

Ghost at the



THE SNOWS: TONY FORTON/IMAGES

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Thousands of years ago

in the foothills of the Himalayas, a former incarnation of the Buddha, Prince Mahasattva, was hunting in the forest. The young prince came upon a tigress who was weak and starving, an animal so desperate that she was about to eat her own cubs. The prince's hunting party conspired to kill the tigress and her family, but the thoughtful prince dissuaded them. Instead he pierced himself with stakes to ease the tiger's thirst with his own blood, and cut off his arms

and legs to feed the pathetic animal, sparing her life and auspiciously moving on to his next incarnation. I don't care what you say about the obvious practical hurdles of this gory end, the prince's animal ethics were impeccable: Only a Buddha could feed the hand that bites him.

You see, the Buddha invented conservation ecology centuries before E.O. Wilson could walk. Compassion, respect for the unity of life, and a profound understanding of the mutual interdependency of all things are the foundation of Buddhism. Nature is the abode of the Buddhist spirit world, and thus receives the most ardent veneration. And nowhere is the personification of nature more perceptible, nowhere are the deities that haunt the spirit

Top of the World

*herders in Ladakh,
elusive snow leopard is anything but elusive,
they see it as a major threat to their livestock.
wards the herders' only option?
peace means protecting both people and leopards.
And that's where our story begins.*

by Philip Johansson

world more vibrant, than in the lofty mountains of the Himalaya. Although Buddhism long ago lost its hold on most of India, eclipsed by the spreading influences of Hinduism and Islam, it remains firmly rooted in the rugged mountains of its most northern district, Ladakh.

Here in the rainshadow of the main Himalayan range, in thin air squeezed dry by snow-capped mountains, the Ladakhi culture has endured on a frugal diet of yak products, barley, and Buddhism for more than two millennia. Despite a history haunted by the shifting forces of Tibetans, Mongols, Moghuls, Afghanis, Gurkhas, and Kashmiris that continues to this

day, the Ladakhi people remain as stolid as the mountains they cling to. Living in austere whitewashed adobe and stone villages with irrigated fields carved from the arid Transhimalayan wilderness, theirs is a frugality of respect. Their population level is lower than in any other part of India, three or four people per square kilometer sprinkled over a vast parched landscape. The Ladakhi people are grateful for the limited resources nature has granted them in this highland desert, with as little as 10 centimeters of rain a year: a field of barley, a garden of turnips and peas, an apricot grove, a handful of goats and sheep, and perhaps a donkey or some *dzo*, a hybrid of yak and cow. But there is a major wrench in their gratitude, one thorn in their middle path to unity with all creation: the snow leopard.



I came to Ladakh as a member of Earthwatch Institute's *Land of the Snow Leopard* project, which for four years has helped to monitor the populations of snow leopard and their prey in Hemis National Park in cooperation with the Jammu & Kashmir Department of Wildlife Protection. This year, in addition to sighting wild sheep and goats, our team assessed the impact of snow leopards and other predators on the livestock of villagers in part of the 3,300-square-kilometer park. *Bharal* (*Pseudois nayaur*), or blue sheep, and other wild mountain ungulates are considered divine creatures by the locals, affording them a level of protection from hunting unheard of in Muslim and Hindu regions of India. But according to Dr. Joseph Fox, University of Tromsø, Norway, and leader of the Earthwatch project, "In the Ladakhi herders' sense of the sanctity of all life, predators come to be a notable exception." Snow leopards may be the poster child of the Himalayan conservation movement, an endangered animal numbering only 200 in all of Ladakh (see sidebar), but to many Ladakhi they are pests.

The "elusive" snow leopard is not so elusive after all, if you have livestock. In the village of Rumbak, a cluster of whitewashed houses backed against a red scree slope by lush terraces, several women of the Dum household were out in the dusty path. They were all talking at the same time in shrill voices and gesticulating toward the stark stony mountains the color of old bones and dried blood. A snow leopard had killed two of their *dzomo*, or female *dzo*, last

winter, and a wolf had also taken down their horse in the pasture. The women wore weathered dresses and red wool robes, or *gonchas*, and had colorful scarves tied around their heads, framing faces of burnished gold riddled with smile wrinkles. Their herd of 150 sheep and goats stood sardined in a small round corral across the path from their house, with a 1.5-meter stone wall and the skull of a *bharal* over the door. The women showed us the stall for their horse, by the corner of their house, now chillingly empty. The eldest woman, who wore thick glasses and a blue down vest shiny with soot, spoke in a strident voice about the villainous snow leopard. It was clearly not the object of her deepest veneration.

Near the end of Rumbak village, above the hissing spring and the giant red prayer wheel, Tsering Choskhor was rounding up the last of his herd of 160 sheep and goats, which he had just brought down from pasture. Rumbak is at an elevation of about 3,900 meters, and villagers herd their animals to pastures as high as 5,000 meters in search of fodder. Tibetan snow finches tittered from the walls of the corral, and rose finches and fire-fronted serins cascaded along the steep slope above the house. Tsering had to chase the last two sheep out of his house, and jostled them into the crowded adobe corral and sealed the door made from smashed oil cans. He said a snow leopard jumped into the corral last winter, but he was able to shoo it away before it went on a rampage. It was not hard to imagine how the leopard got in, as the uphill side of the corral was only half-a-meter higher

A 1990 survey in Nepal revealed that villagers wanted the snow leopard completely eradicated.

than the slope. I could just picture the lithe cat peering in, wide-eyed, like he'd found the jewel in the heart of the lotus: *Om mani padme hum*. But Tsering's annoyance with the leopard was no secret.

Namgail Chunpa, our horse-handler who lives at the end of Rumbak village, even had an encounter with a leopard during our study. He was climbing a ridge to retrieve his herd across the Rumbak River, when he noticed that the horses were edgy and alarmed. He shouted, and a snow leopard bounded away from a rock 10 meters above his herd. Had he been a half-hour later, Namgail's horses might have been another depredation story. He could laugh about it after, enjoying *chang*, the local barley beer, with his

family and friends in the large sunlit main room of his house. The *chang* tasted like bread starter, with a mild buzz to it, and was taken alternately with *soldja*, steaming green tea mixed with yak butter and salt in a scabbard-like churn. For finger food there was *ngamphie*, roasted barley flour, the village staple, plus a deliciously rich medley of *ngamphie*, goat cheese, butter, and sugar. The outside of Namgail's house is painted with red swastikas (a native design) and rows of dots to please *Bsan*, the mountain spirit, but only Namgail's vigilance saved his herd this time.

The Ladakhi have always lived in the midst of snow leopards and wolves, and predators nipping off a few livestock is nothing new. But the level of depredation is becoming more of an issue in Ladakh and other areas of the snow leopard's range. Every family in our Hemis study area reports losing 4.85 animals a year to predation, on average. Each family has a story to tell about close encounters with the "elusive" cat. These numbers may be inflated by the changing relationship between villagers and wildlife, with an understanding that government compensation follows on the heels of predation by the endangered cat. But even one or two goats is a considerable loss, often accounting for 10 percent of a family's flock, and losing a horse or *dzomo* can be economically devastating. Among 13 villages, the reported total financial loss amounted to 100,000 rupees (about \$2,353) in one year. Approximately 60 percent of this havoc is thought by scientists to be wrought by snow leopards, but many more incidents are blamed on the cats. According to Fox and Dr. Raghunandan Chundawat, an Indian wildlife biologist and Fox's Earthwatch co-leader for three years, these conflicts don't always end there. When a large number of livestock are lost in an incident, the leopards are often sought out by villagers and killed. Have snow leopards finally pushed the envelope on centuries of compassion?

"Any forager would have a bias toward easily available resources," says Dr. Yash Veer Bhatnagar, Fox's new coleader this year and conservationist for the International Snow Leopard Trust. Bhatnagar is a key player in ISLT's mission of reducing the conflicts between snow leopards and villagers here, and

Livestock make up approximately 25 percent of the diet of snow leopards (opposite) in the study area, earning the shy predators an unsavory reputation among villagers. A Ladakhi family (left) rests by a mani, or prayer wall, while their cows graze in a meadow.





Sheep and goats of relatives are often herded by villagers, boosting livestock numbers by fivefold or more. Over a hundred animals will be squeezed into tiny summer corals (above) for the night, offering minimal protection. The irrigated fields of villagers (opposite) can be an irresistible temptation to wild ungulates living on the barren slopes above.

reinforcing the enlightened conservation ethic that has sustained the Ladakhi ecosystem for so long. "The prey-encounter rate of a snow leopard walking from Rumchung to Gandala is skewed: he's likely to encounter just a few *bhanal*, but hundreds of livestock." Sheer numbers favor depredation out on the pasture, but that doesn't account for the habit of raiding corrals, which are in or near the villages, often adjoining houses. The risks for the leopard are enormous, as any snow leopard caught in a corral is likely to be stoned or clubbed to death. But the tantalizing payoff is like winning the jackpot: Predators are very habitual, and snow leopards in Ladakh and elsewhere have apparently acquired the gambling habit.

Although attitudes towards snow leopards may be negative in Ladakh, the cats are in even hotter water elsewhere. A 1990 survey in Nepal revealed that villagers in some areas wanted the snow leopard completely eradicated. In the 1970s, famed biologist George Schaller abandoned his survey of snow leopards of the Chitral Range, northern Pakistan, because within four years the population had been hunted down to insignificant numbers. Although the snow leopard is fully protected as an endangered species under India's 1972 Wildlife Act, as well as the 1973 Convention on International Trade in Endangered Species (CITES) to which India is a signatory nation, they are subject to illegal hunting in India. As of ten years ago, a good-quality snow leopard skin could still be acquired in Indian Himalayan towns like Srinagar and Manali for about

\$500. With the lowest human population density in India, a relatively intact ecosystem, and villagers whose tradition it is to keep it that way, Ladakh may represent one of the last great havens for this beleaguered cat.

As my teammates and I reached a 5,000-meter pass between the broad, high pasture of Choktse Phu and the cloud-filled Rumchung Valley, I had to concur with George Schaller's memorable quote in Peter Mathiessen's *The Snow Leopard*: "Isn't that something, to be so delighted with a pile of crap?" There on the weather-bald ridge, on crumbled rocks the red of a Kashmir rug, with an outstanding view of the Indus Valley like a mirage through the clouds, was a turd so fresh that it still smelled of steaming digestion. It was strung together with coarse white hair and the stems and leaves of *Myricaria elegans*, a shrub that grows along the valley streams with spikes of waxy pink flowers, habitually eaten by snow leopards for unknown reasons. Large chunks of broken bones protruded from it, and a small black hoof, probably from the goat of one of the farmers we'd interviewed. This was as close as I got to a snow leopard, which was probably enjoying a nap on the nearby ochre ridges, less than a bowel movement away. Of course the fate of the white goat was very different.

Appreciating the snow leopard's penchant for livestock requires a full understanding of wild prey populations, rugged mountain sheep and goats with

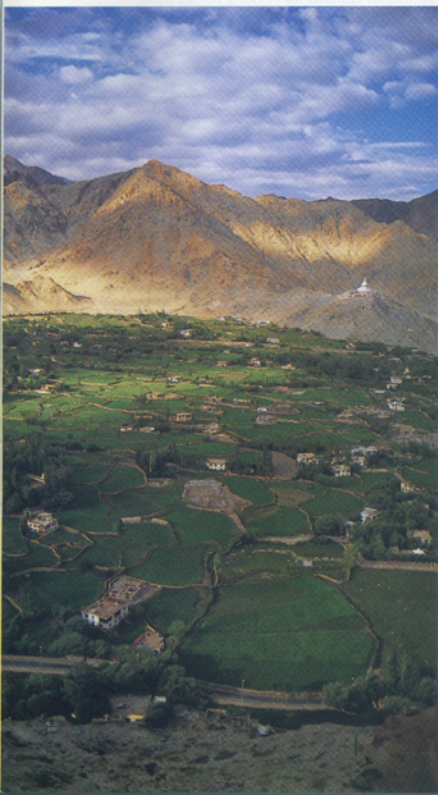
I had to concur with George Schaller's memorable quote...: "Isn't that something, to be so delighted with a pile of crap?"

light-footed names like *bharal*, ibex, argali, and *urial*. If these wild prey were declining, that might drive a greater reliance on livestock than in the past. On the other hand, an increase in wild prey populations could also support more predators, making livestock depredation incidents more likely. The work of Fox and Chundawat has gone a long way toward clarifying these trends. For the past 13 years, 4 years with Earthwatch volunteers, they have been assessing the biomass of wild ungulates and alternate prey like marmots in an attempt to project the sustainable population levels of snow leopards and other predators. Since the late 1980s, *bharal* in the Rumbak watershed have increased 20 percent to about 220-

240 animals. Assuming that a 15 percent predation rate is sustainable, and that snow leopards are only *bharal*, this number would support one or two snow leopards. Of course the equation is not that simple, with snow leopards preying on other ungulates, livestock, marmots, pikas, voles, and birds, and other predators, like wolves (*Canis lupus*) and dholes (wild dogs, *Cuon alpinus*) sharing in the predation of *bharal*. In reality, recent estimates by Fox and Chundawat suggest that four or five adult snow leopards prowl the Rumbak watershed, although their home ranges probably include a much larger area.

Along with the *bharal*, local populations of the rarer Ladakh *urial* (*Ovis vignei vignei*) and Tibetan argali (*Ovis ammon hodgsoni*), have increased since the 1980s. This trend once again owes much to the cultural conservation ethic of the Ladakhi villagers, but also to a recent cessation of illegal hunting. Although Ladakh is predominantly Buddhist, and loathe to hunt, a large minority comes from Muslim Kashmir. "Muslims see things differently," says Rinchen Stakrey, a local guide on our project. "They say, these wildlife are up there for us to use. We have the right to go hunt them." Although not driven by any such manifest destiny, military and paramilitary detachments also found it sporting to practice their aim on unarmed divine creatures. This hunting pressure has slowed only in the past 10 years, primarily under the firm leadership of District Forest Officer Chering Nurbu, a local ranger who rose to considerable influence here in Ladakh. Although Nurbu died five years ago, illegal hunting is now minimal, and the military has much tighter reins on the activities of its men.

On a ridge across from Gandala, a 4,900-meter pass between the Markha and the Rumbak watersheds, I and my fellow Earthwatch volunteers could view several square kilometers of steep scree slopes, from the pass down to the village of Yuruche. It was early morning, the time the locals call *chipe-chirrit*, or "bird song," and we could still hear the robin accentors and redstarts in the dusky depths of the valley. Spiny clusters of *Caragana* and *Acantholimon* clung to the red ridges, and *Artemisia* scented the sparse air with medicinal



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gusto. Snowclad Stok Kangri and Pacha Kangri hovered over the foot of the valley like sentinels of *Btsan*, the mountain deity who rides a white horse. And in the shadow of a ridge to the east, a kilometer away, we could make out the tell-tale moving specks of a group of *bharal*. Closer inspection with the spotting scope revealed that there were 24 in the group, all of them males with their characteristic handlebar horns. Some of the larger ones were sparring, half way between playing and fighting, which they do through the summer to help establish the hierarchy for the autumn rut.

Bharal are the most common mountain ungulates in the region, with perhaps 11,000 in Ladakh alone. Tibetan argali, on the other hand, are rare, with only a remnant population of 20-odd individuals in Hemis, and a total of 200 in eastern Ladakh. From our same lofty ridge we were lucky enough to spot a group of these mountain sheep, one male, four females, and two boisterous young of the year, trotting up the hill toward Gandala. The male had heavy curling horns, not unlike American bighorn sheep, and the females had lighter-weight versions. While the *bharal* stick to steep slopes usually within 100 meters of rocky outcrops, to which they flee for cover, these argali rely on their speed for protection. They are at home in these rolling uplands, trotting along a steep scree slope at 5,000 meters that would have me on hands and knees. Soon the group disappeared over the ridge above Gandala.

With both domestic and wild ungulate populations on the rise in the park, the potential for wildlife competition with livestock, or conflict with farmers, looms near. The impact on wild ungulates has been clearly documented by Earthwatch teams, who observed the displacement of *bharal* and argali herds to higher, sparser elevations by sheep and goats during the middle of the day. Likewise, the 1,600 *bharal* and other wild ungulates in Hemis are bound to step on the hooves of the livestock numbering 10 times that during the summer. Although there's no available objective measure of the impact on the range, reports from elders in the villages suggest that the high-altitude pastures were once more lush. The declining quality of forage is also indicated in the claim by some villagers that goats are not producing as

much, or as good quality, milk as they used to.

In some areas of Ladakh, villagers are charging wild ungulates with degrading "their" pastures. But a more serious conflict is emerging in the form of crop damage. Since the establishment of Hemis National Park in the mid-'80s, and the concurrent crackdown on illegal hunting, the animals have grown bolder. They are found closer to the villages, especially in the spring, and come down the slopes at night to dine on the lush barley and wheat fields. Although domestic animals are likely responsible for most crop depredations, the fact that *bharal* partake in an occasional barley binge is a serious blot on their divine image. Without immediate and creative intervention, the sanctity of life that has held this ecosystem together for centuries risks eroding beyond repair.



A domestic sheep (right) killed by wolves waits to be skinned and butchered. All parts of livestock killed by wild predators are salvaged if possible by villagers. Because snow leopards are protected, and snow leopard depredations can reap compensation for villagers, livestock deaths by other predators and disease are often blamed on the cats.



JOSEPH FOX

Panthera uncia

Snow leopards (*Panthera uncia*) live on precipitous terrain in more ways than one. Their dwindled numbers are thinly scattered over the mountain ranges of Asia, including some of the remotest and highest ranges in the world, from the Hindu Kush in Afghanistan eastward along the Himalayas and the Tibetan Plateau, and north over the Pamirs, Tien Shan, and Altai to the Sayan Mountains near Lake Baikal. A creature of borderlands and hinterlands, snow leopards are distributed across 12 countries and 2 million square kilometers, making their populations difficult to study and conserve. They are nowhere considered common, usually living in densities of 1-3 adults per 100 square kilometers. There are an estimated 5,000 to 7,000 snow leopards left in the wild, with about 400 in northwestern India as a whole.

Living at elevations of 2,000 to 6,000 meters, snow leopards are creatures of sparse grassy or shrubby alpine zones, rugged terrain broken by cliffs and rocky outcrops. A thick coat of gray with soft dark spots and rosettes provides perfect camouflage for these stealthy cats. Stalking from among the scanty cover, they prey primarily on the *bhawal* and ibex that haunt these high slopes, but will opportunistically take other ungulates, including livestock, and marmots, gamebirds, and rodents. Snow leopards can reportedly leap up to 15 meters, landing on sure-footed, oversize paws, their three-foot long tails, half their total length, helping to keep their balance. They do not roar like most large cats, but in the winter mating season they utter a haunting, plaintive wowl that has more than once been taken for a Yeti. Males and females pair only briefly between January and March, and the females raise the one to four young born in a den 100 days later. Snow leopards' expansive home ranges overlap, but they are largely solitary, communicating with others only by scrapes, feces, and scent sprays near prominent features along their travel routes.

Although snow leopards are legally protected in most countries, and covered by international treaties, they still face challenges ahead. Their numbers appear to be stable or increasing in parts of Nepal, India, and Mongolia, but they are still subject to illegal hunting and are declining in other parts of these countries, and in China (where the largest portion of their total population remains), Afghanistan, and all the newly independent central Asian republics like Kazakhstan and Kyrgyzstan. Demand for pelts still drives snow leopard plunder in some of these countries, and wild cat bones such as those of snow leopards are slowly replacing tiger bones in the highly lucrative oriental medicine trade. In countries where the snow leopard is actively protected, conflicts with herders and villagers will prove to be the greatest challenge.

“The villagers’ culture teaches them that everything is interconnected, so we just want to reinforce that.”

The purpose of International Snow Leopard Trust’s mission here, and part of Dr.

Bhatnagar’s recent research with Earthwatch volunteers, is to work with villagers to reduce the impact of snow leopards and other wildlife: to encourage villagers to return to a more active part in their conservation. “It is very sad, certain changes in attitude that have come over people here,” says Bhatnagar. “We would like to stop this trend, and have people on our side. The villagers’ culture teaches them that everything is interconnected, so we just want to reinforce that.” He is starting with the most straightforward measure: stemming the tide of corral depredations. Based on our data on corral dimensions, almost every corral does a great job at keeping livestock in but provides little protection from predators. Many designs for raising the walls are being considered, from chain link to cantilevered willow branches, but the decision for such changes will have to be made at the village level.

In October, ISLT will hold its first village workshop in Markha, one of the most heavily depredated villages in the park. Two winters ago the village lost nearly 150 goats and sheep from corrals in

just two months, so it is very receptive to improvements. Together with villagers, conservationists will review the depredations that they experience, the weak points of their corrals, and potential solutions. Any solution will need to be reached by consensus of the village, and although ISLT will provide some financial assistance, villagers must also contribute their own time and capital investment. Some villages that Bhatnagar and his team screened were interested in the assistance but hesitated at the personal responsibilities, legacy of a bureaucratic welfare society felt even out here in the hinterlands. But the ISLT has used this approach in Tibet and other snow leopard regions, and hopes that success in Markha village will pave the way for similar workshops in every village.

Although corral losses account for only 30-40 percent of livestock depredations, dealing with losses in the pastures will be much more complicated. In the high pastures here there may be up to 400 sheep and goats being herded by 1 person, sometimes a young boy just biding his time because it was his turn to herd. The herder can’t see the whole herd from one end, due to the undulations of the ridges





and valleys, and any self-respecting snow leopard could pick off a couple of goats unseen. Horses, yak, and *dzo* present an even bigger challenge, often being sent to high pastures for days at a time, unguarded. Professional herders paid by the villages, preferably two of them to a herd, would be one solution here, and some communities in the Transhimalaya already take this approach. Sheep dogs would be another option, although park managers worry about their threat to other wildlife. Either solution would involve the concerted efforts of villagers, along with considerable social adjustment and investment.

Range competition between livestock and wild ungulates will require further management and planning decisions by the park administration in cooperation with villagers. Hemis National Park has received little development other than signs and rough-hewn bridges in the past 15 years, and few management initiatives. Assuming that final "notification" and further planning for the park move

forward, managers may designate a "core zone" for the exclusive use of wildlife, surrounded by a "buffer zone" where livestock grazing will continue. The region of our study, between the Indus Valley and the Markha Valley where villages are common, would be part of the buffer zone. Defining what pastures and forage species are preferred by livestock will be a focus of future Earthwatch teams, helping to guide planning decisions and pasture development. The less populated region from the Markha to the Zaskar Valley would probably make up most of the core zone. "It has to happen," says Bhatnagar, referring to the future development of the park. "But when and how—the villagers have to be involved in that process."

The unity of life may already be on the mend in Ladakh, after all. With the establishment of the park and the increasing numbers of trekkers exploring these hallowed valleys, villagers are coming to realize that wild animals have inherent value they had not considered. Although ecotourism is in its infancy here, and most foreigners rarely even see the *bharal* on the ridges, villagers understand that the foreigners come because the park protects wildlife. Many villagers take a special pride in the local presence of a few rare Tibetan argali, and actively took part in their protection from two paramilitary poachers in the 1980s. Attitudes about snow leopards and other predators still hover below the divine interdependence mark. There is a long climb ahead to assure the sustainable future for these mountain predators and their ecosystem. But practical developments, such as corral improvements and increased herder vigilance, along with government compensation for depredation losses, stand a chance in Ladakh to make interdependence more tolerable. ■

Philip Johansson is Senior Editor at Earthwatch. For more information on the people and ecosystem of the region, read Helena Norberg-Hodge's *Ancient Futures: Learning from Ladakh* (Sierra Club Books, 1991) or George Schaller's *Stones of Silence: Journeys in the Himalaya* (Viking Press, 1980). For more information on snow leopards, consult the International Snow Leopard Trust website at www.snowleopard.org. For information on Earthwatch Institute projects dealing with snow leopards and their ecosystems, look for *Land of the Snow Leopard* and our new project, *Snow Leopards of Nepal*, in the 2000 Research & Exploration issue, or at www.earthwatch.org.

Tibetan Mahayana Buddhism is the majority religion of Ladakh, exemplified by numerous monasteries, or gompas (opposite), that dot the landscape. Although bharal (left) are also called blue sheep, they are neither blue nor sheep. They have heavy sheep-like horns, but many other traits place them closer to the goat ancestral line.