

Rural people have been a crucial factor to ensure a long-term viability of the endangered leopard (*Panthera pardus*) population in its stronghold in Armenia – Khosrov Reserve. Thus, understanding local knowledge and attitudes towards this predator becomes very important in our current research activities, otherwise public resentment, conflicts and overall failure of the system of a protected area will be unavoidable (Nepal and Weber, 1995).

When living near people, the predators are regarded as nuisance (confined to livestock or game losses and direct threat to human safety) and killed in every available opportunity, even if a species is legally protected. This is a case for many felid species: Eurasian lynx *Lynx lynx* (Jedrzejewski *et al.*, 1996), cheetah *Acinonyx jubatus* (Conniff, 1999), snow leopard *Uncia uncia* (Oli *et al.*, 1994), leopard (Danov, 1985; Seidensticker *et al.*, 1990), Asiatic lion *Panthera leo persica* (Saberwal *et al.*, 1994), Iberian lynx *L. pardinus*, African lion *P. l. leo* and tiger *P. tigris* (Woodroffe and Ginsberg, 1998). Similarly, occasional poaching of rare leopards occurs in Armenia's Khosrov Reserve and we have studied human attitudes towards these carnivores.

Public surveys were conducted in Oct. 1999 in Vedi village (13 people), Jan. – Feb. 2000 and July – Aug. 2000 in Garni village (46), Bayburd village (10) and among pastoralists living at temporary summer livestock grazing stations on alpine plateaus above the reserve's canyons (11) (Fig. 1). In total, 80 people were interviewed and we did not need to increase this number due to the uniformity of results of this study. All people with whom we talked were men, as they play a dominating role in rural life and would provide us most reliable information about the leopards. Three questions were asked to the villagers (Saberwal *et al.*, 1994): (1) frequency of leopard sightings on their lands; (2) problems they encountered owing to the presence of leopards near their villages; and (3) individual attitude towards the leopards. Attitudes, in their turn, were categorized as strongly like, slightly like, indifferent, slightly dislike and strongly dislike (Oli *et al.*, 1994). Discussions and casual conversations with stock-owners, herdsman and their neighbors were performed as a principal approach to minimize a bias caused by inaccuracies in answers and cross-check the obtained information.

Fig. 1. Location of villages around Khosrov Reserve where our public surveys were conducted. Abbreviations: Y – Yerevan, capital of Armenia, G – Garni, V – Vedi, B – Bayburd, S – summer livestock grazing stations.



The results of our survey are intriguing in their uniformity. All interviewed people said us that the leopards never visit agricultural lands and villages and do not kill domestic livestock and pets. Also, they reported no reliable cases when a leopard attacked a man, mauled him or killed. Hence, people do not express hostility (slight or strong) to this predator and do not have any problems with it. Only one case of the leopard attack on livestock was heard by us, but we were unable to confirm or refute it - in mid-1990s, the leopard had killed a calf and eaten a half of its carcass near Bayburd village. Next day after that, the shepherd who was searching for his lost animal had found the cat just on the cliff overhang in front of the calf remains (A. Malkhasyan, pers. comm.). Actually, people feel complete indifference to the leopard and its conservation. In a few words, this can be reflected by the

following sentences: “What is strange in having the leopards around? Only several people ever glimpsed them in the wild, as they are extremely secretive and nocturnal and live in caves which are very hard to access”. Public opinion about the leopard conservation is similar: “Their staple food, bezoar goats (*Capra aegagrus* – I.K.), are abundant throughout Khosrov Reserve and due to their secrecy and tolerance to humans the leopards will survive whether we conserve them specially or not”.

Even though the leopards do not cause an economic damage to local rural community in Khosrov Reserve, people sometimes kill them. Out of 10 records in late 1990s-2000 in this protected area, two were associated with poaching (two young siblings between Chimankend and Sovetashen villages and one adult male in Tapchan Yallah canyon, all in January 2000) (Khorozyan, 2000). The skin of the adult male was attempted to be sold at \$2,000, but as soon as the owner has known that we and rangers intended to visit him to confiscate the trophy, he escaped but we succeeded to study the skin for morphology (Khorozyan, 2000) and take a piece of pelage for genetic analysis in future. It is very hard to identify the incentives of leopard poaching other than human fear. The stories of “heroic killing a sparkle-eyed beast which swooped on a man” are quite common in villages around Khosrov Reserve. Walker (1994) mentions a tale: “I was told that the shepherd was sitting below a small rock overhang and saw the shadow of the leopard above him. As the leopard leaped down upon him he was able to raise his gun and shoot the animal in mid-air. Such stories of daring-do were often related to us regarding wolves, leopards and other predators”. However, as it was said earlier, no trustworthy cases of leopard attacks on people are recorded in Armenia, hence danger to human safety described in such tales is entirely fictional. Most likely, the story-tellers pursue the goal of attracting more attention from general public and scientists. I also heard about a shepherd who stabbed a leopard in spring 2000 near Kajaran town elsewhere in southern Armenia, but reliability of this case is dubious.

In Khosrov Reserve, humans and leopards co-exist since mid-Holocene (Kasabyan and Manaseryan, 1998) and cats have evolved to be extremely cryptic, living in rough rocky terrain and leading a preferably nocturnal lifestyle. Many cases of seeing local leopards in daytime refer mainly to the young inexperienced male individuals looking for food and roaming widely for new territories, and they have the highest chance to be shot. However, if seen too close they can be frightened away by making noise and blank shots to the air (Gasparyan and Agadjanian, 1974).

To ensure the leopard survival, we urgently need a workable national leopard conservation strategy which would be able to create a harmony in man-leopard relationships and make public awareness and environmental education a highlight topic not only on paper, but essentially in practice. This will be a real implementation of a widely recognized idea that promotion of indigenous knowledge, socio-environmental responsibility and public participation in conservation decision-making is an important constituent of local sustainability in rural areas (Becker, 1998). Now, there is a good time to do this, as local human population has greatly reduced in number due to mass emigration to urban areas and other countries as a result of poor economic conditions, warfare with Azerbaijan for Nagorno-Karabakh in early 1990s and severe drought in summer 2000, hence human pressure on wildlife of Khosrov Reserve can be objectively minimal. Surrounding areas formerly inhabited by people (mainly ethnic Azerbaijani and Kurds) and abandoned now are incorporated to the reserve.

Commonly, agroecosystems (e.g., based on livestock breeding) have a low significance for biodiversity conservation, being highly dependent on management approaches and tolerance of farmers to wildlife, but sound agricultural practices may create a healthy environment and public well-being (Soule, 1991). In this context, implementation of measures to co-exist with leopards can benefit the rustic community of Khosrov Reserve, if performed in a socially and environmentally friendly way. These measures are two – enforcement of protection regime and implementation of outreach educational campaigns.

Enforcement of protection regime. We repose our main hopes in selfless and devoted work of Khosrov Reserve rangers, but currently we cannot demand much in conditions of dire poverty that has struck this area. According to the latest available estimates, this protected area has a staff of 82 people (Grigorian, 2000) and receives \$39,600 from national government annually (56% for salaries, 43% for other operational costs and 1% for capital expenditures, including equipment), but the average monthly salary makes only \$20 (Ministry of Environment, 1999). Actually, its staff is not paid salaries for years and the rangers have to care about themselves on their own – keep livestock/poultry and orchards in their private land plots and use natural resources of the reserve. Shooting and leg trapping of locally abundant small wildlife (European hare *Lepus europaeus*, red fox *Vulpes vulpes*, and others) for meat, collection of mushrooms, wild fruits, berries, nuts and greenery, grazing of livestock and horses and cutting of walnut *Juglans regia* trees for fuelwood are common, but carried out mainly around the staff lodgings in reserve (pers. obs.). The caves can be used as camp sites, including those where the leopards can rest or even breed. When this happens, the disturbed cat moves away for a long distance until

complete safety is guaranteed (pers. obs.). The pelage of badgers *Meles meles*, foxes and wolves *Canis lupus* which are abundant throughout Khosrov Reserve and adjacent territories are freely sold together with souvenirs to numerous tourists who come to Garni village to see the unique pagan temple dated 1<sup>st</sup> century AD (pers. obs.). Suffering from the same poverty as other locals, rangers have to violate the protection regime and sympathize to fellow villagers who do the same, but many of them try to do something within their limited opportunities to make things better. In spite of a very low personal income, locals are neither “intrinsically anti-environmental” nor were hostile to us, environmentalists, as to “snobby urban and richy intellectuals” as many would believe (McBeth and Foster, 1994); instead, they expressed the attitudes conditional on their lifestyle and very survival.

To improve this situation, it is essential to give villagers the chance to raise their own money and thus avert their interest from the reserve’s natural resources. Historical reverence of local people to Khosrov Reserve (it was founded as a royal sanctuary by King Khosrov the Third Kotak in 330-338 yrs A.D.) is weak as never before, as economic priorities dominate. The best solution is launching a long-term ecodevelopment program like Irbis Enterprises in Mongolia which sells handicrafts produced by pastoralists and uses raised funds for conservation of local snow leopards (McCarthy, 2000; McCarthy and Allen, 1999). Khosrov villagers have a tradition to make beautiful knitted goods (women) and wood carvings (men) from locally abundant resources, e.g. apricot trees whose wood is very nice and pliable to treatment (pers. obs.), and such products with leopard images would be sellable on market, especially to foreigners. As the leopard has a great option value in Armenia (Khorozyan, 1998), a good alternative for gaining money for local people and leopards would be ecotourism which has a perfect potential in the country but is not developed yet.

Implementation of outreach educational campaigns. George Bernard Shaw once said: “The worst sin toward our fellow creatures is not to hate them, but to be indifferent to them; that’s the essence of inhumanity”. Goethe’s words are similar: “There is nothing more frightful than ignorance in action” (Chiras, 1991). As shown above, all people that participated in our survey expressed indifference to the leopard what we regard as a result of complete absence of knowledge about this predator (here the logic like “we do not see it – it is not interesting to us” works). Meanwhile, Armenia’s leopards have a high existence value, i.e. ethic and aesthetic perception of a species existence *per se* (Khorozyan, 1998), and this kind of value is significantly influenced by information about the animal’s physical and behavioral characteristics and about its endangered status (Munasinghe, 1992). For example, the fact that 87% of eighty randomly chosen local people interviewed for their perception of tigers in Russian Far East expressed positive attitude to these predators (“they are the treasure of our taiga and need protection”) (Prokhorova, 1996) has certainly been a result of strong and long-term educational and information campaigns. Hence, providing information to local villagers about the leopard status, research and action plan in their environment is a crucial element to increase public interest and awareness about this cat. What is most important in this job is to make people understand that it is essential not to do the following things:

- pursue and shoot a predator. The leopard is perfectly adapted to its rocky habitat and human heat in following it can be mortally dangerous, as either wounded animal will lurk in boulders and then attack a hunter, or hunter himself will fall down from cliffs. Hunting dogs are of little use and frequently die in the leopard habitat (pers. obs.). Moreover, here is a high probability to face a brown bear *Ursus arctos* which can be very aggressive, especially in a period from late fall to late summer associated with hibernation and raising young (pers. obs.).
- visit the caves, rock piles and/or conglomerations of boulders where the predators may breed or rest. Constant disturbance by people may cause a depression in adrenal responsiveness, as recorded in the cougars *Puma concolor* of Utah, USA (Harlow *et al.*, 1992), and possibly produce damaging reactions in animal behavior, physiology and disease susceptibility. However, careful behavior of humans within the leopard’s eyesight does not cause any significant disturbance in animal activities (Bothma and le Riche, 1993).
- let livestock and horses graze uncontrollably. Even though in 1970s some cases of livestock attacks by leopards were recorded in Khosrov Reserve (Gasparyan and Agadjanian, 1974), now they are none and this item is provided here just as a recommended measure to a villager to be sure that his livestock will not be affected by leopard predation. Using aggressive and well-trained guard dogs (e.g., Anatolian shepherds) and keeping grazing livestock away from rough terrain where the

predator may lurk will guarantee full safety of livestock. Besides, it is essential to keep grazing animals in a relatively limited area, so that other portions of good feeding grounds remain available to bezoar goats, the staple prey for the leopards.

Public education as a measure to conserve leopards is successfully implemented in Russia's Far East (Hotte, 1999), Namibia ([www.africat.org](http://www.africat.org)) and United Arab Emirates ([www.arabianwildlife.com](http://www.arabianwildlife.com)) and we welcome exchange of information describing methodologies and results of such education campaigns.

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