

Co-existence in the High Altitudes

**Snow leopards, other wildlife and
people in the Indian Himalaya**

A Conservation Education Strategy



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**Nature Conservation Foundation
and
International Snow Leopard Trust, India
2006**

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Contents

1. A World on Top of the World	4-8
1.1 Unique Treasure Trove	
1.2 Mountains of Hope	
1.3 Human Societies in Transition	
1.4 Beleaguered Wildlife	
1.5 Conservation Education for co-existence	
2. The Abode of Snow	9-13
2.1 Introduction	
2.2 Himalaya: The Major Divisions	
2.3 Climatic Gradients and Associated Features	
2.4 High Altitudes of the Himalaya	
2.5 Wildlife of the Himalaya	
2.6 Wildlife of the High Altitudes	
3. The Jigsaw: Analyses Matrices	14-17
3.1 Introduction	
3.2 A Peep into the Problems	
3.3 Panacea for the Problems	
4. Pieces of the Puzzle: Threats and Target Groups	18-28
4.1 Threats/issues	
4.2 Specific Threats in the Trans-Himalaya	
4.3 Overview of the Target Groups	
5. Putting the Pieces Together	29-40
5.1 Introduction	
5.2 The Educator's Tool-kit	
5.3 Major Programmes	
5.4 Specific Actions	
5.5 Building Capacity and Partnerships	
5.6 Project Snow Leopard: A Sustained Future	
References	41-45
Appendix I	46-47

1. A World on Top of the World

1.1 Unique Treasure Trove

The Himalaya – the highest and the most imposing of the mountain ranges on earth, is spread over 3,000 km length and 80 to 300 km width across China, Bhutan, India, Nepal with associated systems in Myanmar and Afghanistan (Schaller 1977). In India, this mountain range covers nearly 4,00,000 km² (c. 12 % of India's geographical area), mainly in the states of Arunachal Pradesh, Sikkim, Uttaranchal, Himachal Pradesh and Jammu and Kashmir. Small sections also occur in the states of Haryana, Punjab, Bihar, West Bengal and Nagaland. The altitudinal range varies from c. 300 to c. 8,800 m from the Indo-Gangetic plains to Mount Everest.

The high altitudes of the Himalaya (>3,000 m) measure about 2,50,000 km² in India (see Figure 1). This region harbours unique and rich wildlife, which includes large carnivores such as snow leopard, wolf, Indian wild dog, Himalayan brown bear and Himalayan black bear. Snow leopard is the apex predator of this region. The high altitude mountain ungulate communities of Himalaya are the richest in the world and include wild yak, Kashmir stag or hangul, musk deer (three species), Himalayan ibex, flare-horned markhor, bharal or blue sheep, Ladakh urial, Tibetan argali, kiang or the Tibetan wild ass, Tibetan gazelle, Tibetan antelope, Himalayan tahr, takin, serow, Chinese goral and red goral. Most of the above species have been listed in Appendix I (endangered) of the Indian Wildlife (Protection) Act, 1972. Majority of these have also been assigned various threat categories globally (see Mishra *et al.* 2004).

The entire Himalayan mountain range has now been designated as a global biodiversity hotspot (see Myers *et al.* 2000, www.biodiversityhotspots.org). The Himalaya have three endemic bird areas (western, central and eastern Himalaya) containing 38 endemic bird species of which 16 are globally threatened (Grimmett *et al.* 1998). Hence, it is of high significance for global avifaunal conservation. The plant diversity of temperate and alpine regions of the Himalaya is perhaps the richest in the world (www.icimod.org). The Himalayan region supports various indigenous

communities and tribes, which have contributed significantly to conservation of this diversity through unique socio-cultural and ethical practices. Their traditional knowledge and methods have sustained agriculture and pastoralism through ages in the apparently harsh climatic conditions (Mishra 2001). The Himalaya also harbours a rich wealth of livestock (TPCG and Kalpavriksh 2005).

1.2 Mountains of Hope

The Himalaya forms a physical barrier against the dry, strong and cold winds from the Tibetan plateau. This barrier also provides security to countries such as India, Nepal and Pakistan, thus being of strategic importance for national security. Himalaya carries an immense religious and spiritual importance for the people of



India. The role of the Himalaya in biogeography and climate of India; and its subsequent influence on the ecology and economy of the country is immense (see Mani 1974, Schaller 1977). Specifically, its role in the Indian monsoon and concurrent weather patterns is

central (Mani 1974). Majority of large rivers of south Asia (Indus, Ganga, Tsangpo/Brahmaputra, Yamuna, Sutlej) arise from the higher Himalaya and the adjoining Tibetan plateau. These rivers support large areas of agriculture downstream and in the plains, thus playing a vital role in the food security of India, Pakistan, Nepal, Bhutan, Bangladesh and Myanmar. The Himalaya is of immense importance for tourism in the form of recreation, pilgrimage, mountaineering, trekking and outdoor education. Peasants and pastoral communities residing in the high mountains depend on its ecological services and natural resources such as fodder and firewood for their livelihoods. Himalaya's broad spectrum of resources such as medicinal plants, mushrooms, ornamental plants and several raw materials form a vital source of mountain livelihoods. This mountain range also offers vast potential for research in geology, geography, botany, zoology, ecology, anthropology, sociology and paleontology.

1.3 Human Societies in Transition



The rich and unique diversity of the Indian high altitudes is threatened with mounting pressures of an increasing human population, their aspirations and needs of economic development and the concomitant over use and neglect of the region's natural resources. Besides, the mainstream development process is influencing the patterns of farming, transport, communication and market relationship (Ale 2000, Mishra 2001). This has brought about a socio-cultural transition among the communities, which has led to a change in the lifestyles and the nature of their impact. These negative impacts on wildlife and their habitats are apparent across the high altitudes (Ale 2000). As a consequence, several instances of (apparent) conflict between people and wildlife have been observed in the high altitudes (Miller and Jackson 1994, Mishra 1997, Bhatnagar *et al.* 2006b). Absence of relevant local institutions or their ineffectiveness where these exist, lack of awareness among people and poor implementation of laws has hampered snow leopard conservation (see McCarthy and Chapron 2003). Immense pressure and negative ecological impacts of tourism, mountaineering and pilgrimage have been documented in the high altitudes (www.spaltenberger.de/usa/himalayantourism). Presence of armed forces, ecological destruction due to wars and terrorism have added a new global and trans-nation dimensions to the conservation issues. Due to loss of biodiversity and transition from subsistence to market-based economy, traditional ecological knowledge has eroded.

1.4 Beleaguered Wildlife

The Himalaya has witnessed one likely global extinction [Mountain Quail (*Ophrysia superciliosa*) – an endemic bird species found in the middle Himalayan region is believed to have gone extinct] and several local/regional extinctions of bird species, mountain ungulates, large carnivores and possibly lesser vertebrates (see Mishra *et al.* 2004b, Rawat and Sathyakumar 2004). The threat of other regional extinctions also looms large with fewer than 100 Tibetan Gazelle left in India (Bhatnagar *et al.* 2006a). Of the 14 species of large mammals (> 50 kg) in the trans-Himalaya, 12 species are threatened (Bhatnagar *et al.* 2004). Of the 34 species of mammals reported by Mishra



et al. (2004b) from the high altitudes of western Arunachal Pradesh, 18 species were included in various threat categories of IUCN. Twelve species among these were either vulnerable or endangered. Rodgers *et al.* (2002) listed several mammal species of the high altitude Himalaya (Tibetan gazelle, Tibetan antelope, Ladakh urial and Tibetan argali) in need of further protection through improved Protected Area network. Several medicinal plants have been over-harvested in the Himalaya and face the danger of extinction (Rawat 1994), so do some over exploited tree species such as Juniper (*Juniperus*) and Yew (*Taxus* spp.). Gymnosperms such as *Pinus gerardiana*, *Cedrus deodara*, *Picea brachytyla*, and *Cephalotaxus mannii* are threatened

chiefly owing to unsustainable use (TPCG and Kalpavriksh 2005). The genetic diversity of crop plants and domestic animals has eroded in all parts of India including the Himalaya (TPCG and Kalpavriksh 2005).

Mishra *et al.* (2004b) documented heavy hunting of mammals in high altitudes of Arunachal Pradesh in the eastern Himalaya. Similar threat has been documented for Tibetan gazelle, flare-horned markhor, musk deer and snow leopard (McCarthy and Chapron 2003, Bhatnagar *et al.* 2006a). Conflict between humans and predators such as snow leopard (Mishra 1997, Jackson 2000), wolf and wild dog (Mishra *et al.* 2004b) as well as herbivores such as kiang (Bhatnagar *et al.* 2006b) and macaques (Mishra *et al.* 2004b) due to crop raiding and damage to pastures has been documented throughout the high altitudes. Since high altitude wildlife is spread across the national boundaries, conservation of species inhabiting these regions involves political and military intervention.

1.5 Conservation Education for Co-existence

The above discussion points at the need for appropriate educational interventions to resolve conflicts and improve the situation. There is also a need for sustained awareness programmes for local people as well as other target groups to create support and congenial environment for wildlife conservation. This document aims at evolving a strategy and appropriate tools for such a conservation education initiative. This strategy has been prepared in response to the need for a guiding document for a conservation education initiative for the high altitude programme of the International Snow Leopard Trust (ISLT) in India in collaboration with Nature Conservation Foundation (NCF). However, it has been cast in a perspective that could be useful to other organisations and individuals interested in such interventions. The report is organised in five chapters. The first chapter is an introduction to the richness, uniqueness, importance and problems of the Himalaya in general and high altitude Himalaya of India in particular. Chapter two is an overview in terms of physical, climatic, floral and faunal elements of the Indian high altitudes. Third chapter describes the methods and analyses adopted to evolve the conservation education matrix. Fourth chapter discusses the threats and issues with relevant examples and provides an overview of the target groups and their

important characteristics. Chapter five concerns the communication strategy with the associated matrices and brief descriptions of the specific educational tools proposed to address relevant target groups and threats.



2. The Abode of Snow

"Nowhere in the world can such a diversity of vegetation be seen as in the Himalaya."

- W.J. Hooker (1785-1865), famous British botanist

2.1 Introduction

The Himalayan mountain range exhibits tremendous diversity of altitudinal, climatic and physical characteristics. All along the breadth and length of the Himalaya, these features change. There is also a great altitudinal variation and associated physico-climatic aspects. These diverse conditions have given rise to varied floral and faunal communities and human societies. In this chapter, the diverse nature of the Himalaya has been documented in terms of physical, climatic and biological features. A special section on high altitudes introduces the focal ecological unit of this strategy in brief.

2.2 Himalaya: The Major Divisions

The Himalayan mountain range is divided across its length as western, central and eastern Himalaya. Its extreme western part, where the Himalaya merges into the Hindu Kush range is also called the northwestern Himalaya. There are four main sections of the Himalaya along its width (Schaller 1977).

- **Outer Himalaya or Shivaliks**, adjoining the Indo-Gangetic plain with altitudes close to 1,000 m and below and a width of about 50 km. This range is sometimes fused with the main Himalaya, or separated by flat valleys known as *doons*.
- **Middle Himalaya**, a complex system of ridges and valleys seldom exceeding 5,000 m altitude with a width varying from 50 to 100 km. Dhauladhar, Pir Panjal and Mussoorie ranges are examples of mountain ranges located in this zone.
- **Inner Himalaya or Great Himalaya**, which harbour all the above 8,000-meter peaks of the world; located between the middle Himalaya to south and the trans-Himalaya and Tibetan plateau to north. The highest peaks in the states

of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh include Mt. Saltoro Kangri (7,705 m), Mt. Shilla (7,026 m), Mt. Nandadevi (7,816 m), Mt. Kanchenjunga (8,586 m) and Mt. Gyal Peri (7,150 m) respectively (www.indmount.org, www.indiasite.com).

- **Trans-Himalaya**, including ranges and undulating areas mingled with high plateaus to the north of the inner Himalaya. Being located at altitudes varying from 2,200 m to 7,000 m in the rain shadow of the latter, these are also termed the cold desert. These ranges merge into the Tibetan plateau.

2.3 Climatic Gradients and Associated Features

Across the length and width of the Himalaya, there is a vast variation in the rainfall regime. This has given rise to a horizontal zonation with the eastern parts receiving much higher rains. For instance, Darjeeling has an annual rainfall of 3,000 mm; Shimla at 1,200 km to its west c. 1,500 mm and Srinagar another 400 km further west receives c. 650 mm (Schaller 1977). Thus, in general the western parts are drier compared to the eastern parts. Similarly, as southern aspects receive more precipitation than the northern aspects, these are more vegetated. More dramatic than the horizontal variation and exerting a greater influence on wildlife is the vertical zonation of the Himalaya. So much is the change that in a span of less than 200 kilometers, from a humid rainforest in the eastern Himalaya, one could reach an alpine meadow. This vertical variation in climate, vegetation and geographical attributes has given rise to unique plant and animal assemblages. Plant associations in the Himalaya approximate the function of an altimeter. What begins with a Sal forest in the lowlands and Shivalik hills transforms into Chir Pine (*Pinus roxburghii*) forest along the slopes and hill crests gradually giving way to oak (*Quercus* spp.) and blue pine (*Pinus longifolia*) changing with further altitude into oak-fir-beech (*Quercus-Abies-Picea*) association to birch (*Betula* spp.) - rhododendron (*Rhododendron* spp.) communities near the tree line. Shrubby growth (*krummholz*) and alpine meadows appear at about 3,600 to 3,900 m in the western Himalaya to 4,200 m. in the eastern Himalaya, before merging into snowline at about 5,000 m. This diversity of altitudinal niches and specific microhabitats therein has contributed highly to Himalayan species richness. Geographically, the deep gorges of Sutlej and Kali Gandaki rivers have acted as dispersal barriers.

2.4 High Altitudes of the Himalaya

Areas above 3,000 m altitude are regarded as high altitude areas. The high altitude zone covers about 2,50,000 km² area (ca. 7.5 % of India's land area) in India spread over the trans-Himalaya, middle and great Himalaya.



Middle and Greater Himalaya:

The high altitudes of the middle and great Himalaya differ from the trans-Himalayan counterparts in terms of terrain, vegetation and fauna. The same altitudes in the two areas support different vegetation. Forests and sub-alpine vegetation is

found till about 4,000 m in majority of these areas, while in the trans-Himalayan region the same altitude would have sparse scrub and pastures. Several tree species including *Pinus gerardiana*, *P. wallichii*, *Betula utilis*, *Abies pindrow* and *Picea smithiana* are found. Some wild ungulate species are exclusive to this region - Himalayan tahr, flare-horned markhor, takin, hangul and musk deer. Snow leopard occurs in the higher reaches, but in lower areas (below 3,000 m), common leopard is found. Non-buddhist peasant communities inhabit this region that includes parts of Jammu and Kashmir, Himachal Pradesh (Dhauladhar, Kinnaur), Uttaranchal (Mussoorie), Sikkim and Arunachal Pradesh.

Trans-Himalaya: The trans-Himalayan region includes Ladakh region in Jammu and Kashmir, Lahul and Spiti in Himachal Pradesh and northern Sikkim (Rodgers *et al.* 2002). Two major zones have been recognized in the Indian trans-Himalayan region - 'Ladakh Mountains' and 'Tibetan Plateau' (Rodgers and Panwar 1988). The former includes most parts of Ladakh and Lahaul-Spiti with steep mountains and valleys (altitudinal range 2,200-7,000 m), while the latter consists of rolling mountains, vast plains and high-altitude lakes mostly above 4,200 m. in the Changthang region of Ladakh, parts of Spiti, small part of Uttaranchal and the northern plateaus of Sikkim.

While snow leopard is present in both the high altitude regions, wolf occurs only in this region; so do wild yak, Himalayan ibex, Ladakh ural, Tibetan argali, kiang, Tibetan gazelle and Tibetan antelope. The Indian trans-Himalayan region is the catchment of rivers Indus, Chenab and Sutlej. The vegetation of the region is in the form of dry steppe, shrub land or pastures, generally lacking tree growth and formed of species such as *Caragana*, *Astragalus*, *Artemisia*, *Carex*, *Festuca*, *Lonicera*, *Kobresia*, *Poa*, *Potentilla*, *Polygonum* and *Stipa*. (Schaller 1977, Chundawat and Rawat 1994, Mishra 2001). There is a short (3-4 month) growing season for vegetation when temperatures are conducive (Mishra 2001). This has given rise to specialized assemblage of flora and fauna, which is adapted to the cold and arid climate (Bhatnagar *et al.* 2004). Most people follow Buddhism in this region.

2.4 Wildlife of the Himalaya

Table 2.1 shows the currently known species richness levels of plants and major vertebrate groups of the Himalayan region. Among all the Himalayan countries, India possesses the highest number of bird species and is only second (after China) in the species richness of all other vertebrate groups (www.biodiversityhotspots.org). The current estimates of species richness, however, appear to be on the lower side for all groups. Recent surveys in the region have brought to light new species of amphibians and reptiles



(Pawar and Birand 2001) as well as mammals and shown extensions in their known ranges (see Datta *et al.* 2003, Mishra *et al.* 2004b, Sinha *et al.* 2005). Similar possibilities exist for

plant species of the region. A significant feature of species diversity in the Himalaya is the high degree of endemism. For instance, the number of angiosperm species endemic to the Indian Himalaya is 3,165, which represents about 45 % of the total endemic plant species (about 6,850) in India (www.icimod.org).

Table 2.1 Species richness of plants and vertebrates in the Himalaya

Group	Number of Species	Endemic Species	% Endemism
Plants	10,000	3,160	31.6
Mammals	300	12	4.0
Birds	977	15	1.5
Reptiles	176	48	27.3
Amphibians	105	42	40.0
Freshwater Fishes	269	33	12.3

Source: http://www.biodiversityhotspots.org/xp/Hotspots/hotspots_by_region/

2.5 Wildlife of the High Altitudes

The high altitude Himalayan region harbours populations of several globally threatened mammals including the snow leopard, Himalayan brown bear, red panda, Asiatic ibex, flare-horned markhor, Himalayan tahr, wild yak, musk deer, takin, serow, and the Tibetan antelope. Chundawat and Rawat (1994) reported nearly 35 species of mammals from the Ladakh region. Mishra *et al.* (2004b) reported 34 mammalian species from the high altitudes of western Arunachal Pradesh. The mountain ungulate assemblage of the region is the richest, but most species have their southernmost global range here. Pfister (2004) recorded 310 species of birds in Ladakh. Among these, Black-necked Crane (*Grus nigricollis*) – a globally threatened species and several other breeding species such as the Bar-headed Goose (*Anser anser*) assume high conservation significance. Himalaya is also important for conservation of pheasants and their relatives. Three species of amphibians and 11 species of reptiles were reported from Ladakh (Anon. 2001). The high altitude flora has been studied at various sites across the middle and great Himalaya, but due to absence of a comprehensive picture for the entire region; discussion here is restricted to the trans-Himalayan region. The trans-Himalayan regions of Jammu and Kashmir and Himachal Pradesh have been reported to possess over 750 species of

angiosperms (see Chundawat and Rawat 1994), of which several have medicinal properties (Anon. 2001). There are several unique breeds of livestock and indigenous land races of crops in the high altitude Himalaya.



3. The Jigsaw: Analyses Matrices

3.1 Introduction

Published material, key informant interviews and personal observations were used to identify and analyse the threats/issues and target groups. Published information from the studies carried out on the agro-pastoral communities, human-wildlife conflicts and ecology of threatened species of mammals in the Indian high altitudes (e.g. Saberwal 1996, Mishra 1997, Anon. 2001, Mishra 2001, Bhatnagar *et al.* 2002, McCarthy and Chapron 2003, Bhatnagar *et al.* 2004, Mishra *et al.* 2004a, Mishra *et al.* 2004b, Bhatnagar *et al.* 2006a and 2006b) was used. Key informant interviews were conducted to draw information from the decade-long high altitude programme of ISLT and NCF with focus on research, community-based conservation, exploration, creation of protected areas and use of science in influencing policy. This programme has been operational in Spiti, Ladakh and Arunachal Pradesh. Personal observations made during visits to the high altitude regions supplemented the first-hand information. A list of threats (see table 3.1) and target groups was prepared based on the above. Detailed accounts of the nature of threats and target groups as well as their impacts have been presented in chapter four.

3.2 A Peep into Problems

There were three major analyses matrices that were developed based on the background information collected. These included the following:

3.2.1 Threats/issues and target groups: This analysis was conducted in two parts. First, the intensity/extent of impact of different target groups in terms of their direct involvement was scored on a scale of '0' to '3' where '0' denoted no impact and '3' implied high impact. Scores of '1' and '2' showed low and medium impact respectively (see table 3.1). Second, the likely influence of the same groups in terms of tackling the threat/issue or contributing to it was also scored on a similar scale (see table 3.1). For instance, at present hunting may not be affected significantly by tourists, but in future demand for pelt or parts of wildlife could influence the threat.

Similarly, active intervention by the Government and army could have a positive influence on this threat. When both impact and influence of the target groups are considered, there is inclusion of the future role of target groups, not just their present impact. Hence, the sum of these two scores was used as an indicator of importance of target groups to be addressed in the conservation education strategy.

Table 3.1 Impact and influence scores of the target groups for different threats/issues in Indian high altitudes

Threat/Issue of concern	Impact and influence scores #								
	Local people	Govt. dept.	Tourists	Local youth	Armed forces	NGOs	Teachers	General public	Children
Livestock depredation by wild carnivores	3+3	1+2	0+0	1+3	0+0	0+3	0+1	0+0	0+2
Crop and forage losses to wild herbivores	3+3	1+2	0+0	1+3	0+0	0+3	0+1	0+0	0+2
Grazing competition	3+2	0+2	0+0	0+2	0+0	0+1	0+0	0+0	0+0
Hunting and poaching	2+2	2+3	1+2	1+2	1+3	0+2	0+2	1+1	0+2
Over harvesting of medicinal plants	3+3	1+2	1+2	1+2	0+0	2+3	0+2	1+1	0+0
Wars, political unrest and insurgency	1+1	3+3	0+1	2+1	3+2	0+1	0+1	0+1	0+1
Loss, degradation and fragmentation of natural habitats	2+2	2+2	2+2	1+2	1+2	0+2	0+2	0+1	0+1
Natural fragility of the Himalaya	2+2	2+2	3+2	0+2	2+2	0+2	0+2	0+0	0+1
Socio-economic and cultural transition	1+3	2+1	2+1	0+3	0+0	2+2	1+3	0+1	0+3
Unsustainable Tourism	2+2	2+2	3+3	1+2	0+0	2+2	0+1	0+1	0+1
Trans-boundary wildlife conservation	1+1	3+3	0+1	1+1	3+3	0+1	0+1	0+0	0+0
Erosion of indigenous knowledge systems	2+3	0+1	0+2	1+3	0+0	0+2	0+3	0+0	0+3
Lack of awareness	1+1	3+3	0+0	1+1	0+1	1+3	3+3	0+0	0+3
Impact score	26	21	12	11	10	7	4	2	0
Influence score	28	28	16	27	13	27	22	6	19
Total score	54	49	28	38	23	34	26	8	19

For each column, the score to the left is impact score and to the right is influence score

Based on the above analysis, the most important target groups were local people and Government departments/agencies followed by local youth and NGOs. The group with the lowest score was general public, which was apparent. Tourists, teachers, armed forces and children had intermediate scores.

3.2.2 Region wise threats analysis: Matrix of presence/absence information under each threat category for each of the seven high altitude areas of the Indian Himalaya (Table 3.2) provided information on distribution of threats in the region. Lack of awareness, human-wildlife conflict, loss and fragmentation of habitats, erosion of traditional ecological knowledge and trans-boundary conservation emerged as major threats/issues of concerns in all areas. In contrast, wars and presence of excessive armed forces was a specific issue for few parts of Himalaya (see Table 3.2).

Table 3.2 Region wise threats/issues for high altitude wildlife in the Himalaya

Conservation threats/issues	Area	1	2	3	4	5	6	7	8
		Spiti	Rest HP	Ladakh	Rest Kashmir	Uttaranchal	Western Arunachal	Sikkim	All areas
1 Human-wildlife conflict	8								X
1a Livestock depredation by wild carnivores	8								X
1b Crop and forage losses to wild herbivores	1,2,3,4,6,7	X	X	X	X	?	X	X	
2 Grazing competition	8?	X	X	X	X	X	?	?	X?
3 Hunting and poaching	2,4,5,6,7		X		X	X	X	X	
4 Overharvesting of medicinal plants	2,3,4,5,6		X	X	X	X	X	?	
5 Wars and insurgency/Excessive armed force presence	3,4			X	X				
6 Loss, degradation and fragmentation of natural habitats	8								X
7 Threats due to natural fragility of the Himalaya	8								X
8 Socio-economic and cultural transition	8?								X?
9 Unsustainable Tourism	2,3,5,7?		X	X		X		X?	
10 Trans-boundary wildlife conservation	8								X
11 Erosion of indigenous knowledge systems	8								X
12 Lack of awareness	8	X	X	X	X	X	X	X	X

Sources: Mishra 1997, Mishra 2001, Bhatnagar *et al.* 2002, Rawat and Sathyakumar 2002, Sharma and Lachungpa 2002, Mishra *et al.* 2004a and 2004b. Bhatnagar *et al.* 2006a, Bhatnagar *et al.* 2006b

3.3 Panacea for the Problems

The matrices discussed earlier provided the necessary information to develop the relevant educational tools (see Chapter 5). Brainstorming and evaluation of documented/perceived utility for the respective target groups were used to analyse

the relevance and effectiveness of these tools. A matrix was developed that contained relevant educational tools for each threat/issue for important target groups (considering the high impact and influence scores) and their major outcomes as well as measurable indicators for these interventions.



4. Pieces of the Puzzle: Threats and Target Groups

4.1 Threats/Issues

4.1.1 Socio-economic and cultural transition: A process through which most societies have gone in terms of their socio-cultural and economic background is also being witnessed in the high altitudes. The process of cultural transition has been undergoing along with economic 'progress' (Mishra 2001). The cultural systems, which presumably strived towards low impact on resources including those of voluntary population control and equitable division of resources, are in a process of flux (Mishra *et al.* 2003a). Over the last 20-30 years, a transition from subsistence to a market economy has taken place in the Himalaya. This is mainly been brought about by improved transportation, communication and tourism (www.spaltenberger.de/usa/himalayantourism). Greater access to the global market and spread of tourism has increased the demand for natural resources in the high altitudes (www.spaltenberger.de/usa/himalayantourism) and encouraged both immigration from outside (e.g. Arunachal Pradesh, Lahaul) and movement within the region (e.g. Nepal). The electronic media such as television has also influenced the mountain societies. Most population in the region is rural (www.mtnforum.org/resources/library/ganga02a.htm). More than eighty per cent of the hill population depends on primary occupations; secondary and tertiary economic activities being rather limited (www.mtnforum.org/resources/library/ganga02a.htm). Meeting the aspirations of local population for economic development while maintaining local cultural and biological diversity is a challenge for the conservationists (www.icimod.org). This situation could lead to impoverishment of the resource base as well as the cultural richness of the region.

4.1.2 Natural fragility of the Himalaya: Himalaya is geodynamically active and ecologically sensitive owing to its tectonic restlessness, its continuing uplift and resultant structural and physiographical changes. The major natural threats to the wildlife and people in the mountain range include seismic hazards (earthquakes),

soil erosion (and land slides), drying up of springs and reduced stream discharge. Four major earthquakes have occurred in the Himalayan region in the past 100 years (www.mtnforum.org/resources/library/ganga02a.htm). In the cold deserts and high altitude areas, avalanches also cause loss to the natural and human environment. They also bring changes in landform. A relatively recent but important threat is global climate change and associated changes such as melting and retreat of glaciers and its impacts on the people and wildlife living downstream. There have been several human activities, which have neglected this natural fragility of the Himalaya. These include –

- Unplanned expansion of the cities and unsound construction of houses and tourist infrastructure in the higher altitudes.
- Extensive road network, which undermines the seismic and erosion parameters.
- Construction of big dams and a spurt of energy harvesting structures and hydrological interventions.
- Inadequate consideration of aspects such as disaster preparedness and management.
- Expansion of farming on steep slopes as well as unsustainable pastoralist practices leading to land degradation. Cultivation extends to about 3,500-4,500 m in the northwestern Himalaya, while livestock grazing is present even at altitudes of 5,000 m (Schaller 1977) at least in some parts of the Himalaya. Overgrazing by domestic animals creates adverse impacts on the soil and vegetation. These animals also compete with wildlife for forage.

4.1.3 Loss, degradation and fragmentation of natural habitats: The effects of loss, degradation and fragmentation of habitats are manifested through loss of species, reduced benefits of ecosystem services to humans (e.g. freshwater) and an overall impoverishment of the human environment, which may have cultural implications (Norton 1989). Today, the remaining natural habitat in the Himalaya is patchy. The steadily increasing population, high-impact tourism and changing lifestyles of people have led to extensive loss of natural ecosystems including temperate and sub-alpine forests and pastures (Rawat 2000). Several factors have led to an increased

demand on the goods and services available from natural ecosystems in the Himalaya. This demand has resulted in unsustainable harvests and loss or degradation of the ecosystems. Rise in the human population, high stocking of domestic animals (Mishra *et al.* 2001), and the influence of markets (Mishra 2001) have been instrumental in this process. McCarthy and Chapron (2003) point at the subtle yet dominant role of (over) grazing by livestock in fragmentation of snow leopard habitats. There are documented and potential factors such as reduced cycles of slash-and-burn farming in the eastern Himalaya, increasing demand of wood due to tourism, use of forests for energy needs of the armed forces and provision of subsidized fuel to people in the high altitudes that have caused heavy loss of forests. Owing to the ongoing process of globalization, it is difficult to differentiate between subsistence and market influences (Madhusudan 2005).

4.1.4 Unsustainable tourism: The entire Himalayan region attracts a variety of tourists such as trekkers, mountaineers, pilgrims, nature lovers and people interested in recreation. Better road network, infrastructure and communication facilities have played a pivotal role in boosting this high revenue earning industry. In particular, the high-end tourists visiting the Himalaya, the high number of vehicles and the small period during which this pressure is concentrated call for some intervention and alternative thinking. There are three important factors, which have not been adequately addressed while developing the



tourism sector – assessment of the carrying capacity of the sites for tourists, considerations of ecological impact of tourists and measures to reduce the same; and efforts to ensure more benefits to the local communities. Besides, tourism has largely focused on recreation. Tourism has had phenomenal growth in the Himalaya as

shown in table 4.1. In Ladakh too, the number of tourists climbed from virtually zero to 15,000 in 1982 (www.spaltenberger.de/usa/himalayantourism).

Table 4.1 Rise in tourism numbers at various locations in the Himalaya

Year	Number of tourists					
	Badrinath	Kedarnath	Gangotri	Hemkund	Nainital	Mussoorie
1975	1,80,000	82,000	57,000	6,000	3,32,000*	3,06,000*
1988	3,77,000	1,37,000	99,000	53,000	5,60,000	7,20,000

* figures for 1968 (data from sources quoted in www.spaltenberger.de/usa/himalayantourism)

Tourism in the Himalayan region, while providing economic benefit for few has exerted tremendous impact on the local ecology through demands on energy and materials (see www.spaltenberger.de/usa/himalayantourism). The results are often seen as unplanned and environmentally unfriendly construction of infrastructure and facilities, overuse of natural resources, deforestation, degradation of water sources and decline in quality of water, deforestation, solid waste accumulation and erosion of the local cultural milieu (www.spaltenberger.de/usa/himalayantourism). Mountaineers and trekkers often leave large quantities of garbage (up to 15 kg of non-degradable waste per 10 trek days), use natural biomass for their energy needs and cause degradation of trails (see www.spaltenberger.de/usa/himalayantourism). The socio-cultural impacts of tourism include social divides and hostility towards certain ethnic groups (apparent beneficiaries) as in case of Sherpas in Nepal, drug addiction among youth and erosion of customs and cultural practices (www.spaltenberger.de/usa/himalayantourism).

4.1.5 Erosion of indigenous knowledge systems: The communities inhabiting mountains have evolved several indigenous methods and tools that made their lifestyles sustainable. One such example is the use of risk mediation strategies in farming (see Mishra *et al.* 2003a). There are many examples of such practices where thoughtful rotation of crops and use of existing landscape features to maximize production provided sustained benefits. It is also interesting that rural communities ensured the controlled use and equitable distribution of common property resources through developing local institutions. These systems of ecological, social and

economic wisdom of generations today face the danger due to external pressures of development and market economy.

4.1.6 Wars, political unrest and insurgency: The Himalaya are spread across six countries and owing to the international borders of these countries (especially India, China and Pakistan), there is a huge concentration of armed forces. Their resource requirements, especially of fuel impose a danger on the Himalayan ecosystems. The wars in Afghanistan (see McCarthy and Chapron 2003, Mishra and Fitzherbert 2004) and between India and Pakistan, and India and China (Bhatnagar *et al.* 2006a) have caused damage to habitats and populations of endangered species of ungulates. Insurgency in the eastern Himalaya within the Indian Territory also has negative ecological impacts. Since 1996, local unrest in Nepal has led to reduction in tourism-based revenue (www.spaltenberger.de/usa/himalayantourism). This has had a negative impact on the economy.

4.1.7 Human-wildlife conflict: In most areas of the Indian high altitudes, large predators such as snow leopard, wolf and dhole (wild dog) have taken to killing of livestock (Mishra 1997). Domestic animals are more abundant in many parts and are more vulnerable to predation by large carnivores (Bagchi and Mishra 2006). Due to high economic losses, this conflict between herders and large carnivores often leads to retaliatory killing of these animals by poisoning the carcass or depriving the predators from consuming the quarry. Destruction of their litters has also been observed (Mishra 2001). In other cases of human-wildlife conflict, wild herbivores raid crops and pastures causing conflict with farmers who are mostly poor and herders.



4.1.8 Grazing competition with livestock: Domestic livestock often out compete the wild herbivores for food resources (Bagchi *et al.* 2002). Mishra *et al.* (2004a) reported

competition for forage between bharal (*Pseudois nayaur*) and livestock in Spiti region of the Indian trans-Himalaya possibly leading to lower densities and poorer young : adult female ratios in intensively grazed areas.

4.1.9 Hunting and poaching: In many high altitude areas such as Ladakh, Lahul, Sikkim and Arunachal Pradesh; hunting and poaching are direct threats to wildlife (see Chundawat and Rawat 1994, Mishra *et al.* 2004b, 2006, Suresh Kumar, *personal communication*). This threat is probably the highest in Arunachal Pradesh (see Mishra *et al.* 2004b). The species persecuted in the high altitude areas of Arunachal Pradesh



for subsistence requirements include goral, serow, takin, musk deer, bharal and birds such as pheasants (Mishra *et al.* 2004b, Suresh Kumar, *personal communication*). Several large carnivores such as snow leopard and dhole

and small carnivores as well as some herbivores are targets due to loss of livestock, trade in their skins or other body parts, crop raiding (macaques) or hunting for sport (Mishra *et al.* 2004b).

4.1.10 Overharvesting of medicinal plants: It is estimated that about 2,500 species of plants in the Himalaya and 700 species in the trans-Himalaya are used for medicinal purposes at present (TPCG and Kalpavriksh 2005). In several instances, the demand for medicinal plants and their parts has led to over exploitation of respective plant species from different parts of the Himalayan high altitudes (Rawat 2000, Kala 2005). Arya (2004) listed nine species as threatened due to over exploitation from the alpine region of Nandadevi Biosphere Reserve, while Kala (2005) listed 60 threatened medicinal plant species (of which 32 were endemic species) from seven protected areas of the Himalaya. TPCG and Kalpavriksh (2005) have indicated a similar trend for the entire Himalayan region. Harvesting these resources unsustainably would

imply a fall in income besides leading to negative impacts on the plant and animal communities.

4.1.11 Lack of awareness: McCarthy and Chapron (2003) identified lack of awareness as a major hindrance for snow leopard conservation. Awareness about the surrounding environment and conservation issues is lacking in all sections of the society including children, youth, adults or local governance/institutions. However, not all sections of the Indian high altitudes share this lack. For instance, Uttarakhand and to some extent Ladakh has much higher awareness compared to Spiti and Arunachal Pradesh. Since local support and involvement would depend on the level of awareness among local communities and decision-makers, it is imperative that this factor is regarded important for all conservation education interventions.

4.2 Specific Threats in the Trans-Himalaya

Bhatnagar *et al.* (2004) listed eight major conservation problems in the Indian trans-Himalaya. These include inadequate size of protected areas, occurrence of wildlife outside the protected areas including endangered species such as Tibetan Gazelle (*Procapra picticaudata*), grazing competition between wild and domestic herbivores, livestock depredation by wild carnivores, crop and forage losses to wild herbivores, poaching, wildlife diseases and political issues including lack of trans-boundary wildlife conservation initiatives and unrest among local people. Barring the first and last problem, the rest concern the interface of wildlife with local communities and lead to conflicts that often result in losses to both sides. For instance, Mishra (1997) estimated about 12 % livestock losses to depredation by carnivores in the Spiti valley of Himachal Pradesh. Mishra *et al.* (2001) also reported overstocking of livestock and out-competition of wild ungulates (Mishra *et al.* 2002, 2004) by livestock in the Spiti region of the Indian trans-Himalaya. Development in the Ladakh region, which includes expansion of human settlements in remote areas, is depriving several wild mammals such as Kiang (*Equus kiang*), Ladakh urial, and Tibetan gazelle (Bhatnagar *et al.* 2006a and 2006b, *in press*) of their foraging grounds. As a result, crop raiding by wild herbivores such as kiang has been reported in Ladakh (Bhatnagar *et al.* 2006a and 2006b). This has got them into conflict with pastoralists with whose livestock they presumably compete for forage in the high altitude valleys. Increasing tourism

poses a threat in Ladakh and parts of Himachal Pradesh and Uttaranchal. Increasing road network in the Changthang region is another example of the likely negative impacts of this activity. Besides, these threats, McCarthy and Chapron (2003) also included lack of awareness among local communities, lack of proper enforcement and appropriate policy among threats to the survival of snow leopard.

4.3 Overview of the Target Groups

4.3.1 Local communities: This target group is the most directly linked group (primary stakeholders) benefiting from and affected by the human-natural resource interface. It is also the group that is in continuous contact with the habitat and wildlife of the region. This group is diverse in terms of cultural and ecological



outlook and at various stages of economic development from Ladakh to Arunachal Pradesh. The nature of impact also varies from degradation of pastures and forage competition to hunting and over harvesting of medicinal plants. There is

also a great variation in the ongoing awareness and educational interventions. Parts of Ladakh, Uttaranchal and to some extent Sikkim have a fair presence of NGOs and educational initiatives, while Arunachal Pradesh lacks such efforts almost completely. It has been observed that the local population is either unaware about the fallouts of adjacent protected areas or against it (Aparajita Datta, *pers comm.*). In such a situation, the communication strategy needs to address the existing stage of human-nature interface. The most important behaviors that need to be addressed include hunting (for meat and in retaliation for damage to livestock and crops) and poaching (for trade) and unsustainable harvesting of resources (medicinal plants). Behaviors that would be useful include religious and traditional taboos and other socio-cultural systems.

4.3.2 Children: Children form a crucial target group as the future citizens and constitute up to 50 % of the population in many developing countries (<http://earthwatch.unep.net/agenda21/content.php>). There is a need to strengthen the traditional ecological values and environmentally sustainable socio-cultural patterns among children of the Himalayan region. Further, to understand the link between the natural environment and their lifestyle, as well as to reduce their impact on the environment, a long-term education programme with local perspective needs to be undertaken. This will prepare the next generation of local people with an outlook on ecologically sustainable development. Efforts need to be made to carry out awareness drives in the schools of the capitals and some smaller cities/towns of the five Himalayan states. Children in regions other than the Himalaya should also be targeted to impart knowledge and create awareness about the ecological role and importance of the Himalaya and its wildlife.



4.3.3 Youth: Youth comprise about 30 % of the world population (<http://earthwatch.unep.net/agenda21/content.php>). Besides, this group is the most physically able and vibrant group of the population. Hence, it is of high importance for awareness and education activities. In the Himalayan high altitudes, this group includes two main sections i.e. rural youth (self employed, employed and unemployed but not attended college) and college students. It is envisaged that the youth would be targets for awareness creation as well as for orientation and training to prepare future educators and environmentally sensitive citizens. Young women in particular need to be motivated to take active part in this initiative. The present socio-cultural transition in the trans-Himalaya is reflected most by this group and it becomes imperative to target youth for influencing this process. Influencing youth is also critical for sustainability of the conservation education initiative and for local level institution building.

4.3.4 Teachers: The single most influence on a child, other than that of her parents and elder siblings is of her teacher. Teachers also play an important role by being a part of the youth target group. Teachers connect the formal and informal sectors of education as they bring with them the hidden curriculum and their own outlook and world-view. Identifying, orienting and training capable and committed teachers and molding others to play the role of catalysts in spreading awareness would be an important component of the overall strategy for education and outreach.

4.3.5 Local and regional NGOs: As local and regional representatives of people, NGOs play an important role in bringing about social and environmental change. Locally run NGOs are important due to their face-to-face contact with the local communities (especially youth) as well as higher acceptability by people. Further, they form an important link to help surmount the language barrier. In addition, such organizations provide the necessary human resource for awareness and education programmes. As mentioned earlier, such NGOs are active in several high altitude areas. One example is Students' Environmental Cultural Movement of Ladakh (SECMOL). Collaborating with such NGOs to learn from their experience, join hands to strengthen the ongoing initiatives and building their capacity could be pivotal.

4.3.6 Armed forces (Army): Since most of the high altitude areas (particularly the trans-Himalayan region) are located near or along the international borders shared by Pakistan, Nepal, China, Bhutan and Myanmar, involvement of armed forces (specifically army) is essential to success of any initiative of this kind. With their high technical and physical capabilities, the armed forces are a potentially important group for protecting wildlife and their habitats in regions where other agencies would find it difficult to operate. However, this can happen only when this group is aware of the problems and status of wildlife conservation as well as the existing legal framework for protection of wildlife. Besides, for better protection of threatened species in the trans-boundary regions and protected areas, their involvement would be imperative.

4.3.7 Government departments / local governance structures: Local bodies of governance such as Ladakh Autonomous Hill Development Council (LAHDC) and

village panchayats (councils), state forest departments and decision makers at other levels though neither dependent directly nor indirectly on the local environmental resources, play an important role in the ongoing and future developmental activities. Their awareness and involvement are important for environmental awareness and education works in all sectors. Protected area managers and staff form a vital section of this target group with respect to



capacity building for nature interpretation and harmonious relationship with local communities. Sharing of experiences and learning from officers and local staff who have served for long-term in the region would benefit our ideas and implementation process. Local people who have served in the government would be key individuals for support and assistance in implementation.

4.3.8 Tourists and Tourism Operators: Tourism is a growing sector worldwide and the Himalayan mountain range with its beauty and uniqueness has been attracting tourists, trekkers, mountaineers and spiritual seekers in large numbers. In its present context, much of the tourism in the Himalaya is uncontrolled and unsustainable (see www.spaltenberger.de/usa/himalayantourism). The high altitudes being particularly fragile, call for greater care in such activities. A large part of tourism here falls in the category of recreation and mountaineering, which have a high negative impact on the local ecology and socio-cultural milieu. In most cases, neither is the tourist aware nor are the operators about sustainability of this activity. Besides, local people are only a marginal or small part of this industry. Most tourist destinations of the Himalaya lie between 2,000 and 3,000 m. In the trans-Himalayan tract, tourism is present as high as 4,500 m (i.e. in Ladakh and Spiti). Impacts of mountaineering go even beyond this altitude. These areas have witnessed drying up of water sources, deforestation and accumulation of solid waste for which there are no disposal or

treatment facilities. Hence, tourists and tourism operators need to be targeted for creating awareness about their impacts and guided to eco-tourism options.

4.3.9 General Public: Himalaya is not just of relevance and importance for local communities and other directly dependent target groups. People living in the sub-Himalayan tracts as well as those farming the rich alluvial plains of the rivers originating from this mountain range need to understand the ecological importance of the Himalaya vis a vis impact of human activities on its status. The spiritual, religious, ecological and economic significance of the Himalaya is of relevance for the entire Indian sub-continent. In fact, Himalaya is a global treasure and creating awareness about its richness, importance and conservation becomes a priority at a global scale as much as at the local level.



5. Putting the Pieces Together

5.1 Introduction

5.1.1 Goal: To communicate through specific messages and educational tools with relevant target groups the need to conserve snow leopard, other wildlife and their natural high altitude habitats in the Indian Himalaya in ways that people can avail its ecological, livelihood, aesthetic, economic, spiritual and recreational benefits.

5.1.2 Approach: The main approaches of the strategy are -

1. Focus on local level awareness generation and capacity building through long-term programmes. Expand the programmes later to other areas to widen the reach.



2. Target negative behaviours (e.g. hunting,

over harvesting of resources) with specific educational interventions and alternatives to ease the problem in a participatory and voluntary manner.

3. Motivate people to conserve wildlife through protection, rotational use, enterprise, non-consumptive sharing (e.g. eco-tourism), proactive intervention and restoration (e.g. grazing-free areas), use of indigenous knowledge (e.g. eco-friendly farming technologies), conflict resolution and institution building at local & regional levels.

4. Influence the bureaucracy, decision-makers and political machinery to create favourable conditions for the above. Involve other NGOs and individuals through networking, collaboration, support and capacity building to achieve the goal.

5. Design and conduct activities to raise awareness among general public, especially children in other regions of India as well as other parts of the globe about snow

leopard and its associated wildlife, their ecology, status and conservation issues in the Living Himalaya.

5.2 The Educator's Tool-kit

This strategy intends to address specific threats/issues for relevant target groups and broad level awareness generation through three main types of interventions: major programmes, specific actions and link-up activities. Major programmes are long-term, sustained interventions aimed at awareness generation. These would also provide the backbone for several other activities by their sustained and continuous nature. Specific actions encompass a range of activities and products envisaging specific outcomes. Link-up activities are activities/products that provide opportunities to tie up with other similar action/project. Education tools identified and their relevance for different target groups have been presented in table 5.1. There, conservation education activities have been further broken up based on the nature of output (see Table 5.1). The main outputs include major programmes, print material, audio-visual products, field activities and outreach material.

Table 5.1. Conservation education tools for different target groups and their scores

No.	Product/Activity Category	Scores for relevance of education tools for target groups #								
		Local people	Govt. Dept.	NGOs	Local youth	Teachers	Armed forces	Children	Tourists	General public
	Print Material									
1.	Poster set -Living Himalaya	1	3	3	2	3	3	3	2	2
2.	Eco-tourist Guidebook	0	3	3	3	0	0	0	0	0
3.	Poster(s)-Threatened species	2	3	3	2	3	3	3	2	2
4.	Poster-No hunting appeal	3	3	3	2	1	3	1	2	1
5.	Book-Snow leopard	1	1	2	1	3	0	3	2	1
6.	Workbook- My environment	0	3	3	1	2	0	3	0	0
7.	Manual for workbook and activities	0	3	3	2	3	0	0	0	0
8.	Nature Guide manual	2	3	3	3	0	0	0	0	0
9.	Desk-top card on Tibetan Gazelle	0	3	2	1	1	3	1	1	1
10.	Booklet on Project Snow Leopard	1	3	3	2	2	3	0	1	1
11.	Brochure – High altitude programme	0	3	3	1	0	3	0	2	1
12.	Articles in print media	2	2	2	1	2	2	2	2	3

No.	Product/Activity Category	Scores for relevance of education tools for target groups #								
		Local people	Govt. Dept.	NGOs	Local youth	Teachers	Armed forces	Children	Tourists	General public
13.	Field Guide - common high altitude plants and animals	0	2	2	2	3	1	3	3	1
	Audio-visual & Interactive material									
14.	Slide show on Living Himalaya	2	2	2	2	3	2	3	2	2
15.	Film on Cons. with communities	3	3	3	2	1	1	0	2	1
16.	Film on Living Himalaya	3	3	3	3	3	3	3	3	3
17.	Web-site	1	2	2	1	2	2	2	3	3
18.	CD-Rom	0	2	2	0	3	2	2	2	2
19.	Interpretation Centres/Exhibits	1	1	0	1	2	2	3	3	0
20.	Outreach material	1	2	2	1	1	2	2	3	3
	Field Activities									
21.	Distribution workshops for book	0	1	2	0	3	0	0	0	0
22.	Meetings/consultation using PRA, APPA	3	2	2	2	1	0	0	0	0
23.	Training workshops on eco-tourism, EE in schools, colleges	2	3	3	3	3	0	0	0	0
24.	Nature trails	1	1	2	2	3	0	3	3	0
25.	Nature Education Camps	0	2	1	2	3	0	3	3	0
26.	Research on education needs & Attitudinal surveys	3	2	2	2	2	1	2	1	0
	Major Programmes									
1.	Youth Awareness Clubs	1	0	2	3	1	0	0	0	0
2.	Children's Environmental Education Programme	1	2	3	1	3	0	3	0	0
3.	The Living Himalaya Campaign	3	3	3	3	3	2	3	3	3

Scoring is on a scale of 0 to 3, where 0 denotes no relevance and 3 indicates high relevance

5.3 Major Programmes

There are three major programmes planned of which two apply to the most important target groups viz. local youth and children. These programmes intend to develop their understanding, awareness and attitudes for future. The third is a general campaign aimed at raising awareness about the Himalaya and its importance

among various target groups residing in the high altitude regions as well as outside it.

5.3.1 Youth Awareness Clubs (YAC) - Youth as an important target group and a force for change is a highly dynamic component of the society. To mobilize this human resource, village level/village-cluster level youth environment awareness clubs would be formed. These clubs would carry out ecologically meaningful and sustainable actions such as restoration, research, monitoring, training and capacity building. The clubs would also be messengers for creating environmental awareness. They would work in close consultation with other village people. Youth activity centers would be developed in each village where constructive activities are planned and carried out. Such centers would develop village/regional interpretation facilities, tourism infrastructure, libraries and village development material. These clubs would be encouraged to manage and run eco-tourism activities with guidance on developing nature trails, interpretation along these trails and other



specific nature/outdoor education activities. This would require preparation of training manuals, which would be undertaken as per the need. A major outcome of YAC would be development of a team of motivated volunteers in each village/region for supporting and undertaking conservation work.

5.3.2 Children's Environmental Education Programme (CEEP) - Mainly aimed at local school children as well as those who do not attend school, this programme would aim at creating a generation of ecologically aware and sensitive citizens. Trained local youth and village elders in co-operation with schools and teachers would implement this programme. Through various in-school and outdoor activities, this programme would focus on age group 10 to 15 years. Training of teachers and

capacity building of local youth would form an integral component of this programme. An annual calendar of 8 to 10 activities (later to be transformed into a parallel curriculum) would be made with equal weight on outdoor components. Familiarity with local flora and fauna, its use (traditional), status and commercial demand would be communicated through activities and games. Developing a feeling of belonging to their natural environment and being at ease with its vagaries as well as getting excited about its wonders would be included as part of the learning process. Nature trails and nature education camps would be vital tools for communicating specific messages of diversity, status and conservation of flora and fauna in their surroundings. Experience and knowledge of village elders would be drawn to make a workbook for children on local flora and fauna, where in they will record their observations and learning. A workbook – My Environment would be made for the children. They would record their observations, learning and experiences in the workbook. A manual including directions on conducting various activities and using the workbook to teach children along with other print material would be distributed to teachers and youth involved in CEEP. Training workshops would also be conducted to orient and train them in the use of outdoors and manuals. The storybook on Snow leopard narrating its relationship with its physical and biological environment (in English and Hindi languages) to be developed in the first year (2006) would be a major resource for teaching for local as well as other schools in the five Himalayan states. Special distribution and training workshops would be organized to orient the teachers in using it to teach about the Himalayan environment in various subjects. Besides, efforts would be made to target children in all parts of the country in general to raise awareness about issues concerning conservation of high altitude biodiversity in the Himalaya.

5.3.3 The Living Himalaya Campaign (TLHC): This would form the major awareness campaign for the Himalayan as well as other regions. Among major activities to be undertaken in this programme, the most important would be a film on the biodiversity of the Himalaya (including the ways in which it is used and degraded, its status and future). The film would mainly be used for screening at interpretation centers of protected areas in the Himalaya, in villages, tourist destinations and interior schools and colleges of the five Himalayan states. A slide

show kit on the same theme with information material for each slide for educators would also be developed for distribution and sale to schools and colleges. The slide show would be used for awareness generation mainly in secondary schools and colleges in urban centers. A series of three posters depicting the biodiversity of the high altitude Himalaya, its food web, ecological importance and threats on it would be prepared for distribution and sale. The film, slide show and poster set would also be distributed/ marketed as a set to educational institutions, NGOs and Government Departments. An exclusive 'Living Himalaya Interpretation Centre' (or two – one for western and the other for eastern Himalaya) would be conceived and developed in association with respective state Governments and other organisations such as Centre for Environment Education. More activities and events to be included under the campaign would be explored and included as the process gives more experience and learning.

5.4 Specific Actions

The material to be developed under this category would aim at specific threats/issues and major target groups involved. A brief description of some of these activities has been given below. The important messages/contents of the same have been outlined in Table 5.2.

5.4.1 Audio-visual/Interactive Material: A website on the biodiversity of the Himalaya and other aspects of relevance would be made to create awareness about the richness of biodiversity in the Himalaya, its imperiled status and need for conservation. It would have special sections for children. The website would be ready for launch by the end of year 2006, or early 2007. A CD-Rom would also be developed along similar lines. A film on conservation with communities in Spiti and Ladakh would be made to spread the message of success of unique livestock insurance scheme, voluntary closure of village pastures for livestock and improvement in conditions for wildlife. This film would be used as a tool to create support for such schemes elsewhere in the Himalaya where human-wildlife conflict is high. It is likely that after witnessing the success and happiness of other people, more communities would adopt this practice. Efforts would be made to develop interpretation centers in protected areas or other important locations in collaboration

with the state forest departments or other agencies such as the Center for Environment Education. Use of local material, expertise and technology would be encouraged and linkages with tourism and other sectors would also be created to enhance the use of such facilities. For active interpretation, nature trails would be developed in highly visited select protected areas so that tourists can be made aware of the site's ecological features. Possibilities to contribute the text and for interpretation centers being designed by other organizations would also be explored.

5.4.2 Print Material: The products in this category would include educative poster series on threatened biodiversity of the Himalaya (a set of three posters with focus on mammals, birds and plants) and desk-top cards/calendars for endangered species such as the Tibetan gazelle would be made and distributed to the relevant target groups such as the Army and enforcing agencies such as the State Forest Department. A guidebook for eco-tourists (in the form of a rich & pictorial coffee-table book) and a manual for nature guides would address the issues of negative impacts of tourism and focus on eco-tourism. The former would focus on different tourism routes for wildlife viewing and suggest itineraries based on eco-friendly nature of the places. The latter would help local youth and Government guides to interpret nature in an interesting, joyful and interactive manner. A field guide on common high altitude wildlife covering over 200 species of mammals, birds, insects and plants would be brought out. This would have a user-friendly format and handy to carry. Local language versions of the same also may be brought out. A poster based on the appeal of no hunting made by His Holiness the Dalai Lama would be used to create awareness about the religious, legal and ethical aspects of hunting threatened species.

5.4.3 Outreach Products: For communicating the scope and extent of the work of high altitude Himalayan programme of ISLT/NCF, brochures and booklets would be made which could be used for diverse target groups such as armed forces, bureaucrats, NGOs etc. To reach general public, tourists and spread the message of conservation, outreach products such as t-shirts, key rings, caps carrying pictures and message about high altitude wildlife would be developed. Interpretation centers, reception centers of protected areas, tourism spots and eco-friendly resorts would be

vital sites for dissemination and sale of outreach material. ISLT field offices would also play a role in this work, so would the youth environment clubs. Coverage of various aspects of the high altitude programme in media would be of immense help and efforts would be made to develop contacts to get wider coverage for the work carried out under this programme. Articles in newspapers and magazines would be a key component of outreach effort. Success of community-based conservation programmes and research findings of NCF-ISLT work in the high altitudes would be presented in popular language. Interesting facets of high altitude wildlife and people would also be brought out in these articles.

5.4.4 Field Activities: These activities would target various groups and address a variety of threats. Besides conducting some of the activities for the primary target groups, these would be useful for several other secondary target groups. Nature

trails and nature education camps would be important first-hand exposure tools for children, youth and teachers. These would foster a deeper understanding of links between humans and nature and nurture positive values, feelings and attitudes about wildlife and nature. These



tools would also be used for students of schools and colleges of other regions of the country, teachers, Government officials, media persons etc. Two other sets of activities would also be a part of field level work. These include research and monitoring and training workshops.

Research and Monitoring: Since knowledge about the specific educational needs of various target groups from all parts of the high altitudes is not adequate, research on this aspect would be carried out. Questionnaire surveys and observations as well as meetings and consultations with communities and individuals would be used to generate information on aspects linked to awareness and attitudes of the communities towards wildlife and linkages among the factors of high altitude

environment. Networking with researchers of the high altitude programme and those of other organizations would be solicited to increase the knowledge base. Development of various outdoor activities for children and youth would be carried out as an ongoing process. A dynamic monitoring component for all the educational and awareness interventions would be designed. Appendix I provides a matrix of education tools for major threats/issues and a monitoring framework with their anticipated outcomes and measurable indicators. This would help in determining success as well as charting future course of action.

Training Manuals/Modules: Training manuals and modules need to be developed for various target groups such as youth (educators, nature guides), teachers, tourism operators, and NGOs. These would be used for various training workshops and capacity building activities. Both these tools could also be shared and/or marketed. Eco-tourism and nature interpretation would be the chief themes for these products.



Table 5.2. Conservation education tools and their message/contents

No.	Communication Tools	Message/Content
1	Articles in print media	Various conservation issues/options, accounts of biodiversity, traditional ecological knowledge - stories
2	Book on Snow Leopard (in English & Hindi)	Ecology of snow leopard and its associated species including interactions with humans, status and future
3	Booklet - Project Snow Leopard	Background and overview of the project, its main aims and important aspects of conservation
4	Brochure - High Altitude Programme	Highlight the scope and achievements of the programme
5	CD-Rom	Similar contents as website, but more information
6	Desk-top card	Illustrated card with message for conservation of Tibetan

		gazelle and information on its distribution, habitat, status and threats
7	Distribution workshops for Snow leopard Book	Orientation to aims of the book, its use as a tool in including teaching EE in other subjects such as geography & science
8	Eco-tourist Guidebook	Introduction to the Himalaya, important spots for eco-tourists, their biodiversity, do's and don'ts for eco-tourists
9	Field Guide to Common high altitude plants & Animals	Introduction to the Himalaya and their high altitude biodiversity, pictures/illustrated (preferably by local artists), local relevance of biodiversity and suggestions for better viewing, experiences in the wilderness
10	Film on community-based conservation	Risk mediation and benefits through livestock insurance scheme, protecting wildlife through designating grazing-free areas, preventing retaliatory killing of carnivores and dissemination of the Spiti model to motivate people in other high altitude areas to adopt the same
11	Film on The Living Himalaya	Himalayan uplift, fragility & changes, habitats, flora & fauna, threats and conservation issues
12	Interpretation Centres/Exhibits	One/two focusing on The Living Himalaya theme at highly visited tourist spots, more can be in protected areas with their specific biodiversity themes
13	Meetings and consultations	Documentation of local knowledge on biodiversity of the area, assessment of resource use, understanding of problems and needs, discussion of issues of concern, formation of committees etc.
14	Nature Education Camps	Orientation to natural environments of the high altitudes, knowledge of flora and fauna, understanding of their interrelationships and human dependence, impacts on nature, , developmental issues & activities, development of positive values, feelings, attitudes and behaviours about nature
15	Nature trails	Using the work book to document and grasp the natural environment
16	Nature Guide Manual	Nature interpretation, developing and conducting nature trails, observing wildlife, basic ethics, safety, crisis management
17	Outreach products	Specific messages on threatened species, general theme of Himalaya, biodiversity conservation

18	Poster-Living Himalaya	3 posters with themes of biodiversity of Himalaya, Himalayan high altitude food web and importance of and threats to the Himalaya
19	Poster on threatened species of mammals, birds and plants found in the high altitudes	Information on species range & habitat, status, threats and legal provisions
20	Poster on appeal for stopping retaliatory hunting / poaching	Religious basis for not poaching and value of life, importance of ecosystem integrity
21	Research on education needs and monitoring	Attitudes towards wildlife and damage caused by it, pre & post knowledge tests, needs analysis, traditional value systems, awareness about local/global environmental issues & attitudes towards these, assessment of impact of activities/programmes
22	Slide show on the Living Himalaya	Himalayan environment its physical features, rich and threatened biodiversity, conservation issues & what you can do
23	Training Workshops for eco-tourism, nature guide & other skills	How to conduct trails with nature interpretation and basic ethics, safety training & carrying capacity, Teaching about environment to children
24	Website	Information on the Himalaya – physical features, flora, fauna, threatened species, conservation issues, photo gallery, you & the Himalaya, children's section with pictures, games, quiz etc.
25	Workbook - My environment	To record observations, learning and experiences, identification and traditional uses of plants and animals, impacts of human action, status of wildlife, relevant developmental issues, interviews with village elders, meetings with Govt. officials, Army personnel etc.
26	Manual for Educators	Description of workbook activities and directions on conducting these activities & using the workbook to teach children, other resource material

5.5 Building Capacity and Partnerships

It is obvious that reaching such a large number of target groups in an effective manner would require a tremendous effort. With our limited resources and capacity, collaborations and networking with other NGOs, Government and individuals; drawing from success stories of others would enhance our efforts and prevent

duplication. At the same time, opportunities need to be created for our own capacity building in terms of programme planning, implementation and monitoring. Building a team to carry out education and awareness activities (mainly consisting of local people) would be the key in terms of long-term inputs. In this regard, identification and training of members of the local community and NGOs, which can run the activities would be useful for sustained implementation of the conservation education plan.

It is also of importance to enhance capacities of individuals, NGOs, institutions and Government agencies involved in similar work in the high altitudes. Institutions such as The Mountain Institute (TMI), Centre for Environment



Education (CEE), Wildlife Institute of India (WII), GB Pant Institute and NGOs such as Ladakh Ecological Development Group (LEDeG), Students' Educational and Cultural Movement of Ladakh (SECMOL), and several other local organisations are potential partners for education and awareness work in the high altitudes. Government bodies such as the Ladakh Autonomous Hill Development Council (LAHDC), state Forest Departments, Ministry of Human Resources and Department of Science and Technology of the Government of India would be the prime agencies for collaboration, support and capacity building. The knowledge of existing initiatives of the five State Governments (with high altitude Himalayan areas) in conservation education and awareness activities would be gained and potential for collaboration as well as new ideas would be discussed. Private tourism operators, adventure and environment education agencies would form important groups for networking. Efforts to create these partnerships and screening other potential collaborators would be an important part of this strategy. It will be important to create complimentary roles for projects and activities with the collaborators and

partners. Exploring funding sources and partners for supporting the initiatives suggested under this strategy would be needed.

5.6 Project Snow Leopard: A Sustainable Future

Project snow leopard, conceived by the Nature Conservation Foundation and International Snow Leopard Trust aims to safeguard India's unique natural heritage of high altitude wildlife populations and their habitats by promoting conservation through participatory policies and actions. It is in the final phase of planning and likely to be launched in year 2006 in the five Himalayan states in snow leopard range in India. All the state level consultations have been completed and with the five states endorsing it, now the project awaits national consultation before officially being launched. Linkages between the activities and programmes planned under the present strategy and under Project Snow Leopard would be made. Particularly relevant would be education and awareness measures undertaken with respect to conflict resolution in terms of livestock depredation, retaliatory killing of carnivores and grazing competition. Enhancement of protected area interpretation system and creating awareness among communities living in and around the protected areas would also be of relevance for the strategy.



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Appendix I. Educational tools for major threat/issue and relevant target groups

Threat/issue	Major target groups	Major educational tools	Anticipated outcomes	Measurable indicators
Livestock depredation by wild carnivores	1. Local people 2. Local youth	1. Film: Conservation with communities 2. Meetings / consultations	1. Understanding and awareness about livestock insurance, better herding and legal provisions for hunting 2. Participatory solution seeking	1. No. of households / villages involved in livestock insurance and pasture protection 2. New ideas to solve the conflict 3. Increased tolerance (change in attitudes)
Crop/forage losses to wild herbivores	1. Local people 2. Government Departments (Dept.)	1. Meetings/consultations 2. Film: Conservation with communities 3. Research on education needs	1. Understanding of problems & evolving alternate solutions 2 Awareness generation 3. Compensation schemes	1. Increased tolerance (change in attitudes) 2. Reduced retaliation 3. Reduced economic loss
Grazing competition	1. Local people 2. Migratory herdsmen	1. Meetings/consultations 2. Research on education needs	1. Awareness about overstocking and pasture health 2. Reduced damage to pastures 3. Grazing-free areas	1. Healthier & protected pastures 2. Reduction in livestock numbers
Hunting and poaching	1. Government Dept. 2. Local people 3. Armed forces	1. No hunting poster 2. Poster(s)– threatened species 3. Meetings/consultations 4. Street plays	1. Knowledge about species, distribution and status to enforcement agencies 2. Awareness about legal & moral aspects of hunting 3. Sympathy for wildlife	1. Local people's involvement in prevention of hunting 2. Better enforcement - feedback 3. Increase in wildlife poph.
Loss & fragmentation of natural habitats	1. Local people 2. Government Dept. 3. Tourists	1. Living Himalaya – film, posters & slide show 2. CD-rom 3. Web-site	1. Awareness about the ecological role and relevance of Himalaya	1. Restoration of habitats 2. Preservation of the commons
Natural fragility of the Himalaya	1. Tourists 2. Local people 3. Armed forces 4. Government Dept.	1. Living Himalaya – film, posters & slide show 2. Web-site	1. Awareness generation about faulty practices	1. Guidelines for development in the Himalaya
Socio-economic and cultural transition	1. Local people 2. NGOs 3. Teachers	1. Meetings/consultations (PRA, APPA) 2. Street plays	1. Awareness generation	1. Overall developmental process and impact levels? 2. Local institution building, village empowerment
Unsustainable Tourism	1. Tourists 2. Local people/youth 3. NGOs	1. Eco-tourist handbook 2. Nature Guide training & manual	1. Awareness generation 2. Sustainable tourism with local people's involvement	1. Local level tourism development, cash flow 2. Distribution of tourist

Threat/issue	Major target groups	Major educational tools	Anticipated outcomes	Measurable indicators
	4. Government Dept. 5. Interpretation center	3. Nature camps 4. Field guide	3. Better value for money , but reduced ecological impact	load, healthy tourist spots
Trans-boundary wildlife conservation	1. Government Dept. 2. Armed forces	1. Use of media for advocacy 2. Meetings/consultations	1. Awareness and consensus building 2. Proactive role of army	1. Improvement in status of wildlife at borders 2. Trans-boundary PA s, peace zones
Erosion of indigenous knowledge systems	1. Local people 2. Local youth	1. Children's EE programme 2. Youth environment clubs	1. Documentation of indigenous knowledge and system for its transfer 2. Active use of indigenous knowledge	1. Attitudinal change about indigenous practices 2. Spread of this knowledge through NGOs and Govt. agencies
Lack of awareness	1. Government Dept. 2. Teachers 3. NGOs	1. Living Himalaya Campaign 2. Children's EE programme 3. Youth environment clubs 4. Web-site 5. CD-Rom	1. Awareness generation 2. Formation of nature clubs	1. Improved status of wildlife and their habitats 2. Reduction in negative impacts