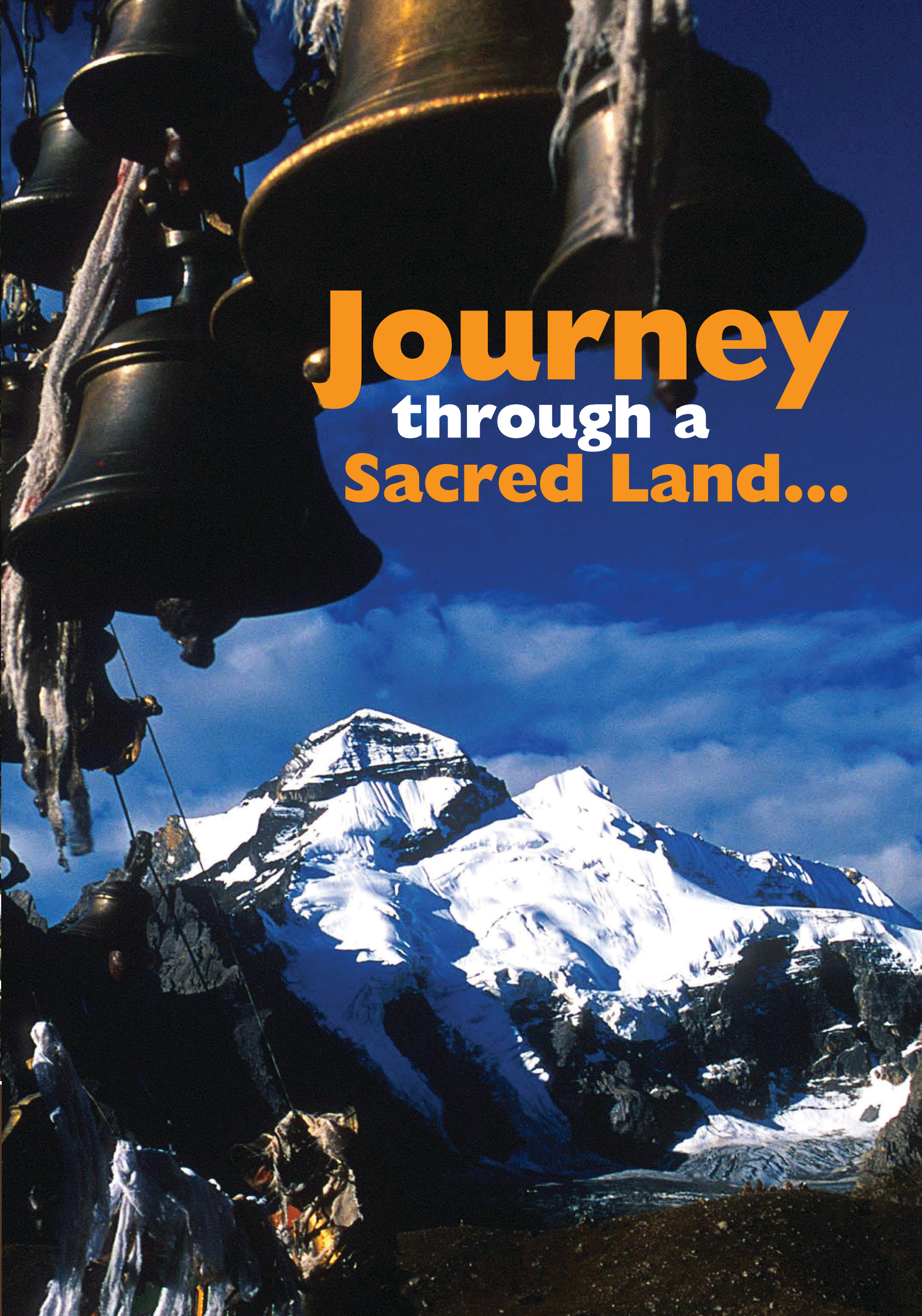

Journey through a Sacred Land...

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United Nations Decade on Biodiversity

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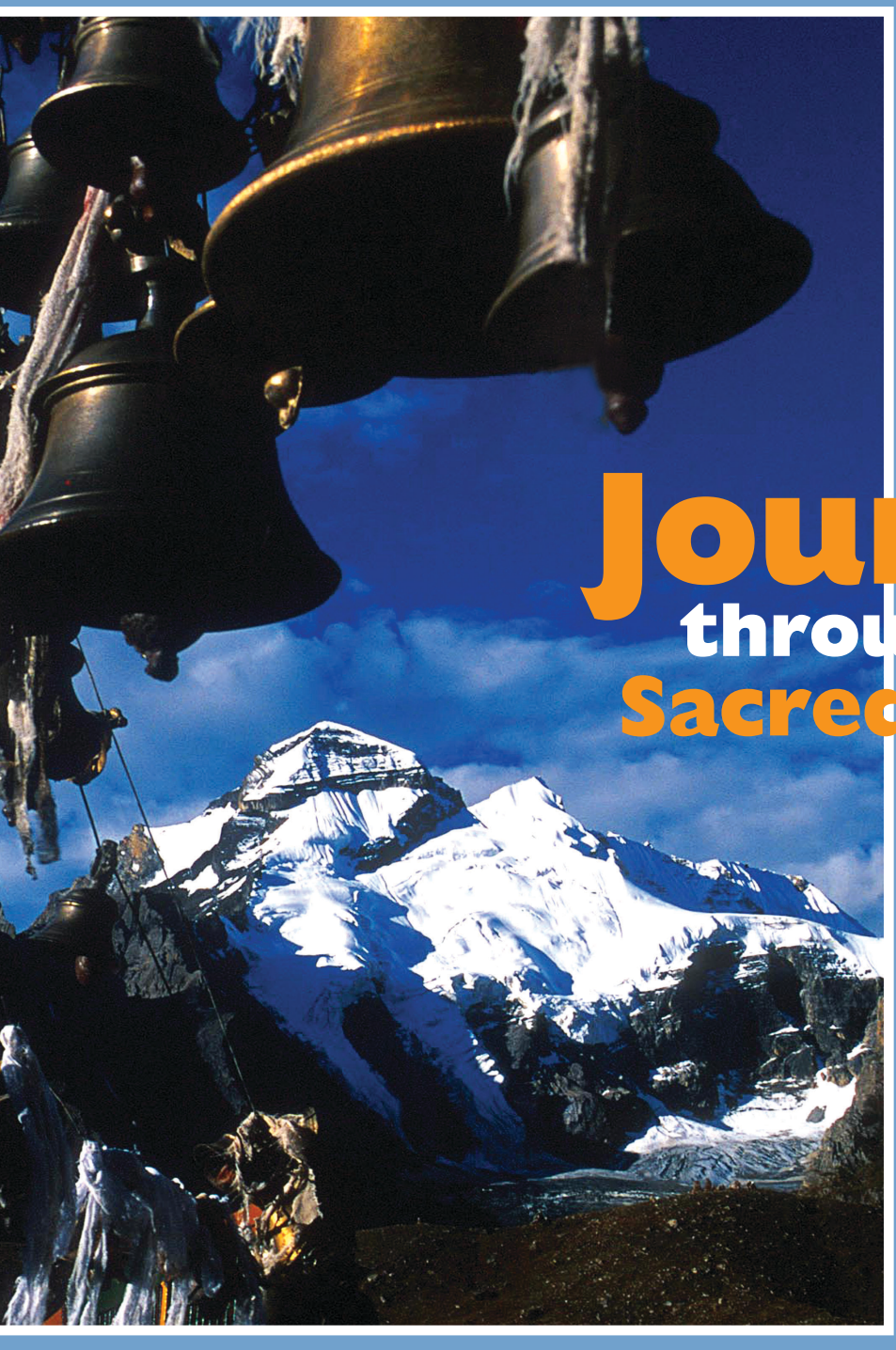

Journey
through a Sacred Land...

Photo: Neeraj Pant

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Foreword

The uniqueness and fragility of mountain ecosystems has prompted global attention in sustainably managing such ecosystems based on human-centered approaches. This also helped mainstreaming of developmental agenda in these regions. Significant progress has been made towards effective monitoring of structural and functional features along with gathering of evidence on changing patterns of biodiversity in these ecosystems. Among mountains of the world, the majestic Himalaya, with remarkable diversity in bio-physical and socio-cultural systems, assumes special place. It is recognized as one of the 34 global biodiversity hotspots. The importance of Himalayan region has been aptly recognized by the Government of India by way of providing for a National Mission on Sustaining the Himalayan Ecosystem (NMSHE; the only location specific mission) under its National Action Plan on Climate Change (NAPCC). Other countries in the region are equally aware of wide ranging life support value of the Himalaya. Among others, the International Center for Integrated Mountain Development (ICIMOD), an intergovernmental organization having eight Regional Member Countries, is engaged in various research and developmental activities in the region. This includes building regional cooperation for undertaking ecosystem management and livelihood promotion activities in identified transboundary landscapes. One such landscape is the Kailash Sacred Landscape (KSL) which encompasses adjacent portions of India, Nepal and Tibetan Autonomous Region of China. This is one of the most revered landscapes of the world, with unique biodiversity and socio-cultural values. This landscape is equally known for goods and services that emanate from the region and meet various requirements of population residing within and much beyond its physical boundaries.

The Kailash Sacred Landscape Conservation Initiative (KSLCI), facilitated by ICIMOD and UNEP in the preparatory phase, has succeeded in preparing status documents and implementation plans for the three participating countries. In Indian part of KSL, the G.B. Pant Institute of Himalayan Environment & Development (GBPIHED) has led the process along with two other partner organizations, namely the Wildlife Institute of India (WII) and the Uttarakhand Forest Department (UKFD). Considerable information base has been built through this process which is being used for developing a plan of action for the landscape during the next phase of implementation of KSLCI.

I am happy to note that GBPIHED has compiled and synthesized available information in the form of this book. As the title suggests, the compilation intends to help readers to touch-upon various facets of landscape as it happens during the actual journey. This compilation, in fact, forms a part of the landscape '*Yatra Kit*' which would form a major component of the Implementation Plan. The '*Yatra*' (Journey) concept, as it has been briefly described towards the end of this compilation, is interesting and provides scope for making entire process more consultative and participatory. Dr. L.M.S. Palni, Director, GBPIHED and his team deserves appreciation for bringing out this useful compilation and providing a way forward for much awaited conservation and sustainable development in the landscape. The intended '*Yatras*' in the landscape will pave the way for involving local communities and other stakeholder groups in the process, which would ultimately provide a unique approach that can be replicated in other parts of the region and elsewhere.

September 24, 2012
Balakrishna Pisupati
Chairman, National Biodiversity Authority

Preface

Dr. L.M.S. Palni
Director
G B Pant Institute of Himalayan Environment & Development

A modest beginning made some years ago by International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal to systematically address issues concerning data deficiency and socioeconomic development in the Himalayan region, following a novel concept of transboundary transects/landscapes in the HKH region, has now started taking shape. ICIMOD has identified seven such critical landscapes to represent most of the bio-physical, environmental and socio-cultural dimensions of the Himalaya. Through the active participation of relevant Regional Member Countries (RMCs) and interested international agencies activities have been initiated to build Regional Cooperation Framework (RCF) on some of the identified landscapes.

Among such landscapes, the Greater Mt Kailash region, which covers the remote south-western part of the Tibetan Autonomous Region (TAR) of China, and adjacent parts of north-western Nepal, and north-eastern parts of Uttarakhand state in India, contains a highly diverse array of ecological conditions, rich and unique biodiversity components, indigenous systems of livelihood, and distinct local cultures. The sacredness and values attached with the landscape elements have provided, from times immemorial, driving force for the existence of some of the most natural sites, and time-tested traditions of management and sustainable harvest of natural resources. The region being the source of the Indus, the Brahmaputra, the Karnali and the Sutlej rivers, provides transboundary ecosystem services vital to the region as well as to areas far beyond. However, on account of its geological fragility, climate sensitivity and ever-increasing threats to biological diversity, the landscape is one amongst the most vulnerable ecosystems worldwide. The indigenous communities and their value-based traditional systems are also undergoing rapid transformation. So is the case with retreating glaciers and changing hydrological regimes, consequently affecting the biodiversity and socio-economic features in the region. All these issues and many more, are of great concern to large populations inhabiting downstream areas.

Recognizing the global importance of this landscape, a project entitled “Kailash Sacred Landscape Conservation Initiative (KSLCI)” has been conceived with a vision and its set objectives to initiate and promote transboundary biodiversity and cultural conservation, ecosystem management, sustainable development, and climate change adaptations within the region. To realize the objectives, ICIMOD has initiated a proactive and systematic process, in collaboration with UNEP, and other partners, to engage regional, national, local partners and other stakeholders among ICIMOD’s three Regional Member Countries (RMCs), namely, China, India and Nepal, towards establishment of a transboundary cultural and biodiversity conservation landscape – the Mt Kailash Sacred Landscape (KSL) — for developing and facilitating a transboundary Regional Cooperation Framework (RCF).

One of the major goals of this project is in respect of generation of long-term ecological, climatic, socio-cultural and biodiversity datasets within the KSL; this would contribute substantially to address the issue of knowledge gaps, a serious impediment for understanding, and predicting impacts of changing patterns, including climate change.

Realizing that the proposed landscape is of great bio-physical, cultural and religious significance for the three participating countries of HKH region (i.e., China, India, Nepal), that the landscape is extraordinarily fragile and ecologically sensitive having significant value in terms of ecological services for the three countries, and that the initiative is timely and relevant under national/regional/global initiatives towards developing mechanisms for: (i) conservation and sustainable development; (ii) adaptation under changing climate, and (ii) poverty alleviation and gender equity, the Government of India (GoI), Ministry of Environment & Forests (MoEF), approved the proposal and designated G.B. Pant Institute of Himalayan Environment & Development (GBPIHED) as the lead institute, and Wildlife Institute of India (WII) and Uttarakhand Forest Department (UKFD) as major partner organizations for implementation of this project in the Indian part of KSL.

India considers this, first of its kind trans-boundary project in the region, of particular relevance under existing national priorities and programmes. For example, the National

Photo: Neeraj Pant

Action Plan on Climate Change (NAPCC) of India through a National Mission on Sustaining the Himalayan Ecosystem (one of eight and the only location-specific National Missions) envisages evolving management measures for sustaining and safeguarding the Himalayan glaciers and mountain ecosystem. The mission, among others, stresses on the need for exchange of information within countries that share the same Himalayan ecology. It also underlines the need for establishing an observational and monitoring network for the Himalayan environment. And, to make the network comprehensive in its coverage, cooperation from neighbouring countries is envisaged. In this context the KSLCI, which attempts to establish a long-term ecological monitoring framework, and on the ground climatic and biodiversity network, would provide unique opportunity for furthering cooperation and establishing a suitable network with neighbouring countries, China and Nepal in this case.

Furthermore, in accordance with the need for community-based management of vulnerable ecosystems (e.g., mountain farming systems) as highlighted under the mission approach on Sustaining the Himalayan Ecosystem, and in harmony with the relevant suggested measures for conservation of mountain ecosystem under the National Environment Policy (2006) of India, the KSL project would help promote community-based ecosystem and sustainable development approaches that empower local communities, promote gender equity, and improve livelihood options for the locals, through appropriate resource management, and identification of alternative livelihood strategies.

Kailash Sacred Landscape Conservation Initiative has been conceived on a long-term basis, which will be implemented in a phased manner. The preparatory phase of this initiative focused on developing the base line information for implementation of a long-term strategy. As the first envisaged outcome for this phase, a comprehensive feasibility document for the Indian part of KSL has been prepared, following the approach of thorough consultation with diverse stakeholder groups. Besides the expertise of three designated organizations (i.e., GBPIHED, WII, and UKFD), various experts on relevant aspects (i.e., individuals and institutions) and officials of government departments were consulted, and the information received has been used for preparing a status report for the target landscape. The target landscape in itself was delineated through extensive consultations. The information generated, through rapid field surveys, by different teams of the three institutions was used to fill in the gaps, as far as possible. The extensive on site consultations with the community representatives and NGOs, followed by an open consultation workshop with stakeholder groups provided desired guidance to identify priorities for the future action.

This publication attempts to put together the major highlights and outcomes of the preparatory phase for the Indian part of KSL. The document, while providing a brief on the status of bio-physical and socio-cultural attributes in the target landscape, also brings together the relevant policies and programmes to highlight its enabling environment. Considering the challenges and opportunities existing in the landscape, best possible options have been suggested for approaching conservation and strengthening knowledge base.

I feel that this publication will provide a strong base towards building much needed frameworks of comprehensive environmental monitoring plans and conservation strategies for the landscape, and ultimately feeding to the envisaged process of developing a Regional Cooperation Framework, to support cooperation and common understanding on issues related to transboundary landscape.

September 22, 2012

Dr. L.M.S. Palni

Director, GBPIHED

Acknowledgements

The nodal ministry, Ministry of Environment and Forests (MoEF), Government of India (GoI), after thorough consultation with the concerned ministries and organizations, agreed to the concept of the proposal entitled "Kailash Sacred Landscape Conservation Initiative: Developing a Trans-boundary Framework for Conservation and Sustainable Development in the Greater Mt Kailash Region of China, India and Nepal". The G.B. Pant Institute of Himalayan Environment & Development (GBPIHED) was designated as the Lead Institute for implementation of the project in the Indian part. MoEF also identified Wildlife Institute of India (WII) and Uttarakhand Forest Department (UKFD) as major national partners, and provided guidance to streamline the process of project execution.

GBPIHED would like to thank ICIMOD and UNEP for facilitation of process along with funding support for the preparatory phase of KSLCI. The then Director General ICIMOD, Dr. Andreas Schild, deserves appreciation for effectively steering the process of KSLCI. Dr. Eklabya Sharma, Dr. K.P. Oli, and Dr. Robert Zoomer of ICIMOD, Kathmandu, were always and readily available for any clarification and provided valuable support.

Present compilation is based on a collaborative effort between Lead and Partner Institutions. The authorities of these Institutions deserve deep appreciation for effectively facilitating the preparatory phase assignment. Both, Director WII, Shri P.R. Sinha, and Principal Chief Conservator of Forests (UKFD), Dr. R.B.S. Rawat, were instrumental in giving direction and necessary support all through the process.

The District Administration, Pithoragarh, and ITBP, Mirthi (Pithoragarh) helped in information collection and logistics for the research teams while in the field. Many other departments provided valuable information. We thank all of them.

Among others, the information received from Herbal Research & Development Institute (HRDI), Gopeshwar; Directorate of Cold Water Fisheries Research (DCFR), Bhimtal; Commandant 130 Inf Bn (TA), Eco Kumaun; Himalayan Study Circle (HSC), Pithoragarh; Himalayan Gram Vikas Samiti (HGVS), Gangolihat; and DFO Bageshwar, etc., was very useful. The strongest acknowledgments are, however, due to members of various research teams from WII, UKFD and GBPIHED and also the associated researchers and resource persons, who enthusiastically and sincerely participated in the process and conducted Rapid Assessment Surveys in remote and difficult terrains in the landscape. Other stakeholders willingly contributed information and participated during various consultations. Shri Threesh Kapoor, Shri Neeraj Pant, Dr Shekhar Pathak, Ms Sabine Leder, Dr CS Negi, Shri GS Bhardwaj provided photographs from their collections, we thank them.

Local inhabitants were keen in sharing their ground-level experiences and at several occasions provided logistic support and helped research teams to understand ground realities.

Many academic and other sources have been used freely in this document and we gratefully acknowledge all such sources. Last but not the least, on behalf of the entire project team (Lead Institute as well as the Partner Institutions), we are grateful to all those who could not be listed above but their direct or indirect involvement helped in completing this task within the stipulated time.

Above all, funding for the present compilation, prepared for distribution as a part of *'Yatra Kit'* during CoP 11 to the CBD, has been generously provided by the National Biodiversity Authority, based on the recommendation of MoEF. Encouragement received from Shri B.M.S. Rathore, Shri Hem Pande, and Dr. J. R. Bhatt of MoEF, is gratefully acknowledged.

Photo: Neeraj Pant

Photo: Neeraj Pant

1 Kailash Sacred Landscape (KSL)

Photo: GS Bhardwaj

Mount Kailash (a.k.a. Mount Kailas), also referred to as *Gangrénboqí Feng* in Chinese and as *Kaila´sa Parvata – Devnagiri* in Sanskrit (with similar names in Hindi, Nepali, and other related South Asian languages), is revered as *Khang Rinpoche* among Tibetans. The landscape surrounding Mt Kailash represents a wide range of biophysical, socio-cultural, and environmental conditions, and is considered among the most revered sacred landscapes in the world. The spiritual and sacred values of this landscape attract tens of thousands of pilgrim every year. Ironically, the region is equally known for its vulnerability to globalization and accelerated development, as well as climate change. As a result, the rich and unique biological diversity, ecosystem goods and services, and value-based cultural heritage of landscape are severely threatened.

The Kailash Sacred Landscape (KSL), as delineated through a participatory and iterative process (for the purpose of a unique transboundary "KSLCI" project; ICIMOD 2010), encompasses remote south-western portions of the Tibet Autonomous Region (TAR) of China, and contiguous areas of north-western Nepal, and north-eastern part of the State of Uttarakhand in India. At the heart of this landscape is located the sacred Mount Kailash and the Mansarovar lake revered by hundreds of millions of people in Asia and throughout the world by the followers of several religions and faiths. The Jains consider it a place where the first Tirthankara, Rishabhdev got nirvana. For the Hindus it is abode of the lord Shiva and his consort Parvati. For the followers of the Bon religion, and the Buddhists it is the sacred jewel. Four major rivers, the Karnali, the Brahmaputra, the Satluj and the Indus (Sindhu) originate from the region and flow through some of the most populated parts of Asia (Zomer & Oli, 2011).

The Kailash Sacred Landscape (KSL) has been delineated to cover an area of 31,175 km^2 , extending from 79° 49´ 26´´ E to 82° 26´ 54´´ E longitude and from 29° 18´ 23´´ N to 31° 12´ 42´´ N. The KSL area includes almost all of Pulan County in the TAR-China; most of District Pithoragarh and a Small part of District Bageshwar in the State of Uttarakhand, India; and portions of Humla, Bhajang, Darchula and Baitadi Districts in north-western Nepal (Figure 1.1). Over a million people live within the landscape; most of this population resides in KSL part of India and Nepal, with very few, sparsely distributed, around 8,000 plus persons, inhabiting the high-elevation areas on the Tibetan Plateau.

The landscape contains a highly diverse array of ecozones, ecosystems and biomes, which in turn support richness of endemic and threatened flora and fauna. The KSL transboundary area represents an irreplaceable natural and cultural treasure that lies both at the geographic centre, as well as the cultural heart of the Hindu Kush Himalayan (HKH) region. Limited livelihood options for indigenous communities have resulted in a cycle of perpetual resource degradation and widespread poverty in the landscape. Moreover, the

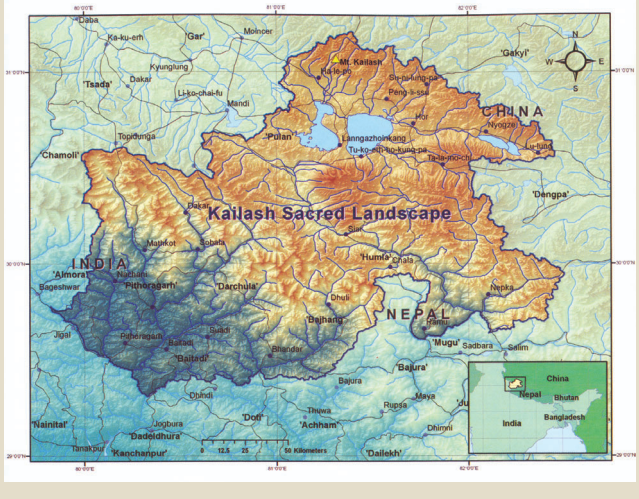


Figure 1.1: Kailash Sacred Landscape (*Source*: Zomer & Oli, 2011).

Photo: Threesh Kapoor

transboundary nature of environmental settings in the landscape means that risks and challenges are common. This would, therefore, also mean that the coping strategies and action plans need to be coordinated between countries sharing this common ecosystems. The KSL holds a great significance in terms of its relevance to human societies and culture, and transboundary resource management is a part of Asian culture (Oli et al., in press).

KSL India – the Target Landscape

Kailash Sacred Landscape (KSL) within Indian borders covers an area of 7,120 km^2 extending to cover the most of district Pithoragarh (6,826 km^2) and a relatively smaller portion of the adjacent district of Bageshwar (294 km^2) in the State of Uttarakhand. Administratively, it covers 8 development blocks of district Pithoragarh (Munsiyari, Dharchula, Bin, Gangolihat, Berinag, Munakot, Kanalichina and Didihat); together with Bageshwar and Kapkot blocks of district Bageshwar. As of 15th August 2011, intent to form a new district encompassing Didihat and adjacent areas has been declared by the State Government. The boundary delineation procedure for the district is yet to begin and this will continue to be a part of the KSL.

Demographically, the KSL represents predominantly rural settlements with only 0.38% of total area falling under urban centres supporting about 13% of the population. The population of the landscape (i.e., Pithoragarh district) has grown at the rate of 5.13% between 2001 and 2011; and provisionally in 2011 the population is recorded as 4, 85,993. The provisional census figures of 2011, when compared with those of 2001, reveal that the population growth rate in 5 mountainous districts (out of existing 13) of the State of Uttarakhand has dropped considerably. Specifically, considering the target landscape, it has nearly halved in last one decade. Coupled with the fact that the literacy rate has continuously gone up, marked at almost 76% for Pithoragarh, there is clear evidence of substantial out-migration from the region in search of jobs. What is more revealing in the latest survey report is improved sex ratio. Considering all these features, Tolia (2011) has opined that while in earlier decades only men used to migrate out, now it is the entire families which may be migrating out to the districts in plains of Uttarakhand or outside the State. Older generation, either out of choice or due to compulsion, often remains back in the villages to take care of the fields and their family dwellings. Consequent to this “new phenomenon” a tremendous impact on the agricultural and pastoral practices is visible. If these trends continue, fuelled by the absence of substantive local livelihood generation programmes, some features of the landscape, that is shaped by the cultural practices, over generations, are likely to change forever over time.

Photo: GS Bhardwaj

Photo: Neeraj Pant

Biogeographically falling in west Himalayan province of India, this landscape lies at the confluence of Western, Central and Trans-Himalaya where not only floral and faunal elements but also diverse human cultures converge. The landscape exhibits great variability and heterogeneity in bio-physical and socio-cultural systems. The variety of bio-climatic zones that exist in the landscape include, among others, hot and semi-arid valleys in the southwest, lush green and humid valleys in the mid-hills, extensive mountain forests, moist alpine meadows, cold and arid trans-Himalayan valleys, high altitude grasslands and steppes, along with extensive area under permanent snow and ice.

Physiography

The landscape with great variability in geological and physiographic forms covers three major physiographic zones - the Trans Himalaya, the Greater Himalaya and the Lesser Himalaya. The Trans Himalayan zone, characterised by low precipitation,

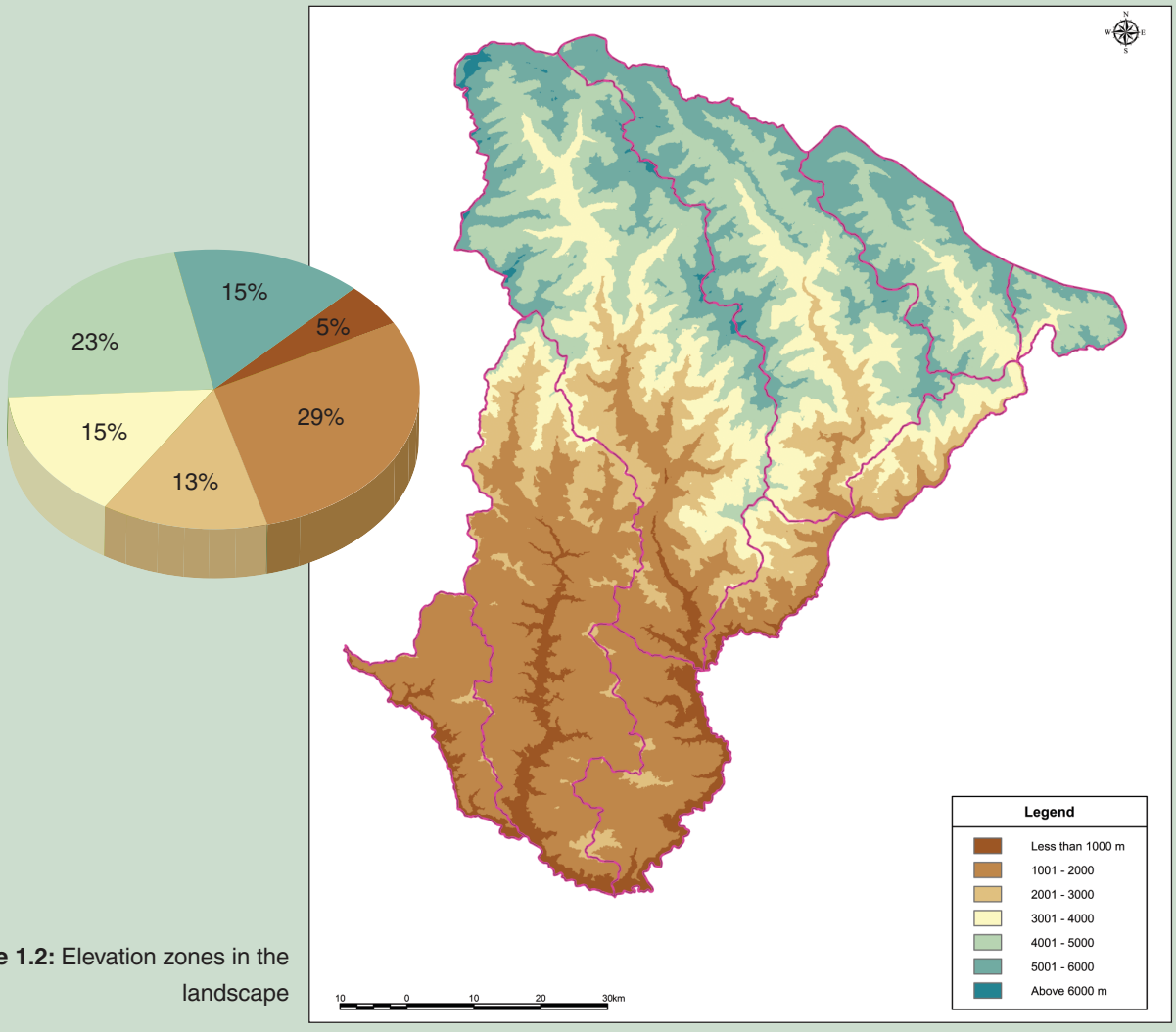


Figure 1.2: Elevation zones in the landscape

presence high altitude meadows and rangelands, and alpine scrub vegetation, covers almost 40% area of the landscape. The Great Himalaya lies south of the Trans Himalaya standing tall with several peaks higher than 7,000 m (Nanda Devi East, Hardeol, Trishuli) and many above 6,000 m (Table 1.1). These ranges are largely aligned in northwest-southeast direction. Monsoon winds drawing in from the south strike the Great Himalayan ranges and precipitates by way of heavy rainfall spread over four months long monsoon season, locally referred to as *Chaumas*. The south western part of the landscape is lush green and humid. The heavy rains, snow, ice and glaciers in these zones are a perennial source of rivers and water for the Lesser Himalayan zone and much of north India and beyond. The Lesser Himalayan zone in the landscape also nearly covers an area of 40%, and represents most densely populated zone. Proportional distribution of land area in different elevation zones is shown (Figure 1.2).

Table 1.1: Major Mountain peaks in the area

Peak	Altitude (m)	Peak	Altitude (m)
Nanda Devi East	7434	Changuch	6,322
Hardeol	7,151	Nanda Gond	6,315
Trishuli	7,074	Nanda Pal	6,306
Rishi Pahar	6,992	Suli Top	6,300
Nanda Kot	6,861	Kuchela	6,294
Chiring We	6,559	Nital Thaur	6,236
Rajrambha	6,537	Kalganga Dhura	6,215
Chaudhara	6,510	Jonglingkong or Baba Kailash	6,191
Sangthang	6,480	Lalla We	6,123
Panchchuli	6,437	Kalabaland Dhura	6,105
Nagalaphu	6,410	Telkot	6,102
Suitilla (Suj Tilla West)	6,374	Bainti	6,079
Suj Tilla East	6,393	Ikualari	6,059
Bamba Dhura	6,334	Nagling	6,041
Burphu Dhura	6,334	Menaka Peak	6,000

(Source:http://en.wikipedia.org/wiki/Pithoragarh_district)

Glaciers, Rivers and Lakes

The Himalayan glaciers are one among the most discussed land forms under Global Climate Change debate. The glacial cover in the region is attributed to the Quaternary Ice Age, nearly 10,000 years back. In the landscape current extent of glaciers has been estimated to in the vicinity of 1,178 km^2 comprising approximately 382 glaciers.

Hydrographically, the entire landscape can be divided into five units: Kutiyangti, Goriganga, Dhauliganga, Ramganga East and Saryu. The first four of these rivers are fed by the glaciers while river Saryu, which flows though only in a small part of the landscape, along the south eastern border, does not receive glacial water. All the rivers ultimately drain into river Kali (Sharda).

The *Kutiyangti* represents the extreme northeast basin of the landscape. The river originates from Parvati Tal (also known as Jolinkong) near Chhota Kailash and joins river Kali at Gunji. The basin consists of 112 glaciers, covering an area of 236.2 km^2, with the Sumzurkchanki as the largest glacier (25.4 km^2).

The Dhauliganga basin consists of 135 glaciers, covering an area of 373.2 km^2 and the Chhiringtashi (27.3 km^2) is largest with a length of around 10 km. Other main glaciers of this basin are Chipa, Nipa, Meol, Ngalaphu, Nimpchikang, Jhulang, Ghungtan, Damoloa, Nassa, Chhiringmabang, Chhiringtashi, Lassar, Sinla, Ramabhitar and Gane.

The Goriganga is the longest river in the landscape and its watershed covers almost 30% of the total landscape area. It originates from Milam, the largest glacier in the basin (103.8 km^2; > 18 km long), and joins river Kali at Jauljibi. It is a south facing glacier originates from the slope of Kohli and Trishul peaks. Shalang, Lwa, Nanda Ghutti, Pachhu, Timpu, Syskaram, Milam, Bamras, Saphed, Tringi, Gonkha, Rata, Kwalganga, Burphu, and Shyangalpa are other major glaciers of this basin.

The Ramganga East originates from the Namik glacier in Nandakot range. This is the basin with the minimum number of glaciers (07) in the landscape, which cover only 6.7 km^2 area. The largest glacier in this basin is Namik (2.4 km^2).

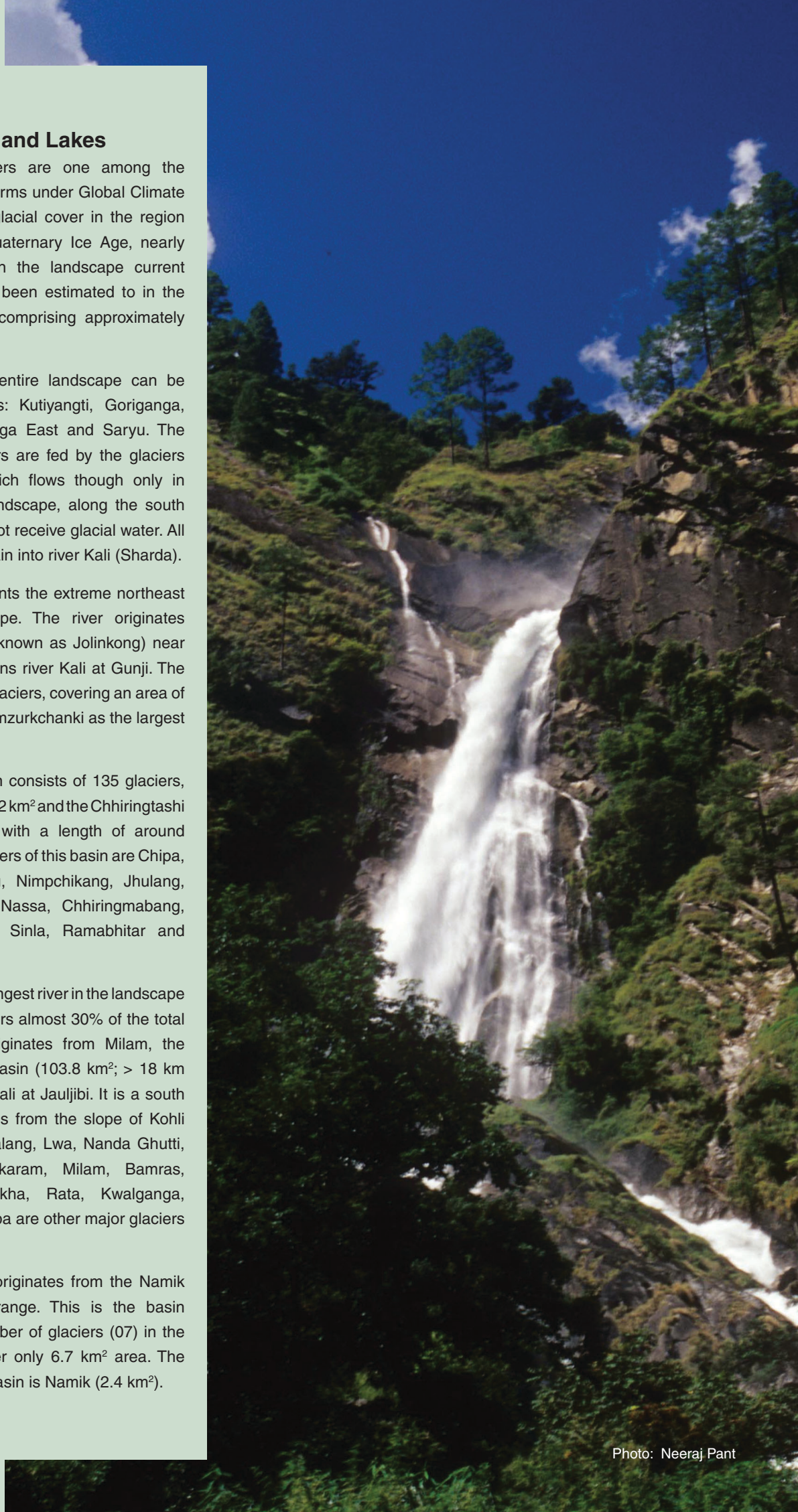


Photo: Neeraj Pant

Besides glaciers and rivers, the landscape is bestowed with some of the most spectacular and highly sacred lakes in the high altitude regions. Parvati (Jolinkong) tal (lake) is located at an altitude of 4,634 m, near the base of the Adi Kailash mountain. Adi Kailash (a.k.a. Chota Kailash) draws its name due to because of the semblance with the Kailash Mountain. Among others, Anchheri tal (at 3,658 m) and Chhipla Kund (at 3,300 m) deserve special mention. All the three lakes have great religious significance and form an important part of the pilgrimage treks. It would not be out of place to say that entire Chhiplakot area, with the Chhipla Kund located here, forms one of the most sacred sites in the landscape. Local people worship god Chhipula near the lake. The site is also famous for its lush green alpine meadows with good populations of numerous sensitive and high value biodiversity elements.

Land use and major life zones

Considering the topography, it is no surprise that snow cover occupies close to 35% of the landscape. Forest cover accounts for another 32%, alpine meadows extend to over 5.2% and high attitude grasslands and rocks occupy 3.9% of the landscape. Area under operational agriculture is close to 6.3% and fallow land is spread over 5.6%, largely located in the lesser Himalayan zone in low to mid altitude areas. Other land classes that are discernible through the satellite data are grasslands including forest blanks (4.8%) and barren land (6.3%).

The prevailing physiographic diversity and unique biogeographic location of the landscape, at the juncture of Eastern and Western Himalaya (*sensu lato*) and with substantial representation of Trans-Himalayan conditions, provide enough opportunities to exhibit richness, representativeness, and uniqueness of biodiversity components at different levels (i.e., genetic to ecosystem). While the landscape, by virtue of its special position in east to west (longitudinal) Himalayan transition, shares biodiversity elements of both east and west Himalaya; it represents diversity of communities/assemblages across the wide

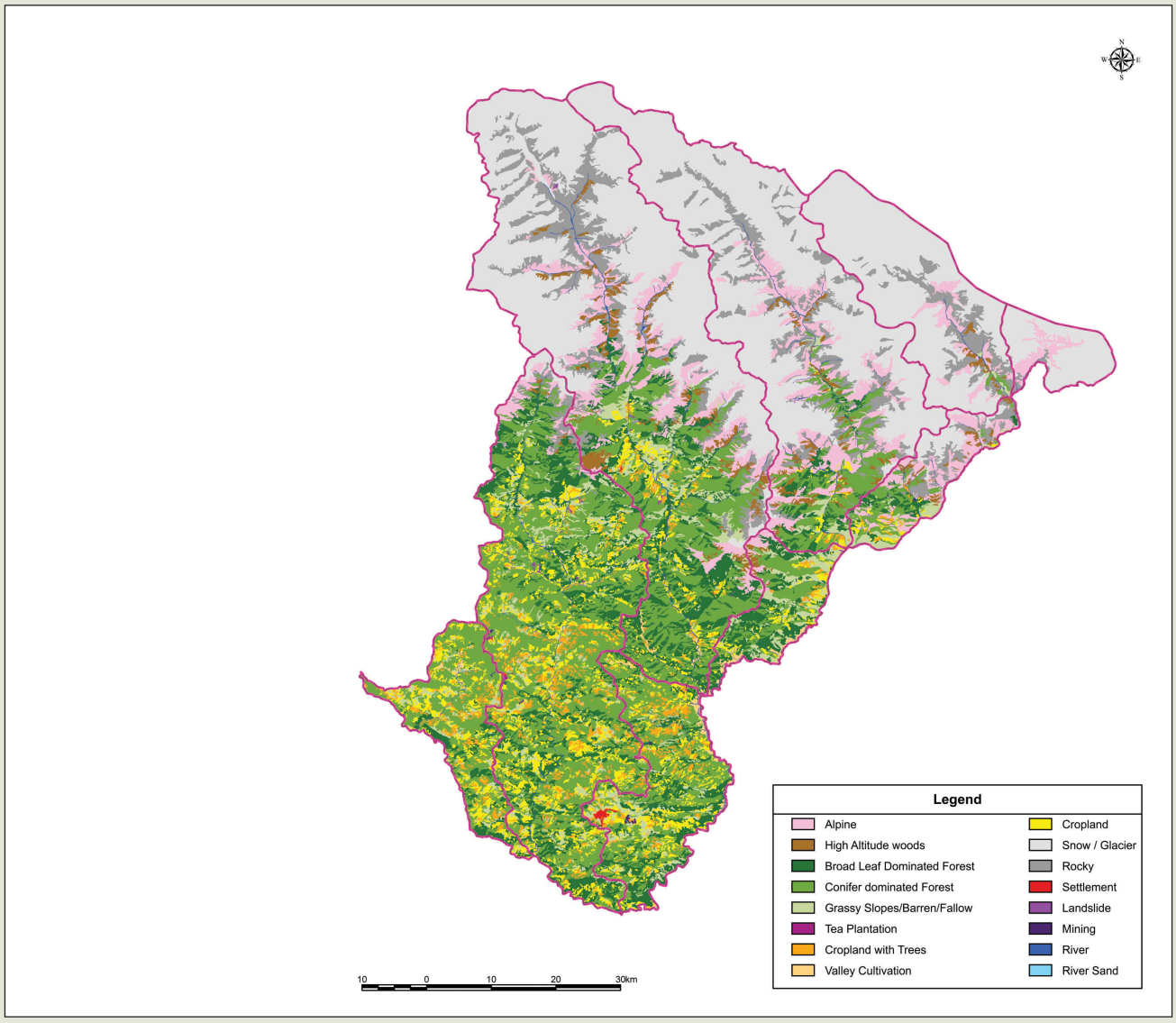


Figure 1.3: Land use/land cover in the landscape


Photo: Threesh Kapoor


Photo: Ajay Rastogi

vertical transition (<400 to >6,000 m asl). The landscape is divisible into following major life zones or eco-climatic zones based on the altitude and climate: (i) Sub-tropical (<1,000 m), (ii) Warm temperate (1,000–2,000 m), (iii) Cool temperate (2000–3,000 m), (iv) Sub-alpine (3,000–3,500 m), (v) Alpine zone of Greater Himalaya (3,600–5,000 m) and (vi) Alpine arid zone of Trans-Himalaya (>4,000 m).

Culture & People

The landscape is located at the tri-junction of India, Nepal and TAR-China with a long history of assimilation of people from mainland India as well as other neighbouring countries. Many well known and some unknown micro-cultures and societies do exist within this landscape originating from the Kol-Munds, Kirat-Mongols-Huns, Khasas, Shakas, and Dravidians, and it is possible to trace the current representatives of these ancient ethnic groups. Consequently, prevailing myths, folk Gods, languages, dialects, folk literature, festivals, fairs and different forms of artistic expression represent some of the examples of the creative influences of different groups. For instance, the linguistic diversity in the landscape includes Johari, Rang, Soryali, Sirali, Askoti, Bhotia, Shauka, Gangoli, and Nepali, etc.

People in the landscape

The highland area– Northern part of the landscape falling in the Great Himalayan and the Trans Himalayan zones consists of four main valleys – Johar, Darma, Chaudans and Byans. These valleys are inhabited by the Shauka and

Rang-Shauka communities commonly known as Bhotias, which historically enjoy tribal mode of living. Bhotias are agglomeration of independent and mutually exclusive sub-groups, primarily Mongoloid in appearance with occasional Aryan and aboriginal traits (Negi, 2007a,b). They are the custodians of age-old tradition of trans-border trade with the TAR-China.

The Askot area– As described in the folklore, Askot is named after integration of *Assi* (eighty) *Kots* (local forts). Inhabited by both tribal and non-tribal populations, this area was the seat of power for Pal-Rajwar feudal Chiefs who controlled and administered the reasonable parts of lower catchments of river Gori and Kali (Mahakali). The upper reaches of the Askot area in Kali and Gori valleys are also inhabited by a primitive tribe called "Van Raut" or "Van Raji". Totalling to less than 700 in number this forest dwelling tribe has under gone rapid transition and received considerable attention over the years, due largely to the mainstreaming process.

The Seera area– It is yet another sub cultural area of the landscape that extends from Ramganga (East) in the west to Askot in the east. In the north it shares boundary with Johar and in the south with Sor. In medieval Kumaun, for a long time, Seera has been the seat of Malla dynasty who ruled from Seerakot, located in a nearby hillock.

The Sor area– The district town of Pithoragarh is at the heart of the Sor region. It was a place of prominence in the British Administration. Sor also evolved as a major activity area for the trans-border trade with Nepal and Tibet, besides being an important point on the pilgrimage route of Kailash-Mansarovar. The inhabitants of the region are commonly called "Soriyal".

The Gangoli area– Also called as *Gangawali*, the area is encircled by two rivers; Ramganga East and Saryu. The Naag is a prominent deity which makes the region distinct from others, with a number of other folk deities occupying their specific spaces in the landscape.

Figure 1.4 represents a broad distribution of cultural areas having unique socio-economic and linguistic features associated with the inhabitants.

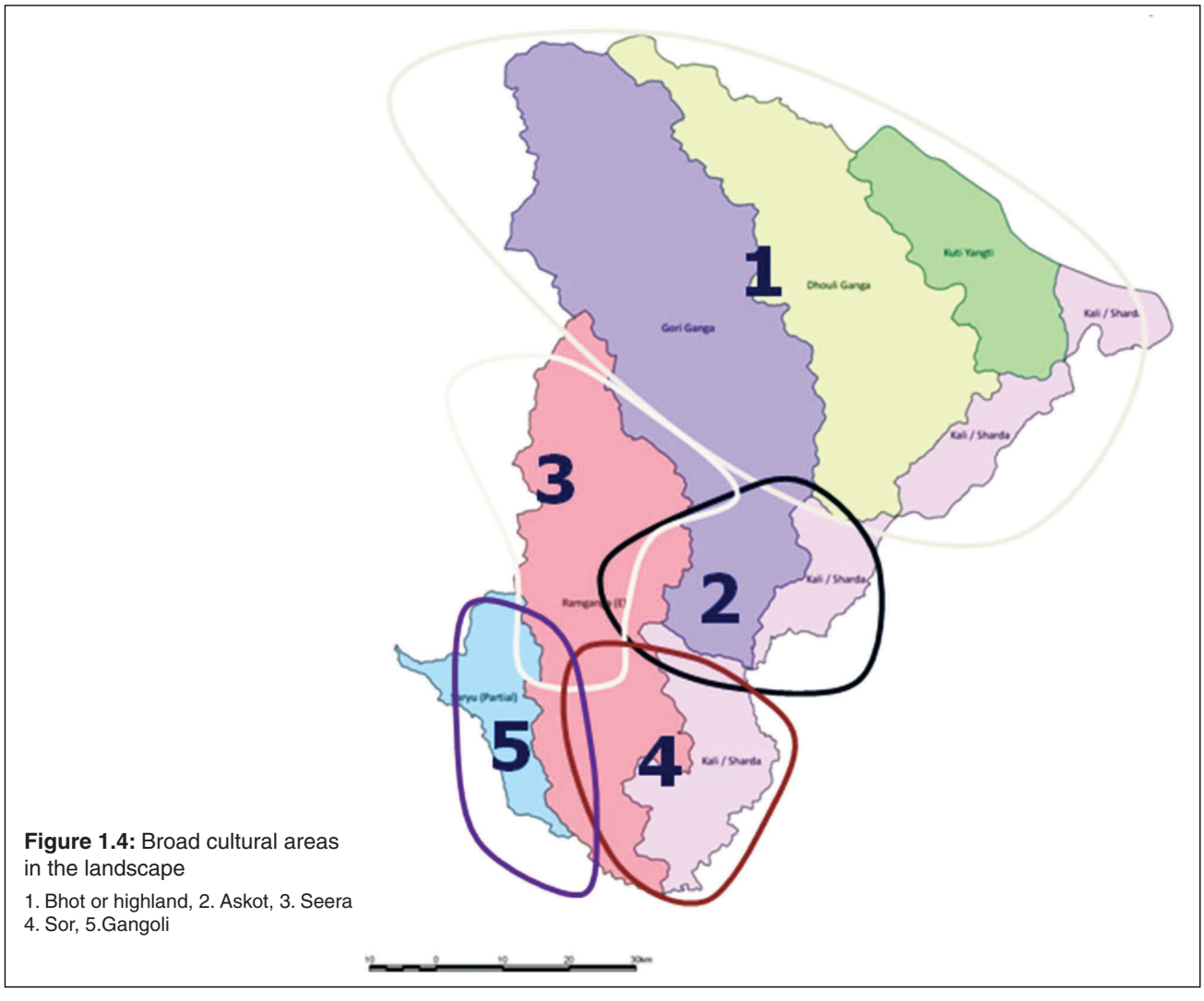


Figure 1.4: Broad cultural areas in the landscape

1. Bhot or highland, 2. Askot, 3. Seera
4. Sor, 5.Gangoli

Photo: Neeraj Pant

Fairs and Festivals

The fairs and festivals of this region are very colourful, distinctive and represent the products of various natural, social and cultural interactions. The people also celebrate all major Indian festivals: Holi, Dussehra and Diwali. *Basant Panchami, Bhitauli, Harela, Phooldei, Bat Savitri, Ganga Dussehra, Dikar Puja, Olgi or Ghee Sankranti, Khatarua, Ghuiya Ekadashi* and *Ghugutia Tyar* are some of the major local festivals. Thal, Jauljibi, Kanar, Rameshwar and Bageshwar are host towns/locations where some of the notable fairs are held in the landscape.

The Jauljibi fair is held in November every year at Jauljibi, the confluence of the rivers Kali and Gori. This is a meeting place of three cultures – the Shauka, the Kumauni and the Nepali. This gateway to Johar, Darma, Chaudans and Byans was, at one time, considered to be the central place between Tibet and the Terai regions (Pathak & Sah,1993). With the closure of the Indo-Tibet border trade, this and some other fairs have lost their former importance. For example, the Thal fair held on *Vaishakh Sankranti* (14th April) used to attract a large number of Shaukas. The fairs were held to exchange, sell and buy goods. Horses and other livestock, ghee, wool, jaggery, food grains, medicinal products from the wilderness, utensils, agricultural equipments, etc., were commonly traded. In the modern times, cosmetics, plastic utilities, clothes and imported goods, etc., have been added to the list.

On the other side of the river Kali in Nepal, the same folk culture exists; therefore, people from Nepal also participate in Pancheshwar, Jauljibi fairs, both to sell their products as well to buy things. The other important fairs in the landscape include Uttarayani, Nanda Devi, Hat Kalika, Rameshwar, Borani (fair with the midnight *mashals*), Saneti and Berinag, Most-Manu, etc. Though all the fairs and festivals have their own salient features, some of the interesting festivals in the landscape that reflect a deeper cultural link with the natural surroundings have been elaborated below.

The *Kandali* festival, held by the Rung sub-tribes in Chaudans valley, happens once in every twelve years at the time of the

Photo: Balwant Rawat

blooming of the flowers of *Kandali* (*Strobilanthes wallichii*), which flowers after every 12 years of growth and bears light blue, magenta and sometimes yellow flowers between July and October. It is a celebration of the defeat of Zorawar Singh's army, which attacked this area from Ladakh (http://en.wikipedia.org/wiki/Kandali_Festival). During the festival the Rung women go out in procession in their traditional attire to destroy this plant at a wide scale. There are several legends and myths associated with this activity. It is also widely believed by the Shaukas of Chaudas that cattle, sheep and goat die after feeding on the flowers of *Kandali*. This plant has a gregarious flowering and is a kind of local invasive species; the festival, to some extent, takes care of checking its spread through community action before mast seeding and subsequent regeneration.

Another festival called *Nabu Samo* is perfomed during the main agricultural season. *Nabu* means "insects" and *Samo* means "to destroy". During the festivities one of the activities involves collection of all harmful insects from the fields in the leaves of *bhojpatra* (*Betula utilis*) or on a piece of cloth by all the family members; eventually they are destroyed after several elaborate rituals including sacrifice of a goat.

Nanda Astami, a festival of the inhabitants of Johar valley, is celebrated in Martolia village every year. Two people are assigned the task of collecting the sacred flowers of *Brahma Kamal* (*Saussurea obvallata*). These individuals, dressed in white clothes, walk to an altitude of about 4,000 m barefoot to collect the fully opened flowers and return the same evening. In addition to ensuring the harvest of *Brahma Kamal* in required quantities only, by mid August most other high altitude medicinal and aromatic plants usually reach the stage of fruiting and seeding, and, therefore, only minimal or no damage is done to the landscape.

The *Jaat* is the most vital socio-cultural, religious expression and sacred manifestation of the communities living in the target landscape. The elements of primitive societies, belief systems, rituals, motifs, patterns of nature worship can be easily seen in the *Jaat yatra*. As a human phenomenon, the *Jaat* is not merely a religious ceremony; it is an important socio-economic and eco-cultural activity in which different phases of human progression - from primitive to modern - are easily traceable. These events are organised annually, biannually or some time in a period of ten to twelve years. Unlike pilgrimage to holy places in the mountains in which individual or some time families go for religious or spiritual attainments, in the *Jaat* whole community or villages of the valley participate. It is a unique example of interdependence and symbiotic relationship among human groups living in the mountains. Among others, the *Chaitol* (in Sor area), and the *Chhipla Jaat* (in the catchment areas of Kali and Gori rivers) are well known.

Interestingly, *Strobilanthes kunthiana*, a shrub, grows gregariously in the shola grasslands of the Western Ghats, locally known as neelakurinji or kurinji, also flowers every 12 years. The mass flowering and subsequent death of kurinji is the subject of hill folklore – some associate the name of the Nilgiris (literally 'blue hills') with the mast flowering of the kurinji.

The plants that bloom at long interval are known as plietesials to refer to perennial monocarpic plants that usually grow gregariously, flower simultaneously following a long interval, set seeds, and die. (http://en.wikipedia.org/wiki/strobilenthes_kunthiana).

The *Hill Jatra* (hill=mud and jatra= jaat) is a festival of pastoralists and agriculturists. The festival, which came to Sor valley from the Sorar (other side of Mahakali river) region of western Nepal, was first introduced in Kumaur village (neighbouring the present day Pithoragarh town). In the assimilation process, the *aathon* (8th day of Bhado month) and *gawara visharjan* also became the part of *Hill Jatra*. The *jatra* was also accepted by the people of Bajethi, another nearby village. With some modifications it was later introduced in Kanali Chhina and Askot as *Hiran Chital*. In this festival impressive masks are used and different agricultural and pastoral activities are presented in a dramatic way. This festival, in a way, expresses the linkages of agro-pastoralist communities of the landscape with the wild life and nature.

On many a hilltops one can see sacred heaps which are piles of stones. They are referred to as *Kathbhuria* or wayside Goddess. *Kathbhuria* is worshiped by offering stones, pieces

Box 1.1: Local perceptions about sacredness

A sacred area refers to the divine force and is a place reserved for beseeching divinity and supreme spirits.

It is a place, where people gather under the banner of God, for the human welfare and the glory of God, and is established by the community to keep secrecies; those may not be accessible to only a select few. Sometimes, people also use these areas to store personal belongings that are special and have sentimental value.

It is often a place, where justice is sought or where one thanks God for his mercy, asks God's blessings and purification.

It is a refuge for totems. Some species are provided special protection under totems and the pastures or valley portions could be declared as sacred for proliferation of the species and sustenance of ecosystem services.

(Source: Negi 2010)


Photo: CS Negi

of wood, cones of *deodar* (*Cedrus deodara*) or fruiting branches of other native trees. Negi (2010a–d) opines that *kathbhuria* ensures effective conservation on the hill tops and offering of cones and fruiting branches facilitates natural regeneration.

Manifestations of Sacredness

The natural and cultural diversity complement each other. Together, the cultural diversity and biological diversity hold a critical key to ensuring resilience in both social and ecological systems – a critical asset in an era of dramatic global change (Wild and MacLeod, 2008). There are a plethora of sacred natural sites in the region. Many peaks, lakes, mountain ranges, forest areas, groves, meadows, pastures, etc., have connections with some myths or are associated with the names of Gods or Goddesses. A recent documentation of the sacred natural sites of the region (Negi, 2010a–d) has revealed a total of 132 sites, including 77 sacred groves, 27 sacred forests (areas larger than 2 ha each), 18 wetlands and 10 pastures. Sacred areas function under the principle of faith and fear of God and require commitment of honesty, respect for ancestors and observation of moral values (Box 1.1). Observation of various rules and customs in the sacred areas for the blessings of the resident deities shape the belief systems and provide a cultural identity to the followers.

Besides the divine *Shiva* and *Shakti* or the many manifestations associated with the Himalaya, the tutelary gods and goddesses who are widely revered and worshiped or propitiated by the people in different cultural areas of the landscape include- *Gabláa, Sang-Syée, Ragá, Náag Devta, Hurmal, Chhurmal, Huskar, Suskar, Balcchin, Kalchhin Kalua, Kshetrapal, Bhumiya, Golu, Goril, Haru-Sam, Ghantakaran, Balak, Bholanath, Malainath, Chaumu, Mostá, Siduá, Bidhuá, Garhdevi, Ghunsyári, Kotgári, Iri, Baudhán,* and various local forms of *Shiva* and *Bhakapati* (Goddess Bhagvati), etc. Many of these deities have been the protector of natural resources and local communities have dedicated parts of forests to them as a mark of reverence. These forests/groves are referred to as *Dev Vans* (sacred forests) where certain customary restrictions on use of the forests are enforced. A few examples of the *Dev Vans* are:

Dev Van of Satgarh lies enroute from Pithoragarh to Dharchula on Kailas Mansarovar pilgrimage route. It offers an interesting feature. The cluster of Satgarh Dev Van has ten sacred forest patches existing in the vicinity of the revenue villages (of Satgarh). The management of each grove is vested with the locals of each village. All these forest patches are situated in such a way that they encircle the Satgarh area. The *Dev Vans* of Satgarh cluster are dedicated to deities such as *Madmahesh, Boorkhasin, Khandelnath, Kalchhin, Chhurmal, Betaal, Asur, Kamarnath,* and/or *Lataul*.

Dev Van of Hokra Devi is located enroute from Tejam to Munsiyari near the village Hokra. The village itself derives its name from the goddess- *Hokra* or *Hunkara*, a very powerful deity and feared by all. The sacred forest covers an area of more than 3 km^2, having dense foliage dominated by banj-oak (*Quercus leucotrichophora*) with 70 % canopy cover. Forest is protected from all sides by a wall, which separates it from the surrounding agricultural fields. The principle structure dedicated to the goddess is a sacred rock, triangular in shape. The rock measures around two and a half meters in height and little more than three meters at the base, and represents a part of the larger rock mass buried within. One of the conservation practices includes *religious taboos* against collection of certain species from the forest.

Dev Van of Chamunda Devi is located in the village Chudhyar, near the small town of Gangolihat. The Devi is referred by many names- *Chamunda, Handika* and *Angriyal Devi* according to the legends associated with her. Weapons are not allowed to be taken inside the forest. It is commonly believed that the Goddess punishes those who do not ascribe or follow the defined provisions of the temple relating to use of the forest. Close by lies the *Dev Van of Hat Kalika* which has a large patch of *Devdar* forest dedicated to Kalika temple and none of the forest produce is used or can be taken away even for personal use, except by members of a defined community.

The sacred forests in Johar, Darma, Chaudans and Byans valleys are known as *Shingul and Se Roa. Shingul* are permanently closed forests (opened for rituals only) dedicated to the village deity. Each Shauka village has the tradition of conserving *Shingul* or *Se Roa*. The *Shingul* at Martoli has an area of 60 ha. In Burphu it is 180 ha, in Biljyu 70 ha, in Tola 61 ha and in Milam, the last village on the frontier has set aside an area of 40 ha for this purpose. The density of trees per hectare in the *Shingul* has been recorded between 222 and 2,889, which is higher than that recorded for the *banj* (Oak) forests of this region (range 741–1,474). These forest areas are dedicated to particular folk deities, i.e., *Nandá, Rágá, Nág Devtá, Sang Sié or Gablá* Se, depending upon the principal deity of a particular village.

Interestingly, unlike other parts of the landscape, amidst plenty of forest, the need for sacred forests is entwined with man's desire to regulate the use of resources; in Shauka valleys the necessity of involving sacred elements in conservation is associated with the paucity of resources. The people inhabiting these areas are a pastoralist-trader society whose livelihood depends entirely on the forest and pastures. The sustained supply of resources, in such areas, can only be ensured through the conservation of resources along with use well within the carrying capacity of the system. Frequently such forest patches are offered to the local deity, where the biotic pressure might disturb the equilibrium or demands imposed by the geographical setting; this action, in addition, acts as protective shield, e.g., from an avalanche. It appears, therefore, sound logic and the ethos of sustainable use might have been the silent force majeure behind the adoption of the institution of *Shingul*. For example, the strange relationship between inhabitants of Ganghar and Panchhu villages to have a control over the nearby forest resources, and for that matter demarcation of larger forest area as *Shingul*, further *explains* the resource crisis and management dynamics of tribal communities. The low productivity of the land and risk reduction of the inhabitants in response to a harsh environment may also be seen as the reason behind the evolution of such strategies. These villages are located in a zone where forests provide critical hinge, as the growth and regeneration is extremely slow and requires delicate care of the resources. It is also plausible that such forest resources might have played significant role in influencing and raising the status of Shauka traders while negotiating with their counter parts in Tibet. Availability of, and access to, forest resources at such altitudes, and the tradition of erecting *Alam* (a pole made up of a tree trunk considered as sacred) in each house hold, through religious ceremony, can be linked to the added manifestation of wealth among the community.

Agriculture and Pastoralism

As for most of the Himalaya, traditional agriculture is the predominant form of livelihood for indigenous people in the target landscape. As such, the landscape forms an integral part of a potential Agricultural Biodiversity Heritage Site in the western Himalayan region. In age old agricultural practices, the local inhabitants have explored diverse forms of productive interaction with nature, resulting in the cultivation of extraordinarily large number of plant species under diverse farming/production systems (Singh, 2009). The enormous heterogeneity in land and climate conditions along a wide range of altitude, accompanied by access to different cultural forms has contributed to extreme diversification of this farming landscape. Moreover, inaccessibility, marginality and unique micro-climatic conditions often favour the evolution of peculiar practices, directly or indirectly aimed for the maintenance of rich genetic diversity in the landscape. In the Trans Himalayan and Great Himalayan zones of the landscape, livestock-based farming systems are prevalent while in the Lesser Himalayan zone, agricultural and


Photo: Sanjay Nainwal

Table 1.2: Diversity of lesser known plants forming food base of Bhotiya tribes in the higher Himalayan region of landscape

Species name	Local name	Utility
Amaranthus paniculatus	Chuwa	Cereal
Fagopyrum esculentum	Ogal	Cereal
F. tataricum	Phaphar	Cereal
Hordeum himalayens	Uwa	Cereal
Panicum miliaceum	Chenna	Cereal
Triticum aestivum	Nappal	Cereal
Zea mays	Makka	Cereal
Eleusine coracana	Mandua	Millet
Phaseolus vulgaris	Rajma	Pulses
Macrotyloma uniflorum	Gahat	Pulses
Glysine max	Bhatt	Pulses
Pisum sativum	Mattar	Pulses
Brassica campestris	Sarsoon	Oilseeds
Solanum tuberosum	Aloo	Vegetable
Chenopodium album	Bathuwa	Vegetable
Raphanus sativus	Moola	Vegetable
Vicia faba	Bakla	Vegetable

horticultural crops take precedence. The farming systems are thus broadly divided into three categories depending on the predominance of crop or the livestock husbandry. The mixed crop-livestock; mixed livestock-crop and the livestock-crop farming systems. These farming systems are complex in nature and reflect various adjustments as well as objectives of the local farmers.

The major cereal crops under cultivation in the region are: Wheat-*Triticum aestivum*, Barley- *Hordeum vulgare*, Rice-*Oriza sativa*, Maize - *Zea mays*, and millet crops (Finger millet - *Eleusine coracana*). Wheat, paddy and millets cover nearly 40%, 35% and 13% each . In higher reaches, especially in Dharchula and Munsiyari blocks, several lesser known crops such as Amarnath/Kedari chuwa (*Amaranthus paniculatus*), Buckwheat (*Fagopyrum esculentum, F. tataricum*), and Uwa (*Hordeum himalayens*) are cultivated for use in various traditional foods. Such crops are well suited and adapted for harsh and unpredictable climatic conditions of higher Himalaya. Table 2 includes diversity of lesser known plants of Bhotiya tribes in higher Himalayan region of landscape.

Two main pulses being cultivated in the landscape are lentil (*Lens culinaris*) that occupies almost 85% of the total area under pulses, followed by black gram (*Vigna mungo*) which is grown on about 14% area. Beside these reported values in respect of pulses, different kinds of beans (kidney bean, scarlet bean, lima bean, soybean, etc.) are widely inter-cropped and have market value. Few farmers who produce surplus are able to realize attractive price as the *rajmah* (kidney beans) from higher reaches of Dharchula and Munsiyari blocks is considered a delicacy. The major oilseed crop is soybean (*Glycine max*) which occupies almost two third of the total area under oilseeds, followed by Indian mustard and toria (*Brassica juncea* and *B. compestris*). Potato (*Solanum tuberosum*) occupies the largest area under vegetable crops, and is an important cash crop for the farmers. Potato from the Trans-Himalayan zone, especially Milam valley fetches a very high price in the market. However, the overall farm production is insufficient for local population of the region to sustain throughout the year.

Most farming families own small parcels of land; 87% own less than 1 ha and 12% own between 1 and 2 ha. Women play a central role in the agricultural economy of the landscape. From the collection of leaf litter for bedding for the cattle shed, grass and fuel wood from the forest, looking after livestock, carrying compost from cowsheds to the fields, seed sowing, weeding, manure application, harvesting and processing of crops, etc., are all done largely by the women folk. In addition, the burden of many other chores essential for day-to-day running of the household also falls on women as a consequence of the out-migration of men from the region in search of jobs outside.

The upper regions of the landscape have undergone many changes in the trans-migration and pastoral practices. Prior to 1962, the Bhotias were involved in the trade with Tibet which required trans-migration from lower valleys to high altitude settlements, rearing and operating the caravans of pack-goats, horses and yaks. With the cessation of trade with Tibet, most of the families had to abandon the practice of seasonal migration to the alpine villages. Three distinct

Table 1.3. Domesticated animal diversity within the landscape			
S.N.	**Name**	**Breed/variety**	**Main use**
1	Cow	Local	Milk, Procreation
2	Ox	Local	Draught animal
3	Buffalo	Local	Milk
4	Yak*	Tibetan	Breeding
5	Jhupu* (sterile)	Cross breed of Yak and Local cow	Draught & pack animal
6	Jumo* (Fertile)	Cross breed of Yak and Local cow	Milk
7	Garu * (sterile)	Cross breed of Yak and Jumo	Draught & pack animal
8	Garmu* (Fertile)	Cross breed of Yak and Jumo	Milk
9	Talbu *	Cross breed of Yak cow and local bull	Draught & pack animal
10	Talbuni *	Cross breed of Yak cow and local bull	Milk
11	Sheep	Local	Wool, meat & pack animal
12	Goat	Local	Wool, meat & pack animal
13	Tibetan sheep	Tibetan	Procreation, wool & meat
14	Tibetan goat	Tibetan	Procreation, wool & meat
15	Horse	Local	Transportation & pack animal
16	Mule	Local	Transportation & pack animal
17	Dog	Tibetan	Watch & guard
18	Cat	Local	To control rodents
19	Poultry (hen)	Local	Egg & meat

*Source: Farooqee et al. (2004); *Confined to high altitude areas of the landscape.*

Photo: GS Bhardwaj

Photo: Lalit Giri

forms of pastoral practices are prevalent in the region viz., nuclear transhumance, trans-migratory and sedentary (resident). In nuclear transhumance only a part of the family moves to the summer settlements in the inner alpine valleys. Trans-migratory practices involve the movement of the entire family to the summer village, and in the sedentary system the entire family does not move, but they drive their scrub and surplus cattle to sub-alpine and alpine areas in summer for grazing. This practice leads to faster degradation of rangelands, soil erosion and loss of moisture. As a whole the practice of transhumance is on the decline. Presently, only less than 10% families in Johar - Ralam and 15 – 20% families in Darma – Byans valleys migrate to alpine villages. Most of the families who migrate to alpine valleys during summer are relatively poor, having no remunerative jobs or business at the lower altitudes. In alpine valleys they rear surplus livestock, get odd jobs with the defence personnel posted there, collect *Jari-booti* (medicinal plants) or cultivate a few crop such as chives (*Allium stracheyii*) and caraway (*Carum carvi*).

The robust Indigenous Knowledge System (IKS) that exists in the landscape has helped maintain diversity of genetic resources. This knowledge has enabled people to sustain even under the most difficult conditions prevalent in the high altitude cold deserts. The subsistence agriculture systems harbour a large variety of traditional crops and cultivars, about which very little is known to the outside world. More recently, a comprehensive documentation of diversity of traditional crops in Uttarakhand (Cereals/pseudo cereals -08; Millets/ minor millets – 06; Pulses -15; Oilseeds -11; Vegetables-28; Spices/condiments -10; Fruits- 19) has been published (Mehta *et al.*, 2010), and nearly all of these are grown in the landscape. Furthermore, within these species enormous genetic diversity (land races/varieties) prevails. Besides plants, within the landscape, indigenous communities have tradition of keeping a great variety of animals for various agricultural and other uses (Table 1.3).

Ecosystems and Biodiversity

Broadly, the landscape falls in two ecozones (i.e., Indomalayan and Palearctic) and represents 4 major ecoregions: (i) Himalayan sub-tropical pine forests; (ii) West Himalayan broadleaf forests; (iii) West Himalayan sub-alpine conifer forests; and (iv) West Himalayan alpine shrubs and meadows. However, a good representation of the elements from Himalayan sub-tropical broadleaf forest ecoregion is also reflected along the valleys towards southern extreme of the landscape.

Vegetation types

The landscape harbours diverse vegetation types ranging from the categories similar to tropical moist deciduous forests to alpine moist and dry pastures. Physiognomically, the forests, scrub (natural and secondary), grasslands (natural and anthropogenic) and alpine meadows represent major categories which are further divisible into a number of communities/sub-classes. Some of the vegetation classes and their Champion & Seth's (1968) equivalents are given (Table 1.4).

While considering the forest types in the landscape, following interesting features are worth mentioning: (i) Hemlock (*Tsuga dumosa*) stands in and around Askot wildlife sanctuary exhibit affinities of this landscape with that of central and eastern Himalaya and this landscape happens to be the western most limit of *Tsuga* in the Indian Himalaya; (ii) in the lower riverine areas of Gori and Kali valleys there are extensive stands of *Macaranga pustulata* (Vern.- Rumal). This fast growing gregarious species is also typical of eastern Himalayan foothills; (iii) five species of oaks occupy different habitats at successive altitudes [viz., *Quercus glauca* (<1,500m, riverine areas); *Q. leucotrichophora* (1,100–2,200m ; gentle, south facing slopes); *Q. lanuginosa* (1,500–2,000m; confined to selected belts of the landscape adjacent to *Q. leucotrichophora*); *Q. floribunda* (2,200–3,300m; shady moist slopes), and *Q. semecarpifolia* (2,800–3,500m; gentle, south-facing slopes often forming the timberline)].

The Biodiversity

The landscape harbours richness of biodiversity elements ranging from lower groups to the higher ones. Diversity in

Table 1.4: Major Vegetation types in the Landscape			
S.N.	**Vegetation Type**	**Corresponding C&S Category**	**Characteristic Species**
1.	Sal Forest	5B/C1a: Dry sal bearing forests	*Shorea robusta, Terminalia alata* *Litsea monopetala, Mallotus phillippensis*
2.	Pine Forest	9/C1b: Himalayan Chir pine forest	*Pinus roxburghii, Glochidion velutinum* *Woodfordia fruticosa*
3.	Sub-tropical Riverine Forests	Not described	*Toona ciliata, Macaranga pustulata* *Engelhardtia spicata*
4.	Banj Oak Forest	12/C1a: Ban oak forest	*Quercus leucotrichophora,Myrica esculenta* *Lyonia ovalifolia, Sinarundinaria falcata*
5.	Moru (Timsu) Oak	12/C1b:Moru oak forest	*Quercus floribunda, Symplocos chinensis* *Thamnocalamus falconerii,Sorbus vestita*
6.	Kharsu Oak	12/C2a:Kharsu oak forest	*Quercus semecarpifolia,Taxus wallichiana* *Prunus cornuta,Thamnocalamus spathiflorus*
7.	Alder Forest	12/1S1 Utis (Alnus nepalensis) forests	*Alnus nepalensis, Pilea umbrosa* *Debregeasia hypoleuca*
8.	Cypress Forest	12/E1 Surai (Cupressus torulosa) forests	*Cupressus torulosa, Lespedeza gerardiana* *Pogonatherum paniceum*
9.	Temperate Grassy slopes	12/DS3: Himalayan Secondary Grasslands	*Themeda anathera, Chrysopogon gryllus* *Cymbopogon distans, Andropogon munroi*
10.	Hemlock (Tansen) Forest	Not described	*Tsuga dumosa*
11.	Temperate Secondary Scrub	12/DS2 Temperate Parkland C1/DS1: Oak Scrub C1/DS2:Himalayan Temperate Secondary Scrub	*Quercus leucotrichophora, Berberis asiatica* *Prinsepia utilis, Rubus niveus*
12.	Temperate Broadleaf Forests (Moist Deciduous)	12 / C1 West Himalayan Temperate Forests	*Acer villosum, Betula alnoides* *Juglans regia, Aesculus indica*
13.	Blue Pine (Kail) Forest	13/C4: West Himalayan High-level Dry Blue Pine Forest	*Pinus wallichiana* *Juniperus communis*
14.	Sub-alpine Forest	14/C1: West Himalayan Sub-alpine Birch/Fir Forest (Betula/Abies)Birch-Rhododendron Scrub Forest	*Rhododendron campanulatum* *Betula utilis, Lonicera* spp., *Rosa macrophylla*
15.	Alpine Scrub	15/E1: Dwarf rhododendron scrub 16/E1: Dwarf juniper scrub	*Rhododendron anthopogon, Cassiope fastigiata* *Salix denticulata, Salix lindleyana* *Lonicera myrtillus*
16.	Alpine Pastures	15/C3: Alpine Pastures (Dry and moist types)	*Danthonia cachemyriana, Potentilla argyrophylla* *Kobresia* spp., *Trachydium roylei*

different floral groups is depicted here.

The baseline literature on fauna in the landscape is very sparse and so far only 16 faunal groups have been documented.

Taxonomic Group	Species	Family	Genera
Bryophytes	211	54	126
Pteridophytes	249	35	73
Lichens	391	44	96
Gymnosperms	13	05	09
Angiosperms	2306	150	1043

Till now, the known invertebrates are represented by 157 species under 12 different groups. Among these, Lepidoptera (45 species) is the most species rich, whereas Hemiptera is represented by just 01 species. Among vertebrates, the landscape supports: fishes 90 species; amphibians 09; reptiles 19, birds 291, and mammals 38.

The region supports a considerably large number of fish fauna (90 species). During rapid surveys in the present investigation, good catch of Asela and Mahasheer were observed in Dharchula and Jauljibi market, respectively. The catch composition of the Kali riverine system is as follows: *Schizothorax* spp. (60%), *Tor* spp. (19%), *Garra* and *Labeo* spp. (5% each), *Pseudoechinus* spp. (2.5 %), *Glypothorax* and *Barilius* spp. (2% each) and *Puntius* spp. (1%). The wide altitudinal gradient of the Himalayan snow fed rivers with diversity in temperature and rocky substratum, not only provides diverse niches for a variety of fishes, but also limits their distribution. For instance, occurrence of sisoridaes: such as *Glyptothorax* sp. and *Pseudecheneis* sp., fishes with special adhesive apparatus which seem to have evolved to suit the torrential conditions of the Himalayan riverine system.

Avifauna is the most species rich faunal group in the landscape. So far it is represented by 193 species. The KSL in the Indian part falls within the boundary of the 128 EBA (Western Himalaya, Priority-Critical) which supports a total

Photo: GS Bhardwaj

of 11 restricted range species of different threat categories. So far no species of EBA-128 has been documented from the landscape. However, as the range of western Himalaya (EBA-128) covers the entire part of Indian KSL, the possibility of their presence should not be ruled out.

The mammalian fauna of the KSL is quite diverse and represented by good populations of the unique Himalayan endemics such as Snow leopard, Himalayan musk deer, Himalayan tahr, Himalayan wolf, and the Himalayan marmot among mammals.

Rare, Endangered, Threatened & Endemic flora

Perusal of literature on the vascular flora of the region (Sahni & Raizada 1957; Rawat 1984; Samant & Pangtey, 1993; Dhar *et al*., 1997) reveals that Indian part of KSL is floristically under-explored. Several taxa are described based on a single collection without definite locality, and the information on population size remains ambiguous in terms of their status on rarity and endemism. However, there have been some recent attempts of population studies, e.g., survey of Kumaun Palm (*Trachycarpus takil*) by Kholia (2009) and that of orchids by Jalal *et al*. (2008). It is extremely difficult to ascertain the trends of population of other taxa at this state. An effort to compile a list of rare, threatened and endangered species of vascular plants in the landscape has been made and selected species that should be accorded highest priority for *in-situ* conservation are given below:

- *Psilotum nudum* (Linn.) P. Beauv. (Psilotaceae): An interesting Pteridophyte, regarded as most primitive vascular plant. Widely but sparsely distributed in Eastern Himalaya, Central India and Western Ghats. It is extremely rare in the Western Himalaya and so far only one population has been located near Askot around 1,500m asl as epiphyte on *Syzygium cumini*.

- *Cyathea spinulosa* Wall. ex Hook. (Cyatheaceae): Tree fern, upto 2.5 m high. Extremely rare in Western Himalaya where only three populations have been reported so far, namely two in Chamoli and one in Pithoragarh district. In Pithoragarh, a total of 27 individuals have been located near Pamtori (Sandev) area of Didihat block. This population is extremely vulnerable due to changes in habitat conditions, occasional forest fires, etc.

- *Juniperus semiglobosa* Regel (Cupressaceae): This is the only tree juniper in this landscape, frequently referred as *J. macropoda* Boiss. in the earlier floras. This is regarded as one of the sacred species by the local communities. Its leaves are used for making incense, to be used on special occasions. Only 4–5 individuals can be seen around Burphu, in Johar Valley

- *Berberis osmastonii* Dunn. (Berberidaceae): A dwarf shrub with erect or sub-erect stems up to 30 cm high. Flowers yellow, during April–May. Endemic to Uttarakhand. So far only two populations have been located in the state. One population (around 1,000 individuals) has been recently located by WII team around Kalamuni pass (2,800 m asl) in Pithoragarh district.

- *Berberis lamberti* Parker (Berberidaceae): Dwarf, spiny shrubs upto 80 cm high. Endemic to Uttarakhand, so far recorded only from Humdhura ridge between 2,700 and 2,900 m asl. It grows along edges of Kharsu forest especially on grassy slopes.

- *Cleyera japonica* Thunb. (Theaceae): A rare tree found only along a few ravines in eastern Kumaun. It was said to be common around Chowkori and Berinag nearly a century ago (Osmaston). However, only 10–15 individuals were located during recent survey by WII near Chowkori (1,600 m asl).

- *Pinguicula alpina* Linn. (Lentibulariaceae): A rare, insectivorous herb, upto 3 cm. Leaves 3-4 radical, found in moist localities between 3,300 and 4,000 m asl. Only two populations have been located so far in Pithoragarh district – one near Sinpu Udiyar in Ralam Valley (3,400 m) and other in Napalchu Nala, Byans (3,300 m). Flowers white, solitary.

- *Onosma pyramidale* Hook .*f.* (Boraginaceae): A hispid

herb, confined to a few pockets in Kali Valley. Leaves sessile. Flowers scarlet, drooping in terminal bunches. Extremely sparse. One population near Sosa (2,600 m) and other population below Budhi (2,800 m) in Byans valley have been located. These need to be monitored further.

- *Trachycarpus takil* Becc. (Arecaceae): Vern. Thakal. A medium sized palm upto 8 m high. Leaves fan shaped. It is endemic to Uttarakhand, having less than 500 individuals. In KSL part of India this species is confined to two localities viz., Thalkedar and Girgaon – Ratapani. Kholia (2009) has done detailed population analysis and gender variation in this species.
- *Lilium wallichianum* Schultes (Liliaceae): A magnificent lily. Extremely sparse. Atkinson (1882) reported it to be abundant on the open slopes of Gangolihat. Flowering – August. This population need to be relocated and monitored.
- *Dendrobium normale* Falc. (Orchidaceae): Restricted range species. Largely reported from Uttarakhand, especially as an epiphyte on banj oak (*Quercus leucotrichophora*) and Toon (*Toona ciliata*). Frequent around Lumti (*Gori valley*), Sandev, Maitli. *Flowering*: May-June. Threatened due to destruction of habitat.
- The incidence of sensitivity is higher for lower plants. For example, out of the 391 species of lichens so far known from the area more than 200 species are known only from single localities. Six species from the landscape are known to be endemic to the area as they are identified only from their type locality and are designated as "rare elements": (i) *Lobaria himalayensis* Upreti & Divakar; (ii) *Myelochroa macrogalbinica* Divakar, Upreti & Elix; (iii) *Myelochroa upretii* Divakar & Elix; (iv) *Lithothelium himalayensis* Upreti & Aptroot; (v) *Caloplaca abuensis* Y. Joshi & Upreti; (vi) *Caloplaca himalayana* Y. Joshi & Upreti.
- *Flickingeria hesperis* Seidenf. & Arora. (Orchidaceae): A rare epiphyte. Endemic to Kumaun (Pithoragarh). A few individuals have been located near Ogla Road, Didihat and Tejam. Flowering: June.
- *Herminium kumaunensis* Deva & Naithani (Orchidaceae): A rare ground orchid. Endemic to Kumaun (Pithoragarh): Chhiyalekh, Byans, 3,300–3,600m; Flowering: July–August. It has been collected only once. Further monitoring of the population is required.
- *Ponerorchis renzii* Deva & Naithani (Orchidaceae): Extremely rare, ground orchid. Endemic to Pithoragarh (above Garbyang 3,300m). Open grassy slope. Only a few individuals have been seen. Flowering: July–August.

Besides the species listed above, a number of species in this landscape require *in-situ* conservation programmes. For example, Brahmkamal (*Saussurea obvallata*), the state flower of Uttarakhand; *Terminalia chebula*, a high value medicinal tree at sub-tropical belt, *Turpinia nepalensis* (one of the rarest trees of Uttarakhand), confined to Ghandhura region need special mention. Among hill bamboos, *Sinarundinaria anceps* Vern. Jumar, is endemic to Uttarakhand. It forms important habitat for endangered Himalayan musk deer, serow, and several other birds. In most of its range there is an acute livestock grazing pressure on this species, and consequently, it is declining rapidly. This species is

Table 1.5: The listed threatened faunal species of the target landscape

Common Name	Scientific Name	IUCN	IWPA	CITES
Assamese macaque	*Macaca assamensis*	EN	I	II
Snow leopard	*Panthera uncia*	EN	I	I
Common leopard	*Panthera pardus*	VU	I	I
Himalayan wolf	*Canis himalayensis*	CR	I	I
Eurasian otter	*Lutra lutra*	NT	I	I
Blue sheep	*Pseudois nayaur*	LR	I	LR/nt
Himalayan musk deer	*Moschus chrysogaster*	EN	I	I
Himalayan tahr	*Hemitragus jemlahicus*	VU	I	NL
Serow	*Nemorhaedus sumatraensis*	VU	I	I
Goral	*Naemorhaedus goral*	VU	I	LR/nt
Himalayan marmot	*Marmota bobak*	EN	I	III

[IUCN – International Union for Conservation of Nature and Natural Resources; IWPA – Indian Wildlife (Protection) Act, 1972; CITES – Convention on International Trade in Endangered Species; EN – Endangered; CR – Critically Endangered; VU- Vulnerable; LR- Low Risk]

recommended for long-term monitoring.

Rare, Endangered, Threatened & Endemic Fauna

Of the known mammals, 10 species are listed as either "endangered" or "vulnerable" by the IUCN; under Schedule I of the Indian Wildlife (Protection) Act, 1972; and in the Appendices of CITES (Table 1.5).

Conservation of species such as the Snow leopard, Himalayan wolf, Himalayan marmot, Assamese macaque, and the Eurasian otter are of great concern as they are very rare in this landscape. This may be due to low population size as this landscape forms the extreme limit of their natural distribution and also due to lack of information on their current status and distribution.

The declining status of the endangered musk deer in this region is largely due to poaching for "musk" as it is in great demand in the illegal trade to cater to the international markets (Sathyakumar, 1993). Habitat degradation due to livestock grazing and anthropogenic pressures in musk deer habitat is another major cause. Due to cumulative impacts of these, the musk deer distribution is now restricted to a few isolated pockets in this landscape. The status of mountain ungulates such as the blue sheep, Tahar and goral is also serious concern as they not only provide the prey base for large carnivores (snow & common leopard) and other carnivores (wolf, marten, red fox), but are also indicators of changes in the habitat. Poaching for meat and competition with livestock are two major issues for conservation of these mountain ungulates (Sathyakumar *et al.*, 1993). Some of the select species that need special attention are:

- Conservation status of seven birds, namely Satyr Tragopan (*Tragopan satyra*), Himalayan Monal (*Lophophorus impejanus*), Kalij Pheasant (*Lophura leucomelanos*), Cheer Pheasant (*Catreus wallichii*), Snow Patridge (*Lerwa lerwa*), Red headed Vulture (*Sargogyps calvus*), Egyptian Vulture (*Neophron percnopterus*) is a matter of serious concern.
- Of the various species of fishes, Deep bodied Mahseer (*Tor tor*) and Golden Mahseer (*Tor putitora*) are threatened and vulnerable. Considering amphibians, the species like *Nanorana ercepeae, Nanorana minica, Scutiger nepalensis* are in threat list.

Wildlife Habitats and Conservation Areas

The landscape is divisible into several distinct physiographic units. These can be designated as broad habitat types and are briefly outlined below:

Alpine and sub-nival habitats: This is the area between natural timberline (3,500+ 200 m asl) and perpetual snowline (5,500+200m asl). The most charismatic species representing this habitat is the endangered snow leopard (*Panthera uncia*). Himalayan tahr

Photo: GS Bhardwaj

Box 1.2: Important migratory routes and wildlife corridors in the landscape

- **Pindari – Namik – Khalia Alpine Corridor:** The tract between upper reaches of Pindari (Bageshwar district) and Namik – Khalia ridge (Pithoragarh district) is linked through a narrow alpine belt. This stretch is home to a number of west Himalayan mammals and avi-fauna. Contiguity of this landscape would be extremely critical for the genetic exchange of various Himalayan fauna.
- **Khaliya – Humdhura Corridor:** The Humdhura ridge is one of the most prominent ridges that runs in south – north direction linking lower parts of Didihat block with that of Munsiyari. This ridge serves as an important corridor for the avi-fauna and a variety of lower animals.
- **Barjikang – Burphu dhura- Rajrambha:** The Barjikang – Bhurphu dhura ridge between Johar and Ralam valleys forms one of the most important corridors for the migration of flora and fauna. This forms excellent habitat for blue sheep and snow leopard that may be critical for maintenance of genetic continuity between Johar and Ralam. Likewise, the Rajrambha and Naginidhura form an important corridor between Barjikang and Panch Chuli basin for the genetic continuity.
- **Riverine corridors along Gori and Ramganga:** Both rivers support rich riverine vegetation on either bank. These forests serve as important corridors for the migratory birds and dispersal routes for a variety of orchids.
- **Riverine areas of Sarayu-Ramganga- Sharada Regions:** At the lower reaches of landscape, the riverine areas of Sarayu - Ramgang - Sharada corridors help in maintenance of travel and dispersal routes of flora and fauna. Detailed studies on the use of important species of avi-fauna especially kalij and red jungle fowl along these corridors would reveal several interesting facts about their biogeography.

(*Hemitragus jemlahicus*), blue sheep (*Pseudois nayaur*), goral (*Nemorhaedus goral*), Himalayan musk deer (*Moschus chrysogaster*), Asiatic black bear (*Selenarctos thibetanus*), Himalayan yellow-throated marten (*Martes flavigula*) and red fox (*Vulpes vulpes*) are other representatives of the wildlife. Two distinct categories of alpine habitats are discernible in the region, i.e., moist alpine habitats of Greater Himalaya typically represented by the species mentioned above and the dry alpine habitats adjacent to the Tibetan plateau where quite a few species of Tibetan origin are encountered [e.g., Tibetan woolly hare (*Lepus oiostolus*), Tibetan wolf (*Canis lupus*), Himalayan marmots (*Marmota himalayana*) and Tibetan snow cock (*Tetraogallus tibetanus*)]. In north-western part of the landscape, there are reports of the presence of Tibetan wild ass or kiang (*Equus hemionus kiang*).

Timberline ecotone and sub-alpine forests: The timberline ecotone represents important and ecologically sensitive habitat. The key mammalian fauna at and around timberline zone are red fox (*Vulpes vulpes*), Asiatic black bear (*Selenarctos thibetanus*), yellow-throated marten (*Martes flavigula*), red giant flying squirrel (*Petaurista petaurista*), Himalayan musk deer (*Moschus chrysogaster*), serow (*Capricornis sumatraensis*) and Himalayan tahr (*Hemitragus jemlahicus*). Among the small mammals, Royle's mountain vole (*Alticola roylei*) and Royle's pika (*Ochotona roylei*) are common. The krummholz formation is frequently used as cover by a large number of species including several pheasants and other avifauna, especially the summer migrants.

Cool temperate grassy slopes: A significant proportion of the upper temperate belt in this landscape is characterized by steep, often rocky slopes dominated by grasses. Important species of wild ungulates on such habitats include Himalayan tahr and goral. Himalayan yellow-throated marten, red fox, common leopard and Asiatic black bear can be sighted occasionally. Such slopes are also rich in a variety of birds including partridges, pipits, vultures and a number of raptors.

Temperate forests and scrub: The middle elevation (between 1,200 and 3,000m asl) forests and secondary scrub in this landscape support a large number of forest formations including dry as well as moist categories (both conifers and broadleaf). Remote and inaccessible localities do support typical temperate faunal assemblages including Asiatic black bear, wild pig, sambar, barking deer, flying squirrel (*Petaurista petaurista*) and Himalayan langur (*Semnopithecus entellus himalayensis*). A wide variety of resident and migratory avi-fauna use these forests extensively.

The sub-tropical forests and secondary scrub: The low-lying, generally gentle and moist places in the landscape (below 1,200 m asl) have long been transformed into human habitation or agriculture. However, a few dry, rocky and inaccessible places away from sources of water support scattered broadleaf open forests and scrub vegetation. Prominent forest formations under these habitats include broadleaf – mixed forests of Sal (*Shorea robusta*) and Sain (*Terminalia tomentosa*), Sub-tropical *Euphorbia* scrub, and occasionally Chir pine. Key faunal elements in such habitats are barking deer (*Muntiacus muntjac*), sambar (*Cervus unicolor*), Indian porcupine (*Hystrix indica*), wild pig (*Sus scrofa*), Himalayan langur, and rhesus macaque. Open grassy slopes and woodlands (common in the western region) have more grazing ungulates such as goral (*Nemorhaedus goral*), besides a wide variety of avi-fauna.

The riverine habitat: The riverine habitats in this landscape are most threatened and vulnerable due to ever-increasing anthropogenic pressure. These habitats form connecting link between the terrestrial and aquatic ecosystems, both along vertical and horizontal planes. The lower Gori valley in particular forms a biodiversity hotspot by having nearly 50% of orchids reported from the State of Uttarakhand. In addition, two new records of rare species of snakes have been reported from this area viz., King cobra (*Ophiophagus hanna*) and the Greater black krait (*Bungarus niger*) in surveys conducted by Himal Prakurti (Munsiyari). Several species of mammals, birds, lower vertebrates use these habitats all round the year, and the river valleys also serve as critical habitat corridors. Together with the Gori valley, particular mention of riverine corridors along Ramganaga, Saryu and Sharda needs to be made in this regard.

Some of the other important migratory corridors identified in the landscape have been included (Box 1.2).

Wildlife Protected Areas

The target landscape consists of one legally defined Protected Area (i.e., Askot Wildlife Sanctuary) and on the upper north-west extreme it includes a part of Nanda Devi Biosphere Reserve (NDBR), a globally recognized mountain BR. The contiguity of the landscape with NDBR provides it an additional benefit of forming a contiguous landform with exceptionally high conservation and socio-economic value.

The Askot Wildlife Sanctuary

The Askot Wildlife Sanctuary (AWLS) covers an area of 600 km^2, as mentioned in the preliminary notification for the declaration of the sanctuary in 1987. Thus, nearly 8.4% area of KSL-India is under legal PA coverage.

It comprises of the reserve forests of the Askot Range (289 km^2), 225 km^2 of Civil and Van Panchayat areas and 85 km^2 of Agricultural lands. It is one of the larger PAs in the Himalayan region; 50% of PAs in the Himalayan Bio geographic zone are below 100 km^2 and more than 85% are under 500 km^2 (Rawal & Dhar, 2001). The AWLS covers a wide range of altitudinal variation starting all the way from subtropical areas to the alpine region. In addition, it is at the confluence of the west and the central Himalaya which further adds to its biodiversity richness.

A detailed inventory of vascular plants is indicative of the presence of over 1,262 species (1,112 angiosperms; 7 gymnosperms and 143 pteridophytes) which covers over 50% representation of what is known from the entire KSL landscape. Of representative floristic elements in the reserve, native (Himalayan) species contribute 34% of total and over 60% of native elements are Himalayan endemics


Photo: Threesh Kapoor

(24 endemic and 235 near endemics). Among taxonomic groups, species richness in family Orchidaceae is particularly important and represents 191 species of orchids out of a total of 237 orchids reported from Uttarakhand. Preliminary information on the faunal species richness indicates the presence of 29 mammals (28.4% of west Himalaya) and 120 birds of west Himalaya.

AWLS supports some critically important habitats/ communities. For example, while considering cumulative biodiversity values, the Timberline Zone (TLZ) of Panchachuli basin (within AWLS) and Ralam valley (neighbouring AWLS) have been identified among ten top-ranking priority sites in western Himalaya. On account of naturalness, endemicity and use value of biodiversity elements these sites, however, assume highest uniqueness score (Dhar, 2000).

The two indigenous communities of Bhotia and Rajis that inhabit this area, together with other ethnic communities, use the resources in a variety of ways. The Rajis have better understanding of wild edible plants whereas the Bhotias exhibit greater knowledge on income-generating resources, e.g., medicinal plants. All together 172 plant species were reported to be utilized by the inhabitants (medicinal 69, edible 72, fodder 57, fuel 31, house building 9, religious 7, and fibre 2).

The Nanda Devi Biosphere Reserve (NDBR)

The Nanda Devi Biosphere Reserve represents unique combination of mountain ecosystems including traditional agro-ecosystems, mixed temperate and sub alpine forests, alpine meadows and glaciers. In recognition of its uniqueness, the reserve has been included in World Network of Biosphere Reserves (WNBR). Also, the Nanda Devi and the Valley of Flowers National Parks, forming core of NDBR, have been inscribed on the World Heritage List. Out of the total area of 6,407.03 km^2; an area of approximately 800 km^2 falls within


Photo: GBPIHED

the north-western boundary of the KSL-India. However, as the habitat is contiguous, practically the whole of NDBR is connected with the landscape providing an enormous opportunity for conservation as well as sustainable utilisation of natural resources.

The recorded floral elements of NDBR include 699 species of angiosperms, 11 gymnosperms, 137 pteridophytes, 146 bryophytes, 77 lichens and 128 fungi. The known faunal diversity includes 19 species of mammals, 243 birds, 229 insects, 14 molluscs, 8 amphibians, 6 annelids, 3 reptiles and 90 fishes. The prominent megafauna includes snow leopard (Panthera uncia), Himalayan Musk deer (*Moschus chrysogaster*), Asian Black bear (*Selenarctos thibetanus*), Blue sheep (*Pseudois nayaur*); the majestic bird life includes Himalayan monal (*Lophophorous impejanus*), Koklas pheasant (*Pucrasia macrolopha*), Cheer pheasant (*Catreus wallichii*), Western tragopan (*Tragopan melanocephalus*), Himalayan snowcock (*Tetragallus himalyensis*), Asian white-backed vulture (*Gyps bengalensis*), Red headed vulture (*Sarcogyps calvus*) and Bearded vulture (*Gypaetus barbatus*).

In addition to the rich biodiversity in the wilderness, there is considerable diversity of crops, traditional verities and landraces that exist in the NDBR. Of the total 47 buffer zone villages in the whole of NDBR, 11 fall within the KSL: Milam, Martoli, Sumdu, Mapa, Ganghar, Pachchu, Burfu, Bilju, Lwan, Khillanj and Tola. These are inhabited by the Johari Bhotia community. The important crops for sustenance in these villages have been included in Table 1.2. A large number of medicinal and wild edible plants in the reserve are being used both for self utilisation as well as for sale.

Forest Management

As indicated earlier, forests cover a large part of the landscape and are integral component of the culture. At present, the basic administrative classification of the forests in the landscape includes 796 km^2 as reserve forests, 1,067 km^2 as civil, 2,300 km^2 as un-classed protected and 791 km^2 as Van Panchayat forests.

Historically, the British occupation of Kumaun started when the Gorkhas were driven out in 1815. The first occurrence of interest in relation to forests was Traill's 1823 settlement (known as assi sala, based on equivalent Hindi year 1880), which fixed nominal village boundaries within each village who could exercise rights of pasture and wood cutting. The san assi boundaries maintain some importance to the present day, although they have no legal significance inside reserved forests. For many years after the British occupation started, the forests in the hills were not considered of sufficient importance necessitating any steps to be taken to protect them.

In 1893, all unmeasured forest (and wasteland) was declared protected forest, and in 1894, rules were drawn up for its management under the control of the Deputy Commissioner, who was given the powers of a conservator. Under the 1894 rules for protected forests certain trees were reserved, and small forest staff was appointed. But there was no restriction on the felling for domestic purposes of Chir pine above 3 girth, and reserved species could be felled on licenses granted by patwaris. These rules proved inadequate to protect the forests, and in 1903 revised rules were issued. The forests were divided into "closed civil" under the direct control of the Deputy Commissioner with forest staff, and "open civil" under the control of patwaris and malguzars. These rules imposed further restrictions, and gradually the system was enforced under which villagers had to indent beforehand for any trees they wanted to utilize from the closed forests. However, with limited staff and extensive forest cover, it was only between 1911 and 1915 that the settlement of rights could be formally undertaken where in majority of the closed civil forests were declared as reserved between 1915 and 1918.

The reserved forests in the landscape were demarcated during 1911–1916. Rights and concessions were also awarded to villagers who were otherwise dependent on these forests. However, there was strong resentment among the people with the belief that all their traditional usage rights have been withheld by reservation of these forests. Large scale destruction of boundary pillars and burning of resin depots, etc. took place as a sign of protest, which together with the unprecedented hot year of 1921 resulted in large scale forest fires. The Kumaun Forest Grievance committee was constituted which in 1922 gave detailed report and recommendations to alleviate the grievances of the public. Several measures were taken up on the basis of these recommendations. A Van Panchayat Act was passed in 1931 which provisioned that the forest lands managed by the Revenue Department as Class I and Civil Forests could be brought under the control of the village committees. The salient features of the Van Panchayat system are given (Box 1.3).

Photos: KC Sekar and Lalit Giri

Box 1.3: The Van Panchayat System in the landscape

The Van Panchayat Act, 1931 and as amended later in 1976, made it possible for the people to collect fodder, graze animals, collect leaf for the bedding of cattle, fuel wood, harvest non timber forest products including tapping of resin and timber for construction from their Van Panchayat forests. The Act provided a broad framework of rules which were then elaborated at the local level by each Van Panchayat. The election of leaders, appointment of guards, and imposition of fines and management of finances were given to the local body. Although the Forest and the Revenue Departments were meant to play a facilitating role, powers related to supervision and enforcement were vested in the officials. So, the success of the Van Panchayat depended (and continues to be so even in the present times) on the combination of strong local leadership in the Van Panchayat committee as well as support from the officers of the two departments. On a macro scale, barring exceptions in some areas that have not had adequate resources, the Van Panchayats have been fairly successful in conservation as well as sustainable utilisation of the natural resources. At present, the landscape is dotted with about 1675 Van Panchayats, covering nearly 16% of total forest area.

Wild Bio-resources

Wild edibles

Considerably large number of medicinal and wild edible plants are known to occur in the landscape. Some of the popular ones include: *Allium humile* (Pharan), *Corylus jacquemontii* (Bhotia badam), *Hippophae salicifolia* (Ameesh), *Morchella esculenta* (Guchhi) in the higher reaches and *Diplazium esculentum* (Lingura), *Myrica esculenta* (Kaiphal), *Rhododendron arboreum* (Burans), *Aegle marmelos* (Bel), and *Aesandra butyracea* (Cheura), etc. in low to mid hills. Many of these wild edibles are not only sold in the local markets but reach even the markets of Nainital and Almora, etc. There exists a big possibility for improving overall production and value addition.

Medicinal and Aromatic plants

The Indian Ayurvedic as well as the Tibetan systems of medicine have depended on the medicinal and aromatic plants from the Himalayan region. The landscape has an extremely rich diversity in such species and has been a centre for collection and trade for a long time. It is specially known for the species occurring in the sub alpine and the alpine zones, e.g., *Picrorhiza kurrooa*, *Podophyllum hexandrum*, *Nardostachys grandiflora*, *Dactylorhiza hatagirea*, and *Aconitum heterophyllum*, etc. All the species mentioned here have become endangered due to over exploitation and are enlisted under Appendix I and II of the CITES (Convention on International Trade in Endangered Species). As a result collection and trade in these species have been banned, which has affected the livelihood prospects of the people. Efforts to cultivate many of these species have been successfully undertaken by a few pioneering farmers but it has been an uphill task to reach the economy of scale owning to slow growth of these plants, and the investment of time and effort required in such ventures. While the potential for building livelihoods and substantive enterprises based on medicinal and aromatic plants is evident in the region, we have yet to witness the emergence of commercially successful ventures.

Photo: Lalit Giri

A species that has gained enormous economic importance in the recent times is that of *Cordyceps sinensis*, locally called keera ghas. It is known as Yar-tsa Gam-bu in Tibet (China), literally meaning "summer herb-winter worm" as the species represents a combination of fungus and a larval growth. It is used as an aphrodisiac and in treating several ailments from fever to cancer. It is highly valued in the market, fetching a price of more than Rupees 3,00,000 for 1 kilogram; and thus has become a major source of earning for the local collectors. In the months of June and July, many alpine meadows can be seen dotted with tents of those who camp in the search and collection of this species. Traditionally there is a system of division of alpine meadows amongst villages, the ecological impact on meadows is visible due to intense activity during the collection months. Adverse impacts on many species, disposal of waste and overuse of other resources needs to be addressed in a systematic manner, with a long-term perspective.

Other NTFPs

In addition to wild edibles and MAPs, a few non-timber forest products (NTFPs) are extracted from the landscape. Notable among these are Jhula (groups of foliose and fruticose lichens, e.g., species of *Usnea* and *Cladonia*). The other economically important lichens of the landscape are *Bulbothrix meizospora*, *Canomaculina subtinctoria*, *Canoparmelia texana*, *H. leucomela, Lobaria retigera, Myelochroa aurulenta, Nephromopsis pallescens, Parmelaria subthomsonii, Parmelinella wallichiana, Ramalina conduplicans, R. sinensis, Usnea longissima, U. orientalis* and *U. thomsonii*.

Among other species, hill (temperate) bamboos - Ringal (*Sinarundinaria falcata, S. anceps*, Thamnocalamus *falconerii, T. spathiflorus*), fibre-yielding plants (*Agave* spp., *Girardinia heterophylla, Eulaliopsis binata*), resin of chir pine (*Pinus roxburghii*), and seeds of oil yielding species such as *Aesandra butyracea* (Cheura), and *Neolitsea umbrosa* (Chirar) are important. Of these, pine resin is extracted in an organized manner, through the Forest Development Corporation. Other products are collected by the local people and traded through contractors. Likewise, there are reports of extraction of maple knots (*Acer caesium* and *A. villosum*) for making wooden bowls. Collection of morel mushroom (*Morchella esculenta*) and honey from the temperate forests provides yet another livelihood option.

Cross Boundary Linkages – econo-cultural symbiosis

The landscape manifests an exceptional phenomenon of symbiotic relations in terms of economic inter-dependence. Over the millennia, nomadic-transhumance, and migration have been the major attributes of economic life intertwined with the indigenous cultures. On a close assessment, one may experience succession through stages of local economies, ranging from hunter gatherer to pastoral, agri-pastoral, agrarian and trans-border trade economies. The bounty of nature, in spite of harsh living conditions, inaccessibility of terrain and geographic isolation had not only helped in the evolution of a system of interdependence in the past, but also facilitated unique trans-border connectivity between the larger landscape inhabitants.

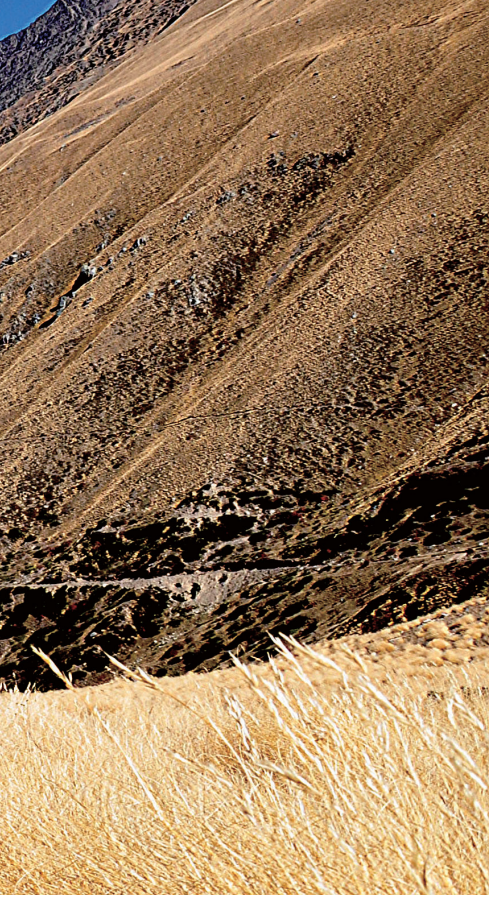


Photo: Ravindra Joshi

The Indian part of Kailash Sacred Landscape, that lies in the east-northern part of Uttarakahnd, bordering Western Nepal and South-Western Tibet, exhibits prevalent transboundary connections. Being located at this tri-juncture, landscape has the natural potential of ethnic, linguistic and cultural mixing. Prevalent traditional systems of trade, commerce, pilgrimage and marriages (especially with western Nepal) have helped this mixing to sustain.

Transborder Mobility- historical perspective

Transborder connectivity of target landscape can be visualized through the north-south and the east-west flow of economy, accompanied by corresponding movement of the societal groups. The north south mobility while provided an opportunity for the interaction of people from Western Tibet with those from the Indian plains, it also facilitated interaction of local population with the outside culture. These movements, with the passage of time, helped evolving a new phenomenon of Trade and Pilgrimage. Several routes to Tibet from Indo-Gangetic plains, passing through the target landscape, are a living testimony of this unique and complex process.

Historically and traditionally, a system of transborder trade existed, with wide ranging socio-economic implications that promoted mobility of people from within and outside the landscape. This mobility was ensured through well defined routes, which in a way defined the path of socio-cultural and economic development in the area. All such routes, particularly the ones which maintained transboundary mobility in the past, and to some extent in the present, should easily qualify for "heritage" considerations.

From west to east, as told by the elders, one could count as many as nine Himalayan passes through which trade was transacted between Nepal-TAR China and India-TAR China, from ancient times. These included: (i) Tinkar Pass (TAR China-Nepal) and, (ii) Lipu Lekh, (iii) Mushishang, (iv) Lanpiya la, (v) Darma Pass, (vi) Untadhura (these five fall in the target landscape), (vii) Chorhoti, (viii) Niti, and

Box 1.4: Possibilities for strengthening cross border mobility

- Explore possibilities for resumption of trade and tourism, though Munsiyari-Milam route, through the Unta-dhura-Kingri Bingri passes, as it would be beneficial for both India and TAR- China. Accessibility through Milam-Untadhura pass is imminent as Milam is slated to be connected by 2012.
- Although outside the boundary of KSL India, yet another possibility of improving trade and tourism prospects between India and TAR-China exist through the Niti pass. Niti village, like Milam and Gunji, has had ancient trade and tourism connection with TAR-China. Niti already stands connected by an all weather painted road. If trade and tourism is restored through Milam and Niti passes, the increased traffic of goods and services through trade and tourism would boost the Indo-Chinese and Nepalese economies considerably.

Photo: Neeraj Pant

(ix) Mana Pass (these three fall in the adjoining Garhwal region). However, evidence from the past suggests that only Lipu lekh, Milam-Untadhura, Niti and Mana passes out of these remained active from trade and tourism point of view. Milam-Untadhura and Lipu Lekh (within the target landscape), being the closest, were the most preferred ones as these involved shortest distances for those exclusively interested in pilgrimage, with the help provided by the traders. Presently, a large part of the target landscape is accessible through only one heritage route, both for trade and tourism, as follows: Lipu-lekh (5,334 m) – Gunji – Mangti – Tawaghat – Dharchula (105 km). From within India the only other transboundary access can be provided through the restoration of trade and tourism, through the Munsiyari-Milam pass. Munsiyari –Milam route consists of Munsiyari-Bogdiar-Milam (54 kms).

Since long, Dharchula and Munsiyary are also connected with west Nepal by a bridge over the river Kali, through the Dharchula municipal town. There exists a free passage, both ways, between Nepal and Indian villages and towns through this bridge over the river Kali. The other India–Nepal custom transaction takes place at the Jhula Ghat village. Jhula Ghat, situated at a distance of 36 kms to the east of Pithoragrah city, has an iron-bridge, which permits official trade transaction between India and Nepal. Dry-port facilities of customs are allowed by Indian customs to the Nepalese traders at Dharchula bridge over the river Kali.

While the road connectivity between Dharchula municipality and western Nepal has improved in recent times, the road connectivity with Jhula Ghat remains non-existent, without any prospects of immediate improvement. In the context of exploring possibilities for strengthening of transborder connectivity for overall benefit to the people in the landscape, a few points should be highlighted (Box 1.4). While exploring such possibilities one could locate various heritage places along these sites for promoting tourism within or outside the KSL-India part. Kailash Mansarovar pilgrimage from the Indian part forms one major transborder activity. A brief of the same is included (Box 1.5). Besides Kailas pilgrimage and trade route, the landscape also provides east–west connectivity for the trading as well as religious activities. A popular route from Kumaun and Garhwal to western Nepal, and to Muktinath passes through Sor region, entering into Nepal at Jhulaghat.

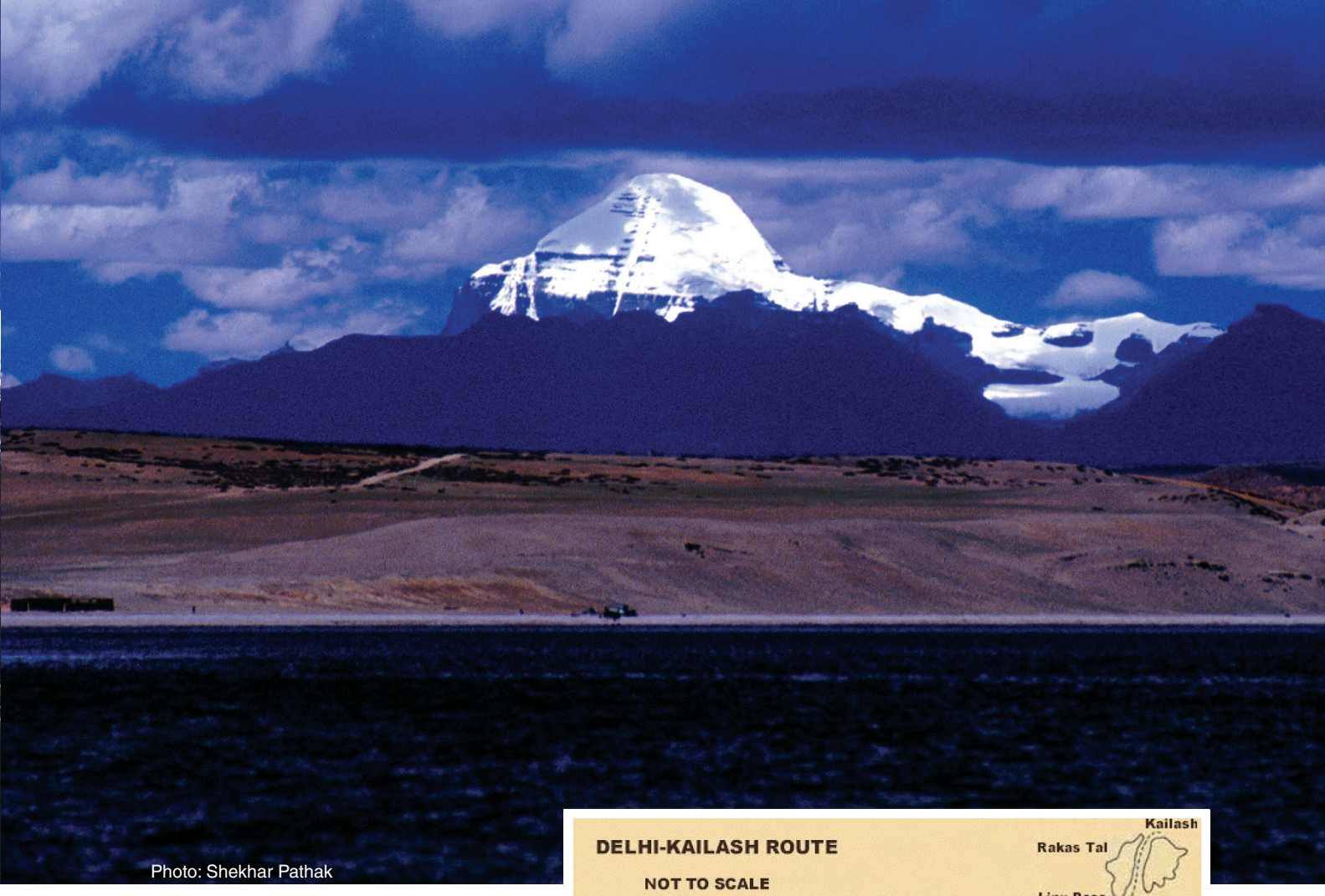
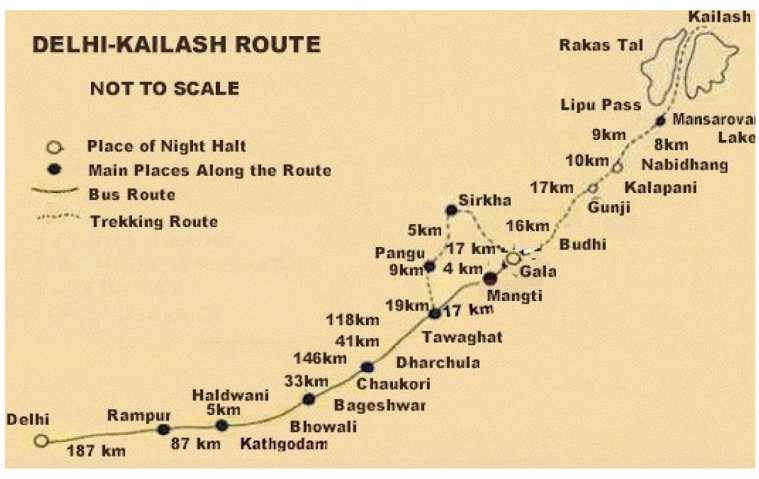


Photo: Shekhar Pathak



Box 1.5. Kailash Mansarovar Pilgrimage from the Indian part of KSL

Every year, religious and spiritual pilgrims journey to this sacred landscape of Kailash Mansoravar. Devotees arriving from India, Nepal, China, the central Asian region, and elsewhere in the world, aspire for this life time journey.

Traditionally, there used to be several routes to reach Kailash from the Indian side. One, from Ladakh region of Kashmir, second passing through Gangotri towards Nailang Ghat, third from Badrinath via Man Ghat, fourth via Niti Ghat, and the fifth route through Almora, Dharchula, Garbyang, and Lipu Ghat. This last mentioned route is now the only route that is used by the Indian pilgrims as officially agreed between the Government of India and the Government of the Peoples Republic of China. Normally there are about 16 batches of 35 pilgrims each every year. Following a time-table, the yatris are called to Delhi, batch-wise. Officials brief them and they are put up in a hotel. The yatris reach Kathgodam (280 km) by bus. Then to Almora, Bageshwar (180 km), Dharchula (160 km), Gala (43 km), Budhi (20 km), Gunji (15 km), Kalapani (10 km), Navidhang (8 km), reaching Lipulekh (7 km) and finally Taklakot across the border (19 km). From Lipulekh Pass the officer divides them in groups for circumambulating the Kailash Mansarovar.

Kailash Mansarovar Yatra is organized by the Ministry of External Affairs along with Indo Tibetan Border Police (ITBP) Force and the Kumaun Mandal Vikas Nigam (KMVN), Government of Uttarakhand. KMVN makes all arrangements for accommodation, food, etc. ITBP provides infrastructural facility in the form of medical aid, wireless links and security cover.

Photo: Sabine Leder

2 Enabling Environment

Photo: GS Bhardwaj

The target landscape, with profound richness of bio-physical diversity, ethnic intermixing and unique socio-cultural assimilation, and prevailing folk wisdom that silently directs not to misuse, degrade or destroy common property, presents a unique context not only to explore possibilities for implementing innovative programmes to ensure: (i) Conservation of Natural Resources, (ii) Maintenance of Scio-cultural fabrics, and (iii) Development of Indigenous Communities, but also to address challenges of environmental monitoring and management. The opportunities associated with the prevalent folk belief systems and widely revered sacred values, further strengthen the case of this landscape to pursue programmes that help in maintaining ecosystem integrity and improving quality of life well within and far beyond the landscape boundaries. Fortunately, a strong enabling (policy and socio-cultural) environment exists to conceptualize and effectively implement such programmes.

National Framework

In order to fulfil its national obligations towards the international agreements in the area of conservation and development, India has a comprehensive and exhaustive framework of laws and policies. Also, India follows certain guiding principles in the area of conservation of its bio-cultural heritage. The Constitution of India, 1950, places directives to the state through its section on Directive Principles of State Policy, inter alia, "*(f) to value and preserve the rich heritage of our composite culture; (g) to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures*".

The prominent policies, legislation and action plans that drive the conservation agenda of the nation include- *National Environment Policy (NEP), 2006*. The key theme of NEP stresses on the fact that while conservation of environmental resources in necessary to secure livelihoods and wellbeing of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from conservation than from degradation of the resource.

Box 2.1: NEP – Measures for the conservation of Mountains

Adopt appropriate land-use planning and watershed management practices for sustainable development of mountain ecosystem

Adopt "best practice" norms for infrastructure construction in mountain regions to avoid or minimize damage to sensitive ecosystems and despoiling of landscapes.

Encourage cultivation of traditional varieties of crops and horticulture by promotion of organic farming, enabling farmers to realize a price premium.

Promote sustainable tourism through adoption of "best practice" norms of eco-friendly and responsible tourism, creation of appropriate facilities and access to ecological resources, and multi-stakeholder partnerships to enable local communities to gain livelihoods, while leveraging financial, technical, and managerial capacities of investors.

Take measures to regulate tourist inflows into mountain regions to ensure that these remain within the carrying capacity of the mountain ecology

Consider unique mountain scapes as entities with "Incomparable Values", in developing strategies for their protection.

(Source: National Environment Policy, MoEF, GOI, 2006, www.envfor.nic.in/nep/nep2006e.pdf)

Among others, the NEP recognizes mountains as the most fragile ecosystems in terms of susceptibility to anthropogenic shocks. There has been significant impact on the mountain ecosystem and this is likely to continue if immediate steps

are not taken. Therefore, measures for the conservation of mountains have been specifically envisaged (Box 2.1).

NEP is one amongst the two policies in India that clearly seek regional cooperation in the conservation of biological resources and protection of environment. The policy acknowledges the transboundary character of environmental problems.

In pursuance to the Convention on Biological Diversity (CBD), India had enacted the Biological Diversity Act in 2002 following a widespread consultative process over a period of eight years. The BD Rules were notified thereafter in 2004. The Act gives effect to the provisions of the CBD. It also addresses access to biological resources and associated traditional knowledge to ensure equitable sharing of benefits arising out of their use to the country and its people, thereby contributing to achieving the third objective of the CBD. India is one of the first few countries to have enacted such legislation. The Act is to be implemented through a three-tiered institutional structure: National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs) and Biodiversity Management Committees (BMCs). NBA has been set up in 2003. Various states, including Uttarakhand, have established SBBs, and BMCs are in the process of being set up.

India is one of the first few countries to have enacted Biological Diversity Act (2002). The Act is to be implemented through a three-tiered institutional structure: National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs) and Biodiversity Management Committees (BMCs)...

Among others, *National Biodiversity Action Plan (NBAP)*, 2008, has been formulated with the objective to augment natural resource base and its sustainable utilization. It proposes to operationalise its mandate through the PA network which includes consolidation of Biosphere reserves, establishment of more reserves designated under Ramsar Convention, and augmentation of *ex situ* efforts through the establishment of network of Lead Gardens and other initiatives intended for the conservation of genetic resources, etc.

At the same time, the Constitution of India in the recent decades has made an attempt to devolve power to bodies of local self-governments to empower local people and especially women and men from marginalized sections such as the scheduled castes and scheduled tribes. Besides this, the recent years have seen the enactment of several rights based laws such as the National Rural Employment Guarantee Act 2006 and the Right to Information Act 2005.

The national policy on farmers which is premised on the fact that majority of the hungry live in rural India and also depend on agriculture for their livelihood, lays emphasis on the economic well being of the women and men feeding the nation (Serving Farmers and Saving Farmers, Fifth and Final Report, 4 October 2006, revised draft National policy for farmers, Ministry of Agriculture, National Commission on Farmers). It stresses that it is the opportune time to revitalize agricultural progress by making agrarian prosperity

Box 2.2: NAPCC and the National Mission for Sustaining the Himalayan Ecosystem (NMSHE)

The NAPCC addresses the urgent and critical concerns of the country through a directional shift in the development pathway, including through the enhancement of the current and planned programmes. It identifies measures that promote our development objectives while yielding co-benefits for addressing climate change effectively.

There are Eight National missions (i.e., National Solar Mission; National Mission for Enhanced Energy Efficiency; National Mission on Sustainable Habitat; National Water Mission; National Mission for Sustaining the Himalayan Ecosystem; National Mission for a Green India; National Mission for Sustainable Agriculture; and National Mission on Strategic Knowledge of Climate Change), which form the core of NAPCC, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change.

NMSHE envisages evolving management measures for sustaining and safeguarding the Himalayan glaciers and mountain ecosystems. The mission, among others, focuses to: (i) understand, whether and the extent to which, the Himalayan glaciers are in recession and how the problem could be addressed, (ii) establish an observational and monitoring network for the Himalayan environment; (iii) promote community-based management of the ecosystems through incentives to community organizations and panchayats for protection of forested land.

(Source: Governance for Sustaining Himalayan Ecosystem – Guidelines & Best Practices, 2009, MoEF & GBPIHED)


Photos: Lalit Giri and Tarun Belwal

and food security and sovereignty to be the bottom line for government policies and priorities in agriculture and rural development. The draft policy is sensitive to gender and human dimension.

More recently, India has shown its commitment towards addressing the emerging issues under Changing Climate scenario. The *National Action Plan on Climate Change (NAPCC)*, 2008 through eight National Missions represents the multi-pronged, long term and integrated strategies for achieving key goals in the context of Climate Change in India. NAPCC envisages, among other things, a National Mission for Sustaining the Himalayan Ecosystem (NMSHE, the only location-specific mission, seven other being thematic in nature). The Mission is aimed at evolving management measures for sustaining and safeguarding the Himalayan glaciers and the mountain ecosystem. Among others, a publication "*Governance for sustaining Himalayan Ecosystem (G-SHE): Guidelines and Best Practices*" (MoEF, GoI, 2009), which forms part of countries broader climate change adaptation strategy, puts together guidelines and best practices related to governance and management of Himalayan Ecosystem.

Considering the importance and specific problems of the hill states, the Planning Commission, Government of India constituted a task force to look into problems of hill states and hill areas and to suggest ways to ensure that these states and areas do not suffer in any way because of their peculiarities (Planning Commission, GOI 2010). The task force report, among others, recommends reshaping of policies to bring in the "Mountain Perspective" for the Indian Himalayan Region, in the national planning. Emphasis has also been laid on developing norms for good governance and harnessing social capital at the grass roots. The report also recommends bringing in the concept of developmental zones and states that the balance between natural resource exploitation and conservation should tilt in favour of the latter.

With respect to the rights of indigenous communities, the *Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006*, recognizes and vests forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded. The Act also provides a framework for recording the forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land. This process of recognition of rights is based on two key concepts: community forest resources and community forest rights.

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 recognizes and vests forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded.

State Policies & Programmes

In addition to national laws, policies and programmes related to conservation, development and governance as mentioned above, there are some state specific (i.e., Uttarakhand) policies and programmes which exhibit commitments of the state for conservation and sustainable development. Among others, Van Panchayat Niyamavali, 1931 and 1976 (Forest Council Rules 1931 and 1976), Uttaranchal (Uttarakhand) Panchayati Forest Rules 2001, Village Forest Joint Management Rules 1997, Uttaranchal Resin and Other Forest Produce (Regulation of Trade) Act, 1976, Regulation of medicinal plants in Uttarakhand with special reference to Cooperative trading in Medicinal plants, etc., need special mention.

Among programmes, *Rashtriya Krishi Vikas Yojna (RKVY)* with objectives– to improve livelihoods of the poor families by producing quality herbs in large quantities; promotion of mass cultivation of selected promising and potential species of high altitude medicinal and aromatic plants in high altitude areas of district Pithoragarh; to develop market centers in the vicinity of the cultivation areas to support forward


Photo: Sanjay Nainwal

market linkages; to carry out research and development activities on selected species for varietal improvement, agro-techniques, post-harvest improvement and value addition; establishing nurseries of medicinal and aromatic plants growing in high altitudes and supplying planting material in sufficient quantities required for commercial cultivation; establishing a training and capacity building centre in Munsyari, is operational in the landscape.

Further, *Chief Minister's Herbal Development Plan (Mukhyamantri Jadi Buti Vikas Yojna)*, has been launched to develop clusters of villages to benefit over 4,000 farmers from medicinal plants cultivation in the area. *The Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)*, the national flagship programme, aims at enhancing the livelihood security of people in rural areas by ensuring 100 days of employment per year to all rural households through unskilled labour. The funds under MNREGA are therefore available to the inhabitants of the target landscape.

Some of the other schemes and programmes of the government being implemented for the welfare and benefit of the local people in the state, and hence equally effective in the target landscape, include:

- *Council for Advancement of People's Action and Rural Technology (CAPART)* supports several programmes in the Pithoragarh district such as the Ringal Vikas and Ringal Cultivation to train rural unemployed youth in traditional cottage industry of ringal and protecting the shrinking forest of Ringal. The programme supports training in ringal craft and provides marketing channel to the artisans. Support to set up ringal nurseries for further plantation. CAPART provides support for land development, gulli plugging, construction of check dams, resource centres and retaining to benefit farmers and artisans. Farmers are also trained in diversification of agriculture to enable them to enhance their income generation from agriculture.

Rural artisans are extended trainings on tweed and carpet weaving to uplift the traditional wool industry of Kumaun and to provide them with marketing infrastructure. CAPART also extends support in the area of horticulture through trainings and demonstration on new techniques including in grafting of pear and mehal tree. CAPART is also introducing farmers to new crops such as almonds and saffron.

- *Aajeevika Pariyojana of Uttarakhand Government* has been introduced in the region with the help of civil society organizations to improve the livelihoods opportunities of vulnerable groups in a sustainable manner and by strengthening local institutions that relate to livelihoods development.
- *The Non-Conventional Energy Development Authority (NEDA)* is supporting programmes to develop non conventional energy resources in remote areas of the landscape with a goal to enhance sustainable livelihood opportunities in the region. It also promotes setting up of bio-gas plants and smokeless chulhas.
- *The DRDA through IRDP* provides margin money for credit and technical assistance to the poor. The State Sericulture Board and CAPART are helping set up mulberry nurseries and trainings on rearing of cocoons and sericulture techniques and formation of groups to provide rural employment during pre sowing and post harvesting days of agriculture crops. DRDA is also helping set up Cheura (Diploknema butyracea) nurseries.
- *A number of fishery based schemes and programmes* have been initiated by the Government of Uttarakhand and Government of India to promote livelihoods and income generation activities for the local rural communities in and around Pithoragarh district. The Directorate of Coldwater Fisheries Research based in Bhimtal, about 200 kms away from Pithoragarh, has set up an experimental fish farm in Champawat, close to the target landscape, to conduct on-farm experiments on culture and breeding of Chinese carps and common carps.
- The Directorate of fisheries is also making an attempt to develop the technology for culture and breeding of snow trout considering its importance in angling and ecotourism. This can bring good livelihood opportunities for the local fish farmers by augmenting prospects of employment and self-employment. The fish is endemic to the Himalayan region and is found in abundance in the streams of Uttarakhand. It is also considered as an important food fish in the region. Mahseer and Indian trout are in high demand by anglers in the region.

These policies and programmes are formulated and supported by various departments such as the tourism, industries, forest, tribal affairs, education, human resources development, rural development, non conventional energy, social welfare board, state sericulture board, science and technology, etc. The Planning Commission of India has a special package for the region in the form of the Hill Area Development Plan.

A few other initiatives, which deserve mention w.r.t. the target landscape, include *Eco Task Force (ETF)*. The Government of India, the Ministry of Defense had set up an Eco Task Force (ETF) in April 1994 initially for a period of 7 years with the twin objective of reversing the process of eco-degradation and the rehabilitation of ex-servicemen of the Kumaun region in the state of Uttarakhand. This unit has been engaged with the task of afforestation and soil conservation of Jhulaghat and Dharchula sub-watersheds in the target landscape. The ETF was given a new task in April 2001 upto 2006, to reverse the eco-degradation of 3,300 ha of barren land in Jhulaghat area along the river Kali. The other assignment was given for the period 2008–2013 to afforest barren hills along river Ram Ganga. The Task Force is required to work on community commons as well and ensure that the villagers are sensitized to the importance of maintaining ecological balance and biodiversity conservation.

In addition to the above-mentioned governmental efforts, several non-governmental organizations are supporting various livelihoods improvement and conservation initiatives in the region to promote the welfare of local communities and maintain natural heritage of the landscape. More importantly, the landscape represents a tradition and culture of community based management of natural resources. The prevailing sacredness values attached with various ecosystem elements are major driving factors for conservation of resources.

Biodiversity Conservation and Rural Livelihood Improvements Project (BCRLIP), initiated by Ministry of Environment and Forest, Government of India, proposes to conserve

Biodiversity Conservation and Rural Livelihood Improvements Project (BCRLIP), initiated by Ministry of Environment and Forest, Government of India, ... aims to strengthen links between conservation and improving livelihoods of local communities that live in the neighbourhood of biodiversity-rich areas.


Photo: CS Negi

biodiversity in selected landscapes, including wildlife protected areas/ critical conservation areas while improving rural livelihoods through participatory approaches. The project aims to strengthen links between conservation and improving livelihoods of local communities that live in the neighbourhood of biodiversity-rich areas. The Askot Wildlife Sanctuary (AWLS), which falls within the Indian part of KSL, in the state of Uttarakhand, has been identified as one of the locations for implementing this project.

Being biologically and culturally rich, the concept of Biosphere Reserves suits to the sacred Kailash landscape. This concept of conservation lays emphasis on linkages between biodiversity conservation and socio-economic development. The programme promotes the use of regional networks of biosphere reserves as a vehicle for knowledge – sharing and exchange of experience, research and monitoring, education and training, and testing of participatory decision-making, thereby contributing to the emergence of "quality economies" and to conflict prevention. In addition, the MAB programme lays special emphasis on establishing a knowledge base on cultural practices fostering local-level sustainable use of biodiversity in biosphere reserves; local and indigenous knowledge as a basis for equitable biodiversity governance; and raising awareness of the role of sacred natural sites, cultural landscapes and intangible heritage in ecosystem management and sustainable use of biodiversity. The target landscape on its upper north-west extremes includes parts of Nanda Devi Biosphere Reserve (NDBR), a globally recognized mountain Biosphere Reserve. The contiguity of the landscape with NDBR provides it an additional benefit of forming a contiguous landform with exceptionally high conservation and socio-economic value.

The concept of collective bio-cultural heritage prevails in the landscape and people believe that biological resources and knowledge should develop collectively and cumulatively.

Customary Arrangements, Knowledge base & Bio-cultural Protocols

The target landscape represents a remote area of the country which has a considerably large tribal population. The landscape is also a culturally pluralistic area where local customary laws prevail along with the statutory laws. Most aspects of life in the landscape are governed by social customs and traditional practices.

The concept of collective bio-cultural heritage prevails in the landscape and people believe that biological resources and knowledge should develop collectively and cumulatively. This involves collective management of biodiversity, landscapes, cultural and spiritual values and customary laws. The spiritual values and livelihoods are tied up with the landscape and people strongly believe in the mountain gods. As such, the Himalaya in local parlance is called "*dev bhoomi*", abode of the gods.

The local inhabitants traditionally "live in harmony with nature", and thus naturally have a strong bonding with nature. The sacred values and religious practices have formed the basis of attitudes and feelings of local people towards nature conservation and environmental ethics, which essentially considers human being as part of the nature. Nature is seen as the guardian. One of the prominent mechanisms of conservation at the community level in the landscape has been the institution of Sacred Forests called *Dev Van*. The motivation behind keeping these intact patches of forests can be attributed to the recognition of ecological services emanating from these patches. Such services would include

soil conservation, maintaining watersheds and provision of forest products. These community institutions do not depend on state or government for promulgation of laws for management. The communities perceived the earth, forests of the villages, festival, biological diversity and cropland biodiversity as existing in the realm of sacred trust inherited from their ancestors. They are not considered as individual's properties; rather, they are worshipped in a collective manner. In the *Dev Vans*, forests/rangelands are offered to the deities. Communities hold meetings to decide upon issues such as how much area is to be offered and what form of sanctions to be imposed against violators. Interestingly, both the Van Panchayats (community managed forests) and Reserve Forests (state managed forests) have *Dev Vans*. In some parts, especially on higher Himalayan tribal areas, sacred forests are called *Shingul* and *Sye Roa*. They represent permanently closed forests dedicated to village deity.

The above notion of sacredness had also played important role in conservation of ecologically interesting areas. In target landscape one of the most sacred and ecologically interesting alpine sites is Chhipla-Kedar, located between the Kali and Gori river basins. In this range, highest point is at Najurikund (4,425 m) – the seat of Chhipla Kedar (the manifestation of lord Shiva). The area has great religious and cultural significance. The local communities from all the sides organize Chhipla-*Jaat* every third year and journey to the seat of Lord Chhipla has to be performed barefoot. Such journey forms a part of traditional ecosystem monitoring mechanism.

Considering the resource use practices in the target landscape, pastoralists utilize the spatial and temporal diversity of vegetation in high altitude areas so as to maximize production and to follow a grazing system which allows the pasture a chance to rest and recover. In many cases the customary rights for the grazing areas remain with a community or person living well below the pasture. Under such circumstances negotiating grazing rights by the pastoralist with any customary right holder(s) is also common.

The management of grazing in this part also follows a formal system of property rights, permits and rules which determine who is allowed to graze animals, where and how


Photo: Ravindra Joshi

many, and when they should move from one grazing area to another. A more direct form of management which the Forest Department utilizes is the closing of certain grazing permit areas in order to establish a forest or bush plantation. Parallel to this government regulated system, is a set of informal rules followed by pastoralists as they negotiate access to different grazing areas from right holders, government officials and other pastoralists.

In addition there are emerging statutory systems in some cases to facilitate the customary arrangements while some restrictions exist. For instance, several forestry related activities in Van Panchayats and in Reserved Forests are now undertaken by the local communities. A federation of the Van Panchayats called the Forest Development Agency (FDA), is operational at the division level chaired by the Conservator of Forests and has the territorial DFO (Divisional Forest Officer) as the Secretary. This agency is responsible for preparation of projects and receives funds from various agencies and transfers the same to the Van Panchayats for forestry activities. This concept has evolved over the experiences of the Joint Forest Management (JFM). The FDA is presently having projects funded by the National Afforestation and Eco-development Board under the National Afforestation Plan. The fund generated for compensatory afforestation and recovery of Net Present Value (NPV) of forest land diverted for non forestry activities are recycled to the respective Van Panchayats for different forestry activities.

While all these reflect local and national level commitment for conservation and sustainable use of resources, an attempt needs to be made to bring about the convergence amongst various initiatives and resources of different players – the government, non-government, multilaterals and bilateral donors, international non-governmental agencies and private sector to ensure synergies in achieving the goals of conservation and inclusive growth in the landscape.

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Photo: Ravindra Joshi

3 The Landscape in Transition

Photo: Sabine Leder

Undoubtedly the socio-economic and cultural facets of life in the landscape were in harmony with its ecology until 1960s, when border trade with the present Tibetan Autonomous Region of China was flourishing. A large part of population directly or indirectly depended on the transborder trade and practiced transhumance; remaining population enjoyed the traditional hill agriculture. Cessation of trade between TAR China and India during 1959 caused a big disruption in the system thereby bringing in significant socio-cultural and environmental changes in the landscape. The enhanced administrative control on forests initiated by the Britishers in early 1920s and ensuing difficulties, could be, to some extent, compensated with the then existing customary rights, rules, and strong community institutions. However, the inhabitants could do nothing for the resumption of transborder trade. In quick succession, the land ceiling laws and land reforms that were being enforced in the country were also made applicable to the border regions leading to further hardship. The inclusion of the Bhotias in the Scheduled Tribe status in 1965 came as a much respite. In addition to the benefits from several Government schemes for the welfare of tribal communities, it provided for greater opportunities for the engagement of the tribal people in mainstream Government administration and other jobs. The educated and competent Bhotias successfully competed in central and state services bringing the much needed economic relief to the people in the greater Himalayan and the trans-Himalayan regions of the landscape. At the same time, it ushered in changes in the traditional engagements of the people in the farm, livestock and other livelihood sectors. All these resulted in migration of people from the highlands, particularly from the valleys of Johar, Darma, Byans and Chaudans during the past few decades.

Of late, outmigration to plains in search of jobs has also been a major consideration for the people in mid hills and

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the lower valleys. Concomitant to this, general degradation in land, water and environment has been witnessed on several accounts, which have led to further loss of livelihood opportunities in the region. Recent spurt in activities pertaining to river valley projects and associated infrastructure development, general improvement in access and transportation has, to some extent, opened up potential for more jobs. At the same time this has begun to adversely impact the social and the natural environment.

The people, both in urban as well as rural areas in the landscape, are experiencing severe shortage of water for drinking and irrigation. This could be a reflection of the extensive deforestation, land use change, frequent forest fires and climate change, in tandem with poorly planned land development and road construction activities, that frequently interferes with the natural recharge zone of water springs and causes diversion of underground channels. Discharge from the springs, which are primary source of drinking water in rural areas, has decreased substantially over the years with many of them running dry for major part of the year. Only 15% of the crop land in landscape has access to irrigation

The people in the landscape are experiencing severe shortage of water for drinking and irrigation. This could be a reflection of extensive deforestation, land use change, forest fires and climate change in tandem with poorly planned land development and road construction activities...

facilities. General decline in water availability, together with poor maintenance and operations of irrigation infrastructure, has led to further distress in the farming households.

The other major issues in farming are: (i) decrease in the net sown area, (ii) predominance of wasteland, (iii) declining agriculture production, (iv) reduction in soil fertility due to high erosion and nutrient leaching through run-off, (v) increasing trend in the scattered and small land holdings, (vi) crop damage due to wild animals, (vii) decline in the number of land races and traditional varieties, (viii) change in the land use of prime agricultural land, particularly to residential

Photo: Balwant Rawat

areas, and (ix) abandoning of agriculture fields due to out-migration of farming families. Also, for the livestock diversity, the landscape is facing following negative trends : (i) growing number of less productive livestock, (ii) shortage of green fodder during winter and summer season, (iii) declining number of land races/breeds and unscientific introduction of exotic breeds, and (iv) decrease in available grazing lands .

A major environmental issue that faces the landscape, that could affect a large part of the Indian subcontinent, is the recession of glaciers, often associated with the global warming and climate change. For instance, the area covered by glaciers in Dhauliganga valley in 1962 and 2005 have been reported as 428.84 km^2 and 362.44 km^2, respectively, which shows a decline of 66.44 km^2 (GBPIHED, 2009). The reduction in the area under glaciers has been calculated using Survey of India toposheets (1962-63) and satellite data of 2005. The interpretation of maps shows 15.5 % net loss in glaciated area in Dhauliganga basin. The observations made in this investigation suggest that small glaciers and ice fields may be affected more due to global warming. In addition, larger glaciers are being fragmented into smaller glaciers. The overall water availability in the landscape and beyond could be adversely affected by this phenomenon.

Some of the additional problems, associated with unplanned growth of towns, relate to the generation of waste and its safe disposal, provisioning of sewerage systems to protect drinking water sources from contamination, etc. Infrastructural development and river valley hydroelectric projects suddenly bring in a large cross section of workers, including manual labourers, from outside areas affecting the socio-economic milieu and possibly causing adverse impact on cultural harmony. Often the onsite concentration of construction workers takes a heavy toll on the forest cover as the need for fuel-wood and other resources goes up many folds. With almost no knowledge of local traditions and little solidarity with the resident community, this migratory population could potentially cause damage to forest resources including poaching of wild animals.

Incidence of forest fires, both accidental and intentional, is on the rise. Community action warranted taking care of such incidences effectively, and the practice of control fires is getting eroded as the stake in conservation is gradually getting reduced with the passage of time. Regeneration of broad leaved species has been adversely affected and the invasive species are proliferating steadily over ever increasing areas. This degradation of wildlife habitat eventually has led to increased incidence of crop raiding by the wild animals. Menace due to monkeys and wild boars have reached unmanageable proportions affecting the food security in the region. At the same time, cases of dogs and cattle lifting by the leopards are on the rise fuelling further resentment amongst the inhabitants.

Declaration of reserves such as the Askot WL Sanctuary has run into rough weather. The inhabitants perceive, perhaps a legitimate fear, that with the declaration of sanctuary, permissions needed for development projects, including vital link roads, would be problematic. While considerable diversion of forest lands for development activities in the landscape is certainly a cause for concern, a balanced view of the basic needs of people versus the large scale diversion of land for huge river valley projects is largely missing in parts of diverse stakeholders. The river valley hydroelectric projects which often require diversion of water from the rivers, leaving parts of the river bed dry in the downstream areas, damage the habitat for aquatic and amphibian life.

Some of the additional problems, associated with unplanned growth of towns, are relate to generation of waste and safe disposal, provisioning of sewerage systems to protect drinking water sources from contamination, etc.

There is little merit and justification in saying that the local community is subject to intrusion on their resources on account of competing demands, from other people or projects because the local traditions, indigenous knowledge, customary laws and institutions are inevitably eroding rather quickly. The ethics related to the system of sustainable collection of non timber forest products including high value medicinal plants has given way to overexploitation leading to poor availability, quality and even localised extinctions in many areas. The winds of change are affecting the Kailash Sacred Landscape, as perhaps many other parts of the world, and the trend of degradation has accelerated in the recent decades.

Potential and Pathways to Conservation

Ensuring sustainable development of the target landscape is a challenging endeavour and involves complex issues of governance, stakeholder participation and knowledge of local customs and traditions on one hand and appropriate scientific interventions on the other. There is a need for clear guidelines for sustainable management and governance of the ecosystem goods and services. The landscape harbours a successful historical past of cultural value driven community based conservation and management of natural resources which needs to be rejuvenated especially among the younger generation. Traditions of sacred groves/ places, indigenous practices of conservation of water resources, and strong base of village level institutions, such as *van panchayats*, are some of the examples. However, such best practices have rarely been integrated with the development and conservation planning in the landscape. The conservation strategy, has to have as its important component, to mainstream such valuable lessons and practices for strengthening various aspects of governance and management in the landscape.

Cultural Ethos of Sacred Nature

There is clear evidence in the landscape that the best conserved natural sites are those that have been culturally protected. They form a network spread throughout the region, encompassing the valleys and different habitat types. World over sacred natural sites are being increasingly recognised for the cultural and biological diversity, and the protection of keystone species as well as sustaining critical ecosystem services. They have long existed, well before the initiation of establishing protected areas, and present a challenge to the planners to incorporat such values in the formal conservation system vested with the State authorities. In this context, IUCN in association with the Man and Biosphere Programme of UNESCO has created, 'Principles and Guidelines for

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Management of Sacred Natural Sites' (Box 3.1). Principally, these recommendations focus on sites located in legally recognised Protected Areas but the guidelines are a useful reference tool for enhancing conservation of sacred natural sites in the landscape. About 40 sacred sites occur within the existing protected sites of Askot Wildlife Sanctuary and in parts of the Nanda Devi Biosphere Reserve, that fall within the Kailash Sacred Landscape.

Taking clues from the above mentioned guidelines we could work on our own strategy for wider recognition of sacred natural sites in the landscape. One of the tasks that is evident in this regard is to work with local "experts" and

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knowledge holders, along with the key informants to carry out comprehensive ethnographic documentation. This should encompass the diversity of cultural traditions in the landscape. Scientific explanations and validation of some of the local knowledge systems would generate deeper understanding of the ecological principles deeply embedded in the cultural ethos. It would be a valuable contribution to the future generations of the local communities, as well as to the world outside, as it should make sense to the traditional thinking and those with modern scientific minds. At the same time, changes that may affect sacred sites that go beyond the comprehension of the traditional societies, such as the climate change influences; could be better understood using scientific methods and evidences. Adaptation strategies should thus be evolved aligning the two worldviews.

In any given strategy, perhaps what is most important is to remember that the spiritual aspects of the natural sites should be kept at the heart of the conservation ethics and practices. It is likely that, over time, as the "worldly" citizens increasingly get restless, confines of nature and avenues for spiritual rejuvenation are going to be particularly sought after. The Kailash sacred landscape offers a tremendous destination with myriads of temples and holy sites that are

Box 3.1: Sacred Natural Sites: Guidelines for Protected Area Managers

IUCN has led the process of evolution of the Guidelines for Sacred Natural Sites coordinated by the specialist group on Cultural and Spiritual Values of Protected Areas. This work began in 2003 with a focus on sacred natural sites of indigenous and local communities. Hundreds of such sacred natural sites that are under the custodianship of indigenous communities have been included in the Protected Area network. In many cases such inclusion has not been in proper consultation with the local custodians and has deprived them of their rights. It has not only resulted in poor conservation strategy but also led to socio-economic hardships and erosion of cultural values amongst local communities. In addition, it has also led to violation of United Nations declarations and several international conventions related to rights of indigenous peoples. Therefore, suitable guidelines specially geared towards protected area authorities needed to be evolved in consultation with a diversity of institutions, agencies and communities. IUCN published this set of six principles and 44 guidelines in 2006. The six principles and some of the guidelines are:

Principle 1: Recognise sacred natural sites already located in protected areas. One of the significant guidelines under this principle is that of recognition that the cultural and spiritual inspiration is part of the ecosystem services that nature provides (guideline 1.2).

Principle 2: Integrate sacred natural sites located in protected areas into planning processes and management programmes. The principle endorses a landscape based approach where in it is recognised that the sacred sites have a role in wider cultural landscapes, protected areas systems, ecological corridors and other land uses (guideline 2.8).

Principle 3: Promote stakeholder consent, participation, inclusion and collaboration.

Principle 4: Encourage improved knowledge and understanding of sacred natural sites. It encourages integrated biological and social research programmes that study biodiversity values, assess the contribution of sacred natural sites to biodiversity conservation, and understand the social dimension, especially how culturally rooted behaviour has conserved biodiversity (guideline 4.2).

Principle 5: Protect sacred natural sites and provide appropriate management access and use. It recommends application of integrated environmental and social impact assessment procedures for developments affecting sacred natural sites (guideline 5.9). It specially recognises that while well managed responsible tourism provides the potential for economic benefits to indigenous and local communities, but tourism activities must be culturally appropriate, respectful and guided by the value systems of custodian communities (guideline 5.4).

Principle 6: Respect the rights of sacred natural site custodians within an appropriate framework of national policy. It recommends legal protection, policy reform and management change in order to reduce human and natural threats to sacred natural sites, especially those not protected within national protected area network and other land planning frameworks (guideline 6.1).

Sacred natural sites remain outstanding assets of the whole of humanity, and due to the threat of on-going degradation and loss, are deserving of urgent support. The purpose of these guidelines, therefore, is to increase that support by providing guidance based on the shared experiences of field practitioners, protected area managers and traditional custodians.

Source: Wild, R. and McLeod, C. (Editors) (2008). Sacred Natural Sites: Guidelines for Protected Area Managers. Gland, Switzerland: IUCN

Photo: Lalit Giri

Photo: Lalit Giri

historically connected through stories, myths and folklore. Many of the places, locations and resident deities are related to each other, forming pilgrimage circuits. It is perhaps critical that the sanctity of such spots is maintained and what is mentioned about a place should be seen or experienced through the visit to particular places in the landscape.

Many of the sacred places require repair or renovation, and sometimes expansion plans also need to be conceived to create places for visitor handling, offices, conveniences, rooms for storage and resting areas for the staff. In addition, there could be requirements for laying pipelines for water and electric cables, etc. The energy that flows in the sacred sites may get modified or disrupted if these actions are not undertaken with proper knowledge and care. The challenge is that the science and practice of maintenance of sacred sites should take into account the energy flows, which is very little understood in the current times. It has happened because, in human history, over the last few hundred years during the course of the industrial age, we have lost respect for traditional knowledge both in the field of creating and maintaining sacred spaces (Box 3.2).

As a comprehensive approach to keep this essential dimension of energy flows in the sacred places, efforts need to be strengthened to develop appropriate guidelines on restoration and renovation work. The vital link of the sacred with the energy of the living earth that has been cherished by human society deserve to be better understood and practiced for the welfare of one and all.

Box 3.2: Energy in the Sacred

We humans are deeply sensitive to the energies of the earth and the cosmos. Our ancestors had deep and abiding reverence for natural places and sacred sites that had remained unchanged in spite of human activity and understood their profound energetic and healing qualities.

Buildings too were built with this sense of harmony with life. A conscious effort was made while deciding the location of dwellings, barns and sheds for the animals, public places and temples, etc. In addition, considerable details were worked out in terms of layout and design, as well as the specific materials that could be used. In the Indian tradition, this was referred to as the science of Vastu; in China it is Feng Shui; and in the European context there were master builders who were the chief architects for the rich plethora of megalithic sites, cathedrals and other public buildings. In aboriginal and indigenous cultures too the knowledge of aligning the earth energies with the celestial energies was applied with varying degrees of sophistication.

In addition to the buildings, sacred trees and stones are also familiar all across the world. All these constitute a part of the earth energies that human beings have consciously tried to harness from time immemorial. The sacred geometry of individual structures and their placement with regard to each other in a sacred complex increases the possibility of conscious spiritual connection and contact. Places where underground water, faults, and other energy patterns come together can cause the human aura to expand, body energies to come into alignment, and gateways to spiritual realms to open.

It is time to revive this knowledge for the benefit of the earth as well as its inhabitants. Considerable work is ongoing in the general area, as well as towards assessment of energy channels and flows in and around sacred sites. One of the most important sites that have been recently mapped for energy flows is the Swayambhunath Stupa complex in the Kathmandu valley (see the book on the restoration of the Great Stupa, 'Light of the Valley').

Anne Z Parker, PhD. Professor of Environmental Sciences in the Naropa University, USA; and co-author of the book 'Earth Alchemy: Aligning your home with nature's energies'.

Photo: Lalit Giri

4 Approaching Conservation

Photo: Lalit Giri

Natural systems function through organic linkages. For a large part in the human history, the lifestyle of the people co-evolved with the resources available in nature, and the knowledge and respect about the same. The knowledge evolved with due consideration to an integrated view of the resource use viz. land, water and forests. The worldview that had evolved around conservation and utilisation of these primary resources was duly supported with strong framework of community regulations, especially in the mountain areas. The pioneering work of Jodha (1990) made an attempt to analyse some of these mountain specificities, which the traditional societies may have considered, besides other factors, in laying down the norms of utilisation of the environmental resources. The main specificities identified for the mountain areas include: inaccessibility, fragility, marginality, niche and diversity. Organic linkages of the various driving forces create specific niches which provide opportunities for special activities/products with a comparative advantage to the mountain areas. Thus, the traditional societies should be given due credit for a comprehensive understanding of the key drivers of environmental change in the mountain areas, and for evolving appropriate practices and regulations, as an adaptive mechanism, to conserve and sustain the limited resources.

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The institution of *lath panchayat* reflects the age old tradition of village level governance system for forests and water resources. A number of such *panchayats* are still functioning in the landscape, though they do not have official or legal sanctity in the statutory forest policy and legislation. The foundation of many such institutions and customary frameworks is rooted in the concept of treating forest and water as common property resources. As described under the section on Forest Management earlier, the gradual control over the forest by the pre-colonial rulers was followed by the determined actions by the British administrators who laid down an elaborate mechanism of control. The system regulated the use of timber, non timber forest products and put restrictions even on the collection of leaf litter and grazing of livestock. Organised resistance by the communities under the local leadership in the 1920s led to the restoration of certain rights along with the declaration of *Van Panchayats*.

The impact of the *Van Panchayats* system on peoples' livelihood and conservation of forest resources has been a case of mixed bag; owing to its dependence on a whole lot of external as well as internal factors. The authority of the forest and revenue department officials and the extent and status of forest on the *Van Panchayat* land being the main external factors; while inequity of exercising forest rights, thefts, and free riders are amongst the main internal factors. An effective coordination of the elected leaders of the *Van Panchayat*, the forest department and the revenue department officials perhaps under a single umbrella could enhance the success. The enactment of the Scheduled tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 has further enhanced the chances of effective community participation in the management of natural resources in the region. In the backdrop of existing knowledge of the bio resources, socio economic aspirations of the communities and current management of forest resources in the landscape the following action priorities are emerging.

Action Priorities

Defining conservation targets

Given that the target landscape faces a high degree of uncertainty about the status of its natural resources (including biodiversity, land and water), primarily because complete inventories are yet to be made, defining conservation targets is a fundamental challenge.

Considering the heterogeneity in bio-physical conditions and strong variations in the relationship between people and nature, particularly along the wide altitudina/climatic range that prevails in the landscape, the social and ecological values tend to manifest at different scales. Therefore, the successful negotiations of trade-offs will come with reasonable attention to political, social, economic and ecological dynamics at multiple spatial and temporal scales,

The understanding of resources and their linkages with human needs and aspirations is at a very low ebb in the landscape and poses a formidable challenge while defining conservation targets at different levels and scales.

and would critically depend on effective interactions across these scales (McShane et al., 2010). This understanding of resources and their linkages with human needs and aspirations is at a very low ebb in the landscape and poses a formidable challenge while defining conservation targets at different levels and scales. In this context, it is important to understand the nature of variations in institutional and socio-ecological outcomes and their drivers (Persha et al., 2010).

Understanding conservation and development trade offs

While analyzing conservation imperatives for the landscape, the key challenge would be to effectively use development programmes in the service of conservation. This implies,

While analyzing conservation imperatives for the landscape, the key challenge would be to effectively use development in the service of conservation.

utilizing human welfare targets (development means) as the best choice for achieving conservation (Salafsky 2010). It would also imply that the key challenge for attempting a conservation strategy for the landscape is not to ignore the human activities, but to understand how they affect the ecosystem (i.e, goods, services and the livelihoods).

In the context of above, the most prominent challenge is to understand and address the ongoing processes of rural transformation, which include rapidly disintegrating (i) socio-cultural value system, (ii) indigenous knowledge and practices, and (iii) local institutions. This has led to: (a) intensive migration from remote rural areas to the urban centres within and outside the landscape, thereby resulting in a multitude of social and environmental concerns ranging from changes in land use to health and hygiene, (b) weakening of linkages of inhabitants with natural resources causing deterioration in the state of resource protection, (c) eroding genetic resources, especially from traditional farming systems.

Building participatory conservation alternatives

In view of the above and considering more inclusive notion of conservation and sustainable use, finding novel or strengthening existing forms of community participation and local governance of natural resources has emerged as a key challenge. This would mean, not to deny urgency of protecting resources, but to explore alternative and more participatory ways to reach this objective in order to seek sustainability (Pimm et al., 2001). Of late, across the globe, the participatory approaches have been found to represent a reliable and widely accepted complementary modality to operationalise conservation efforts (Velazquez et al., 2009).

...considering more inclusive notion of conservation and sustainable use, finding new or strengthening existing forms of community participation and local governance of natural resources has emerged as a key challenge.

Incorporating climate change adaptation and mitigation dimensions

Considering that the Climate Change is a reality and the mountain ecosystems, their components and processes, are highly sensitive to these changes, it is imperative to duly integrate Climate Change dimensions into the conservation framework. Given our current understanding on the impacts of climate change on metapopulations, habitat distribution and land use changes, issue, such an integration, however, poses a big concern, and future biodiversity research and conservation strategies would face challenge to re-orient focus and scope by integrating spatially and conceptually more dynamic aspects at the landscape level (Opdam and Wascher 2004). Further, accommodating the Climate Change adaptation strategies that fully incorporate revised priorities for biodiversity, and the recognition of the rights and opportunities for the involvement of indigenous peoples and local communities (Sandwith, 2008) becomes a real challenge.

Develop a functional network of institutions

Realising the immediate need to address above mentioned challenges, synergizing resources of various organizations

to establish a functional network of institutions in the landscape would be a big challenge. Bringing together the local, national, regional institutions, and making them to agree to take ownership of activities and assume responsibility for mobilizing resources in synergistic manner to address issues of conservation is a real concern.

Emerging opportunities

In the light of the above priorities, the landscape presents immense opportunities to address the issues and challenges. The major opportunities include the following:

Key Challenges	Opportunities offered by the landscape
Defining conservation targets	• Strong altitudinal/climate transition, prevailing heterogeneity in bio-physical conditions and strong variations in the relationship between the people and nature. • Richness, representativeness, and uniqueness of biodiversity elements and other bio-physical resources. • Clear zones/areas of wilderness (including snow, alpine and sub alpine areas), sacred and uniqueness values. • Discernible natural water zones (glaciers, rivers, lakes, and springs). • Abundant forest zone with diversity of forest types, goods and services. • Prevalence of indigenous farming systems, knowledge and practices.
Understanding conservation and development trade-offs	• Diversified genetic heritage as a source for livelihood. • Availability of fertile river valleys with irrigated land for optimization of agricultural production. The rich mosaic of traditional rain-fed agriculture as a means of maintaining genetic diversity and immense possibilities for adaptive management of agriculture systems using models best suited for local ecological/economic conditions. • Rich and diversified traditional ecological knowledge to connect intangible with tangible benefits. • Strong basis of cultural value systems and local institutions • Diverse range of ecosystem and cultural services, ranging from maintenance of water flow to carbon sequestration, and from recreational to spiritual values.
Building participatory conservation alternatives	• Long-term natural and cultural interactions which have depended on the local level governance systems resulting in successful traditions of participatory, culture based management of natural resources. • Continuum with Nanda Devi Biosphere Reserve – a model landscape for biodiversity conservation and community-based development. • Existence of a legally defined protected area – Askot wildlife sanctuary.
Incorporating climate change adaptation and mitigation dimensions	• A typical mountain landscape with multiplicity of climate sensitive resources, habitats and ecosystem goods and services. • Diverse responses of endemic, sensitive and key stone species. • Maintenance of global value of ecosystem services emanating from glaciers, forests, and rangelands. • Diversity in vulnerability distribution • Indigenous knowledge and practices to cope with and adaptations to hazards, changes and extreme events
Develop a functional network of institutions	• Enabling environment and policy back-up. Major National level initiatives including– National Environment Policy, National Action Plan on Climate Change – National Mission on Sustaining Himalayan Ecosystems, Greening India Mission and Specific task force of planning commission to look into problems of hill states and hill areas, National Biodiversity Action Plan and State Biodiversity Board. • Existence of traditional systems of co-existence and community based management • Commitments at local and national level for environmental conservation and sustainable development • Common agreement on socio-cultural, socio-economic and bio-physical values, and their rapidly deteriorating state in the target landscape

... accommodating the Climate Change adaptations strategies that fully incorporate revised priorities for biodiversity and the recognition of the rights and opportunities for involvement of indigenous peoples and local communities becomes a real challenge.

Details on possible actions, processes and outcomes need to be deliberated with the diversity of stakeholders in the region. The custodians of resources, community institutions as well as Government departments, are in position to implement the actions on the ground. There are several schemes and programmes of the Central and the State Governments that need to converge for defining a sense of definite direction towards sustainability in the region. The conservation and development goals need to be phased out in the short, medium and long term measures, which would direct the spread of actions and priorities in different identified zones of the landscape. Guidance from the traditional ways and the framework of mountain specificities would become the corner stone of this ambitious human endeavour to save a magnificent piece of earths' sacred nature for perpetuity.

Photo: Ravindra Joshi

5 Building Knowledge

Photo: Tarun Belwal

As reflected in the preceding sections, the target landscape is extremely heterogeneous in terms of its physical, biological and socio-cultural environment. The landscape, in spite of diverse type of pressures, has, as of now, to a large extent succeeded in maintaining richness and uniqueness of floral and faunal components, naturalness in the wilderness areas, and overall integrity of socio-cultural systems. *Albeit*, the increasing impacts of rapidly transforming socio-economic conditions and increasing developmental demands, especially urbanization, sadly with poorly planned infra-structure, are clearly visible across the landscape. The Conservation Strategy for KSL- Indian Part, as included in the previous chapter, has attempted to elaborate upon various sectoral and cross-sectoral issues and action priorities for conservation and development of the target landscape. It has been emphasized that the effective implementation of above strategies and action plans by various implementation agencies, in cooperation and collaboration with the inhabitants, would be crucial to ensure long term economic and ecological security of the landscape.

All such strategies, for successful implementation, however, would need to build on scientifically sound decision making system. The system which integrates robust datasets generated through standard assessment and monitoring protocols. Also, this gives adequate emphasis on uninterrupted information/data generation from diverse sectors of environment.

Following the axiom '*You manage what you measure*', a Comprehensive Environmental Monitoring Plan (CEMP) for the target landscape has been proposed (Box 5.1). It provides basic elements of an environmental monitoring framework which is built through inter-connection among various parameters of physical, biological and social environment.

Box: 5.1 Objectives of CEMP in KSL

- establish an institutional mechanism for systematic recording of environmental changes including climatic variables
- promote the early identification of and response to potential adverse environmental impacts associated with anthropogenic pressures and natural changes (including climatic)
- document the ecosystem response to conservation efforts and changed land use practices
- detect progressive changes in traditional cropping systems, livestock husbandry practices and agri-biodiversity in the region vis-a-vis adaptations by local communities to changing climate
- facilitate and encourage regional knowledge sharing and trans-boundary cooperation for conservation of natural resources, globally threatened species and sites of ecological and cultural significance

Addressing Information Gaps

It is visualized that the long-term environmental monitoring programme would greatly help in reducing the knowledge gaps, lack of which is a major impediment in understanding, modeling, and predicting of climate change impacts at various scales. Towards realizing this, the CEMP aims at: (i) building regional and national capacity for long term ecological research and environmental monitoring; (ii) supporting landscape level conservation of ecosystems, priority species and habitats, and (iii) ensuring continuous flow of reliable data/information on identified parameters so as to help policy planners and decision makers. Broadly CEMP for KSL-Indian part would follow the objectives as listed (Box 5.1).

Ensuring Datasets

As elsewhere, CEMP for target landscape gives major emphasis on ensuring availability of systematic reliable datasets, collected using common accepted protocols, to support decisions on issues pertaining to conservation and development. Broadly, the scope would span from understanding of on-going processes of rural transformation on one side to the impact assessment related to climate change on the other (Figure 5.1).

As a cardinal principle, the monitoring programme in the landscape would: (i) remain simple, reliable, accurate and repeatable, (ii) cover key environmental parameters at landscape, ecosystem, habitat and plot/site levels, and (iii) represent a large transect along the altitudinal gradient.

Monitoring parameters

The following parameters are suggested for monitoring at different levels:

Land use/Land Cover (LULC): Realizing that land use changes are among the most important transformations at the landscape level, the changes in LULC categories due to various reasons including rapid development of infra-structure, human habitation and river valley projects, is proposed to be constantly monitored. This would require establishment of spatial database on major LULC categories, such as, forests, cultivable waste, rangelands, protected areas, human habitations, livestock camps, wetlands and road network, etc.

Climatic parameters: Considering major altitudinal zones in the landscape, establishment of at least one Automatic Weather Station (AWS) in each of the representative zones and a number of WSs at multiple-locations has been proposed. Amount and duration of rain, snowfall, mean monthly temperature (minimum and maximum), wind velocity, and relative humidity are the recommended key climatic variables for systematic monitoring. Other parameters would include: wind speed, duration of cloudiness, air pollution, etc.

Cryosphere: Long term monitoring of the recession (or, increase) in expanse of glaciers would form an important component of monitoring. Effective use of RS & GIS tools would help in achieving this task. This monitoring is proposed to be undertaken in collaboration with specialized institutes such as Wadia Institute of Himalayan Geology (WIHG), and Space Application Center (SAC), Ahmadabad, etc.

Water resources: Baseline maps showing drainage pattern and distribution of water, especially during the pinch period (mostly summer months), would be essential to detect changes in water availability in the landscape. Water table/discharge at selected locations and under different environmental conditions is proposed to be yet another simple parameter to monitor. Monitoring of water quality, especially drinking water, is also an important consideration under CEMP. Such monitoring may concentrate on natural springs and streams feeding to human habitations. Periodic monitoring of changes in the water use pattern in major sectors viz. domestic use, livestock demand and irrigation, etc., will be critical for developing a suitable Decision Support System (DSS) for the planners.

Edaphic parameters: Standing state of nutrients in soil at selected sites, soil pH, and soil moisture during growing season are the major parameters which vary at spatio-temporal scales. Various indices of erosion and rate of siltation of water bodiesare proposed to be monitored at selected sites. River dynamics in lower valleys, dynamics of smaller streams at higher altitudes and also changes in the edaphic and moisture conditions on either side of dams are other

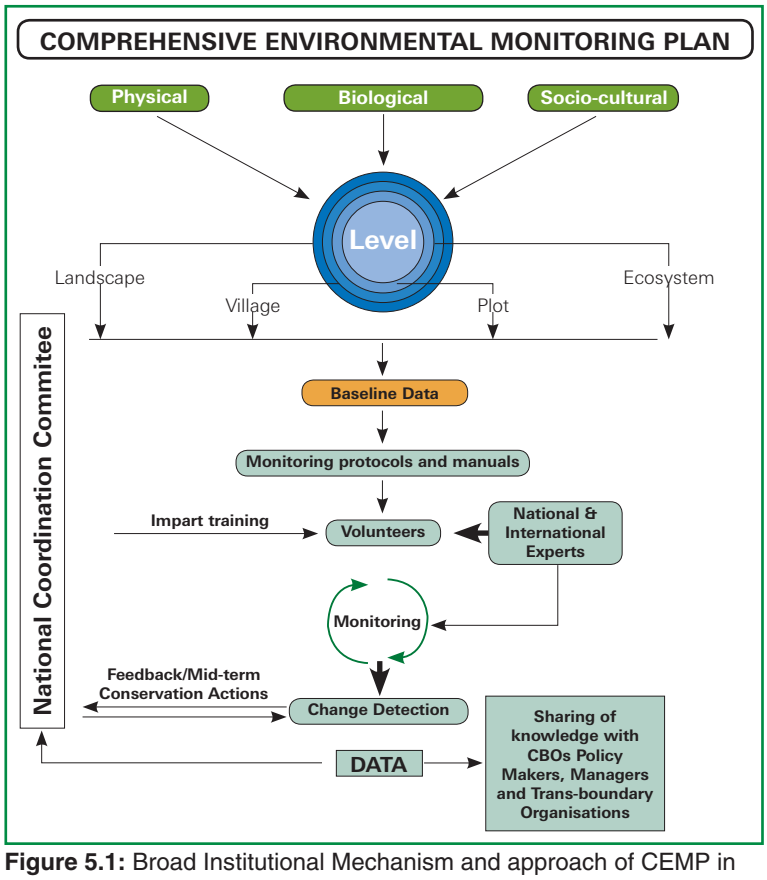

Figure 5.1: Broad Institutional Mechanism and approach of CEMP in KSL-India part


Photo: Lalit Giri

important parameters to be monitored. Estimation of soil C-sequestration in different land use categories and under major forest types should be of great value in the long term for valuation of Ecosystem Services (ESS).

Pastoral practices: The livestock composition in the KSL-India varies considerably from lower to higher altitudes. Increase or decrease in the proportion of a particular species can have strong influence on the rangeland vegetation. Similarly, changes in land use in some areas can lead to changed in migration patterns. The cause and effect of such changes need to be monitored regularly. Coordinated efforts are required between the local community institutions, departments of forestry, revenue and animal husbandry to keep track of migration pattern, duration of stay at various camps and seasonal use of pastures. Further, monitoring adaptations to changing climate assumes a great significance for the landscape.

Vegetation dynamics: Vegetation dynamics (i.e., succession, nutrient and energy cycle, and phenology) would form an important parameter. Proportions of major forest types e.g., oak forests, pine forests, mixed broadleaf, hemlock forests, bamboo brakes and area under riverine forests would indicate the certain state of environment. The geo-referenced permanent plots and reference points for repeat photography to monitor general structure and composition of vegetation are proposed to be established within representative forests as well as alpine rangelands in collaboration with the nearest academic institutions or interested professionals. Within permanent plots, proportions of various indicator species including rare and threatened taxa as well as alien invasive species would be monitored. C-sequestration potential of various forest types would also need to be monitored for documenting the flow of Ecosystem Services and for quantification.

Ecologically sensitive areas (ESAs): Critical wildlife habitats (e.g., key feeding and breeding areas for threatened


Photo: KC Sekar

fauna), wintering ranges of ungulates such as alpine marsh meadows, wildlife corridors and movement paths, botanical hotspots, sites of endemic flora and unique geological features can be categorized as ESAs. Through an appropriate institutional mechanism and CBOs, selected ESAs in the landscape could be monitored at the regional as well as local scales.

Human and livestock health: A network of disease surveillance system and regular monitoring of human and livestock health would be essential to prevent potential major losses. Incidence of communicable and zoonotic diseases among humans and livestock, incidence of heat stress and heat stroke, outbreak of insect pests and parasites need to be recorded systematically in the landscape. A simple measure to monitor the incidence of pathogens among domestic livestock and wild ungulates / carnivores could be done by regular examination of faeces for parasitic load.

Rural transformations and consequences: Towards understanding conservation and development trade-


Photo: Lalit Giri

offs in the landscape (described as a key challenge for the Conservation Strategy) it would be important to establish a continuous monitoring system which looks into the process of rural transformation wherein patterns of changes in socio-cultural value systems, indigenous knowledge and practices, structure and functioning of local institutions, etc. This need regular unbiased evaluation. The outcome of such investigations is expected to help in better understanding of prevalent issues with multifaceted implications. Process of migration, both within and out-side the landscape, is one such issue having ramifications on NRM, genetic erosion from farm lands, land use, and socio-cultural integrity. Cautiously designed protocols, involving organizations and individuals having skills and expertise on socio-cultural dimensions, would need to be engaged to help in achieving this task.

Climate Change vulnerability of local communities: Possible impacts of climate change on the socio-economic conditions of local communities and influence on land use practices need to be recorded systematically in the landscape. Monitoring the access to, and utilization of various biomass resources and conflicts (if any), is important in order to evolve new approaches and strategies to mitigate negative impacts on marginal communities and mainstreaming such interventions into the national and regional development policies. Other key parameters for socio-economic monitoring include: gender ratio, resource use patterns, indigenous knowledge system, traditional knowledge like usage of ethno-botany and sale and extraction of various NTFP species, etc.

Energy resources and consumption pattern: Nature and quantity of use of biomass in the form of fuel wood, twigs/ bushes, crop residue, animal dung, briquette, charcoal and coal, biogas or liquid fuel viz., Kerosene, Diesel, LPG/CNG, Gasoline (petrol); Grid electricity, Micro hydro-electricity, Solar, Wind and other power for various house hold and other purposes are the possible parameters for monitoring energy use patterns.

Indicator, RET&E and keystone species: 'Keystone species' would form major monitoring object to detect the health and vitality of ecosystem. In addition, the population dynamics of Rare, Endangered, Threatened and Endemic (RET&E), and indicator species deserves continuous monitoring, especially to address issues of ecological conservation in the landscape.

Agro-biodiversity: Area under irrigated and dry land farming, land holding pattern of the local communities, cropping pattern and agri-biodiversity form important parameters for monitoring. Distribution and the extent of land races/ traditional vis-a-vis introduced varieties is also proposed for monitoring. Preparation of such data base will rely heavily on GIS and RS tools.

Abundance and coverage of Alien Invasive Plants (AIPs): Appearance of certain weeds especially *Lantana camara*, *Parthenium hysterophorus*, *Cassia tora*, and *Eupatorium adenophorum*, etc., in new areas needs to be monitored w.r.t., presence or absence, number of patches under invasive species, reappearance of natural shrub and herb species after eradication of AIPs, reappearance of AIPs after eradication, none or little natural plant reappearance, flowering, fruiting and seed dispersal and soil seed bank of AIPs.

Flow of benefits of environmental services: Assessing the impacts of anthropogenic and natural factors on services and their socio-economic, socio-cultural and overall environmental values at different spatial and temporal scales would form an important component of CEMP. However, realizing the complexities and intricacies involved in such evaluations and their valuation, there is a need for regional cooperation in building skills and expertise, and for developing common strategies and protocols.

Seeking Convergence

As indicated earlier, a number of conservation objectives with action priorities have been identified for the target landscape. It would be desirable to establish an effective integration of monitoring programmers with such interventions. Among others, following should help in such integration:

- *Strengthening of Van Panchayats (VPs):* having understood the role played over the years across the region (Uttarakhand), and potential of Van Panchayats in equitable sharing of forest resources and participatory resource management, it is proposed to strengthen community forests (i.e.,VPs) in the landscape. This can be achieved largely through capacity building and technical support to local management committees for better management of resources. It is expected that adequate training and awareness amongst members of VPs, frontline staff of the Forest Department and other volunteers from Community Based Organizations (CBOs) and Civil Society would go a long way in implementing programmers for monitoring key parameters so as to detect the status of VPs. Such a team of trained volunteers would also assist in survey and preparation of participatory management plans.
- *Restoration of degraded forests and rangelands:* Most of the forests in the landscape, especially in the mid hills, are severely degraded due to high levels of biomass harvesting. Identification of representative forest patches with diverse range of degradation in different watersheds within the landscape, and appropriate interventions in such patches for restoration and assisted natural regeneration is likely to improve the forest status. Baseline data on the canopy cover, forest structure and regeneration status of such sites, with periodic monitoring is proposed, in collaboration with volunteers from the community. Similarly, following local interventions for the restoration of heavily degraded rangelands (both in the temperate and alpine regions), monitoring of ground cover and estimation of the proportion of unpalatable species may be taken up at selected sites.
- *Protected areas and conservation reserves:* The Askot Wildlife Sanctuary, that lies in the centre of KSL – India, awaits final notification and settlement of traditional rights of local communities. Once the boundaries of the sanctuary have been realigned and rights of the local communities are amicably settled, the conservation status of biodiversity as well as overall environmental conditions are likely to improve in the landscape. The management plan for Askot WS is yet to be realized. It is understood that a number of management interventions at the local scale would be proposed in the aforesaid plan, including wildlife and habitat monitoring plans, and mechanism(s) to resolve cases of offence related to wildlife and conflict.

  A select number of Conservation Reserves have been proposed within the KSL-India. The conservation reserves, once notified, would require active local management committees to ensure preparation of simple, yet effective management plans and monitoring protocols for key variables.

  The proposed Conservation Strategy emphasizes on developing zone-wise plans for activities related to conservation and development in the landscape. Therefore, needs assessment (ecological, economic, and socio-cultural) and subsequent monitoring with respect to fulfilment of such requirements assume importance.
- *Alternate livelihoods through NTFPs:* The funds under India's flagship programme, Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) are also available to the rural people of KSL-India. The works that can be supported under MNREGA mainly fall in the category of soil conservation, watershed management, road connectivity, etc. The families below poverty line (BPL), particularly the ones that are largely dependent on collection and sale of NTFPs for their livelihoods, may be given priority under this programme. One of the important parameters for monitoring the livelihood pattern in the KSL – India would be the number of BPL families in each block, their dependence on forest resources and the impact of altered socio-economic conditions.

  Further, as intended in the conservation strategy, commissioning of participatory evaluation systems to support and compensate the efforts of indigenous communities in maintaining the goods and services of the ecosystem is critical. Such mechanisms would depend on the availability of reliable information pertaining to contributions made and the benefits drawn. In addition,


Photo: Sabine Leder

emphasis of the strategy is to promote value added premium products and ecosystem based tourism. In all such cases it is important to concurrently put in place effective impact (positive and/or negative) monitoring system.

- *Sacred sites and solid waste management:* Considering diverse manifestations of sacredness in the landscape and its direct or indirect contributions to the overall maintenance of bio-physical values and socio-cultural integrity of the landscape it is necessary to put in place a comprehensive strategy for the conservation and management of such sites. In this context, involvement of local NGOs, CBOs and civil society at large would prove to be effective.

  Furthermore, management of solid waste en-route and camping sites for such places assumes priority. Appropriate indicators of cleanliness and mechanisms for waste management need to be utilized with periodic monitoring. In regard to this use of bio-degradable products should be encouraged with 'ban' on the non-biodegradables.

Striking Synergy

How 'good' a synergy is build amongst diverse players and actors would define the path of success. While local communities form the core at ground level, the relationship should spread to the global/regional levels. The participation of Indigenous Communities in the whole process would hold the key to success. Further, the linkages with regional/global and national programmes are planned to be proposed, through a 'sieve and funnel' mechanism which allows percolation of really desired components.

The success would be determined through an effective synergy of various local level organizations (GOs, NGOs, CBOs, etc.). Establishment of a coordination mechanism at the local level, for effective use of available financial resources, in the right perspectives of KSL-Conservation Strategy is important. A consortium of organizations can be envisaged to implement, monitor and evaluate the programmes and projects to meet the goals stipulated in the Strategy. The KSL-core group of organizations could act as a technical advisory cell. This cell, in consultation with the proposed consortium , should venture into exploring possibilities of adequate funding under ongoing national schemes, for implementation of KSL Conservation Strategy and Monitoring Plan. Further, the opportunities available

The participation of Indigenous Communities in whole process would hold the key of success. ....the linkages with regional/global and national programmes are planned, through a sieve and funnel mechanism which allows percolation of really desired components.

Photo: Sabine Leder

under global initiatives can be harnessed for attracting funds, skills and technologies to realize long term goals of the initiative.

A successful conservation and monitoring programme for the landscape would heavily depend on the availability of reliable baseline information, which in turn requires involvement of adequately skilled personnel from the professional organizations. Therefore, a synergy through effective collaboration and networking of such organizations needs to be encouraged. Apart from the expertise of core institutions (i.e., GBPHIED, UKFD and WII), several other local organizations can contribute significantly towards striking this synergy. Availability of several specialized organizations, such as Forest Research Institute (FRI) Dehra Dun; Zoological, Botanical and Forest Survey of India; Indian Institute of Remote Sensing (IIRS), Wadia Institute of Himalayan Geology (WIHG), Indian Institute of Technology, Roorkee (IITR); Herbal Research and Development Institute, Gopeshwar; Kumaun University (both Nainital and Almora Campuses) and affiliated Government P.G. Colleges at Pithoragarh, Berinag and Narayan Nagar; various Government Departments (e.g., horticulture, agriculture, animal husbandry, fisheries, irrigation, soil conservation, tourism, planning, etc.), and well established NGOs and CBOs in the landscape and its vicinity, provide an excellent opportunity for putting in place a good and effective network.

...endeavour would be to institutionalize the participation from schools and colleges, so as to facilitate simultaneous multi-location monitoring. In the process, this will help in building skilled manpower for long-term sustainability...

Among others, endeavour would be to institutionalize the participation from schools and colleges in the process, so as to facilitate simultaneous multi-location monitoring. In the process, this should help to build skilled manpower for long-term sustainability of such initiatives. Another important, albeit ignored, aspect of synergy is to bring in the disciplined uniformed manpower in this fold, such as Paramilitary Groups (e.g., Indo Tibet Border Police-ITBP), and workforce available in the form of National Cadet Corps -NCC, etc. These groups, especially the ITBP, man the areas mostly inaccessible to the common people. They have organized manpower and infrastructure in remote and hostile higher Himalayan areas in the landscape. Their active collaboration in the initiative would not only facilitate information generation from remote and un-inhabited areas but also in building capacity of poor indigenous people from far flung areas, to withstand the affects of changing climate and economies. It is well known that ITBP has been instrumental in organizing the Kailash Mansarovar Pilgrimage from the Indian side, and is responsible for providing medical, telecommunication and security cover to the pilgrims, up to Lipu-lekh pass and back. ITBP Disaster Management Teams trained in casualty detection have been placed enroute to conduct rescue operations, if required.

Photo: Sabine Leder

Photo: Lalit Giri

Notwithstanding the fact that KSL part of India has a definite flare of uniqueness, which is reflected in extreme heterogeneity of biological, physical and socio-cultural forms, in the age-old traditions of unparallel system of indigenous knowledge and practices, and in its rich ethos of living in harmony with nature through reverence to the extraordinary power of the sacred, as elsewhere in the mountains. The landscape, however, in the recent times, is experiencing a rapid transformation. The ongoing process of demographic and land-use changes, a consequence of changing needs and aspirations of the inhabitants, manifested by way of human migration, increased activities related to infrastructure development, that often include poorly planned land development and road construction, are amongst the most visible and apparent drivers of change. However, other subtle as well as chronic forms of disturbances are active over the millennia, thus impacting on different components of environment in a myriad of ways. All these, have affected the overall integrity of ecosystems and quality of life of the inhabitants of the landscape. This calls for urgent attention and need for concerted actions. The actions should be governed by a long-term vision, responding to a new set of thinking that should suitably align with the economic, socio-cultural and environmental realities prevailing today. Such a vision needs to be value based, pragmatic, and should lead to a systematic and planned path of sustainability.

It is not only about the future of sensitive taxa, critical habitats, goods and services of the ecosystems, but also about the people, their livelihoods and value systems, cultures and traditions. In simple words, the interests of indigenous people should be at the forefront, keeping the ecology and economy of the landscape in mind.

> ...other subtle as well as chronic forms of disturbances are active over the millennia, thus impacting on different components of environment ... have affected the overall integrity of ecosystems and quality of life of landscape people...

While thinking on issues mentioned above, particularly in the case of mountain landscapes and their resources – as in the present case, one cannot afford to ignore the imminent impacts of Climate Change, which need to be accommodated in the vision and the envisaged action plan, as an important additional factor.

Harnessing Sacredness and Knowledge Repository

In the above context, arriving at an appropriate vision and action plan poses a real and formidable challenge; the difficulties are enormous. Yet, opportunities do exist. Any thought on the landscape, among others, immediately points towards the possibility of harnessing the diversity of sacred manifestations, in the right perspective of conservation and development – this presents the greatest opportunity. Long existing linkages of people with nature, and the consequent and evolving repository of indigenous knowledge and practices (IKP), present yet another window of opportunity. Logically, to develop synergy between these two opportunities, one can explore the possibility of building on the strengths of traditional ways of life and respecting the framework of mountain specificities, so as to help achieve the daunting task of saving the sacred land, as well as harnessing the virtues of this unique landscape.

As it stands now, in spite of its extra-ordinary value, the landscape is deficient in terms of authentic datasets. These need to be generated through robust scientific approaches, to effectively articulate plans for management of the landscape.

This huge shortcoming needs to be addressed with right earnest, so as to move closer towards the above mentioned path. Building synergy amongst various stakeholder groups is an absolute must, and would help enormously in achieving this target.

As it stands now, in spite of its extra-ordinary value, the landscape is deficient in terms of authentic datasets; these need to be generated through robust scientific approaches, to effectively articulate plans for management of the landscape.

KSL Conservation Initiative

Recognizing the importance of the KSL, a modest beginning has been made by ICIMOD & UNEP in collaboration with partner institutions in China, India and Nepal, in the form of 'Kailash Sacred Landscape Conservation Initiative (KSLCI)'. The overall "Vision" is to conserve this sacred landscape, and the "Mission" is to preserve its unique and rich biodiversity, cultural heritage, and vital ecosystem services, through transboundary ecosystem management and participatory approaches.

Conceived on a long-term time frame, KSLCI seeks to: (i) enhance regional cooperation and build capacity with a view to put to use appropriate ecosystem management approaches, (ii) encourage fast-track planning and implementation of transboundary conservation measures, and (iii) enhance complementarities and coordination among diverse actors involved in the KSL. The Regional Cooperation Framework (RCF) has been envisaged to provide the basis for implementation of KSLCI. The RCF has been formulated on the principles of National Sovereignty, Consultative and Participatory Management, Equitability and Inclusiveness, Sustainability, Partnership, Ecosystem Management and Transboundary Cooperation.

The Regional Cooperation Framework (RCF) has been envisaged to provide the basis for implementation of KSLCI

The outcome of Preparatory Phase of KSLCI has resulted in: delineation of the landscape following participatory and iterative process; development of the KSL Feasibility Assessment Reports which serves as an environmental and socio-economic baseline; preparation of a Conservation Strategy that provides comprehensive details of conservation priorities, threats, opportunities and the action plan; and development of a Comprehensive Environmental Monitoring Plan that provides a framework for enhancing regional cooperation for environmental monitoring and long-term ecological research.

The 'Start-up Phase' of KSLCI, focused on development of regional and national implementation frameworks, and the preparation of work plans for full-scale implementation of KSLCI (to commence in 2012). The Start-up phase, as was envisaged, resulted in development of work plans for implementation of the Conservation Strategy, the Comprehensive Environmental Monitoring Strategic Plan (CEMSP), and initiate consultation for Community Based Conservation Initiatives.

As evident, the cumulative outcomes of the above two phases of KSLCI has provided adequate baseline material to realize the vision as articulated in the beginning. It has, to large extent, also provided a holistic framework for realizing the Conservation and the Development goals in a balanced manner. Also, the inbuilt mechanisms of regional cooperation under this initiative would help in building technical skills and expertise, where required.

...it is believed that the level of involvement and intensity of participation of indigenous communities in the whole process would provide the vital energy for the success of this initiative.

Thus, at the national level, collective endeavour would be to take the benefit of this opportunity to address issues of KSL-India part. This can only happen, and yield desired results, if the diverse stakeholder groups come together to participate and contribute. However, it is believed that the level of involvement and intensity of participation of indigenous communities in the whole process would provide the vital energy for the success of this initiative. Let the work begin, in tandem with the stakeholders of the landscape, for the conservation of one of the holiest landscapes on the face of earth that holds transcendent beauty and powerful motivation.

'Yatra' Ways

From the foregoing descriptions it is evident that the diversity, uniqueness and naturalness accompanied by immense spiritual value of the landscape have historically attracted pilgrims, adventure seekers and mountaineers. Further, trade journeys, tours by early British administrators and scientific voyages have also been fuelled by this attraction. The '*Yatras'* (journeys) of religious leaders such as Tirthankar Adinath Vrishabhadeva, Adi Shankaracharya, Jesuit priests; explorers and geographers such as Pt. Nain Singh Rawat, Kishan Singh Rawat; administrators like Traill, Batten, Beckett, Sherring; scientists and naturalists such

Photo: GS Bhardwaj

as Strachey, Winterbottom, Moorcroft and Dutheie, etc.; writers and spiritual seekers such as Swami Pranavananda and Swami Narayan, etc., have helped build a historical, bio-physical and socio-cultural perspective for the region in general and the Kailash landscape in particular. More recently, '*Yatras*' conducted by the PAHAR team, and the group-pilgrimage to Kailash Mansarovar have added to the knowledge base. In addition, thousands of people have passed through the landscape over centuries in caravans practicing the barter system of trade. The landscape, with diverse manifestations of sacredness and consequent contribution towards sustained socio-cultural fabric and maintenance of wilderness, holds special significance in the present day context when large numbers of people across the globe wish to visit the area for reasons of pilgrimage, adventure, and mountaineering and for experiencing the diversity of nature and culture.

Across the human history, '*Yatras*' have served as a subtle and effective mechanism to interact with the community, learn about nature and culture, and explore possibilities for improving livelihoods and detecting changes over time. This potential of the '*Yatras*' , as a means for social and environmental intervention, needs to be properly harnessed. This would require popularizing the concept of '*Yatra*' as a: (i) tool to connect with people (stakeholders), and nature so as to understand/document patterns of change over time; (ii) process of learning and sharing experiences; and (iii) means of promoting livelihood options. The project would endeavour to widen the concept of landscape '*Yatras'* (journeys through landscape) to come to rescue to the: (a) diminishing traditions of art, architecture, folk customs, indigenous systems of food, agriculture and livestock, along with the knowledge base that sustained the rich biological and cultural diversity in the landscape; (b) fast deteriorating knowledge and practices related to the spiritual, religious and bio-cultural significance of sacred natural sites as well as existing places of architectural and heritage value; (c) rampant outmigration of young people from the landscape and the consequent changes in the demography; and (d) rapid landscape transformation and resultant loss of livelihood potentials. Therefore, the '*Yatra*' approach, among others, forms an integral part of KSLCI implementation plan in India, particularly to establish meaningful samvad (dialogue) with diverse groups of stakeholders so as to ensure their participation in defined actions of environmental monitoring, resource conservation and sustainable use of landscape goods and services.

Photo: Neeraj Pant

Abbreviations Used

AIPs	Alien Invasive Plants
AWLS	Askot Wild-Life Sanctuary
AWS	Automatic Weather Station
BCRLIP	Biodiversity Conservation and Rural Livelihood Improvements Project
BMCs	Biodiversity Management Committees
BPL	Below Poverty Line
CAPART	Council for Advancement of People's Action and Rural Technology
CBD	Convention on Biological Diversity
CBOs	Community Based Organizations
CEMP	Comprehensive Environmental Action Plan
CEMSP	Comprehensive Environmental Monitoring Strategic Plan
DCFR	Directorate of Cold-water Fisheries Research
DFO	Divisional Forest Officer
DRDA	District Rural Development Agency
ENVIS	Environmental Information System
ESAs	Ecological Sensitive Areas
ETF	Eco Task Force
FDA	Forest Development Agency
FRI	Forest Research Institute
GBPIHED	G.B. Pant Institute of Himalayan Environment and Development
GoI	Government of India
GOs	Grassroots/Government Organizations – Social Movement Organization (SMOs)
G-SHE	Governance for Sustaining Himalayan Ecosystem
HGVS	Himalayan Gram Vikas Samiti
HKH	Hindu Kush Himalayan
HRDI	Herbal Research & Development Institute
HSC	Himalayan Study Circle
ICIMOD	International Centre for Integrated Mountain Development
IIRS	Indian Institute of Remote Sensing
IITR	Indian Institute of Technology, Roorkee
IKP	Indigenous Knowledge Practices
IKS	Indigenous Knowledge System
IRDP	Integrated Rural Development Programme
ITBP	Indo Tibet Border Police
IUCN	International Union for Conservation of Nature
JFM	Joint Forest Management

KSL	Kailash Sacred Landscape
KSLCI	Kailash Sacred Landscape Conservation Initiative
LULC	Land Use/Land Cover
MAB	Man and the Biosphere
MAPs	Medicinal & Aromatic Plants
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoEF	Ministry of Environment and Forest
NAPCC	National Action Plan on Climate Change
NBA	National Biodiversity Authority
NBAP	National Biodiversity Action Plan
NCC	National Cadet Corps
NDBR	Nanda Devi Biosphere Reserve
NEDA	Non-conventional Energy Development Authority
NEP	National Environment Policy
NGOs	Non-Governmental Organizations
NMSHE	National Mission for Sustaining the Himalayan Ecosystem
NPV	Net Present Value
NTFPs	Non-Timber Forest Products
PA	Protected Area
RCF	Regional Cooperation Framework
RET&F	Rare, Endangered, Threatened and Endemic
RKVY	Rashtriya Krishi Vikas Yojna
RMCs	Regional Member Countries
SAC	Space Application Center
SBBs	State Biodiversity Boards
TA	Territorial Army
TAR	Tibetan Autonomous Region
TLZ	Timberline Zone
UKFD	Uttarakhand Forest Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VPs	Van Panchayats
WIHG	Wadia Institute of Himalayan Geology
WII	Wildlife Institute of India
WNBR	World Network of Biosphere Reserve
WS	Weather Station

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