

Mountain Ungulates of the Trans-Himalayan Region of Ladakh, India

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The Trans-Himalaya is a vast expanse of cold and arid land encompassing the entire Tibetan Plateau and its marginal mountains, with an estimated area of 2.5 million sq km (965,000 sq. mi.). Ladakh is located at the western tip of this huge plateau, and is the least inhabited area in India, with fewer than three persons per sq km (0.4 sq. mi.). The region supports an intact assemblage of Pleistocene large herbivores (Schaller 1977). These herbivores underwent an adaptive radiation in the late Miocene, occupying the mountainous niches created in the aftermath of the collision of the Eurasian and the Indian plates and the consequent rise of the Himalaya (Schaller 1977).

Ladakh's mammalian herbivores (20 species), belonging to six families, include eight wild ungulates: Tibetan gazelle (*Procapra picticaudata*), Tibetan antelope (*Pantholops hodgsoni*), blue sheep (*Pseudois nayaur*), Ladakh urial (*Ovis vignei vignei*), Asiatic ibex (*Capra ibex siberica*), Tibetan argali (*Ovis ammon hodgsoni*), Tibetan wild ass (*Equus kiang*), and wild yak (*Bos grunniens*). The populations of these mountain ungulates have declined in the last century due to poaching and habitat loss associated with human endeavors.

Most of the aforementioned herbivores are currently listed on the Schedule I of the Indian Wildlife (Protection) Act of 1972 and Appendix 1 of the Convention on International Trade in Endangered Species (CITES). The Ladakh urial and Tibetan antelope also listed as endangered species on the Redlist of the International Union for Conservation of Nature (IUCN). Although several parts of eastern Ladakh, known as Changthang, have remained undisturbed wildland areas, others are being encroached upon by humans in recent years, and the herbivores inhabiting them face an array of threats associated with an increasing demand on natural resources (Fox et al. 1994).

Cashmere wool, or Pashmina, is the mainstay of the economy of the people of the harsh environment of eastern Ladakh, where any other form of land use is less profitable. However, as the needs and aspirations of the people have increased, they have tended to increase the livestock population (Namgail et al. 2007a), which makes the survival prospects of many wild ungulates sharing resources with them questionable. The western part of Ladakh, however, is lower and fertile, and people there practice agriculture complemented by livestock production, but wild ungulates in this region are not welcomed by farmers, whose crops are damaged by the animals.

Although more localized surveys (often within protected areas) were carried out in the past to determine the status and threats to these mountain ungulates, there has

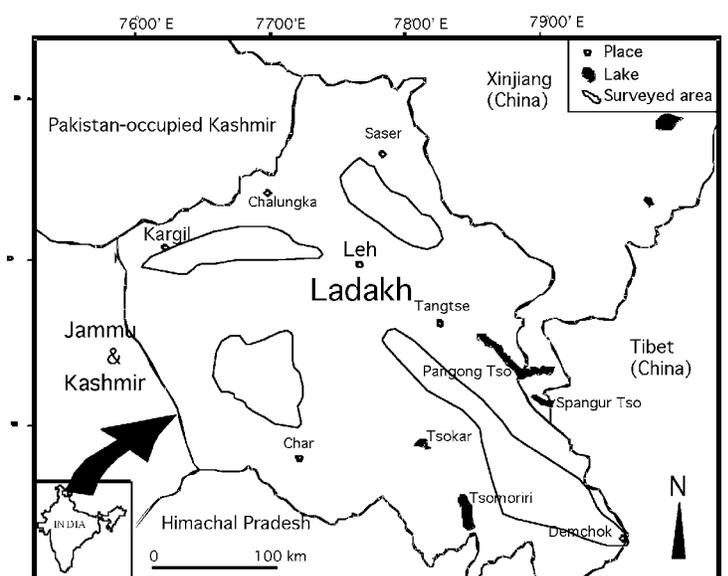


Figure 1—Ladakh area of the Indian Trans-Himalaya, with the surveyed areas demarcated.



Figure 2—A subadult male blue sheep observed in the Zangskar Mountains. Photo by Tsewang Namgail.

been no apparent effort to understand the patterns at a geographical scale, which is crucial for prioritizing larger ecologically areas for the conservation of these threatened animals.

Field Surveys

Surveys were carried out between March 2005 and August 2006. The entire Ladakh region (see figure 1), encompassing almost 80,000 sq km (30,888

sq. mi.), was divided into four geographical zones: Nubra in the north, Zangskar in the south, Changthang in the southeast, and Sham in the west. Within Nubra, the surveys largely focused on the areas between Khardong and Hundar along the Shayok River, and Kyagar and Panamik along the Nubra River (see figure 1). Within Zangskar, Hanumil, Pishu, Pidmu, Rinam, Karsha, Padum, Photoksar, Lingshed, Dibling, Yulchung, and Nyarak were surveyed. Time was also spent gathering information from the areas between Padum and Pensi Pass. In Changthang surveys mainly focused on Hanle, Chumur, Kuyul, and Demchog areas. The surveys in the Sham zone covered Panikhar, Sangkoo, Umba, Bodkharbu, Dha-Hanu, Lamayuru, Hemis Shukpachan, Domkhar, Skurbuchan, and Wanla.

The surveys were carried out in two phases. During the first phase, Changthang (March 2005) and Sham (April 2005 and June 2006) areas were surveyed, and the second phase covered Zangskar (July 2006) and Nubra (August 2006). The surveys largely involved driving to different areas and observing mountain ungulates, and also

interviewing local people to find out the presence/absence of animals. All the animals observed on the way to different places were also recorded. Given the huge geographical area of Ladakh, driving from place to place was the only practicable way to survey the region for mountain ungulates. The presence of an animal's horns in an area was also taken as the evidence of its occurrence there, which was further confirmed by interviewing people in a nearby village. Nature and extent of threats to various species were determined by interviewing villagers throughout the region.

Mountain Ungulates

There are eight wild ungulates in Ladakh, out of which only six were observed during the surveys. Secondary information was gathered on the other two species, namely the wild yak and Tibetan antelope. Due to the extinction and colonization dynamics, currently there is a spatial variation in the species richness of the mountain ungulates in the Indian Trans-Himalaya, with some valleys supporting four to five wild ungulate species, whereas others support only one species. Below are the species-wise accounts of status and distribution of mountain ungulates in Ladakh.

The Tibetan gazelle is a small antelope weighing about 15 kg (33 lbs.). It has a grayish-brown body and a short, black-tipped tail in the center of a heart-shaped white rump-patch. The animal is endemic to the Tibetan plateau (Schaller 1998). Within Ladakh, the species had a wide distribution in the early 20th century (Stockley 1936), but its range underwent a marked contraction in the last several decades due largely to illegal hunting and habitat degradation (Fox et al. 1991; Bhatnagar et al. 2006). During the present survey, I counted 36 gazelles in six groups in and around



Figure 3—A full-grown male blue sheep in its winter coat in the Shun Gorge of Zangskar. Photo by Tsewang Namgail.



Figure 4—Two full-grown male Asiatic ibex in their rocky habitat in western Ladakh. Photo by Tsewang Namgail.

the Kalak Tartar plateau, the last stronghold of gazelle in Ladakh. Competition with domestic sheep and goats was found to be the most important threat to the long-term survival of the animal (Namgail et al. 2008a). The current estimated population of the species in Ladakh is fewer than 100 animals (Namgail et al. 2008a).

The Tibetan wild ass, or kiang, is the largest wild ass in the world, with some stallions standing 1.4 m (4.6 ft.) tall and weighing up to 400 kg (880 lbs.). It occurs all across the Tibetan Plateau and peripheral areas. Presently, the eastern part of Ladakh is the major stronghold of this animal in India. During the present survey, I carried out repeated transect counts between Rongo and Hanle in eastern Ladakh. On the first transect count, I tallied 136 kiangs in the sedge meadows along the Hanle River, and during the second transect, I counted a maximum of 133 kiangs. The now-sedentary nomadic pastoralists, who currently practice agriculture, fence off land for growing crops, which seems to be the most significant threat to the animal. It is estimated that presently there are about 2,000 kiangs in Ladakh.

The blue sheep is a unique mountain ungulate that is somewhere between sheep and goat, as it displays characteristics of both. The blue sheep is widely distributed on the Tibetan Plateau and the peripheral areas (Namgail et al. 2004). During the surveys, I observed 89 individuals in seven groups in the Rong area between Likkse and Mahe. In addition, I observed three groups near Omachhu and Pishu village in Zangskar, and five groups in western Ladakh.

Several species of large herbivores inhabiting Ladakh are facing a precipitous decline in their populations.

Conflicts with farmers due to crop damage and poaching for meat seem to be the major threats to blue sheep in Ladakh. It is the most abundant wild ungulate in Ladakh, with an estimated population of 11,000 individuals.

The Tibetan argali is the largest wild sheep in the world, standing just

over 1 m. (3.5 to 4 ft.) at the shoulder, with the horn measuring 90 to 100 cm (35 to 40 inches). The Tibetan argali occurs widely on the Tibetan Plateau, but in small populations scattered throughout the area (Schaller 1998). In some areas, the population may be stabilized, whereas it is declining in others (Namgail et al. 2004; Namgail et al. 2007b). The species was thought to have gone extinct from the Hanle Valley 20 years ago, but the present survey in eastern Ladakh reported its occurrence there. Historically, the species was affected negatively by trophy hunting, as the argali has huge horns, but currently competition with domestic livestock has emerged as the single most important threat to the animal (Namgail et al. 2007b). The most current estimate suggests that there are not more than 400 argali left in Ladakh (Namgail et al. 2008b).

The Ladakh urial is a small wild sheep that is about 80 cm (31 in.) high at the shoulder, and that weighs an average of 65 kg (143 lbs). The species is endemic to Ladakh, where it has a peculiar distribution, occurring only along two major rivers: the Indus and the Shayok. The population of the animal declined in the last century due to trophy and meat hunting (Mallon 1983). During the surveys, I observed the animals near Hemis Shukpachan and Lamayuru villages in western Ladakh. Owing to its occurrence near human habitations, the animal has borne the brunt of human onslaught. The two major valleys where urial occur are also the areas with the highest human density, due to the fertile land along the river banks (Namgail 2006a). The urial often descend to the agricultural fields and damage crops, especially in spring, and the farmers often retaliate. The current estimated population of the animal in Ladakh is 2,000 individuals.



Figure 5—Two adult Tibetan argali rams grazing in the Tsabra catchment of Gya-Miru, Ladakh. Photo by Tsewang Namgail.

The Asiatic ibex is a majestic wild goat that is about 80 to 100 cm (31 to 40 in.) high at the shoulder, and that weighs an average of 60 kg (132 lbs). The species is partial to rugged areas, as it has strong and muscular legs that help it negotiate steep cliffs (Namgail 2006b). The species is the second most abundant wild ungulate in Ladakh after the blue sheep (Namgail 2006b). The Asiatic ibex was hunted heavily in

the past by both trophy and meat hunters (Fox et al. 1992), and the present population is very sparsely distributed. During the present surveys carried out mostly during summer, I saw 15 individuals near the Hemis Shukpachan and a group of 13 individuals near Hanupatta before the Singge Pass. It is estimated that there are about 6,000 individuals in Ladakh.



Figure 6—A herd of Ladakh urial in the western part of Ladakh. Photo by Yash Veer Bhatnagar.

The Tibetan antelope is a graceful animal adapted to the highlands of Tibet (Schaller 1998). The animal is confined to Aksai Chin and the Chhang Chhenmo areas of north-eastern Ladakh. These areas are relatively inaccessible; however, interviews with local people and wildlife officials suggested that moderate numbers of antelope, not more than 200 individuals, occur in these areas. The Tibetan antelope is being slaughtered on the Tibetan plateau for its much-valued wool, known as Shahtoosh, which is one of the finest natural fibers in the world. Shahtoosh is smuggled out from Tibet to Kashmir in India and woven into exquisite scarves and shawls, which are exported to the developed countries. There are 250 individuals of this endangered species in Ladakh.

The wild yak is a sturdy and bulky ungulate with high lung capacity and a thick coat, which are adaptations to the high-altitude environment of Tibet. The males have imposing, stately horns. Although in the past the animal occurred in a wider area of Ladakh, presently it is confined to the Chhang Chhenmo Valley. The historical distribution of the species was spread as far west as the Gya-Miru area, as indicated by the presence of several pit traps, targeted at wild yak, in the area. Species in the past suffered at the hands of trophy hunters, but competition with domestic livestock for the scarce rangeland resources is presently threatening the animal's population in Ladakh. There is an estimated population of about 200 wild yaks in the region.

Recommendations

Several species of large herbivores inhabiting Ladakh are facing a precipitous decline in their populations. They face an array of threats from modern

developmental initiatives, poaching, and increasing human and livestock populations. Some species, such as the Tibetan gazelle, Tibetan argali, wild yak, and Tibetan antelope, are rare and need immediate attention from conservationists. Among these the former three had wider distributions in Ladakh, but presently they are confined to small pockets. The causes of their local extinctions are not known, and need to be studied so that further declines might be stemmed.

During the present surveys it became apparent that there are fewer species in the western part of Ladakh and Nubra Valley and greater numbers in the Changthang region. Ecological studies need to be designed and executed to understand such spatial variation in species richness, so that area-specific conservation strategies can be developed. The populations of the mountain ungulates should be monitored regularly, which will enable us to record the rate of decline or recovery in their populations, and prioritize our tasks as we work to save these unique and threatened animals. Moreover, there is also an urgent need to study the conditions and carrying capacity of the rangelands in the region.

The wild ungulates in the Sham area cause crop damage. Although compensation to farmers may serve as an immediate solution, preventive measures should be worked out to reduce the overall level of crop damage in the long run. The wild ungulates in eastern Ladakh, in contrast, were mainly threatened by increasing livestock population. This is especially so after the increase in livestock population in the wake of increased demand for cashmere wool (Namgail et al. 2007a). The current rate of increase in the livestock population is unsustainable, and as such is detrimental to both livestock and wildlife. Identifying crit-



Figure 7—A typical blue sheep habitat with rugged terrain that is secured from predators such as the wolf and the snow leopard, which are less agile in steep cliffs. Photo by TR Shankar Raman.

ical wildlife habitats and freeing them from livestock grazing could reduce pressure on the wild ungulate populations in the region.

Creating conservation awareness through special education programs is urgently needed. The local people need to be educated about ecosystems and their functions so that they appreciate and conserve them. Since the younger generations, especially the school children, are the future potential stewards of the wild animals, they should be the prime focus of environmental education programs. From a commercial point of view, the local people need to realize that the unique biodiversity of Ladakh, if preserved in its entirety, will attract wildlife enthusiasts from across the world, thereby providing tourism business.

Several developmental projects, such as building roads to remote areas and dams for electricity, are underway, but the impact of these projects on the wildlife is not being assessed. Since Ladakh is increasing its number of development projects every year, it is

imperative to conduct environmental impact assessments, and projects should be allowed only if receiving no objection certificates from the conservation agencies.

A network of protected areas was established in Ladakh in the late 1980s. Unfortunately, most of these do not harbor viable ungulate populations, and most of them have permanent snowfields or glaciers, which are not usable by ungulate wildlife. The limited labor force within the wildlife protection agencies is a major problem. The current strength of the staff at the Department of Wildlife Protection, Leh, is not more than 30, and this team has the responsibility of patrolling about 30,000 sq km (11,583 sq. mi.). Under such circumstances, it is imperative that the local communities provide help in protecting wildlife. Furthermore, given the region's environmental and geographical characteristics, it is desirable to target smaller, ecologically significant areas for protection of the most endangered species.

References

- Bhatnagar Y. V., C. Mishra, and R. Wangchuk. 2006. Decline of the Tibetan gazelle in Ladakh. *Oryx* 40: 229–32.
- Fox J. L., C. Nurbu, S. Bhatt, and A. Chandola. 1994. Wildlife conservation and land-use changes in the Transhimalayan region of Ladakh, India. *Mountain Research and Development* 14: 9–60.
- Fox J. L., C. Nurbu, and R. S. Chundawat. 1991. The mountain ungulates of Ladakh, India. *Biological Conservation* 58: 167–90.
- Fox J. L., S. P. Sinha, and R. S. Chundawat. 1992. Activity patterns and habitat use of ibex in the Himalaya Mountains of India. *Journal of Mammalogy* 73: 527–34.
- Mallon D. 1983. The status of Ladakh ural *Ovis orientalis vignei* in Ladakh, India. *Biological Conservation* 27: 373–81.
- Namgail T. 2006a. Trans-Himalayan large herbivores: Status, conservation and niche relationships. New York: Wildlife Conservation Society, Bronx Zoo.
- . 2006b. Winter Habitat partitioning between Asiatic Ibex and blue sheep in Ladakh, northern India. *Journal of Mountain Ecology* 8: 7–13.
- Namgail T., S. Bagchi, C. Mishra, and Y. V. Bhatnagar. 2008a. Distributional correlates of the Tibetan gazelle *Procapra picticaudata* in Ladakh, northern India: Towards a recovery programme. *Oryx* 42: 107–12.
- Namgail T., Y. V. Bhatnagar, C. Mishra, and S. Bagchi. 2007a. Pastoral nomads of the Indian Changthang: Production system, land use and socio-economic changes. *Human Ecology* 35: 497–504.
- Namgail T., J. L. Fox, and Y. V. Bhatnagar. 2004. Habitat segregation between sympatric Tibetan argali *Ovis ammon hodgsoni* and blue sheep *Pseudois nayaur* in the Indian Trans-Himalaya. *Journal of Zoology* 262: 57–63.
- Namgail T., J. L. Fox, and Y. V. Bhatnagar. 2007b. Habitat shift and time budget of the Tibetan argali: The influence of livestock grazing. *Ecological Research* 22: 25–31.
- Namgail T., J. L. Fox, and Y. V. Bhatnagar. 2008b. Status and distribution of Tibetan argali *Ovis ammon hodgsoni* in Ladakh, northern India. *Oryx*: [AU: Please provide volume number and page span, which should be available as this was published in 2008.]
- Schaller G. B. 1977. *Mountain Monarchs: Wild Goat and Sheep of the Himalaya*. Chicago: University of Chicago Press.
- . 1998. *Wildlife of the Tibetan Steppe*. Chicago: University of Chicago Press.
- Stockley G. 1936. *Stalking in the Himalayas and Northern India*. London: Herbert Jenkins.
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- Heller, N. E., and E. Zavaleta. 2009. Biodiversity Management in the face of climate change: A review of 22 years of recommendations. *Biological Conservation* 142: 14–32.
- IPCC. 2007a. *Climate Change 2007—Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Geneva, Switzerland: International Panel on Climate Change.
- . 2007b. *Climate Change 2007—The Physical Science Basis*, Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Geneva, Switzerland: International Panel on Climate Change.
- Luyssaert, S., L. Sebastiaan, E. D. Schulze, A. Börner, A. Knohl, D. Hessenmöller, B. E. Law, P. Ciais, and J. Grace, J. 2008. Old-growth forests as global carbon sinks. *Nature*: 455: 213–215.
- Mackey, B., H. Keith, S. Berry, and D. L. Lindenmayer. 2008a. *Green Carbon: The Role of Natural Forests in Carbon Storage. Part 1, A Green Carbon Account of Australia's Southeastern Eucalypt Forest, and Policy Implications*. Canberra, Australia, ANU E Press, epress.anu.edu.au/green_carbon_citation.html.
- Mackey, G. B., J.E.M. Watson, and G. Hope. 2008b. Climate change, biodiversity conservation, and the role of protected areas: An Australian perspective. *Biodiversity* 9: 11–18.
- Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Synthesis*. Washington, DC: Island Press, www.millenniumassessment.org/documents/document.356.aspx.pdf?
- Righelato, R., and D. V. Spracklen. 2007. Carbon mitigation by biofuels or by saving and restoring forests? *Science* 317: 902.
- Shearman, P. L., J. E. Bryan, J. Ash, P. Hunnam, B. Mackey, and B. Lokes. 2009. The state of the forests of Papua New Guinea: Mapping the extent and condition of forest cover and measuring the drivers of forest change in the period 1972–2002. *Biotropica*. Published Online: February 10, 2009, 3:18PM DOI: 10.1111/j.1744-7429.2009.00495.x.
- Victor, David, M. Granger-Morgan, Jay Apt, John Steinbruner, and Katherine Ricke. 2009. The geoengineering option: A last resort against global warming? *Foreign Affairs* 88(2):
- World Conservation Congress. 2008. IUCN (World Conservation Union) motion 087 “Enhancing ecological networks and connectivity conservation areas” and motion 099 “Biodiversity conservation and climate change adaptation and mitigation in national policies and strategies,” iucn.org/congress_08/assembly/policy/.
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