

# A Regional Perspective for Snow Leopard Conservation in the Indian Trans-Himalaya

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## Introduction

Wildlife in India, especially the large mammals are primarily concentrated in the Protected Areas (PAs), which to have become habitat islands, isolated by vast stretches of unsuitable habitat for wildlife. Human population has been constantly increasing in the country and has recently crossed the one billion mark. At present about 4.7% of the country's 3.3 million km<sup>2</sup> geographic area is under National Parks (NPs) and Wildlife Sanctuaries (WLS), and there are plans to increase this to ca. 5.7% in order to make the PA network biogeographically more representative (Rodgers *et al.* 2000). The human pressure on India's wild lands has been constantly increasing, with more and more cases of serious conflicts between people and parks being reported. Wildlife conservation in India has a long history of management through 'policing' the PAs. It is only in the past two decades or so that conservationists and park managers have realized that exclusion of people completely from PAs is not a viable option - a realization that has thrown up numerous challenges. The fact that a majority of Indian PAs have not been legally gazetted due to non settlement of the rights and concessions of local communities residing inside the PAs also calls for a review of this situation. Fortunately, the amendment to the Indian Wildlife Protection Act (2002) by inclusion

of two additional categories of PAs *viz.* Conservation Reserve and Community Reserve would provide a pragmatic solution to this hitherto unresolved issue through rationalization of PA boundaries.

PAs in India and elsewhere are meant to preserve and protect a range of conservation values. Each PA has specific objectives of management. Many of the objectives and conservation issues are common to a vast variety of PAs. One such objective for most Trans-Himalayan PAs is the conservation and maintenance of a viable snow leopard (*Uncia uncia*) population as a 'flagship species' (Anon. 1988). Further, when conservation objectives and issues are similar, solutions may be as well, although adaptations for local conditions may be necessary. Often, managing and monitoring all aspects of biodiversity in a PA is difficult and hence, managers tend to concentrate on focal species that guide conservation efforts for the area (Simberloff 1998). As per a critique on the single species management approach by Simberloff (1998), these species may be 'flagship species'; one that is 'normally a charismatic large vertebrate, one that can be used to anchor a conservation campaign because it arouses public interest and sympathy'. Or it may be an indicator species, one that is usually sensitive to disturbance in the ecosystem



that they represent and their population abundance is indicative of a healthy ecosystem. A third species oriented approach is to have an 'umbrella species', which needs such large tracts for its conservation that saving this species automatically saves an entire range of species occurring within its habitat.

The snow leopard is a charismatic large carnivore, distributed over most of the Trans-Himalaya and the Greater Himalaya (Box 1). The sympathy and appeal that the snow leopard has drawn internationally is self-evident. The International Snow Leopard Trust (ISLT), an organization completely dedicated to the cause of the snow leopard conservation has been in existence for over two decades now, with programmes in several of the 12 range countries including India. Within India as well, an entire conservation and management program focused on the snow leopard was proposed several years ago, some what along the lines of Project Tiger (Anon. 1988). Apart from its appeal in garnering public support and funding, which renders it a valuable flagship species for conservation, its large home ranges and ubiquitous distribution in the Indian Trans-Himalaya make the snow leopard a suitable umbrella species as well. Importantly, the serious conservation issues in the Trans-Himalayan region – livestock grazing and associated out-competition of wild prey as well as livestock depredation—both involve or affect the snow leopard directly or indirectly. It is therefore imperative that the snow leopard conservation in the Trans-Himalaya should have a regional perspective involving range states and line agencies, which influence its conservation status in one way or the other.

In this paper, we use the above reasoning to say that the snow leopard qualifies both as a flagship and an umbrella species representing the Trans-Himalayan ecosystem and that its conservation would mean the conservation of the Trans-Himalayan region as a whole. We also try to detail how the resource-deficient Trans-Himalayan region is special, where most of the region still has wildlife values and where communities or individual families have traditional rights over all usable land. Hence, conservation challenges of the region will not be addressed by merely increasing the area under PA network, but by ensuring effective conservation measures in the larger region and by increasing the stake of the local communities in snow leopard conservation by providing viable livelihood support options.

### The Trans-Himalayan Landscape

The Trans-Himalayan region is a cold, arid, mountainous landscape that covers the rain shadow regions immediately north of the Himalaya. The region is characterized by severe winters lasting over six months, with temperatures dropping to as low as - 50°C in some places. Another characteristic of the region is the short plant growth season of merely two to three months, when productivity is usually low. These harsh conditions have given rise to hardy and highly adapted flora, fauna and people.

Within India, the Himalaya and Trans-Himalaya are included in six states. Of these, the Ladakh region of Jammu and Kashmir, Lahul-Spiti region of Himachal Pradesh, and northern Sikkim have Trans-Himalayan areas that cover approximately 1.85 lakh km<sup>2</sup> (Rodgers *et al.* 2000).



**BOX 1****SNOW LEOPARD - AN ELUSIVE CARNIVORE**

Snow leopard is an elusive cat with a potential range of approximately 2.4 million km<sup>2</sup> in the arid mountain tracts of Central Asia, the Trans-Himalaya and the Himalaya (Jackson and Hunter 1996). Even though it has a relatively large global range, it has gone extinct locally at many places and at present are distributed in fragmented populations spread over less than 1.6 million km<sup>2</sup> (Jackson and Hunter 1996). A coarse, but best possible estimate of its global population is 3,500 - 7,500 animals. In India, it ranges over some 75,000 km<sup>2</sup>, yet number only 200 to 600 (Fox 1994). Because of this precarious status, the snow leopard is included in the Schedule I of the Indian Wildlife (Protection) Act 1972 (Anon. 1992) and as 'endangered' in the IUCN's Red List (Nowell and Jackson 1996).

Snow leopard prefers rugged mountain tracts with abundant prey and stalking cover (Schaller 1977, Jackson and Ahlborn 1984, Chundawat 1992, McCarthy 2000). However, in much of the Tibetan plateau and Mongolia, snow leopard occurs in open, rolling habitats where shrubs and outcrops offer cover for stalking of abundant prey (Mallon 1984, Schaller *et al.* 1988, McCarthy 2000). The primary prey species of snow leopard in its range are bharal (*Pseudois nayaur*) and ibex (*Capra ibex sibirica*), although others such as urial (*Ovis vignei*), argali (*Ovis ammon*), markhor (*Capra falconeri*), wild goat (*Capra agegrus*) and marmot (*Marmota* spp.) may also be important locally (Schaller 1977, Chundawat and Rawat 1994). Estimates suggest that each snow leopard needs approximately 20 to 30 adult bharal annually (Jackson and Ahlborn 1984). Other estimates suggest that snow leopards need *ca.* 730 kg of meat annually from their large prey species such as bharal, and other smaller ones such as domestic sheep, goats, marmots and birds (Chundawat and Rawat 1994). Snow leopard distribution and status in the wild may be adversely impacted by low prey density, leading to increased depredation on domestic stock, thus causing conflicts with resident herders (Oli *et al.* 1994, Mishra 1997, Jackson 2000).

While a limited number of studies have yielded modest information on snow leopard ecology (Chundawat 1992, Jackson 1996, McCarthy 2000), even less information on population status across the range is available. The population and range figures above are largely educated guesses, however, snow leopard most certainly occurs in small and isolated populations, thus increasing the threat of the extinction (Jackson and Ahlborn 1990). Information on population status and structure is however very important to determine viability of populations. The reason for the lack of information on populations of snow leopard is because of the elusive nature of the species and the harsh habitat that it occupies. Snow leopard tends to move, bed and mark along linear geographical features such as crests, major ridgelines, at the base of cliffs and in gullies. Monitoring for signs along these features is the best possible way at present of estimating snow leopard population trends in an area (Jackson and Hunter 1996). This practice is however not in wide use at present. Use of genetic tools and camera trapping are other viable alternatives for gathering information on snow leopard abundance but are expensive.

The fact that the snow leopard has a wide distribution in the Trans-Himalaya and that it is the apex predator in most of this region enables the species to be used as a 'flagship species' and an 'umbrella species' to guide conservation efforts in the region, as was recognized by the Government of India in the 1980's (Anon. 1988). In this paper, we reckon that all conservation activities directed at snow leopards would benefit the ecosystem, and any conservation activity in the region including livelihood support to the local communities will also benefit the snow leopard directly or indirectly.



Uttaranchal and Arunachal Pradesh, along with the other three states mentioned above, have alpine and high arid areas on their northern boundaries that also comprise snow leopard range in India. The entire Himalayan block (2.1 lakh km<sup>2</sup>) is classified as the Biogeographic Zone 02 (Province A to D), or 'Himalaya' (Rodgers and Panwar 1988), but the higher reaches, the Greater Himalaya, that constitutes the snow leopard range, is a narrow belt quite distinct in topography, climate and vegetation from the rest of the Himalaya – being much colder, arid and being devoid of forests.

The Trans-Himalayan region in India forms the catchment of three major rivers. In the northwest, the Indus, with its major tributaries - Zaskar and Shyok, drains the entire Ladakh region. South of this, the Chenab river, with its tributaries, the Chandra and Bhaga rivers, drains the Lahul valley. East of Lahul is the Spiti valley that drains into the Sutluj river, which passes through the Kinnaur region. Within India two provinces in the Trans-Himalaya are recognized (Rodgers and Panwar 1988). The 'Ladakh Mountains' constitute approximately 60% of the Trans-Himalayan zone and is spread in the Kargil, Zaskar, Leh, Nubra, and Lahul-Spiti regions of Jammu and Kashmir and Himachal Pradesh. These areas are mostly rugged mountains and valleys and have a large altitudinal range from 2,200m in the Kargil and Nubra regions to over 7,000m in the Karakorum range. The second province is the 'Tibetan Plateau' that constitutes the remaining 40% of the Trans-Himalaya. This region includes Changthang in Ladakh, parts of Spiti and the northern plateaus of Sikkim and is characterized by vast plains, rolling mountains and some large high-altitude

lakes. Most of this region lies above an elevation of 4,200m.

In spite of the overall low numbers of species of plants and animals in the Trans-Himalaya (Das 1966), the region is home to an array of highly specialized assemblage of flora and fauna. There are over 600 flowering plants and numerous species of graminoids many with significant ethnobotanical value as medicinal plants, forage for livestock, or fuel (Kala 2001). The region is also home to over 225 bird species, including numerous breeding waterfowl (Pfister 1998, Singh and Jayapal 2001). Some of these species, such as the black necked crane (*Grus nigricollis*) and the bar headed geese (*Anser indicus*) are of considerable conservation significance. The region has gained further importance as it has over six species and sub-species of wild sheep and goats that are an important genetic resource from the region. There are numerous mammal species in the region that are classified in the Schedule I and II of the Indian Wildlife (Protection) Act 1972 and some of these are listed in Appendix 1 of CITES. Ecological information on all species from India is scarce, however, some details about bharal and snow leopard are known (Chundawat 1992). Ibex ecology was described by Bhatnagar (1997) and Manjrekar (1997). Information on the status and distribution of species have been reported by Fox *et al.* (1991), Mallon (1991), Shah (1994, 1996), Chundawat and Qureshi (1999) and Bhatnagar and Wangchuk (2001).

Although data on land ownership are not easily available, bulk of the land is State owned with traditional rights of use held



by communities or individuals. Most usable land is already utilized as pastures, agricultural land, and for the collection of fuel, fodder and housing material.

### Existing Conservation Scenario in the Trans Himalaya - Wildlife Protected Areas in the region

Keeping our focus on snow leopard conservation, we mention here PAs in the Himalaya and the Trans-Himalaya. However, realizing that a relatively small portion of the Himalaya would qualify as snow leopard habitat, the discussion in the subsequent sections primarily deals with the Trans-Himalayan region.

Reliable information regarding the presence of snow leopard is absent for most PAs in the Indian Himalaya. Based on information that we have gleaned from literature and our own studies, there are 25 PAs within India that have potential for snow leopard occurrence (Mallon 1987, Anon. 1988, Fox *et al.* 1988, Bhatnagar 1997). There are two National Parks (NP) and three Wildlife Sanctuaries (WLS) in the Trans-Himalaya, together constituting ca. 15,000 km<sup>2</sup> or 8.2 % of the Trans-Himalayan zone in India (Table 1). There are nine NPs and 11 WLS in the Greater Himalayan zone with coverage of a further ca. 15,000 km<sup>2</sup> (7.6 % of the zone 02) that may have snow leopards. Most of the PAs in the Greater Himalaya have very small portions in snow leopard habitat and the extent of such areas is not yet documented. Further, in at least three NPs and five WLS of this region with an area of 6,600 km<sup>2</sup>, the presence of snow leopard is very doubtful (Table 1). There are a few other erstwhile Hunting Reserves in the Kargil District of Ladakh, however their present status

after the adoption of the Jammu & Kashmir Wildlife (Protection) Act (2002) is not clear.

It is evident from Table 1 that 17 of the 25 PAs (68%) with a potential for snow leopards are smaller than 1000 km<sup>2</sup>, with five of them being smaller than 100 km<sup>2</sup>. There are a further three PAs in the 1001 to 2000 km<sup>2</sup>, two in the 2001 to 4000 km<sup>2</sup>, and three in the > 4000 km<sup>2</sup> range. In areas where PAs are habitat 'islands' the smaller PAs, especially those smaller than 100km<sup>2</sup>, have little potential for long-term maintenance of viable snow leopard populations (Jackson and Ahlborn 1990). Even within the larger PAs there are numerous limitations at present. From Table 1 and Fig 1, it is apparent that the PA network in the Trans-Himalayan and the Greater Himalayan zones is comparatively large in extent. Also, it is evident that the region has some of the largest PAs in the country (Rodgers *et al.* 2000). However, the following facts need to be critically examined:

1. Some PAs such as the Karakorum WLS are large, but have unclear boundary demarcation. There are over 15 towns and villages and numerous military establishments within the area. The human population in the region is over 10,000 (Anon. 1998a). There is also a great amount of military activity and vehicular traffic in the area, and all these factors render the area barely qualified as a wildlife sanctuary. This, and other similar areas, however, inflate the proportion of area under PA network in the zone.
2. Most PAs have up to 50% of their area under permanent ice or glaciers, shear and large rock





faces, most of which have little wildlife values, thus further inflating the size, but not contributing to the wildlife values directly.

3. There are no Reserve Forests in the Trans-Himalaya that usually buffer disturbances in most wildlife PAs elsewhere in the country. Hence it is only the PAs in the Trans-Himalayan areas that have any legal status for the conservation of the native biodiversity.

### Conservation issues in the Trans-Himalaya

A variety of physical, biotic and political characteristics of the Trans-Himalaya influence conservation issues that are peculiar to the region. Chief among the challenges is the limited resources available to the native population of the region. These populations which mostly occur at low to moderate densities of <2 persons per km<sup>2</sup>, are primarily agro-pastoral, or, as in the Tibetan Plateau zone, are largely nomadic pastoralists. Human populations are increasing in the region with the breakup of the traditional polyandrous system and with fewer people opting for becoming celibate monks and nuns (Anon. 1998a, Mishra 2000). An important factor that needs to be considered is that in the harsh Trans-Himalayan landscape there is hardly any area that is not already in use by people at some time or the other during the year. Arable land is mostly limited to alluvial fans, and some stable areas in the valley bottoms. Almost all the available arable land is already under cultivation and all pastures are grazed by the domestic stocks at least seasonally. Addition of newer areas under some poverty alleviation schemes incorporate development of expensive and long flow

irrigation systems. Our observations show that these most frequently end up as failures since most of such channels are damaged by avalanches or are washed away by floods or simply break up due to the unstable substrate. Thus in spite of numerous efforts any significant addition of arable land is remote. National parks and sanctuaries in India do not permit consumptive use and require resettlement of people outside such areas (Anon. 1992). The point that we are driving at is that the Trans-Himalayan region has very specific and limited area for cultivation or use as pastures and thus offers no or very few alternatives for resettlement of people outside PAs. The region has other peculiarities such as very poor road access, power supply, and difficult communication, apart from a harsh climate during much of the year. These features of the region thus do not allow scope for conventional industrial development and employment in the region, as is possible in other regions of the country.

As far as the wildlife values are concerned a very important characteristic of the Trans-Himalayan area is that it provides almost continuous wildlife habitat (Fox *et al.* 1991, Chundawat and Qureshi 1999, Bhatnagar and Wangchuk 2001). Almost the entire landscape has large mammals, including the snow leopard and wolf, but the densities may vary greatly from very poor areas to small pockets that may be rich in some large mammals. This means that a large amount of wildlife may actually be occurring outside existing PAs. In Nepal, for example, over 60% of the snow leopards are thought to occur outside PAs. In India, our coarse estimate is that of the probable maximum of 600 snow leopards in India (Fox 1994), ca. 80% may be occurring outside PAs. Among other endangered wildlife species such as the Tibetan antelope, Tibetan gazelle,



Tibetan argali, brown bear, and kiang, the entire or substantial populations occur outside existing PAs (Chundawat and Qureshi 1999, Bhatnagar and Wangchuk 2001, Sathyakumar & Qureshi 2002). Mishra, (2001). has found that in Spiti, the Tabo area that is not within any PA has bharal densities that are higher than the Kibber Wildlife Sanctuary. Shah (1996) has found remnant populations of the highly endangered Tibetan gazelle and argali in unprotected areas in northern Sikkim. The paradox here is that in spite of a very large proportion of the Trans Himalaya being under the PA network, numerous endangered species continue to occur outside. With this, and the fact that the region in general is resource deficient, with few livelihood options for the local herders we need to reconsider the approach of having large national parks and wildlife sanctuaries as 'inviolable areas' in the region. This is a challenging situation and the lack of a vision for conservation, as usually defined by Management Plans for PAs is absent at present.

Conservation issues common to the area primarily relate to deficiencies of infrastructure and staff for PA management, grazing competition between wild and domestic herbivores, conflicts relating to damage to crops and livestock by wildlife, some levels of poaching of snow leopard and prey species, wildlife diseases and political issues. These issues were also flagged as the most important ones in a meeting between scientists and managers at Leh (Mathur 2001) and of numerous snow leopard experts from all over the snow leopard range countries (McCarthy and Chapron 2003). We now examine these issues in some detail:

### **Infrastructure and staff for PA management**

In the harsh environs of the region, there is a severe shortage of staff, effective infrastructure and funds for the management of the PAs. For example Ladakh has ca. 13,100 km<sup>2</sup> under its PA network with a total park staff of merely about 20. This translates to 655 km<sup>2</sup> to every park staff - a completely ineffective strength to manage the region under any circumstance, but especially so under the difficult climatic and topographic conditions in the Trans-Himalaya. The numerous existing tasks of the Wildlife Department range from protection, tourism management, verification of compensation claims to nature education activities in the PAs spread all over the ca. 45,000 km<sup>2</sup> Ladakh region. We also understand that most park staff lack the necessary clothing, equipment and housing necessary for effective work in the region. The situation in Lahul & Spiti is not very different. It is an urgent requirement for the Centre and State Governments to provision the necessary resources to these areas for effective conservation in the region.

### **Grazing competition between wild and domestic herbivores**

The entire region has heavy dependence on livestock. While some of the people are agro-pastoralists, many are entirely pastoral. Estimates range from 10 to a few hundred livestock heads per household in the region (Mishra 1997, Richard 1999, Bhatnagar and Wangchuk 2001). Livestock population in the Indian Trans-Himalaya has been growing continuously in the past decades, as evidenced by data available from Ladakh, where the livestock population has almost doubled between 1972 and 1992 (Anon. 1998a, Bhatnagar



and Wangchuk 2001). Even though conclusive information on habitat degradation, and direct competition between domestic and wild herbivores from the region has just started coming (Mishra 2001), it is evident from some preliminary studies that the present livestock grazing levels in areas such as eastern Ladakh and Spiti may already be unsustainable (Mishra 2001, Bhatnagar and Wangchuk 2001, Raghavan 2003, Namgail 2003). The potential impacts of excessive grazing by livestock include depletion of the scarce forage for wildlife, habitat degradation, disease transfer, and reduction in the breeding performance of

both wildlife and domestic stock (Mishra 2001).

Conclusive studies to ascertain impacts of livestock grazing need to be taken up at many sites. There is also an urgent need to see how the pastoral and agro-pastoral communities of the region can be drawn into a trade-off that reduces their dependence on large livestock holdings, while at the same time helps in improving their standard of living. An example for such an effort was made by the Nature Conservation Foundation, Mysore, and details are given in Box 2.

## BOX 2

### Kibber Grazing Reserve

The Nature Conservation Foundation, a science and conservation organization based in Mysore, signed a written agreement with the village council of Kibber in Spiti in the year 2000, where both these institutions resolved to protect a 5 km<sup>2</sup> area exclusively for wildlife by agreeing not to graze their livestock in that region. The rangeland area has been traditionally used for livestock grazing and collection of fuel, and medicinal plants. Two years of protection is already showing signs of wildlife recovery, as indicated by the increased use of the area by bharal. The compensation costs for lost grazing are being met with by the Van Tienhoven Foundation in the Netherlands, and the project is being implemented voluntarily by scientists associated with the Nature Conservation Foundation and the Wageningen University. The International Snow Leopard Trust has recently joined hands with the initiative, and these institutions are working together towards off-setting the costs that the local people are bearing for living with wildlife (through programs in conservation education, supporting self managed insurance schemes, value addition to local handicrafts), and towards enabling the local people to benefit from the wildlife they share their resources with (wildlife tourism).

### Conflicts relating to damage of crops and pastures by wild herbivores

The Jammu and Kashmir Department of Wildlife Protection staff in Leh has been receiving compensation claims for damage to crops by species such as bharal and urial. The extent of such damage is not yet clear, but there is an increasing trend in such claims. There is a need to have a better record of conflict cases. 'Hotspots' of such conflict zones should be clearly identified and if any are

found, participatory exercises should be taken up to minimize the losses.

In a surprising development some nomads and state Govt. officials claim that the kiang are now damaging the winter pastures of the valuable *pashmina* or Cashmere goats in Changthang (Fox *et al.* 1991, Richard 1999). It has been argued that such claims are largely baseless and are probably a result of reduced tolerance levels among the



people in recent times (Richard 1999, Bhatnagar and Wangchuk 2001).

### Livestock depredation by wild carnivores

Livestock depredation seems to be a serious conservation issue in the Trans-Himalayan region. As indicated earlier, livestock rearing at present forms an important part of the local economy and any loss to livestock results in a direct monetary loss to the local herders. Park staff in Ladakh report that often up to 60% of their annual outlay goes in meeting the livestock depredation compensation claims filed by people (Rauf Zargar, Wildlife Warden, Leh, *Pers. Comm.*). Damage to livestock takes place in the pastures as well as in the night time corrals. In India's Trans-Himalayan zone only four studies have as yet quantified the extent of livestock damage due to depredation by wild carnivores. These studies are by Mishra (1997) from Spiti, Bhatnagar *et al.* (1999) from the Hemis NP, Ladakh, and by Jayapal (2001) and Sathyakumar (2001) from Zaskar, Ladakh. The damage to livestock in many of these areas is quite high and in some villages up to 14 animals per household have been lost in an year. The monetary loss to households in the Hemis NP averaged ca. Rs. 12,000/- during 1996-97 (Bhatnagar *et al.* 1999). This study also showed that over 40% of the losses were taking place in the corrals, an aspect that can be dealt with more easily than the damage in pastures. Small and effective means of alleviating these conflicts have been developed by ISLT and SLC, along with local NGOs and the Wildlife Department in Hemis NP, which has potential for replication elsewhere (Jackson and Jain 1999).



### Integration of efforts by different Government Departments and Non-Government Organizations

Owing to the remoteness of the Trans-Himalayan region, the state governments have resorted to a system of governance that is called 'Single Line Administration'. Under this system, the district head, the District Commissioner (DC) or the Additional District Commissioner (ADC) becomes the head of all Government Departments working in the region. In addition, the Ladakh region, that constitutes bulk of the Trans-Himalayan region in India, has a Ladakh Autonomous Hill Development Council (LAHDC), a form of local Government.

After consultation with the Wildlife Department in Ladakh, it was apparent that inter-agency cooperation and coordination in the region is lacking, leading to inefficient functioning by the Wildlife Department (Mathur 2001). Examples of major developmental activities being undertaken inside wildlife PAs were cited as cases when the Wildlife Department had to stop such activities when they were well underway. This earned the ire of the local people as well as the respective Government Departments undertaking the work. For these reasons, we feel that the 'Single Line Administration' would facilitate coordination between Departments more effectively, specially if there are relevant policies and practices in place that make it imperative on the respective DCs or ADCs to keep wildlife conservation interest in mind before approval of any development schemes.

The Ladakh region has an added advantage of the existence of numerous

non-government organizations (NGOs), many of which have a good reputation of grassroots work in the fields of alternative sources of energy, organic agriculture, and education. This is a resource that should be effectively tapped for conservation related work.

### Political issues

The entire Trans-Himalayan region has international borders. Ladakh has a large and hostile border along the west and northwest with Pakistan held Kashmir called the Line of Control (LoC). On the north and east is the international border and the Line of Actual Control (LAC) with China. Himachal Pradesh and Sikkim also share borders with China. Numerous stretches along these borders are disputed territory. Species such as the Tibetan antelope, argali, kiang and Tibetan gazelle occur at numerous places along and across the border with China (Fox *et al.* 1991, Shah 1996, Chundawat and Qureshi 1999, Bhatnagar and Wangchuk 2001). Good snow leopard, ibex and urial habitat occurs along the LoC. Often due to the sensitive nature of the region the Wildlife Departments have little control over the region. There is heavy presence of defence forces on both sides and wildlife of the region might also be a casualty to the frequent skirmishes. The problem is compounded when these may be the only places within the country where a species occurs. Trans-border conservation of these species should thus be given high priority.

Jammu and Kashmir has a separate Wildlife Protection Act, which had placed endangered species such as the Tibetan antelope and brown bear under Schedule II, for which hunting licenses could be given. The amended Act is however at par

with the National legislation (Anon. 2002). The entire Trans Himalayan region spreads across three states and inter-state collaboration in conservation efforts though difficult, is nevertheless necessary.

What we want to stress here is that the political dimension is important to consider while planning any large-scale conservation effort in the Trans-Himalayan region, a region replete with sensitive borders spreading over three states.

### Poaching of snow leopard and prey species

Sport hunting was quite widespread during the British period in the Trans-Himalaya (Stockley 1928, Ranjitsinh 1981). Even after independence the trend continued till the early 1980's when the defense forces, Government officials and others were known to hunt in various parts of the Trans-Himalaya, especially in Ladakh. This had decimated the populations of numerous species in the region (Ranjitsinh 1981, Fox *et al.* 1991). Recently, however, there is evidence of a decline in hunting in many parts of the Trans-Himalaya, with the revival of some wildlife populations in the region such as the Ladakh urial (Chundawat and Qureshi 1999).

Buddhism is the dominant religion in most of the Trans-Himalayan region in India and hunting is generally not practiced, unless it is in retaliation for some damage to their property. However, in western Ladakh and in Lahul, hunting might still be an issue. Again, little information exists on the extent of poaching going on in the region. Some illegal trade in wildlife products, including snow leopard parts



and *shahtoosh*, may be occurring in the region (Wright and Kumar 1997). We understand from the Wildlife Department in Leh that no hunting license has been issued since the mid-1980's. Until trends in poaching and wildlife trade in the region are better documented and understood suitable measures cannot be devised and undertaken to minimize the problem.

### Wildlife Diseases

Wildlife disease can be damaging and may even lead to the extinction of small populations. This is particularly true for small, isolated populations as the Tibetan gazelle in Ladakh, and snow leopard in parts of the Trans-Himalaya. Information on wildlife disease from the region is, however, completely absent and there is an urgent need to generate such information. The reports of infectious diseases such as PPR and FMD in livestock of the region increase the threat of an epidemic in the wild herbivore populations. It is suspected that the frequent imports of livestock from the plains by the armed forces for meat could be a source of exotic diseases in the region. Effective quarantine and screening of all imported animals and vaccination programmes for livestock are needed for the entire region, but on priority for areas in and around the PAs or areas with endangered species.

### The way forward

Some measures that could be undertaken in the region to aid conservation have already been discussed above in the section dealing with conservation issues in the Trans-Himalaya. What we give below is an indicative way of planning wildlife conservation in the region as a whole. We understand that these ideas will have to be fine tuned through wider

stakeholder consultations. What we have tried to argue so far is that:

- Even though there are some large PAs in the Trans-Himalaya, bulk of these are occupied by permanent ice and sheer rock faces - the effective areas important for wildlife within them are usually small. Some of them may not even qualify as a PA.
- For existing PAs an effective vision for management is mostly absent.
- Most of the large mammals in the Trans-Himalaya, need large areas given the sparse resources, and seasonal movements. Further, wildlife in this region is mostly outside the existing PAs and simply adding more areas under the PA network may not be a viable solution.
- Areas in PAs usually form an important resource for native people, for whom few alternative livelihood options are available. Traditional concept of large inviolate PAs is not practical in the region.

Based on the conservation issues presented above, and the almost continuous wildlife distribution in the region, we feel that conservation in the Trans-Himalaya has to be planned with a regional perspective, in which the native people are taken as an integral part of the conservation efforts. Having large inviolate national parks and sanctuaries does not seem viable in the region. The shift of focus for conservation in private lands is a need recognized by conservationists worldwide (Knight 1999, Norton, 2000). Using this line of thinking, we feel that continuing with the existing scheme of PAs may not work in the Trans-Himalayas and we now need an alternate paradigm for wildlife conservation in the



region. One of the ways of moving ahead is to carefully work on the zonation of existing PAs and of the larger Trans-Himalayan landscape in general.

### **An alternate zonation concept**

#### ***Zonation within existing PAs***

PAs in India have zones of varying landuse, such as a core zone, which is inviolate, and a buffer zone that may have multiple-use (Anon. 1992, Sawarkar 1995). The latter zone further may have areas earmarked for forestry operations, tourism and other consumptive uses. Our information suggests that none of the existing PAs in the Trans-Himalaya have cores and buffers delineated. The NPs are essentially 'core zones' in their entirety. With the enhancement in the legal status of the WLS following the 1991 amendment of the Wildlife (Protection) Act, 1972, all the PAs constituting ca. 15,000 km<sup>2</sup> mentioned in Table 1 have technically become 'core zones'. Continuing with this practice, as we have already seen, is not pragmatic. We thus suggest that for the existing five PAs in the Trans-Himalaya we change the management zonation approach by carefully delineating core zones in a mosaic, with a buffer area surrounding it. The difference from the existing scheme, primarily is that we do not take impractically large areas of a few thousand km<sup>2</sup> as inviolate core zones and we have multiple core zones within any PA based on its value.

The steps to be followed may be as follows:

- Carefully survey all PAs to determine areas that have high wildlife value, either in terms of presence of an endangered species such as snow leopard, Tibetan gazelle or argali, or

in the presence of a large diversity of large mammals.

- Designate such area as a core zone using a participatory approach (see also Box 2).
- Have at least one such core area for every 100 km<sup>2</sup> of the PA, although consideration of species movements may need to be included in their planning.
- The peoples rights may need to be settled using innovative schemes such as those outlined in Box 2 and in the section on conservation efforts below.
- The buffer zones would be all the remaining area in the PA where traditional use may continue. Attempts would however, be made to minimize the negative impacts of human use.
- Focused studies that help in determining suitable levels of use need to be encouraged.

#### ***In areas of the Trans-Himalaya outside existing PAs***

The issue of conservation of wildlife outside PAs is more complex. As alluded to earlier, the need for this arises because:

- Endangered species like the snow leopard, Ladakh urial, Tibetan gazelle, argali and chiru occur mostly outside existing PAs
- Including all such areas under the PA network would mean that over 50% of the Trans Himalaya will need to come under the PA network
- Resources for managing such a large network, both material and human are not available
- It is likely to further increase people-park conflicts manifold



There is thus a need to recognize these areas for their importance and device strategies for their conservation. This is with the knowledge that local culture/values and the low human population density have an important contribution in wildlife persisting in these areas. Zonation seems one clear means to develop this strategy. We realize that aspects of what we present below may be theoretical but will surely be useful in developing a framework.

In the alternate approach, we suggest further four landuse zones, which have subtle differences in their management objectives. The first zone is the 'Conservation Zone' which is a small, carefully researched and selected area preferably measuring more than 10 km<sup>2</sup>, and where ever possible, up to 100 km<sup>2</sup>, where the local people agree to give up their rights in exchange of some development schemes (Box 2). These are then surrounded by the 'Alternate Livelihood Zone', which would be the most widespread zone. Here the various Government departments' and NGOs work together to limit livestock numbers and dependence on natural resources so as to allow sustainable utilization of resources. This zone can also have agro based and other non-polluting industries to create employment. The third zone can be 'Low Value Zone', which includes unusable areas under permanent ice and large rock faces. These areas will constitute a major portion of the area. The zone can also include narrow stretches of areas that have lost all value for maintenance of wildlife such as townships and excessively degraded areas.

These zones would go a long way in addressing the issue of conservation and

development using a regional perspective.

### **Areas with information gaps and indicative actions**

#### ***Additional livelihood options***

At present, we have the options of cash crops such as green peas and potato that can be marketed as fresh vegetables in markets in the plains and locally. To minimize the loss through decay during transportation to markets, part of the produce could be processed locally into processed food products or health food. Another industry suggested is electronic industry that is usually less polluting to the environment. But issues regarding power and access need to be addressed first in order to make such ideas viable. The region needs better schools and colleges and has potential for establishment of national level educational institutions. For all these activities, enhancement of the present infrastructure is extremely important. Ladakh already attracts large number of international and domestic tourists. The benefits from tourism are however largely limited to a very small population within Ladakh. There is tremendous potential for development of ecotourism schemes in the region that would enable tourism to take place in a sustainable manner and with substantial benefits reaching local residents. The potential for the development of nature tourism and handicraft based industry should thus be explored as a means of alternative livelihoods. This however, should not be developed as the only means of sustenance of families.

Some highly innovative nature tourism schemes are being developed for Ladakh by organizations such as the Snow Leopard Conservancy, The Mountain Institute along with local organizations



such as Ladakh Ecological Development Group (Jackson, Rodney and Jain Nandita, pers. comm.).

***More effort needs to be devoted to establish optimal stocking densities for livestock in different parts of the range***

Grazing competition between livestock and wild herbivores seems to be a significant conservation issue. However, quantitative information on impacts of this is grossly lacking from the region. The studies should also try to determine stocking densities that enable wildlife to exist at levels that allow them to breed and sustain a healthy population. These studies will be crucial for recommendations for the permitted grazing in the multiple-use areas.

***Levels of perceived and actual conflict between wildlife and people need to be established***

Data on actual levels of conflicts, the wildlife species involved and conflict 'hotspots' is often lacking from the region. For designing any conflict resolution scheme, such data is of immense importance. With such information, mitigation measures such as corral improvement, in small, but effective ways should then be taken up to resolve the issues (Jackson and Jain 1999). Innovative livestock insurance schemes are also an important possibility. These can be taken up in conjunction with programmes that help in actual reduction of the damage. One such scheme has been designed in Baltistan where the community managed insurance funds are complemented by money generated through wildlife tourism (Hussain 2000). Another one is being formulated in Kibber wildlife sanctuary, Himachal Pradesh, India by the Nature Conservation Foundation-ISLT. Resolving conflicts effectively will

have a two pronged benefit. One is that the monetary loss to the local herders will be reduced and second is that they will be more sensitive to conservation efforts.

***Conservation awareness initiatives***

Conservation awareness initiatives that illustrate the peculiarities and fragility of the local environment need to be taken up for the local people, tourists and importantly, the district Government officials and politicians. For the latter these may be in the form of relevant directions from various Central Ministries for keeping wildlife conservation perspective in view when developing conservation schemes.

***Proactive policies and guidelines from the Wildlife Department***

The Wildlife Department, in collaboration with scientific organizations needs to develop Management Plans for the existing PAs with relevant zonations in place. All other potential areas that could serve as the revised 'Core Zones' need to be surveyed immediately. Issues relating to infrastructure need to be addressed to the Ministry of Environment and Forests. The revival and redrafting of the 'Snow Leopard Scheme' (Anon. 1988) could be an ideal opportunity to bring in the suggested changes in the conservation of the region.

The Wildlife Institute of India, Dehradun, along with its partners, the International Snow Leopard Trust and the US Fish and Wildlife Service have already undertaken a step in the direction of generating information on the gap areas and also conservation efforts that enable better trained staff with sound management plans in place. The programme also intends to try and influence policy for conservation in the region (Anon. 2001).



## Conclusions

The above mentioned is an indicative approach of reconciling conservation concerns with development planning that would lead to improved standards of living through increased employment, better education, increased agricultural returns, increased value for livestock products, and also increased ecotourism and wildlife viewing. Use of conflict alleviation measures would help build trust between conservation and local herders. These will constitute important steps towards providing suitable alternatives to people and enable them to give up the areas to be used as the small 'core zones'. The strategy would also reduce livestock grazing pressures in some areas; reduce human-wildlife conflicts, and, hopefully, lead to the revival of wildlife in most areas in a manner that is more acceptable to the local people, politicians and conservationists alike. Undoubtedly, a regional perspective for conservation and development cannot be developed overnight. What is however needed is a beginning of planning, integrating and implementing of a wide array of conservation measures, based on an understanding of the ecology, environment and developmental needs of the Indian Trans-Himalaya, which is a vast landscape with unique biodiversity.

It would also be essential to revive the 'Project Snow Leopard' to deal with the regional planning issue by evolving a framework for conservation and development in a participatory manner. The urgency of reviving the 'Project Snow Leopard' cannot be overemphasized given the conservation challenges facing the vast Trans-Himalayan landscape and the crisis for survival of snow leopard – the flagship species of the region.

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Large mammals of the Indian Trans-Himalaya along with their legal conservation status



Species	Scientific Name	Indian Wildlife Protection Act 1972	IUCN Category (CAMP Workshop - Anon 1998b)
<i>Ungulates</i>			
Siberian ibex	<i>Capra ibex sibirica</i>	I	Vulnerable
Tibetan argali	<i>Ovis ammon hodgsoni</i>	I	Critical
Ladakh urial	<i>Ovis orientalis vignii</i>	I	Endangered
Bharal	<i>Pseudois nayaur</i>	I	Low Risk
Tibetan antelope	<i>Pantholops hodgsoni</i>	I	Critical
Tibetan gazelle	<i>Procapra picticaudata</i>	I	Critical
Tibetan wild ass	<i>Equus kiang</i>	I	Vulnerable
Wild yak	<i>Bos grunniens</i>	I	Critical
<i>Large carnivores</i>			
Snow leopard	<i>Uncia uncia</i>	I	Endangered
Lynx	<i>Lynx isabellina</i>	I	?
Tibetan wolf	<i>Canis lupus chanco</i>	I	Vulnerable
Wild dog	<i>Cuon alpinus</i>	?	Critical
Red fox	<i>Vulpus vulpus</i>	?	Low Risk
Brown bear	<i>Ursus arctos</i>	I	Low Risk