Human Dimensions of Wildlife, 9:307–315, 2004

ISSN: 1087–1209 print / 1533-158X online
DOI: 10.1080/10871200490505756

A Community-Based Approach to Mitigating Livestock Depredation by Snow Leopards

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Livestock depredation by the endangered snow leopard (Panthera uncia) *is an increasingly contentious issue in Himalayan villages, especially in or near protected areas. Mass attacks in which as many as 100 sheep and goats are killed in a single incident inevitably result in retaliation by local villagers. This article describes a community-based conservation initiative to address this problem in Hemis National Park, India. Human–wildlife conflict is alleviated by predator-proofing villagers' nighttime livestock pens and by enhancing household incomes in environmentally sensitive and culturally compatible ways. The authors have found that the highly participatory strategy described here (Appreciative Participatory Planning and Action—APPA) leads to a sense of project ownership by local stakeholders, communal empowerment, self-reliance, and willingness to co-exist with snow leopards. The most significant conservation outcome of this process is the protection from retaliatory poaching of up to five snow leopards for every village's livestock pens that are made predator-proof.*

Keywords *snow leopard, depredation, human–wildlife conflict, participatory planning, India*

Introduction

A major source of conflict between park authorities and local communities in the Indian subcontinent revolves around livestock and crop damage within protected areas or their buffer zones (Hussain, 2003; Kharel, 1997; Mishra, 1997). For

The authors are especially grateful to the Wildlife Warden, Leh for permission to work in Hemis National Park. The authors are indebted to the residents of the park for their commitment to co-existing with snow leopards and protecting the park's important mountain biodiversity. Thanks to Nandita Jain and Renzino Lepcha of The Mountain Institute for helping to refine the methodology employed in engaging herders. Funding for this work was provided by the Leonard X. Bosack and Bette M. Kruger Charitable Foundation, the International Trust for Nature Conservation, and The Shared Earth Foundation.

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example, livestock depredation by snow leopards (*Panthera uncia*) has been reported across the Himalayan region (Jackson, Ahlborn, Gurung, & Ale, 1996; Jackson & Wangchuk, 2001; Mishra, 1997; Oli, Taylor, & Rogers, 1994). Unless addressed equitably, such conflict places the array of wildlife in protected areas at increased risk of retributive killing or poaching.

Snow leopards inhabit an area of approximately 3 million square kilometers, including Mongolia, China, and five central Asian states. Although this study focused on Ladakh in Northern India, two examples from other areas serve to illustrate the extent of livestock loss as a result of the endangered snow leopard. In Kibber Wildlife Sanctuary, in India's State of Himachal Pradesh, reported losses amounted to 18% of the livestock holdings, valued at approximately $138 (USD) per household (Mishra, 1997). A comprehensive household survey of herders living in Khangshar village in the Annapurna Conservation Area in Nepal suggested that predation accounted for 63% of all livestock mortality over an 18- to 24-month period (Jackson et al., 1996).

These studies implicated various factors in depredation by the snow leopard, including lax guarding and other husbandry practices, the use of poorly constructed pens to house livestock at night, grazing within high-risk areas (especially during winter), and relying on children rather than adults to guard livestock. In Kibber, the villagers claimed predation rates increased after the establishment of the sanctuary, but surveys indicated a dramatic increase in livestock numbers (Mishra, 2000). Within protected areas, domestic livestock may outnumber wild prey by three times or more; within the buffer zone, the imbalance may be even more skewed so that a snow leopard usually has a higher likelihood of encountering domestic prey over wild prey.

Snow leopards are frequently blamed for loss from other sources of mortality, such as disease, consumption of poisonous plants, and accidents. In Nepal, local residents considered eliminating snow leopards as the only viable solution (Oli et al., 1994).

As this problem grows, it is increasingly important to seek mitigation strategies that create a sustainable co-existence (Mishra et al., 2003). This article summarizes one such strategy: community-based initiatives for alleviating conflict due to snow leopard depredation on livestock in Hemis National Park, northern India.

Study Context

Hemis National Park covers approximately 3,350 km^2 (1,293 mi^2) of the Trans-Himalayan Range of Ladakh in the State of Jammu and Kashmir (Fox & Nurbu, 1990). The park offers prime snow leopard habitat, harboring four species of wild sheep and goats, giving it international biodiversity importance. About 1,600 people live in 16 small settlements scattered across three valleys. They grow barley and vegetables, and own more than 4,000 head of livestock, of which 81% are sheep and goats and 11% are yaks, cattle, and crossbreeds. Tourism provides

an important source of supplementary income. Ladakh was opened to tourism in 1974 and the Markha Valley circuit through Hemis National Park remains the most popular trekking route, with approximately 5,000 annual visitors.

In response to intensified conflict between people and snow leopards, the Department of Wildlife Protection initiated in 1996 a compensation program for affected livestock owners. The program has been ineffective for several reasons. Livestock owners must travel up to four days to report their losses, so on-site verification is rarely possible. Payment is 35% (or less) of market value and takes up to two years because of budgetary constraints. Not surprisingly, relations between villagers and park authorities have suffered, increasing the likelihood of retributive killing of snow leopards.

As a first step in introducing community-based planning, the authors needed information on depredation rates and patterns, so they conducted a survey of 79 households, which indicated that villagers owned 3,977 head of livestock with an average household holding of 50.3 animals (Bhatnagar, Wangchuk, & Jackson, 1999). Of the six different types of livestock identified, most were sheep and goats. This sample of villagers reported losing 492 animals (12% of all livestock) to predators over a 14-month period, or 6.2 animals valued at $297 per family. The economic implications were significant to the villagers. The snow leopard (55%) and wolf (31%) were identified as the main perpetrators. Sheep and goats constituted 75% of all stock lost, followed by yak/cattle (13%), and horses (8%) (Bhatnagar et al., 1999). Three settlements (Markha = 37%, Rumbak = 9%, Chokdo = 8%) incurred 54% of all known or presumed depredation. Depredation rates varied geographically with distinctly recognizable "hotspots."

Snow leopards took full advantage of poorly constructed pens, jumping easily over the low stone walls. The most devastating livestock losses occurred after one or more leopards entered and killed all of the sheep and goats contained within the enclosure. These incidents totaled only 14% of all reported depredation events (n = 210), but accounted for nearly 50% of all livestock killed. Understandably, these losses anger livestock owners, who often retaliate by poisoning or trapping the suspected culprit.

Remedial Measures Implemented Through Participatory Planning

In 2002 and following this survey, the Snow Leopard Conservancy (SLC), a nongovernmental organization, initiated a pilot strategy to reduce conflict between people and snow leopards by: (1) reducing livestock loss by predator-proofing night-time pens and improving daytime guarding practices, (2) enhancing rangeland habitat and prey populations through community-based stewardship and sustainable resource management, and (3) increasing household incomes to help offset unavoidable depredation losses.

The authors engaged communities by using a highly participatory process known as *Appreciative Participatory Planning and Action* (APPA), which builds

on a community's strengths to improve what works and to make it better using low-cost, locally appropriate interventions. APPA employs basic Participatory Rural Appraisal (PRA) tools to lead villagers and other stakeholders through a sequential four-step reiterative process of *Discovering, Dreaming, Designing,* and *Delivering.* This process, outlined in what follows, ensured that the plan grew from the local people's wealth of traditional knowledge relating to animal husbandry, predator occurrence, and behavior.

APPA Step 1: Discovery—Discover the Community's Strengths and Valued Resources

Effective remedial action hinges on understanding the root causes of depredation, which in turn requires good knowledge of how people manage their domestic herds and their rationale for decision-making. PRA tools enable both planners and villagers to gather diverse information on existing conditions (Table 1). The Discovery phase exercises conducted in five settlements in Hemis implicated poorly constructed livestock pens and lax daytime guarding practices as the primary cause of depredation. Livestock were allowed to forage, often completely unguarded, in areas with well-broken terrain and cliffs that constitute prime habitat for the snow leopard (Jackson et al., 1996).

Historically, there was better emphasis on daytime guarding and problem predators were controlled by trapping or other traditional control methods no longer permitted. With children at school and the youths increasingly reluctant to assume animal husbandry, even highly vulnerable small-bodied livestock were

TABLE 1 Examples of PRA Tools used for Appraising Livestock Depredation and Animal Husbandry Patterns

Map of valued natural resources and village assets.
Map of seasonal pastures and depredation "hotspots."
Calendar of seasonal livestock movements and daily herding cycle.
Calendar of seasonal depredation losses (shows peak depredation periods).
Pair-wise matrix ranking of major sources of livestock mortality.
Pasture ranking with respect to depredation and other losses.
Ranking of different guarding measures.
Income and livelihood ranking matrix.
Semi-structured interviews to assess predation causes and patterns, along with possible remedial actions.
Venn diagram showing village institutions affecting livestock production and management.
Village or pasture walk to obtain firsthand understanding of livestock management practices and issues.

often left to graze unattended. With livestock outnumbering natural prey, depredation was inevitable, especially with growing predator numbers due to protected area regulations and actions against hunting. Mapping and ranking of pastures indicated depredation varied with locality, presumably reflecting differences in predator density, habitat suitability, or husbandry patterns.

APPA Step 2: Dreaming—Envision the Community's Short- and Long-Term Future if Necessary Resources were Suitably Mobilized and the Community Acted in Concert

In this step, we envisioned what each village could "look like" within 1 to 2 years (short-term) or 5 to 10 years (long-term) if the community acted collaboratively to reduce predation loss, protect snow leopards and other wildlife, and successfully enhance household incomes. Collective dreaming broadened the framework upon which stakeholders could devise interventions for achieving these objectives. Participants tended to visualize situations in which people and wildlife lived harmoniously. Virtually all herders agreed that existing corrals were inadequate, as the walls were too low and flimsy to deter snow leopards. Highest ranked by the herders was predator-proofing of night-time corrals to prevent future mass attacks, followed by protection of the natural prey base and herder education for improving daytime guarding practices. With predation on the open range being virtually impossible to eliminate, the authors focused on ways of enhancing income generation, especially by capturing more tourism revenue.

APPA Step 3: Designing—Design a Basic Action Plan for Guiding Development and Nature Protection that Substantially Limits Long-Term Dependency on Outside Financial Sources or Technical Expertise

Stakeholders were asked to follow SLC's "best practice" design guidelines to better ensure that remedial actions would be: (1) environmentally responsible, (2) economically sustainable within the local context, (3) socially responsible (i.e., building on tradition and cultural values compatible with the protection of nature), and (4) implemented under a mutually agreeable and communally signed "action plan" that set forth the specific responsibility, contribution, and obligation of each partner (Jackson & Wangchuk, 2001). These guidelines encourage stakeholders to blend traditional knowledge with external expertise and scientific information so that interventions comply with protected area regulations, yet are also integrated with the longstanding pastoral system. The APPA process encourages villager participation in the design and construction of predator-proof livestock enclosures based on drawings prepared in the field.

In Ladakh, the typical improved sheep or goat corral measures 18×35 feet with an 8 foot stonewall and a roof covered by 4×4 inch wire mesh supported on

wooden poles. Each structure has one close fitting wooden door that can be locked at night. Imported materials (e.g., wire mesh, cable fasteners, poles, doors, door frames) provided by SLC cost $400 to $800 (USD). The villagers provided mud and stones along with their time and labor for constructing the corral. Snow leopards have visited these new corrals on several occasions, but no losses have resulted.

The community's sense of ownership and satisfaction with this approach contrasts with outside agencies who built similar pens in Hemis National Park without seeking community involvement. One such corral was situated at the base of a cliff where snow leopards could gain easy access. Not surprisingly, this corral remains unused by the community that it was intended to benefit.

Stakeholder consensus on setting realistic targets for alleviating conflict is also important. Given limited availability of labor and costs involved with hiring shepherds, there is no easy way to avoid depredation on the open range. Large-bodied stock such as horses, yaks, and cattle crossbreeds must roam widely when foraging and are only rarely tended by a shepherd. These animals are especially prone to snow leopard predation in the winter when they are the weakest due to poor nutrition and when escape can be impeded by deep snow.

APPA Step 4: Motivating the Participants—To Initiate Improvements Immediately and Largely on Their Own Rather Than Waiting Until an Undefined Time in the Future

The authors explored ways in which wildlife can directly or indirectly benefit local people. Discussion was stimulated with posters designed in the traditional artistic style, depicting both poor and effective animal husbandry practices and ways to take advantage of tourism and nature-viewing opportunities. The authors examined how communities might improve on what they are already doing rather than trying to establish unfamiliar activities or businesses. With an increase in adventure trekking, they encouraged villagers to improve their capacity to capture more of the revenue without unduly increasing their dependency on tourism. The authors concentrated on skills training for operators of "parachute cafes" (i.e., recycled Army surplus parachute tents) for offering refreshments or simple meals to trekkers. Operators were trained in how to improve their menus, ensure hygienic conditions, and enhance their campgrounds. Some youths were trained in nature and culture guiding. Parachute cafes serve as focal points for disseminating information on wildlife viewing and conservation opportunities. In 2003, with support from UNESCO and The Mountain Institute, SLC assisted villagers in setting up traditional homestays as a means of offering visitors the opportunity to experience local culture while allowing qualified providers to earn additional income during the 4-month summer tourist season.

Implementation

All initiatives were implemented under an "action plan" specifying the activities and inputs for each action, the location, responsible person(s), what each stakeholder agrees to contribute, when the agreed-to measures will be completed, the conservation and economic benefits of the proposed action, and how the outcome shall be monitored. Reconstructed corrals must benefit all livestock-owning households who must also cease filing claims for compensation and report any instance of poaching to the authorities. A reciprocal contribution in the form of labor and collection of locally available materials is required from each participating community. Each beneficiary household or livestock user group who assumes full responsibility for constructing and maintaining the improved pen is required to sign agreements. Finally, to avoid encouraging an increase in livestock numbers, the authors tried to ensure that the new corrals are no larger than the structures that they are intended to replace. Most pastures are already under substantial grazing pressure, in effect forcing sheep to steeper and less productive pastures. An important long-term goal is to improve forage conditions for native prey species to help reduce depredation pressures on domestic stock. Clearly, this will require concerted actions such as rest-and-rotation grazing schemes, establishing special pastures reserved for wildlife, and other measures for enhancing forage plant seedling establishment and productivity.

Evaluating the Approach

The following targets and indicators were identified to track the project's outcome and effectiveness (monitoring actions are in brackets):

1. Significant reduction in livestock depredation rates with the elimination of mass attacks, assuming that corrals are properly constructed and maintained and herders improve guarding practices [SLC and villagers are recording livestock losses and source of mortality. To date, none have been reported from improved corrals];
2. Improvement in local attitudes toward snow leopards and other predators [SLC conducted focused interviews and a comprehensive survey to ascertain current attitudes. A post-intervention survey will be undertaken in several years to assess any changes in attitudes toward snow leopards];
3. With the need for night-time guarding eliminated, herders would spend time on more productive activities [interviews indicated that some herders have increased production of handicrafts and other tourism-related activities]; and
4. Increased household income from tourism-related activities, with 10% being deposited in a community-managed fund to support conservation and development initiatives [SLC and operators are tracking revenue from homestay and parachute cafe activities along with "soft" indicators of wealth].

Conclusions

It is widely acknowledged that the future of most protected areas depends on the degree to which local people's concerns, needs, and aspirations are addressed by conservationists. The authors based their strategy on the belief that stakeholder involvement regardless of gender, age, or economic status, *from the very beginning of a conservation effort*, leads to effective plans that better assure environmental stewardship. As the authors' experience in Ladakh shows, improving existing livestock pens can be accomplished inexpensively and can be led by the communities they serve. Corral predator-proofing prevents mass attacks on livestock by snow leopards and the significant economic impact associated with such incidents. One member of a Village Corral Committee reported: "we herded our sheep and goats into the new pen, locked the door, and walked the two miles to our home. When we returned in the morning, there were tracks of a snow leopard all around the pen. This happened two nights in a row, but we lost none of our animals. As Buddhists, we are very happy for the sake of our livestock and for the snow leopards who might now go back to hunting blue sheep. Also, we are very happy because now as shepherds, we no longer have to lie awake on the cold ground next to the pen."

The authors estimate that for every village's pens made predator-proof, up to five snow leopards are protected from retaliatory killing by local people. They found that it is effective in local communities to implicitly link SLC's requirement for specific conservation measures to their funding of corral improvements and income-enhancing initiatives. Local people have seen that they can benefit from offering visitors good wildlife viewing opportunities, traditional homestays, attractive camping sites, or handicrafts for sale.

The authors have also demonstrated the effectiveness of other elements vital to effective conservation outputs, including ensuring reciprocal co-financing and commensurate responsibility from the community, and regular monitoring and evaluation under an agreed-to "action plan" that sets forth responsibilities, contributions, and obligations of each partner (Sanjayan, Shen, & Jansen, 1997).

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