

ON THE TRAIL OF THE ELUSIVE SNOW LEOPARD



Radio-collaring a Snow Leopard

Photo: WWF/Rodney Jackson

Almost nothing is known about the endangered snow leopard (*Panthera uncia*) in the wild because its secretive habits, low numbers, sparse distribution and inaccessible habitat have discouraged attempts at study. This project, carried out in Nepal by Rodney Jackson, Principal Investigator, and Gary Ahlborn, Research Associate, and supported by WWF-US, is the first successful attempt at in-depth study of this rare cat, and provides the first information base for home-range, movements, habitat use, activity patterns and other aspects of snow leopard ecology. A summary is given of the report submitted to the Government of Nepal at the end of the project's first phase.

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Snow leopards are widely but sparsely distributed through the mountains of Tibet, the Himalaya of Nepal, India, Bhutan and Sikkim, the Hindu Kush of Pakistan, the Pamirs of Afghanistan and ranges along the border of the Soviet Union and the People's Republic of China. Except for Nepal, Pakistan, India and Russia, where brief survey work has been undertaken, the leopards' present status, distribution and abundance are unknown.

In 1981, the Government of Nepal approved an application to study snow leopards in west Nepal, in cooperation with biologists of the Department of National Parks and Wildlife Conservation (DNPWC). Field work was completed between January 1982 and June 1985.

The study area was located north of the main Himalaya Range near the Tibetan border in far west Nepal, in the Langu River gorge, among the most forbidding areas in the Himalaya. Elevations range from 2,700 m along the river to over 6,800 m on the Kanjiroba Himal which forms the southern boundary of the study area. The area totals about 300 sq km and includes an "inner core" area of about 80 sq km where most of the field work has been focussed. It is located in the western portion of the Shey-Phoksundo National Park.

Despite its remoteness and rugged nature, the study area provided the following opportunities:

- A dense, undisturbed snow leopard population.
- Sympatry between snow leopard and common leopard limited to a small section of the valley.
- Good, relatively undisturbed bharal and tahr populations. Bharal are primarily restricted to the north bank of the Langu, tahr to the south, however, the two species overlap in the southern core area, enabling us to examine habitat preference and partitioning.
- An opportunity to examine snow leopard habitat use, density and prey

utilization under a variety of conditions.

While the Langu Valley is atypical for the Himalaya in that it is essentially unpopulated by humans and ungrazed by livestock, information from this study provides a baseline of snow leopard habitat preferences and requirements under pristine conditions. Obviously, it needs to be followed up with studies in more representative situations.

Primary objectives were to examine, to the extent possible in a four-year study, snow leopard activity and movement patterns, home-range size and configuration, habitat utilization and predator-prey relationships (food habits and basic ungulate prey population dynamics). We specifically attempted to answer the following questions:

- Does the snow leopard's home-area and land tenure system resemble those of other large solitary cats such as the mountain lion and tiger?
- How do individuals utilize their home-range space with regard to resources?
- What are the patterns of movement shown by individuals relative to each other, and what mechanisms operate in spacing behaviour?
- Is sign a reliable indicator of relative population abundance?
- What conservation measures are necessary to protect the species?

Snow leopards were trapped using specially-designed leg-snare traps. Five cats (two females and three males) were fitted with radio-collars and tracked over periods up to two and a half years. Extensive information was gathered on such aspects as home-range size and configuration, movement and activity patterns, habitat utilization, and scent and visual marking. This was supplemented with some information on food habits, land-tenure patterns, and population characteristics.

Preliminary results indicate that the

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Langu snow leopards occupy surprisingly small, almost completely overlapping home-ranges, between 10 and 30 sq km, a figure that fails to take into account the substantial surface area due to the rugged terrain. While all individuals regularly used common areas, their occupancy was staggered in time, thus confirming the species' solitary nature. They may remain in one area for up to ten days, before moving often to the opposite end of their range, some 5 or 7 km away. Typically snow leopards move less in a day than one kilometre as the crow flies, but their travel routes are sinuous because they move along sharp ridges or the base of cliffs, thereby covering much greater distances in search of prey. Leopards are most active around dawn and at dusk, but are not averse to daytime travelling where undisturbed by man.

The Langu snow leopards exhibited a strong preference for broken terrain, especially cliffs, usually bedding within 50 m of an edge. Cliffs were used in excess of their occurrence in the study area, while even-surfaced terrain was under-utilized. Elevations above 4,200 m were used less than expected, and we found no evidence of seasonal movements or separate summer and winter home ranges.

By repeatedly visiting transects, we found that cats of both sexes mark extensively, leaving such signs as scrapes, scats and scent at prominent locations throughout their range. These serve as "calling-cards", important in an essentially solitary species such as the snow leopard that avoids close contact with others except during the brief mating season. On the average, radio-tagged snow leopards of both sexes were separated by at least 2 km on the same day. Sign may be extremely valuable in indicating the presence and relative abundance of the species in other areas, a crucial indicator since the snow leopard's vast range and inaccessible terrain preclude searches of the intensity that are possible for, say, the tiger.

Snow leopard numbers were estimated at 5-12 animals per 100 sq km, a figure

that compares favourably with Schaller's (1977) estimate of about one cat per 100 sq km for Shey Gumpa area, and Mellon's (1984) estimate of about one cat per 150 sq km for Ladakh, India.

The Nepalese Counterpart, Karan B. Shah, undertook detailed studies of the blue sheep or bharal (Pseudois nayaur), the principal prey of the snow leopard in much of its range. His work should contribute substantially to knowledge about this unusual Tibetan ungulate, considered by scientists to be more goat-like than sheep-like in its behaviour.

Partly on the basis of information from this study, Nepal established its largest national park, the Shey-Phoksundo National Park encompassing some 3,555 sq km of prime habitat for rare species like the snow leopard, musk deer, wild dog, goral, and possibly the very rare Tibetan sheep or nayan (Ovis ammon hodgsoni).

The second phase of the research will involve the preparation of a management plan for the Shey-Phoksundo National Park and wide-ranging surveys of snow leopards in other parts of Nepal, as well as in Pakistan, using techniques developed in this pioneering project. The primary goal will be to determine accurately the status of populations both within and outside existing parks and reserves throughout the region, and to promote conservation area multiple-use planning strategies. In this respect the near-mystical snow leopard could serve as a sensitive indicator of a healthy mountain ecosystem and a symbol of man's commitment to its conservation.

Preliminary recommendations for the management of the snow leopard and its prey are provided for the Langu Valley segment of the Shey-Phoksundo National Park. Our request for permission to examine the remaining 90% of the park is under consideration. The guidelines provided below therefore only to the far mid-western corner of the park, namely the Langu Gorge from the Ruka Khola west to Bailung Khola immediately

east of Dolphu. This is the only village located within the park in our area.

The Langu Gorge is unique in terms of the density of snow leopard it supports; numbers are greater than reported anywhere else in the cat's range. It therefore provides Nepal with the opportunity to ensure that this endangered species continues to exist under near pristine conditions in at least one area.

Management Objectives

- To ensure the protection and ultimate restoration of all natural communities within the affected area. Alpine and subalpine habitats in this area are especially vulnerable to disturbance because of steep slopes, shallow soils and semi-arid climatic conditions. The Langu Gorge is essentially uninhabited by man and consequently reflects wilderness conditions rare in Nepal's mountain environment.
- To provide special protection for endangered species, particularly the snow leopard and musk deer. Protection of these species requires that hunting and livestock grazing be strictly controlled.
- To implement measures to protect soils, rangeland resources, fuelwood and watersheds with particular emphasis on the area around Dolphu village.
- To respect traditional rights of villagers, with controls for those activities affecting the area's fauna and flora.
- To secure the cooperation of local people as a vital step in properly managing the Park's resources. An important objective is to facilitate conservation education in schools and among all villagers, including community leaders.
- The dangerous terrain of the Langu Gorge does not lend itself to the promotion of trekking, although

Dolphu and Wangri could be considered in the future as part of the region's resource base. However, the Karnali Zones' remoteness and lack of basic facilities severely limits its foreseeable potential for tourism. The Langu Valley is a restricted area.

Recommendations

The establishment of a Panchayat Conservation Committee to assist in wildlife, rangeland and forest resource protection, and to participate in enforcing the park regulations, is strongly recommended. The committee could play an invaluable role in implementing much needed grazing, firewood, watershed and wildlife protection plans, especially in the rapidly deteriorating environment around Dolphu village. Participation by village leaders is an essential ingredient in the effectiveness of protective measures, especially as the local villagers depend upon Park resources and have traditionally used them.

Hunting should be controlled in accordance with the rules of the Department of National Parks and Wildlife Conservation. While a total prohibition on musk deer harvesting is essential, it is unrealistic to attempt to enforce a ban on unthreatened species like the bharal and tahr. Local populations could sustain harvest rates of about 10% without harm; therefore some hunting under license is recommended for the trade-off it would bring in village cooperation. However, the practice of hunting with poisoned bamboo spears should be discouraged, because it is unselective in the species killed and snow leopards are equally vulnerable.

Livestock depredation by snow leopards is apparently not a significant problem, in contrast to livestock losses from the forest leopard (Panthera pardus). The villagers did not seem to perceive the snow leopard adversely, but repeatedly expressed their desire to control the common leopard.

Snow leopard populations, prey species and their habitat are best protected

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by controlling hunting and by ensuring that livestock grazing of presently ungrazed rangeland is not permitted. As long as native ungulate populations persist at present levels, livestock depredation by snow leopards should not develop into a problem. The depletion of native prey species and retribution by livestock herders are judged as significant factors in the decline of the snow leopard throughout the cat's range.

Snow leopard population trends should be monitored by undertaking sign surveys every two years, using carefully placed, permanent transects and standardized techniques. Surveys must be made during the late winter (February-March), and should follow the methodology developed during this study.

Snow leopards can only be preserved by managing intact populations, i.e. by considering the population of the Shey-Phoksundo National Park and adjacent buffer areas as a single unit. Thus adequate management recommendations cannot be provided until a survey has been undertaken to determine the species' status and distribution in the whole park. Integral to this investigation is a survey of prey populations, competing predators such as the wolf (Canis lupus), habitat mapping and characterization, examination of habitat edge and interspersions, a determination of livestock grazing patterns, and examination of traditional man-wildlife interaction patterns with special emphasis on hunting, livestock depredation and grazing needs. Use of a habitat suitability model to evaluate habitat potential is recommended.

Such aspects as minimum population size, reserve (management area) size and configuration, genetic diversity, dispersal corridors and habitat suitability cannot be addressed solely from the Langu information base; a wider-ranging, comparative survey is an imperative requisite for the development of sound management recommendations.

Annual or biennial censusing of bharal and tahr populations should be undertaken in selected areas. This is the

best way of alerting DNPWC to possible declines and provides the only sound means upon which to base the issuance of hunting licenses. Counts are best undertaken in two seasons: rutting season (December-January) and the lambing season (late May-June).

The general inventorying of the fauna and flora should be continued.

Studies should be undertaken of the effects of burning on bharal and tahr rangeland before permitting local villagers to set fire to inner gorge areas.

We strongly recommend that DNPWC develop a National Snow Leopard Conservation Plan, in order to manage better this unique species as well as its high mountain habitat.

Nepal has demonstrated its keen interest in conservation by establishing six mountain national parks. With one possible exception, all are too small or too populated by man to support significant snow leopard populations. Conservation of this species can only be achieved by protecting habitat through all means possible, including sound land-use and management outside the narrow confines of a national park. Large predators like the snow leopard are sensitive indicators of environmental quality; ecological homeostasis is strongly correlated with population size and land-use patterns. By addressing the needs of this rare species and its prey, the habitat requirements of many other plants and animals that share the same ecosystem are met. Thus a National Snow Leopard Conservation Plan would also protect other species.

The snow leopard stands as an internationally recognized symbol of the high Himalayan ecosystem. By promoting wildlife surveys as suggested above, Nepal not only confirms its commitment to conservation, but provides outstanding leadership in the region.

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