the range countries. On the other hand, conserving the region's natural heritage offers the opportunity to work together towards a common goal that is widely accepted across all borders and cultures. But a solemn promise alone will not save the leopard. What we need is (1) a clearly structured cooperation between all partners involved, (2) the implementation of well-planned actions, and (3) a monitoring system that allows assessing and where needed correcting the measures taken.

In this paper, we describe the larger context of leopard conservation in the Caucasus and outline the planning process. Realms to be considered (Fig. 1) are: (1) population interventions (species or population level), (2) securing important places (landscape and habitat level), (3) analysis and reduction of threats,

and (4) providing enabling conditions. All these aspects influence – positively or negatively – the conservation of the leopard in the Caucasus and must be considered in a comprehensive conservation strategy. The preservation of a large carnivore on a regional level is a complex endeavour, and it is impossible to assess and to discuss all factors in this chapter. The intention of this work is to provide a conceptual framework for the conservation of the leopard in the Caucasus and to facilitate the development of a conservation strategy at the strategic planning workshop in Tbilisi, Georgia from 30 May to 1 June 2007.

Underlying factors

Conservation planning must not only consider ecological conditions, but also underlying factors such as cultural, geopolitical, socio-economic and institutional aspects and foresee future developments, constraints, and opportunities. Two excellent documents – the United Nation Environmental Programme's *Caucasus Environmental Outlook 2002* (CEO; www.grid.unep.ch) and the *Ecoregional Conservation Plan for the Caucasus* (Williams *et al.* 2006) compile these factors and provided valuable background information.

Socio-economic aspects. The political and economic situation of the range countries is a key factor in leopard conservation. The economic breakdown after the disintegration of the Soviet Union led to an increase in exploitation of natural resources through woodcutting, overgrazing, unregulated hunting of animals and collection of plants (Krever *et al.* 2001; Zazanashvili *et al.* 2007). Commercial logging, once an important branch of local industry, dropped significantly, but the energy crisis caused an increase in unregulated woodcutting to obtain firewood, leading to degradation of forests (see below).

Poverty of rural people is – and will be for years to come – a serious impediment for the conservation of natural resources and the natural heritage. One third to half of the 35 million people in the Caucasus live below the poverty level. For these people, the conservation of the leopard that threatens their livestock and competes for game is probably no priority. Many people in villages (Fig. 2) must supplement their incomes with food from vegetable gardens, livestock, fishing, and (illegal) hunting. However, the human population living in remote areas is decreasing. Half of the human population lives nowadays in urban centres, and the rural exodus continues. Migration and falling birth rates have caused the human population to drop by 7–10 percent since 1990, and it is further declining in Armenia and Georgia.

Human dimension and cultural aspects. Information on human attitude and conflicts between local people and leopards in the Caucasus region is very limited. In Armenia, 80 people have been interviewed in rural areas (Khorozyan 2001). All interviewed people said that leopards never visit agricultural lands or villages. Only one case of depredation was captured in the inquiry; most people were not aware of livestock or pets being killed by leopards. The individual attitude of people towards leopards was indifferent. Human attitudes may differ between countries or cultural regions, but such information is not available or has never been compiled.

Population considerations

Species persist in a given area neither as systematic entity nor as individuals,

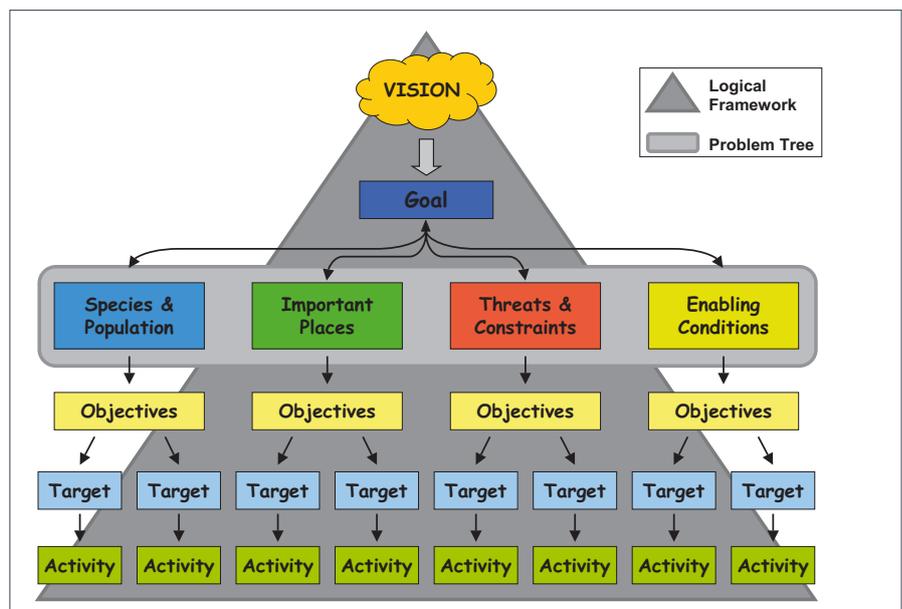


Fig. 1. Logical framework pyramid for the development of a conservation strategy. Vision and Goal define the long-term aims, Species & Population, Important Places, Threats & Constraints and Enabling Conditions define the levels of intervention (see text). Objectives, Targets and Activities describe the steps for the implementation of conservation measures.

but as populations. The long-term goal of our efforts must be to restore a viable population and – beyond a “minimum viable population” – to maintain the leopard as an integral part of the Caucasian eco-system. The taxonomic uniformity of the leopard in the Caucasus is not definitely agreed (see Lukarevsky *et al.* 2007b), but we consider the whole

Caucasus to belong to the historic range of the same subspecies. The present number and distribution of leopards is so limited (Lukarevsky *et al.* 2007a) that securing the present status will not be sufficient to save the population. Nobody can exactly predict what size a “viable population” must have, but we should aim for a magnitude of several



Fig. 2. Mountain village in Azerbaijan. People in the mountains who struggle for day-to-day survival consider the leopard as a competitor and may see its conservation not as a priority (Photo WWF, F. Mörschel).

hundred individuals to maintain a demographic and genetic healthy population. It goes without saying that the preservation of the remnant occurrence is first priority, but then, the extant nuclei need to recover and lost ground be regained. Considering the fragmented distribution of suitable habitats (Zimmermann *et al.* 2007), the leopard will survive in the Caucasus as a meta-population, with several relatively closed sub-populations, which are separated from each other, but connected through corridors (see below) allowing the migration of dispersing individuals. Some of the occupied areas may serve as “sources” – well-protected sites producing a surplus of leopards – whereas other areas or sub-population may be “sinks”, depending on immigrating animals because the local reproduction cannot compensate for the mortality. The possible shape of a future meta-population – size and source or sink status of each sub-population and its connection to neighbouring sub-populations – is important to consider in conservation management planning. Compared to other large mammals, cats are relatively bad colonisers, and most likely, active translocations or reintroductions may be needed to recover the Caucasus leopard popula-

tion. Parameters describing a population are the land tenure system (social set-up and individual space use), habitat use, recruitment, dispersal and mortality. This information is still lacking for the leopard in the Caucasus. As additional data become available, refined spatially explicit models (see Zimmermann *et al.* 2007) will allow improved planning of the meta-population approach.

Securing important places

Conservation of large carnivore populations takes place at landscape level. Assuming a potential average density of 1 leopard/100 km², a population of 500 individuals would cover an area of 50,000 km². All known extant occurrences are located within protected areas (Lukarevsky *et al.* 2007a; Zimmermann *et al.* 2007). If well protected, the larger of the protected areas can serve as sources, allowing the leopard to expand into neighbouring sites. Within protected areas, protection of habitats, prey, and leopards must have clear priority over any other use, and this protection must be enforced. Our knowledge on the present status of the leopard is sufficient to identify the key protected areas: PAs with known leopard presence, those acting as stepping-stones towards

the adjacent leopard populations in the south and southeast, and the priority sites for being re-colonised in the near future. But the leopard population will also need to expand over non-protected suitable areas. Such human dominated multi-use landscapes may be a sink for the leopard, but they are nevertheless important for the thriving of the entire population. Management schemes – e.g. compensation of livestock losses or removal of problem leopards – may here differ from protected areas, in order to gain the support of local people for leopard conservation. Between the sub-populations, across the landscapes not suited for the permanent presence of leopards, corridors will grant the exchange of individuals maintaining the genetic integrity of the meta-population. Corridors are stripes of habitat allowing the temporary use, but not the permanent presence of resident leopards. Dispersing subadult individuals can use corridors to leave their natal range and gain new living space. To identify and maintain corridors is crucial for the recovery and maintenance of a meta-population.

Threat reduction

To halt the further decline and prepare the recovery, factors threatening the leopards must be mitigated. Information allowing an assessment of the significance of the various threats in the Caucasus is very limited. But there is little doubt that the decline of the leopard in the ecoregion is a variation on a common theme: direct persecution (poaching and retaliation killing), indirect threats (habitat destruction and prey depletion) and possibly intrinsic factors (disease, demographic and genetic problems). These categories of threats go normally hand in hand and accelerate the vortex of extinction when the population is increasingly under stress (see Breitenmoser 1998).

Direct persecution. Illegal killing occurs in all range countries. Since 1990, we know about 23 leopards, which were killed or removed in 19 events (AM, 11; AZ, 6; GE, 1; RU, 5; Lukarevsky *et al.* 2004, Khorozyan 2000; E. Askerov and V. Lukarevsky, pers. comm.). In Azerbaijan, according to interviews with villager from Ordubad and the mountains



Fig. 3. A Leopard (left) and a lynx (right) skin hanging in front of a house in southern Armenia. Poaching is believed to be a major threat to the survival of the leopard in the Caucasus (Photo V. Lukarevsky).

of Gazangeldag, at least two leopards were killed and one was injured when it attempted to attack cattle in the early 2000s. Attacks on domestic animals are one of the reasons of hostility and the conflict between people and the leopard in south Nakhchyvan (Lukarevsky *et al.* 2004). Conflicts over livestock seem to be the root cause for illegal killing, but no data are available to assess the amount of the depredation or retaliation killing. It is also impossible to estimate the number of unreported cases and hence to assess the impact of illegal killing on the population level or to compare its significance with other causes of mortality. However, the fact that in Armenia in 2000 alone, four cases of illegal killing were discovered (Fig. 3) indicates that the impact of illegal killing must be considered important. Historic hunting bags for large cats demonstrate that healthy populations normally can stand a considerable loss from direct persecution; but as soon as a population is under pressure from habitat loss or prey reduction, the impact of hunting or poaching escalates.

Habitat destruction and prey depletion. Large carnivores are – compared to herbivorous species – less habitat dependent, and leopards are among the most adaptable of the cat species. They are, however, indirectly affected by habitat destruction as it strongly influences prey distribution and availability. About a quarter of the Caucasus remains in reasonably natural condition; less than 12 % can be considered pristine (Williams *et al.* 2006). Forest exploitation (logging, grazing) has led to habitat degradation and fragmentation. In Armenia, 270 km² of forests (8% of the national forest area) were cut down from 1992–95 during the energy crisis.

Forest and habitat decline went along with a decrease of wild and an increase of domestic ungulates. Numbers and range of most prey species have declined over the past 15 years or longer and populations are becoming fragmented (Mallon *et al.* 2007). The extent and trajectory of these declines are usually not known, as population data are lacking for most areas. Poaching and illegal wildlife trade have increased as the result of the economic crisis (Williams *et al.* 2006). Uncontrolled hunt-



Fig. 4. Member of an anti-poaching unit (APU) detains a poacher in Armenia (Photo WWF, K. Manvelyan).

ing of game is particularly widespread in mountain regions. Quotas for game species are set without monitoring of the populations, and harvest rates are often not sustainable. Overabundant livestock competes with wild ungulates for fodder. Sheep grazing in winter ranges and in steppes and semi-deserts of the eastern Caucasus have nearly tripled over the past decade. Overgrazing and uncontrolled livestock pasturing threaten also subalpine and alpine ecosystems. Today, already a third of the pastureland suffers from erosion (Williams *et al.* 2006) as a consequence of unsustainable livestock husbandry practice.

Fragmentation and infrastructure development. Loss of habitat quality and prey availability may first turn a source area into a sink, and, as deterioration continues, turn it into unsuitable and hence unoccupied space, cutting the original distribution area into pieces. Large clusters of potentially suitable habitat still exist (Zimmermann *et al.* 2007). Fragmentation does not seem to be the main reason for the vanishing of the leopard. It may, however, form a considerable obstacle for its recovery. Along with the economic development, traffic lines, hydropower reservoirs and other potential barriers will increasingly bisect the habitat for wildlife and especially cut through important corridors,

which are typically in valleys. Rural exodus reduced the human population in the mountains, but urban areas boosted and construction of infrastructure increased, mostly built without environmental impact assessment. As a consequence of the renaissance of the “Silk Road”, TRACECA (Transport Corridor Europe-Caucasus-Asia) – constructed with financial investments from the European Union and other international institutions – transport volumes across the Caucasus increase year by year, and many new roads are being built. Lately, Armenia planned a new road to Iran; 17 of the 90 Armenian kilometres would have cut through Shikahogh Reserve – one of the country’s key areas for the leopard. WWF and other local and international organisations helped to find alternative routes and save the reserve (www.panda.org).

Intrinsic factors. Small, isolated populations face an increasing risk being affected by disease, demographic or genetic problems. We lack any information to assess these potential threats to the leopard in the Caucasus. The extremely low number of individuals estimated for some of the remnant nuclei (Lukarevsky *et al.* 2007a) let however fear that many of them are demographically no longer functional.

Enabling conditions

To encounter threats and support conservation actions, a number of enabling conditions must be established:

Institutional and organisational aspects. Cooperation between several countries and different public and private organisations requires regular exchange of information. So far, NGOs have been driving forces in establishing such contacts. The *WWF Caucasus Programme Office* in Tbilisi, Georgia coordinates the regional conservation activities. In 2001, the *Caucasus Biodiversity Council* (CBC) was founded. The council meets twice a year and works on vital conservation problems in the eco-region. Each country sends one representative from the Ministry of Environment and one from a civil society organisation. The Council assists and monitors projects and programmes and facilitates cross-border conservation work and has become an important forum for conservation in the region.

Political commitment. In March 2006, KfW Development Bank and WWF Germany organised a conference in Berlin under the auspices of the German Federal Ministry for Economic Cooperation and Development, BMZ. The conference brought together the ministers of environment from the Southern Caucasus countries, as well as representatives of Iran, Russia, Turkey, international conservation and donor organisations. The conference aimed to strengthen the dialogue between governmental and non-governmental organisations in the field of nature conservation and sustainable development, and confirmed the commitment of the Caucasian countries to work together to conserve their mutual natural heritage. Two new and concrete initiatives were agreed: the establishment of a Caucasus Protected Areas Trust Fund (see below under funding) and a Caucasus Monitoring Network. The targeting of the three Caucasus countries of Armenia, Azerbaijan and Georgia for the new European Neighbourhood Policy under the auspices of the European Union has also created a new and important platform for developments, including new finances, review of key legislation and engagement of the civil society, which

could be beneficial for the conservation of the entire Caucasus, including the leopard.

Professional capacity. Improved capacity in wildlife conservation and related domains is needed across the Caucasus. Khorozyan (2004) concluded for Armenia that a good start was done strengthening capacity for biodiversity conservation that however more needs to be done; this is true for the entire region. More efficient law enforcement is urgent. Anti-poaching units (APUs) have been established since 2003 in Armenia (Fig. 4). Several capacity building workshops have been organized, and a manual was published with support from WWF/CEPF (see below). In Georgia the NGO *Ecovision* supported customs officers fighting illegal wildlife trade in Georgia. Training programmes for border guards and rangers of the Hyrcan National Park (AZ) were offered, and Khorozyan (2004) organised similar programmes – including educational material in Russian – for border patrols and border army units in Armenia.

Awareness and education. Public awareness and education activities have been addressing different target groups. WWF organised numerous programmes for school children (Fig. 5) with theatres, art contests, and essays around leopard, and eco-camps for 42 school children and five teachers in Armenia and Azerbaijan. The broad public was informed about leopard conservation through articles in newspapers and TV shows. Posters and booklets were distributed to local rural communities, national authorities, border militaries, and soldiers (Khorozyan 2004).

Funding. Governmental funding for conservation is still scarce in the Caucasus ecoregion, but as the region is a priority area for economic development and a designated Hotspot for the conservation of biological diversity (Mittermeier *et al.* 1999), international funding is available also for conservation projects. WWF, Conservation International (CI) and the German Ministry of Economic Development and Cooperation (BMZ) with support of the German Development Bank KfW established a

trust fund providing long-term financial sustainability for priority protected areas in Armenia, Azerbaijan and Georgia with a start-up funding of nine million US\$ in 2006. Together with GEF, the World Bank, the MacArthur Foundation and the Japan Government, CI created the Critical Ecosystem Partnership Fund (CEPF). In the Caucasus Hotspot, CEPF has four main funding priorities: (1) to support civil society efforts that promote transboundary cooperation and improve protected area systems in five target corridors; (2) to strengthen mechanisms to conserve biodiversity in the Caucasus Hotspot with emphasis on species, site and corridor outcomes; (3) to implement models demonstrating sustainable resource use in five target corridors; and (4) to increase the awareness and commitment of decision-makers to biodiversity conservation in five corridors. More specific for leopard, WWF has funded a first phase of the Caucasus leopard project (2001–05). This project has initiated research and surveys (Luvarovsky *et al.* 2007a). Financial support has come from WWF Switzerland, and since 2003 also from WWF Germany (Zazanashvili *et al.* 2007). Leopard conservation work in Armenia was furthermore supported by The Whitley Awards (Khorozyan 2004) and by the People's Trust for Endangered Species (D. Mallon pers. com.).

Planning process and implementation of conservation actions

The planning process is a conservation activity on its own, as it is the starting point for building partnership and involvement of stakeholders. In a large, culturally and politically diverse region such as the Caucasus, the planning must be stratified and decentralised, as it is impossible to gather all groups concerned in one place. Yet, range-wide considerations – e.g. defining objectives at the meta-population level – exceed the local scope and must be agreed upon between the national institutions involved. We therefore recommend a planning process on two levels: (1) development of a regional conservation strategy setting general goals for the entire eco-region and defining the cooperation at international level, and (2) the establishment of national or sub-regional action plans

defining the concrete measures and actions as implementing tools of the conservation strategy.

Partnership and stakeholder involvement is needed both on regional and local level. Partners for the development of the range-wide strategy are national governmental agencies in charge of nature conservation and wildlife management, non-governmental nature protection organisations, and scientific experts (the “Triangle of Conservation”; Breitenmoser *et al.* 2006). These institutions must work together in the strategic planning (agree on principles and priorities for the recovery of the meta-population), and organise and supervise the implementation of the strategy on national and sub-regional level. On the second level, where national or sub-regional action plans are being developed, the partnership includes institutions responsible for agriculture and forestry, economy, civil engineering, energy, and education, and the involvement of local people. Experience proves that a species such as the leopard cannot simply be “protected”. Even if the law protects the species and part of its range, other, higher ranked interests and priorities may compromise the legal protection. A consensus is needed between the conservation community, other stakeholders, and the local people directly affected by conservation measures. Such consensus can often be achieved through integrating all groups concerned already into the planning phase.

Development of conservation plans. The first step towards a comprehensive conservation action plan is an assessment of the situation to provide baseline information for the planning process. This is a task for scientists and professional services.

Then, a conservation strategy is to be developed as a master plan for the conservation of the leopard across the Caucasus ecoregion. The strategy must include the identification of long-term goals and conservation measures on the range-wide level and define the cross-border cooperation. The Conservation Strategy for the Leopard in the Caucasus is to be endorsed by the range country governments, so that it can provide political and conceptual guid-

ance and set the standards for the following action planning on national or sub-regional level. This third step – the development of action plans – translates the principles of the conservation strategy into concrete measures and activities to be implemented in the field. The action plans assign tasks for specific areas to certain institutions and define a schedule for their execution. The conservation strategy and the national or sub-regional action plans are developed in a participatory process using e.g. a logistic framework approach (Fig.1; Breitenmoser *et al.* 2006), allowing the critical buy-in and integration of different knowledge, opinions, and values.

Monitoring and follow-up. The recovery of the leopard in the Caucasus will be a long-lasting endeavour, and many of the parameters and variables tentatively important for the planning process are not sufficiently known. The parameters now considered to develop the plans – including economic conditions – will change over the years. Hence the conservation programme must employ adaptive management principles, regularly monitoring success and failure, and introducing new actions and measures to respond to new developments. Both the conservation strategy and the action plans must be revised on a regular basis – several years for the strategy, rather frequently for the national or sub-regional plans – in order to reconsider objectives, targets, and activities (Fig. 1). This implies the establishment of a standardised monitoring process allowing assessing the development of all critical parameters. Factors to be monitored include the development of the leopard population (distribution and abundance), the dynamics of the prey populations, and possibly human dimension aspects such as awareness, attitude, etc.

Strategic planning does not save a species – only successful implementation of conservation actions does. Yet, many action plans collect dust on shelves, and many conservation funds evaporate inefficiently because strategic planning and involvement of key institutions was neglected. Let us together make sure that this will not be the case for the leopard in the Caucasus.

References

- Breitenmoser U., Mallon D. and Breitenmoser-Würsten Ch. 2006. A framework for the conservation of the Arabian leopard. *Cat News Special Issue No.1*, 44-47.
- Breitenmoser, U. 1998. Large predators in the Alps: the fall and rise of man's competitors. *Biological Conservation* 83: 279-89.
- Khorozyan I. 2000. Leopard in Armenia's Khosrov Reserve: Spots, rosettes and population genetic status. *Cat News* 33, 16-18.
- Khorozyan, I. 2001. Human attitudes to leopards in Khosrov Reserve, Armenia. *Cat News* 34, 14-17.
- Khorozyan I. 2004. Strengthening local capacities for biodiversity conservation in Armenia. Final report to the Whitley Awards. 22 pp.
- Krever V., Zazanashvili N., Jungius H., Williams L. and Petelin D. 2001. Biodiversity of the Caucasus Ecoregion. WWF, Baku-Erevan-Gland-Moscow-Tbilisi. 132 pp.
- Lukarevsky V., Ackiev M., Kudaktin A. and Yarovenko Y. 2004. Strategy and action plan for the near eastern leopard in Russia. WWF Russia, 24 pp.
- Lukarevsky V., Akkiev M., Askerov E., Agili A., Can E., Gurielidze Z., Kudaktin A., Malkhasyan A. and Yarovenko Y. 2007a. Status of the leopard in the Caucasus. *Cat News Special Issue No. 2*, 15-21.
- Lukarevsky V., Malkhasyan A., Askerov E. and Hazaryan G. 2007b. Biology and ecology of the leopard in the Caucasus. *Cat News Special Issue No. 2*, 9-14.
- Mallon D., Weinberg P. and Kopalani N. 2007. Status of the prey species of the leopard in the Caucasus. *Cat News Special Issue No. 2*, 22-27.
- Mittermeier R. A., Myers N., Mittermeier Goettlich C. 1999. Hotspots – earth's biologically richest and most endangered terrestrial ecoregions. Cemex, Conservation International.
- Williams L., Zazanashvili N., Sanadiradze G. and Kandaurov A. 2006. Ecoregional Conservation Plan for the Caucasus. Contour Ltd., Tbilisi, 220 pp.
- Zazanashvili N., Askerov E., Manvelyan K., Krever V., Farvar, M.T., Kalem S. and Mörschel F. 2007. The conservation of the leopard in the Caucasus. *Cat News Special Issue No. 2*, 4-8.
- Zimmermann F., Beruchashvili G., Lukarevski V., Breitenmoser-Würsten Ch. and Breitenmoser U. 2007. Mapping the vision – potential living space for the leopard in the Caucasus. *Cat News Special Issue No. 2*, 28-33.