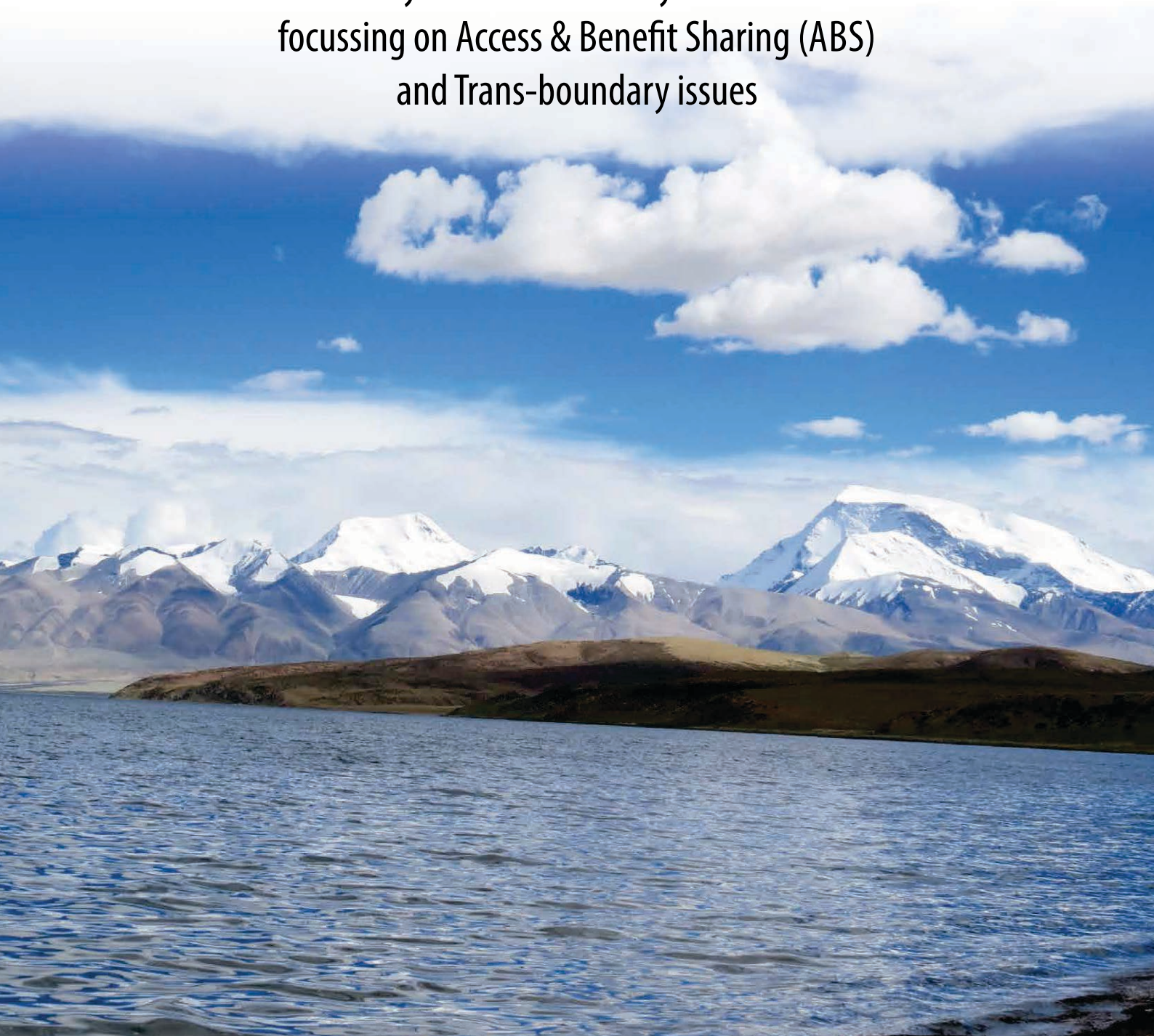
उत्तराखण्ड जैवविविधता बोर्ड
UTTARAKHAND BIODIVERSITY BOARD

उत्तराखण्ड शासन

KAILASH
SACRED LANDSCAPE CONSERVATION AND DEVELOPMENT INITIATIVE

Study on "Science-Policy Interface" focussing on Access & Benefit Sharing (ABS) and Trans-boundary issues



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FOREWORD

Keeping in view the cultural, religious and spiritual importance of Sacred "Mount Kailash" and its landscape having unique biodiversity, a project namely 'Kailash Sacred Landscape Conservation and Development Initiative' (KSLCDI) has been launched with the cooperation of three regional countries i.e. China, India and Nepal. This programme is anchored at International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal. For implementation of this programme in India, GBPIHED has been nominated as 'Lead Institute' by the Ministry of Environment, Forest and Climate Change, Government of India (MOEF&CC). A "Regional Programme Implementation Plan" (RPIP) has been prepared under five main components namely, Innovative livelihood and climate change adaptation; Ecosystem management for sustaining services; Access and benefit sharing for the development of resilient communities; Long-term conservation and environmental monitoring; and Regional cooperation, enabling policies, and knowledge management.

Access and benefit sharing (ABS); one of the three objectives of the Convention on Biological Diversity (CBD) entered into force and became an international legal instrument on 12 October 2014 i.e. 90 days after the ratification of Nagoya Protocol (2010) by the 50th instrument. To attain the objectives under the Component of "Access and benefit sharing" (ABS) within **KSLCDI** India, a 'Letter of Agreement' (LoA) was signed between GBPIHED and UBB.

For effective implementation of ABS under this programme, it was required to carry out a study reviewing various policies of State & Central Government pertaining to the community rights over biological resources and to evaluate the role of institutions in the process of sharing of benefits arising out of the commercial utilization of genetic resources and indigenous/ traditional knowledge. Keeping in view the above objectives, Uttarakhand Biodiversity Board commissioned a study namely-*"Study on science-policy interface"* focusing on Access-Benefit-Sharing (ABS) and trans-boundary issues.

No doubt that "Science Policy Interface" is critical in shaping environmental governance but connecting science with policy still remains a challenge. Science and other forms of knowledge are not used effectively in policy making and policymakers do not effectively inform scientists about the need for scientific knowledge. Growing need of effective interface between science and policy has triggered a range of initiative and one such initiative is the establishment of "Intergovernmental Platform on Biodiversity and Ecosystem Services" (IPBES) in 2012.

It is hoped that this study shall be useful not only for KSL part of India but also the partner countries involved in the implemention of ABS.

Dr. Rakesh Shah
Chairman

PREFACE

For maintaining the cultural and environmental integrity of the Kailash Sacred Landscape (KSL) area and to develop a knowledge base, a regional trans-boundary conservation and development program has been initiated. This long term joint venture, namely "Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI)" has been launched by International Center for Integrated Mountain Development (ICIMOD), Kathmandu in partnership with three regional countries i.e. China, India and Nepal. The three broad objectives of this initiative are to enhance cooperation among the regional member countries; to increase collection of climate change data in the KSL; and recognize & strengthen local capacity for community based participation in conservation and sustainable development.

For implementation of the KSLCDI, each partner country has nominated focal Ministry as nodal agency. For India, the focal Ministry is "The Ministry of Environment, Forest and Climate Change, Government of India" (MOEF), and the G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) is functioning as 'Lead Institute' for implementation of this programme in India. For this programme, a "Regional Programme Implementation Plan" (RPIP) has been prepared with five main components which include: innovative livelihood options; ecosystem management for sustaining services; access and benefit sharing for the development of resilient communities; long-term conservation and environmental monitoring; and regional cooperation to enabling policies and knowledge management. For implementation of activities under "Access and Benefit Sharing (ABS), an agreement has been signed between GBPIHED and Uttarakhand Biodiversity Board (UBB) in March 2014. As a part of the agreement activities, UBB commissioned a study namely "Study on science-policy-interface focusing on issues like Access-Benefit-Sharing (ABS) and trans-boundary issues for contribution to policy paper."

This study is based on the review, analysis and evaluation of various policy, legislation, programmes, report of the committees & studies, guidelines & administrative orders issued by central or state government of Uttarakhand and research work carried out by various institutes/ agencies regarding conservation of biological diversity and ABS with specific reference to India, Uttarakhand & Indian part of KSL.

The report on this study has been divided into ten sections. After a brief background on the concept and objectives of KSL and KSLCDI (section: 1.0), the introduction section has been devoted to describe the landscape, climate, geography and biodiversity of the KSL in brief and of the Indian part of KSLCDI in detail (section: 2.0). The issue related to science-policy-interface (SPI) which is the main subject matter of this study, has been dealt in subsequent three sections (section: 3.0, 4.0 & 5.0). Section:3.0 includes general concept to CBD, Nagoya Protocol, IPBES and platform available in India for SPI and section: 4.0 reveals the policies, legislations and programme of Government of India and State Government of Uttarakhand

regarding conservation, sustainable management and use of biological resources in India which is also applicable to KSL-India. Section: 5.0 deals with "major policy intervention for Biodiversity conservation and management in Uttarakhand such as ban on green felling in hills & subsequent impact studies, participatory/community forest management through Van Panchayat, science based initiatives in herbal sector such as introduction of CDH plans for MAPs and collection & trade of Yar-Tsa-Gumba (*Cordyceps sinensis*). Second important field of this study, which is regarding "access and benefit sharing" (ABS) has been dealt in detail under section 6 of this report by reviewing and critically evaluating some of the measures taken at international and Government of India level. Trans-boundary issues related to KSL part of India, China & Nepal has been identified in section: 7.0. Finally a detailed discussion has been made under section: 8.0 followed by summary & recommendations in section: 9.0 and 10.

Concluding the study, emphasis has been given to develop a platform in one of the KSL partner countries as well as at state level in Uttarakhand for knowledge management and sharing of scientific and other information so that the gap between science and policy making process could be reduced. Survey of flora & fauna at micro level in the KSL part of India is also a priority area. Taking on the issue of ban on green felling by Hon'ble Supreme Court based on the recent studies; to rationalize the distribution of timbers as grant/free of cost to villagers along with area of allotment; to consider the amendment in grazing policy mainly for traditional/migratory grazers; providing resources for preparing CDH plans for MAPs/NTFPs and for constitution of BMCs & preparation of PBRs have also been discussed. Apart from that, issues calling for urgent attention like trans-boundary cooperation for conservation of RET species; poaching and trade on wildlife products as well as some plant species etc also have been addressed.

I am thankful to Uttarakhand Biodiversity Board for giving me this task, which was very interesting and challenging being first of this kind of study representing a remote boarder district of India under KSLCDI. My heartfelt thanks to Dr. Rakesh Shah, Chairman and Mr. G.S. Pande & Mr. S.S. Rasaily, Member Secretary, Uttarakhand Biodiversity Board for their cooperation and assistance in making available various information's as well as giving suggestions for improving this report. I am also thankful to Mr. Dhananjay Prasad, Deputy Director and Mr. Arvind Uniyal, Administrative Officer of UBB for extending their cooperation from time by time during preparation of this report.

I hope this report fulfills the requirement of this study and shall be helpful in developing policies related to conservation and sustainable use of biological resources and also in promoting ABS with specific reference to KSL part of India and KSL region at large.

Bhagat Singh Burfal, Ph.D.
Principal Investigator (P.I.)

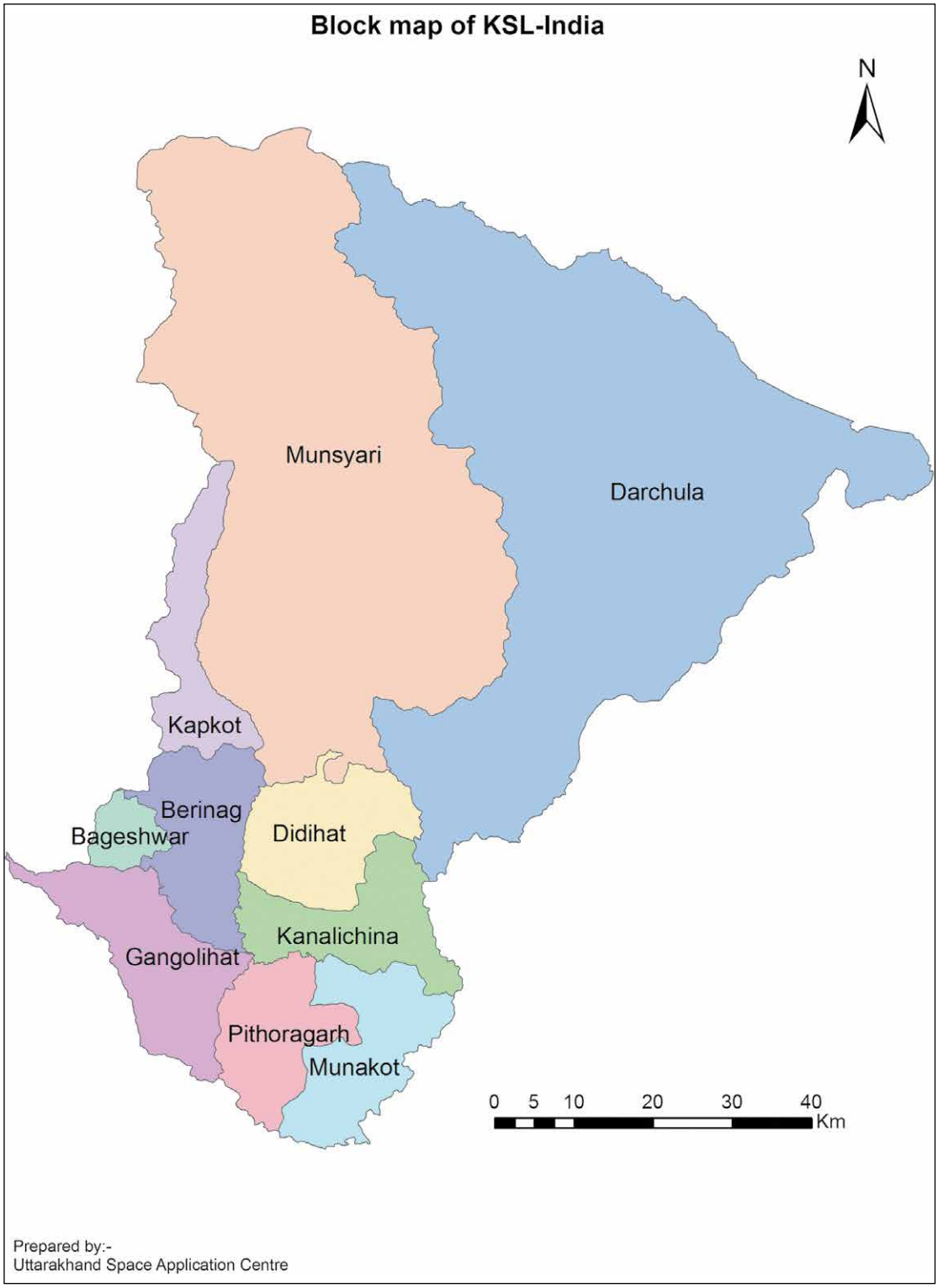
Dehradun

LIST OF ABBREVIATIONS

ABS	Access and Benefit Sharing
BMC	Biodiversity Management Committee
BD Act	Biological Diversity Act (Government of India)
BD Rules	Biological Diversity Rules
BSI	Botanical Survey of India
CAP	Centre for Aromatic Plants
CBD	Convention on Biological Diversity
CDH	Conservation, Development, and Harvest (plan for MAPs)
CHEA	Central Himalayan Environment Association
CIMAP	Central Institute for Medicinal and Aromatic Plants
CMS	Convention on Migratory Species
CSIR	Council of Science and Industrial Research
FAR	Feasibility Assessment Report (of KSLCI)
FRI	Forest Research Institute
GBPIHED	Govind Ballabh Pant Institute of Himalayan Environment and Development
GTZ	German Technical Cooperation (now Deutsche Gesellschaft fur International Zusammenarbeit IGTZ)
HAPPRC	High Altitude Plant Physiology Research Centre
HRDI	Herbal Research and Development Institute
ICAR	Indian Council of Agricultural Research
ICFRE	Indian Council of forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
IPBES	Inter-governmental Science-Policy Platform on Biodiversity and Ecosystem Services
ITPGR	International Treaty on Plant Genetic Resources
IUCN	International Union for Conservation of Nature and Natural Resources
JFM	Joint Forest Management
KSL	Kailash Sacred Landscape
KSLCDI	Kailash Sacred Landscape Conservation and Development Initiative
KSLCI	Kailash Sacred Landscape Conservation Initiative
LoA	Letter of Agreement

MAP	Medicinal and Aromatic Plants
MoEF&CC	Ministry of Environment, Forest and Climate Change (Govt. of India)
MPCA	Medicinal Plant Conservation Area
NAAS	National Academy of Agricultural Science
NASI	National Academy of Sciences
NBA	National Biodiversity Authority
NBAGR	National Bureau of Animal Genetic Resources
NBFGR	National Bureau of Fish Genetic Resources
NBPGR	National Bureau of Plant Genetic Resources
NMPB	National Medicinal Plant Board
NTFP	Non Timber Forest Produce
PA	Protected Area
RET	Rare Endangered and Threatened species
RF	Reserved Forest
SBB	State Biodiversity Board
SMPB	State Medicinal Plant Board
SPI	Science-Policy-Interface
TK	Traditional Knowledge
UBB	Uttarakhand Biodiversity Board
UCOST	Uttarakhand Council of Science and Technology
UFDC	Uttarakhand Forest Development Corporation
UNCCD	United Nations Convention to Combat Desertification
VP	Van Panchayat
WHC	World Heritage Convention
WII	Wildlife Institute of India
ZSI	Zoological Survey of India

CONTENTS



Block map of KSL - India

1

BACKGROUND

Considering that Kailash Sacred Landscape (KSL) is an important cultural and religious landscape having unique ecological diversity, a trans-boundary initiative namely 'Kailash Sacred Landscape Conservation and Development Initiative' (KSLCDI) has been launched as a collaborative effort of International Center for Integrated Mountain Development (ICIMOD), Kathmandu with the help of three regional countries (China, India and Nepal) to maintain the cultural and environmental integrity of the area and to develop a knowledge base so as to build a regional conservation framework and implementation program (FAR, 2012). For implementation of the KSLCDI, which is a long–term collaborative programme, each partner country has nominated focal Ministry as nodal agency. The focal Ministry i.e. Ministry of Environment, Forest and Climate Change, Government of India" (MOEF&CC) nominated G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) to act as 'Lead Institute' for implementation of programme in India. Serving as the primary focal point for the project in India, GBPIHED has entered into a 'Letter of Agreement' (LoA) with International Centre for Integrated Mountain Development. (ICIMOD, 2012)

For the KSLCDI programme, a "Regional Programme Implementation Plan" (RPIP) has been prepared with following five main components (ICIMOD, 2012):

i) Innovative livelihood and climate change adaptation;
ii) Ecosystem management for sustaining services;
iii) Access and benefit sharing for the development of resilient communities;
iv) Long-term conservation and environmental monitoring; and
v) Regional cooperation, enabling policies, and knowledge management

Having recognized the convergence of the objectives and realized the need for a close collaboration for implementation of the mutually agreed activities under Access and benefit sharing component of **KSLCDI** within the identified landscape area in India, a Letter of Agreement (LoA) has been signed between G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) and Uttarakhand Biodiversity Board (UKBB) for implementation of programme activities under Component (iii).

Access and benefit sharing (ABS), is one of the three objectives of the Convention on Biological Diversity (CBD) which was further strengthened legally by Nagoya Protocol (2010). Being one of the main components of KSLDI, it was required to carry out a study reviewing various policies of State & Central Government pertaining to the community rights over biological resources and to evaluate the role of institutions responsible for facilitating the communities in the process of sharing of benefits arising out of the commercial utilization of genetic resources and indigenous traditional knowledge. Secondly, considering that the policies related for the sustainable management and use of biological resources be based on scientific knowledge, it was felt that there is need to evaluate present government policies with respect to their scientific base and status of coordination between the scientists and policy makers. Thirdly, it was also felt that for the successful implementation of KSLDI project and to assure long term benefit out of this project, trans-boundary cooperation among the three partner countries would be essential. Therefore, study for exploring possibilities of

trans-boundary cooperation pertaining to the conservation and trade of biological resources was also felt to be carried out.

Keeping in view the above objectives, Uttarakhand Biodiversity Board commissioned a study namely-*"Study on science-policy interface focusing on issues like Access-Benefit-Sharing (ABS) and trans-boundary cooperation for contribution to policy paper"* under KSLDI project.

"Science Policy Interface" is critical in shaping environmental governance, although most effective means of connecting science with policy is still debatable. As a matter of fact, science and other forms of knowledge are not used effectively in policy making and policymakers do not effectively inform scientists about their need for scientific knowledge. Growing awareness of the importance of effective interface between science and policy has triggered a range of initiative. In the area of biodiversity governance, its importance has led to the establishment of "Intergovernmental Platform on Biodiversity and Ecosystem Services" (IPBES) in 2012. Needless to mention that "science policy interface" are complex in nature and their understanding as to what they are, how they work, where and how they fail, how to improve them etc are definitely a challenge.

It is expected that this study shall prove to be useful not only in KSL part of India but also in the KSL region of the partner countries for developing policies related to conservation & sustainable use of biological resources and also in promoting and implementing ABS.

2

INTRODUCTION

2.1 General

The Kailash Sacred Landscape (KSL) spreads across a vast region that includes remote portions of the Tibet Autonomous Region of China (TAR China) and contiguous areas of Nepal and India. This entire area is historically, ecologically, and culturally inter-connected and is the source of Asia's four most important rivers namely the Ganges, Brahmaputra, Indus, and Sutlej. At the heart of this landscape is the sacred Mount Kailash, which is revered by millions of people in Asia and throughout the world. The landscape exhibits great variability and heterogeneity geographically and culturally, covering at least four geological and physiographic zones (lesser Himalayan Zone in the south-most inhabited, the Greater Himalayan Zone, the Trans-Himalayan Zone, and the Tibetan Plateau-least inhabited). Due to variation in altitude (369 - 7678 m asl) and topography, the variety of bio-climatic zones that exist in the landscape includes, among others, hot and semi-arid regions in the south-west, lush green and humid valleys in the mid-hills, extensive mountain forests, moist alpine meadows, remote and arid trans-Himalayan valleys, and high altitude

grasslands and steppes along with extensive areas of permanent snow and ice. The region harbours a high diversity of flora and fauna of both regional and global significance (FAR, 2011).

The Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) is a trans-boundary collaborative programme between China, India, and Nepal, spread over an area of about 31,252 km^2 extending from 79^0 49′ 26″ E to 82^0 26′ 54″ E longitude and from 29^0 18′ 23″ N to 31^0 12′ 42″ N latitude. The KSLCDI is located within the remote south-western portion of the Tibet Autonomous Region of China (10,843 km^2), adjacent districts in far-western region of Nepal (13,289 km^2) and the north-eastern flank of Uttarakhand State in northern India (7,120 km^2). [FAR,2011;Rawal et al.,2012] (Fig. 1)

About 15% of the KSL area is classified as permanent snow or ice, 20% is estimated to be under some form of forest cover and an additional 18% is bare or uncultivated fallow. In the southern part of the landscape, which is dominated by human habitation, forest patches appear to be in smaller and more fragmented form than in the northern parts. It is estimated that less than 10% of KSL is agricultural land which is also a major and important source of livelihood for the local mountain communities. Permanent grazing areas and other pasture lands comprise over 27% of the total area. Trans-humane, nomadic herding and on-farm livestock production are the most important livelihood activities for much of the region.

Over a million people are estimated to live within the KSL, although most of this population is in India and Nepal, with very low population densities at the high elevations

Fig. 1: Map of the KSL *Source: KSLCI, Feasibility Report (2011)*

on the Tibetan Plateau. The people of this landscape share a cultural heritage and have been linked by historical trade and pilgrimage routes for centuries. They have developed local specific patterns of natural resource use for food, medicine, fibre and in earlier times, for barter. These 'heritage routes' and remnants of this once-flourishing trade add to the beauty and rich cultural history of the region. However, at present, these communities are vulnerable as they suffer from the impact of remoteness which include limited infrastructure, transportation and poor educational & health facilities.

The limited livelihood options together with modern changes in lifestyle due to globalization, accelerating development, environmental degradation and the erratic weather patterns due to climate change, put these indigenous and local communities, the landscape, and its biodiversity at risk and threaten their long-term sustainability (FAR, 2011, Rawal et al., 2012).

The KSLCDI is an attempt on the part of the three neighboring countries to join hands to preserve the unique biological diversity, ecosystem goods & services, and the value-based cultural heritage of one of the most revered and sacred landscapes of the world.

The KSLCDI has the following broad objectives (FAR, 2011):

i) Enhance cooperation among the regional member countries
ii) Increase collection of climate change data from the KSL area

Recognise and strengthen local capacity for community based participation in conservation and sustainable development.

2.2 Indian Part of the Landscape

2.2.1 The landscape and land use

The Indian portion of the KSL target landscape is situated at the north-eastern flank of Uttarakhand State comprising mostly of Pithoragarh District (6,826 km^2) and a small portion of the Bageshwar District (294 km^2) having common border with Nepal and TAR China. Some basic information on KSL-India has been summarized in Table. 2.2.1.

Table. 2.2.1: Basic Information of KSL-India

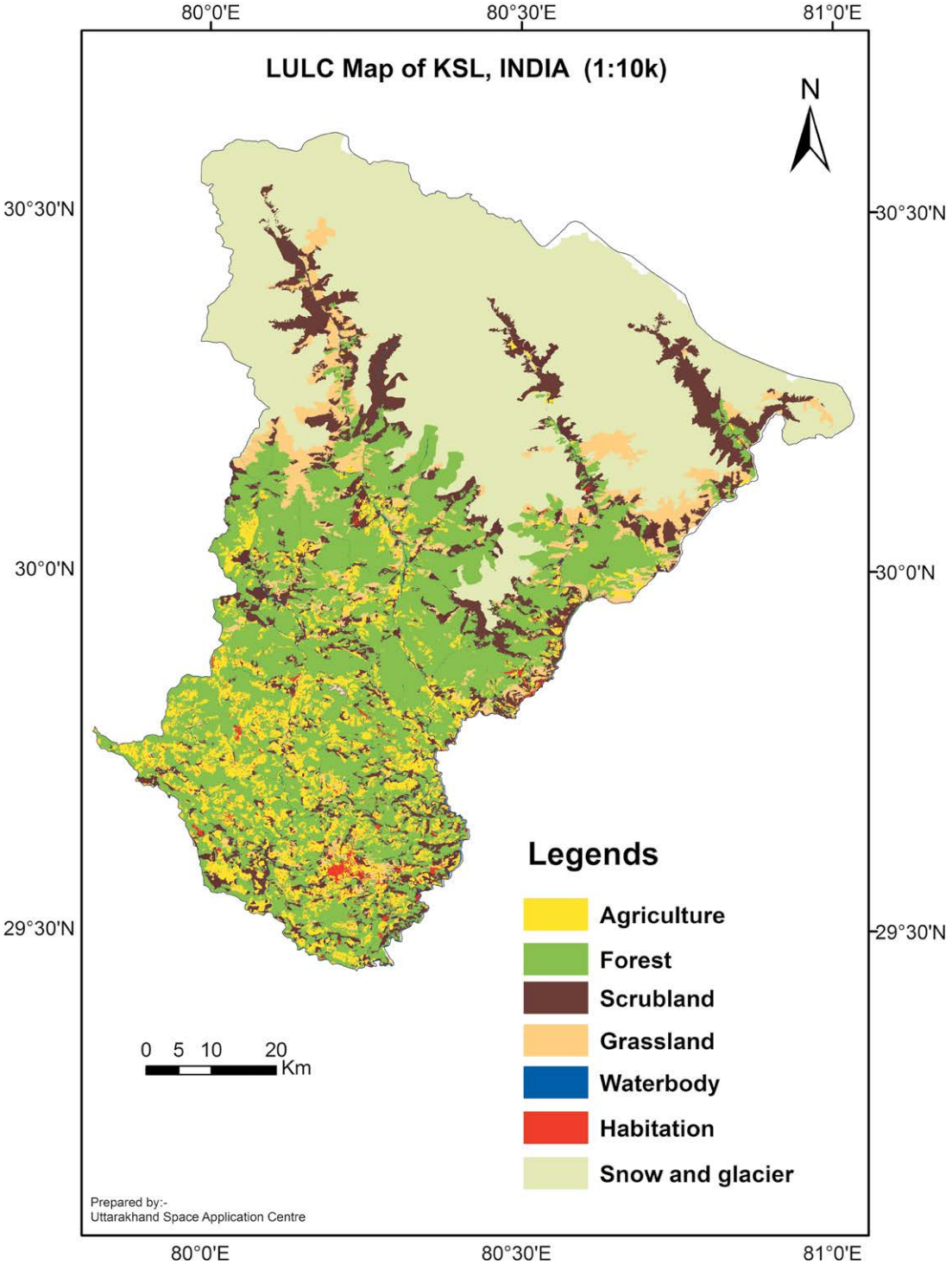
S. No.	Items	Information
1.	Total Area (km^2)	7,120
2.	Area by District:	
	Pithoragarh (km^2)	6,826
	Bageshwar (km^2)	294
3.	Elevation Range (m asl)	428-6,895
4.	Eco-regions within the KSL target area	5
5.	Number of watersheds	4
6.	Watershed Area (km^2):	
	Panar-Saryu	350
	Saryu-Ramganga	1,500
	Gori-Kali	2,750
	Dhouli-Kali	2,650
7.	Human Population as per 2011 census	483,439
8.	Land use (Pithoragarh District):	
	8.1 Forest (km^2):	
	Forest cover	2094 (28.88%)
	High altitude grazing land (Bugyals)	1520 (17.93%)
	Snow/ice (glaciers)	771 (0.63%)
	Mountain & snow peaks	811 (4.22%)
	Barren, river, river- banks, lakes	205.5 (2.83%)
	Total of forest area (km^2)	5407.5 (74.49%)
	8.2 Non- Forest area (km^2):	
	Agricultural production	532.78 (7.35%)
	Horticulture	268.9 (3.71%)
	Grazing land	529.13 (7.30%)
	Habitation & other settlements	110.1 (1.52%)
	Uncultivated agricultural land	407.59 (5.62%)
	Total of Non-forest land (km^2)	1848.5 (25.50%)
	Grand Total of the District (km^2)	7250 (100%)

Source: FAR (2011), Sinha, A.R & Manoj Chandran (2012), Census (2011), ISFR (2011).

The KSL-India landscape comprises of four major hydrological units: the Panar-Saryu (350 km^2), the Saryu-Ramganga (1,500 km^2), the Gori-Kali (2,750 km^2), and the Dhauli-Kali (2,650 km^2) watersheds. A distinct bio-climatic zone is evident existing between elevation gradient ranging from above 430 m asl to almost 7,000 m asl. The total human population of this area is more than 48,300. The main languages include Kumaoni (high variability), Johari, Beyanse, Darmia, Hunia (a Tibetan mixed dialect), Hindi, and Nepali. Indigenous ethnic groups in this area include Van Rawats and Bhotiyas. Literacy rate for men are quite high (90%) which is somewhat low in case of women (63%).

Approximately 74% of the area is forest land; however, land under actual forest cover is only about 29%. About 11% is agricultural land (including horticulture) and uncultivated land is about 5.6%. The landscape comprises of a significant area under permanent grazing and other pasture lands (25%) and under mountain/snow cover/glaciers & barren lands (28%), whereas habitation & other settlement is only about 1.5% (Table. 2.2.1).

The KSL-India landscape consists of one Protected Area i.e. Askot Wildlife Sanctuary (AWLS) and on the upper north-west extreme, it includes a part of Nanda Devi Biosphere Reserve (NDBR). The contiguity of the landscape with NDBR provides it an



Land Use Land Coverage Map (LULC)

additional benefit of forming a contiguous landform with exceptionally high conservation and socio-economic value. The AWLS covers an area of 600 km^2 as mentioned in the preliminary notification for the declaration of the sanctuary in 1987. It comprises of the reserve forest area of Askot Range (289 km^2), 225 km^2 of Civil and Van Panchayat areas and also 85 km^2 of Agricultural lands comprising of 111 villages (BCRLIP, 2008).

2.2.2 Biodiversity

The land holdings in the KSL part of India is although marginal and fragmented,

even then, rich crop diversity has been reported from this area (Arun Kumar et al., 2010; Negi, 2010). About 211 different local varieties of food crops have been identified as grown in this landscape of which 105 has been classified as cereals or pseudo-cereals, 21 pulse crops and 10 oil yielding plants. Dominant cropping systems centre on Paddy (*Oriza sativa*) with 10 species having 41 varieties, of which 31 are upland verities not requiring field flooding, 20 varieties of Wheat (*Triticum aestivum*) & Barley (*Hordeum vulgare*) and 14 varieties of Mandua (finger millet - *Eleusine coracana*) apart from 5 other millets from the *Panicum* and *Pannisetum species*. Almost 31 different vegetables and 31 fruit plants are grown. In higher reaches specially in Dharchula and Munsyari Development Blocks (Malla Johar, Darama, Vyas & Chuadas valley), several lesser known crops such as Buckwheat(Ogal- *Fagopyrum esculentum* & Phaphar- *F. taataricum*), Uwa (*Hordeum Himalayans*), Potato (Alu - *Solanum tubeerosum*) etc. are grown. Two main pulses cultivated in the landscape are Lentil (Masur-*Lens culinaris*) and Black Gram (Moong-*Vigna mungo*). Besides these varieties of pulses, different kinds of Beans (Kidney Beans, Scarlet Beans, Lima Beans, Soya Beans etc.) are widely intercropped and have market value. Rajama (Kidney Bean- *Phaseolus vulgaris*) from higher reaches of Munsyari and Dharchula Blocks is considered to be growing under adverse conditions (Rawal et al., 2012) and is under consideration for being patented.

There are numerous forest species and a rich diversity of plants. These are distributed along a gradient categorized into four main bioclimatic eco-zones ranging from sub-tropical (300–1,800 m asl), through temperate (1,500–2,800 m asl) and sub-alpine (2,800–3,800 m asl), to alpine (3,500–5,000 m asl). According to Champion & Seth's classification with recent addition of six new forest types & two revisions by Sinha & Manoj Chandran, the area represents 8 major groups, 15 sub-groups and 40 forest types (Champion & Seth, 1968; Sinha & Manoj Chandran, 2012) [Table: 2.2.2].

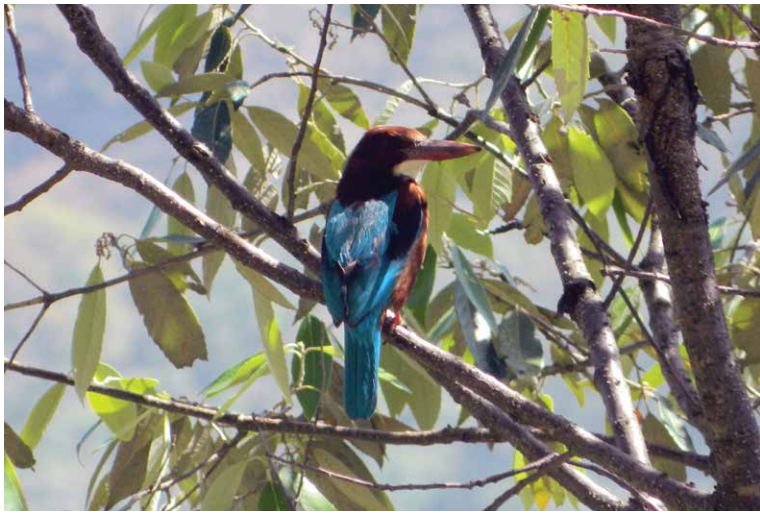
Table. 2.2.2: Forest Types represented in the Landscape (Pithoragarh District/ Forest Division)

Major Group	Sub Group	Forest types	
3 Tropical Moist Deciduous forests	3C North Indian Moist Deciduous Forests	3C/c2a(i)	Montane Valley Sal forest (New)
		3C/C3	Moist Mixed deciduous forest
8 Subtropical Broad leaved forests	8C Subtropical Riverine Forests (new)	8C/C1	Subtropical riverine forest (New)
		8C/C2	Riverine *Macaranga pustulata* forests (New)
9 Subtropical Pine forests	9C1 Himalayan Subtropical Pine forests	9C1b	Upper Himalayan Chir pine forests
	9D Himalayan Subtropical Scrub	9DS1	Himalayan Subtropical scrub
		9DS2	Subtropical *Euphorbia* scrub
		9DS3	Subtropical *Phoenix* scrub (new)
12 Himalayan Moist Temperate Forests	12C1 Lower Western Himalayan Temperate Forests	12C1a	Banj oak forests
		12C1b	Moru Oak forests
		12C1c	Moist Deodar forests
		12C1d	Western mixed Coniferous forests
		12c1e	Moist temperate deciduous forest
		12c1f	Low level Blue pine forests
		12c1g	*Cupressus torulosa* forests (revised)
		12c1h	Alder forests (revised)
	12C2 Upper Western Himalayan Temperate Forests	12c2a	Khursu oak forests
		12c2b	West Himalayan Upper Oak Fir Forests
		12C2c	Moist temperate deciduous forest
		12C2d	*Quercus lanata* forests (New category)
		12C2e	Lauraceae forests without Oaks (New)
	12C3 East Himalayan Moist Temperate Forests (Western Limit)	12C3a	East Himalayan Mixed forests Coniferous (Western limit)
		12C3c	*Tsuga dumosa* forests (New)
	12D Degradation Stages	12DS1	Montane Bamboo brakes
		12DS2	Himalayan Temperate Parkland
		12DS3	Himalayan Temperate Pastures
13 Himalayan Dry Temperate Forests	13C4		West Himalayan high-level dry blue pine forests
		13DS2	Dry Temperate Scrub
		13IS1	Hippophae scrub
14 Sub Alpine Forests	14C1 West Himalayan Sub alpine forests	14C1a	West Himalayan Sub alpine Fir forests
		14C1b	West Himalayan Birch Fir Forest
	14D Degradation		
	stages	14DS1	Sub alpine pastures
15 Moist Alpine Scrub	15C1		Birch-Rhododendron scrub forests
		15E1	Dwarf Rhododendron scrub
		15E2	Dwarf Juniper scrub
	15C3		Alpine pastures
16 Dry Alpine Scrub	16C1		Dry Alpine scrub
		16C1a	Caragana scrub(new)
	16C2		Dry Alpine pastures (new)
		16e1	Dwarf Juniper scrub

Source: Champion & Seth (1968); Sinha & Manoj Chandran (2012).

It is reported that the KSL-India landscape harbours richness of biodiversity elements ranging from lower groups to the higher ones which include about 3170 species, 288 families and 1347 genera (Rawal et al, 2012). The area is dominated by west Himalayan forest types such as the Chir pine (*Pinus roxburghii*) and Oaks (*Quercus* species)) and this is the western most limit of the Tsuga and Macaranga communities. There is a high rate of species richness, particularly of epiphytic orchids (120 species of *Orchidaceae*). There are 234 near endemic and 24 endemic species (together constituting 21% of flora). 10 species are listed in the Red Data Book, and 11 species have small population in a narrow geographic range and/or are under pressure of high demand. There are significant sensitive habitats and/ or areas (e.g., the timber line zones of the Panchchuli basin and the Ralam Valley) that are recognized priority sites. Over 172 species are used by local communities with significant amount of indigenous knowledge based on their traditional knowledge. The area is very rich in terms of the diversity of medicinal and aromatic plants (MAPs). Several well known botanical hotspots exist in the area, particularly in the alpine zone (above 3,500 m asl) [FAR, 2011; Rawal et al., 2012; Sinha & Manoj Chandran, 2012].

The Askot Wildlife Sanctuary (AWLS) covers a wide range of altitudinal variation starting all the way from sub-tropical to alpine region. In addition, it is at the confluence of the west and central Himalaya which further add to its biodiversity richness. A case study in the AWLS (Dhar et al, 1997; FAR, 2011) revealed the presence of an estimated 1,200 plant species representing over 700 genera and 173 families.



Fauna reported in the KSL-India part include at least 90 fish species, 19 reptiles, 9 amphibians, 193 birds and 38 mammals. The IUCN list of species reported as threatened for this area includes 3 which are critically endangered, 7 as endangered, 7 as vulnerable and 18 which are near-threatened.

This area is particularly rich in cultural diversity having a proud history and many cultural traditions. Different sacredness values within the landscape have contributed to the conservation of biodiversity in this area. In addition to the main pilgrimage routes and associated cultural heritage sites, there are many sites regarded as sacred, religious or otherwise culturally significant. For example, there are at least six sacred lakes namely Parvati Sarovar, Anchari Tal, Jolingkong Lake, Chhiplakot Lake, Maheshwari Kund, and Thamri Kund apart from having a large number of sacred groves. In addition, there are many festivals and fairs held in this area throughout the year (Negi, 2010).

3

SCIENCE POLICY INTERFACE

3.1 General Concept

Perhaps, the issue related to science-policy interface is one of the important topics of discussion presently in the domain of the scientists, policy makers and the stakeholders. Science-policy interface has been understood as social process which encompass relation between scientists and other actors in the policy process, and which allows for exchange, co-evolution and joint construction of knowledge with the aim of enriching decision making. Thomas Koetz et al. (2011) has defined 'science-policy- interface'(SPI) as institutional arrangement that reflect cognitive models and provide normative structures, rights, rules and procedures that define and enable the social practice of linking scientific and policy making process (Vatn, 2005; Young, 2008). They assign role to scientists, policy-makers, other relevant stake holders and knowledge holders and help guiding their interactions according to specific principles and purposes. If both the activities of making science, viewed as systematic pursuit of knowledge and making policy (politics), viewed as the process of bargaining, negotiation and compromise by institutional structures

then, by extension, their interactions should also be understood in institutional terms. There is need to provide better understanding of how the configurations of SPI institutional arrangements is related to the effectiveness of international environmental agreements that they are intended to support.

Some of the important measures taken at the international level to strengthen the SPI related to conservation and sustainable management and use of genetic resources and eco-systems along with indigenous and traditional knowledge related to biodiversity include: Convention on Biological Diversity (1992), Nagoya Protocol (2010), establishment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which are briefly given below along with the status of SPI platform at national level in India.

3.2 Convention on Biological Diversity

The Convention on Biological Diversity (CBD) emerged from the "UN Conference on Environment and Development" also known as the "Earth Summit", held in Rio de Jeneiro (Brazil) in 1992. It came into force at the end of 1993, with the following objectives:

"The conservation of biological diversity, the sustainable use of its components and fair & equitable sharing of the benefits arising out of the commercial utilization of genetic resources by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over these resources and to technologies and by appropriate funding".

Thus CBD is an International Treaty for the conservation and sustainable use of biodiversity and for equitable sharing of benefits (ABS) arising out of the commercial utilization of genetic resources. With 194 parties (193 countries and the European Union), the CBD has near-universal participation of countries committed to preserve life on Earth. The CBD seeks to address all threats to biodiversity and ecosystem services, including threats from climate change through scientific assessments, the development of tools, incentives and process, the transfer of technologies, good practices and active involvement of relevant stakeholders including indigenous and local communities (ILC), youth, NGOs, women and business community.

However, the success to achieve the objectives of the CBD will largely depend on the scientific inputs available to the member countries for mutually agreed policy decisions.

3.3 The Nagoya Protocol

The Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their commercial utilization is a supplementary international agreement to the Convention on Biological Diversity (Nagoya Protocol, 2010). It provides for a transparent legal framework for the effective implementation of one of the three objectives of the CBD i.e. fair and equitable sharing of benefits arising out of the utilization of genetic resources. The Protocol also include benefit sharing by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account rights over the resources and technologies and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components. It was adopted by the Conference of the Parties to the Convention on Biological Diversity at its Xth meeting on 29 October 2010 at Nagoya, Japan. Currently (November, 2015), there are 65 parties, 69 ratifications and 92 signatories to the Nagoya Protocol (www.cbd.int). Important 20 articles of Nagoya Protocol are listed in the box shown below.

20 Important Articles of Nagoya Protocol	
Article 4 :	Relationship with International Agreements and Instruments
Article 5 :	Fair and Equitable Benefit-Sharing
Article 6 :	Access to Genetic Resources
Article 7 :	Access to Traditional Knowledge Associated with Genetic Resources
Article 9 :	Contribution to Conservation and Sustainable Use
Article 10 :	Global Multilateral Benefit-Sharing Mechanism
Article 11 :	Trans-boundary Cooperation
Article 12 :	Traditional Knowledge Associated with Genetic Resources
Article 13 :	National Focal Points and Competent National Authorities
Article 14 :	The Access and Benefit-Sharing Clearing-House and Information-Sharing
Article 15 :	Compliance with Domestic Legislation or Regulatory Requirements on Access and Benefit-Sharing
Article 16 :	Compliance with Domestic Legislation or Regulatory Requirements on Access and Benefit-Sharing for Traditional Knowledge Associated with Genetic Resources
Article 17 :	Monitoring the Utilization of Genetic Resources
Article 18 :	Compliance with Mutually Agreed Terms
Article 20 :	Codes of Conduct, Guidelines and Best Practices and/or Standards
Article 21 :	Awareness-Raising
Article 22 :	Capacity
Article 23 :	Technology Transfer, Collaboration and Cooperation
Article 25 :	Financial Mechanism and Resources
Article 26 :	Conference of the Parties Serving as the Meeting of the Parties to this Protocol
Article 30 :	Procedures and Mechanisms to Promote Compliance with this Protocol

Source: Text of Nagoya Protocol (Nagoya Protocol, 2010); website at: www.cbd.int/abs/nagoya-protocol

The Nagoya Protocol will create greater legal certainty and transparency for both providers and users of genetic resources by establishing more predictable conditions for access to genetic resources and by helping to ensure sharing of benefit by the provider agency in lieu of providing genetic resources to the user agency.

The Nagoya Protocol creates incentives to conserve and sustainably use genetic resources, and therefore enhances the contribution of biodiversity to development and human well-being. The Nagoya Protocol applies to genetic resources and traditional knowledge (TK) associated with genetic resources and the benefits arising from its utilization. The Nagoya Protocol sets out core obligations for its contracting Parties to take measures in relation to access to genetic resources, benefit-sharing and its compliance.

Series of scientific survey for assessment of biological resources & genetic resources, their distribution, local and industrial uses, documentation of related traditional knowledge, mechanism for knowledge management and knowledge sharing would be needed to make Nagoya protocol useful for the member counties for their benefit and for protecting the genetic resources and traditional knowledge.

3.4 The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

One of the major challenges for the conservation and sustainable use of biodiversity and ecosystem services is to ensure that decisions and policies are made with the best available scientific information. Till date, there is no ongoing global mechanism recognized by both the scientific and policy communities to collect, synthesize and analyze information for the purpose of decision making.

The "Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)" is a science policy inter-

governmental platform that was established on 21 April 2012 after years of international negotiations. Its objective was to create an interface between the scientific community and policymakers to build capacity, to strengthen the use of science in policy making and to address gaps in the science-policy interface on biodiversity and ecosystem services. The IPBES is expected to provide an ongoing mechanism on biodiversity and ecosystem services recognized by the scientific and policy communities to bring information and analyze it for future use during decision making conventions and dialogues (www.ipbes.net).

All member countries of the United Nations can join the platform and its members are committed to building IPBES as the leading inter-governmental body for assessing the state of the planet's biodiversity, its ecosystems and the essential services they provide to human beings.

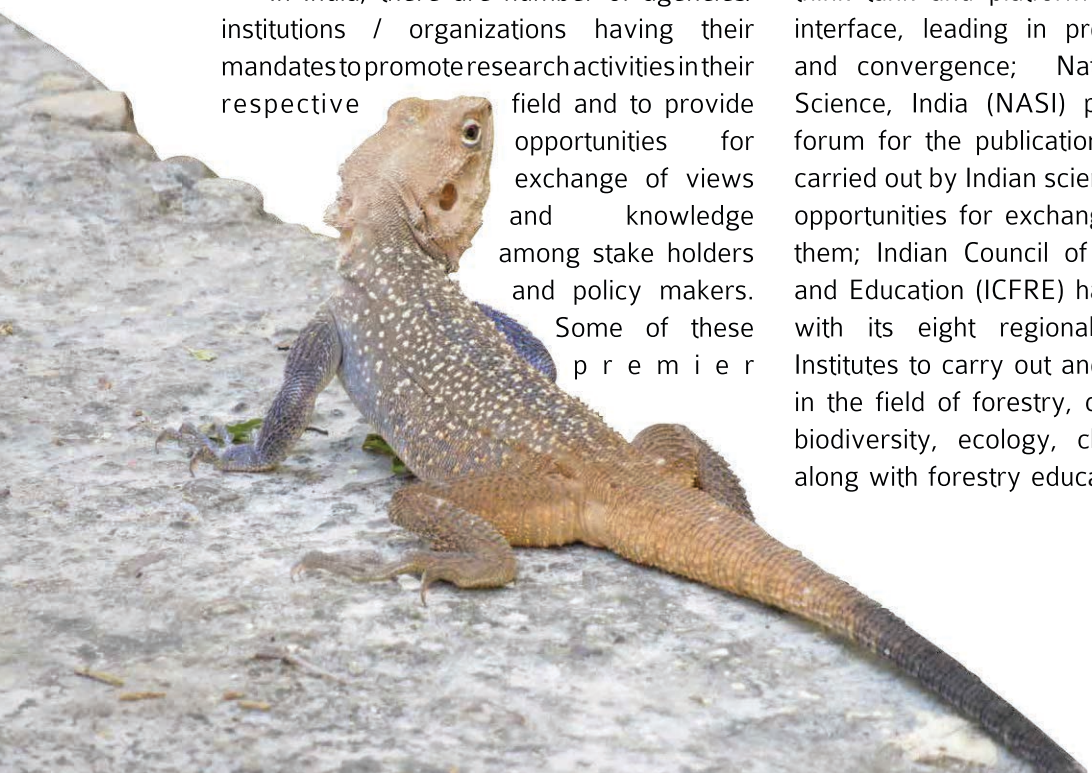
The IPBES provides a mechanism recognized by both the scientific and policy communities to synthesize, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organizations, non-governmental organizations as well as indigenous people and local communities. This involves a credible group of experts in conducting assessment. The evaluations under IPBES also take into account cultural services and the influence of human factors on biodiversity. IPBES has also to work to generate knowledge and assess the status and trends of biodiversity and ecosystem services, identify possible policy responses and build capacity at the biodiversity science-policy interface in a transparent way and it will aim to strengthen capacity for the effective use of science in decision-making at all levels.

The IPBES also aim to address the needs of Multilateral Environmental Agreements (MEAs) related to biodiversity and ecosystem services such as the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species (CMS), the Ramsar Convention on Wetlands, UNESCO's World Heritage Convention (WHC), the International

Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR) and the United Nations Convention to Combat Desertification (UNCCD). IPBES is also expected to build on existing processes ensuring synergy and complementaries in each other's work. It is also processing a frame work for the period 2014-2018.

3.5 Platform for Science-Policy-Interface at National level in India

In India, there are number of agencies/ institutions / organizations having their mandates to promote research activities in their respective field and to provide opportunities for exchange of views and knowledge among stake holders and policy makers. Some of these premier organizations include Council of Science and Industrial Research (CSIR) - a premier industrial R&D organization working in entire spectrum of science and is actively involved in generation of knowledge and technologies, development of product & process and take its transition to the market place; Indian Council of Agricultural Research (ICAR) - to promote research, education and awareness in the field of agriculture, horticulture and animal husbandry; National Academy of Agricultural Science (NAAS) is considered a credible think tank and platform for science-policy-interface, leading in promoting excellence and convergence; National Academy of Science, India (NASI) provides a national forum for the publication of research work carried out by Indian scientists and to provide opportunities for exchange of views among them; Indian Council of Forestry Research and Education (ICFRE) has been established with its eight regional Forest Research Institutes to carry out and promote research in the field of forestry, community forestry, biodiversity, ecology, climate change etc. along with forestry education, extension and



awareness activities; and Wild Life Institute of India (WII) with a mandate to promote research in the field of wildlife conservation and management.

Besides these, there are various other national level institutes like Botanical Survey of India (BSI), Zoological Survey of India (ZSI), Forest Survey of India (FSI), National Bureau of Plant Genetic Resources (NBPGR), National Bureau of Animal Genetic Resources (NBAGR), National Bureau of Fish Genetic Resources (NBFGR), GBP institute of Himalayan Environment and Development (GBPIHEAD), National Biodiversity Authority (NBA) & State Biodiversity Boards (SBBs) and Universities along with private research institutes working in the field of research related to biodiversity, landscape management and traditional knowledge.

However, India is lacking in having a common platform/forum to bring together all stakeholders (working in the field of science and technology, including science and technology institutes, Government laboratories, universities and private industries) and discussing the important issues so as to come out with suggestions to interact with the policy makers and bureaucrats to involve science in policy making process.

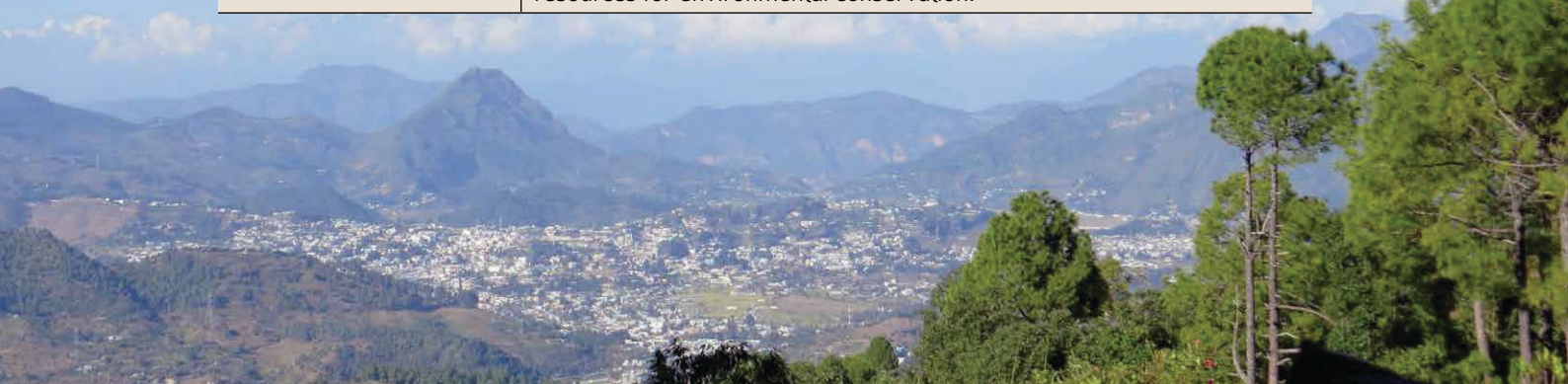
4

POLICIES AND LEGISLATIONS RELEVANT TO BIODIVERSITY CONSERVATION AND SUSTAINABLE USE IN INDIA

The constitution of India contain specific provisions for environmental conservation articulated under directive principles of state policy (48-A) and fundamental duties (51-A). Numerous policies, legislations (acts, rules, circulars and orders) relating to environmental protection as well as specific laws relating to forests, wildlife and biodiversity have been enacted in India taking into account Governmental and civil society concerns. Some of the key Central Government policy & legislation/law documents along with a brief outline of their priorities relevant to forests, environment & biodiversity are given in Table-4.1 & Table-4.2 which are also applicable to the Indian part of the Kailash Sacred Landscape (KSL India).

Table. 4.1: A brief outline of the Government of India's policies, plans and strategies dealing with biodiversity

Policies plans and strategies	Brief outline of priorities
National Forest Policy, 1988	Provides for national goals and guidelines relating to areas under forests, afforestation, social forestry and farm forestry, management of state forests, rights and concessions, diversion of forest lands for non-forest purposes, wildlife conservation, tribal people and forests, shifting cultivation, damage to forests from encroachments, fire and grazing, forest based industries, etc. The policy also covers forestry education, research, management, survey and database, legal support, infrastructure development and financial support.
National conservation strategy and policy statement for Environment and Sustainable Development, 1992	Outlines the nature and dimensions of environmental problems of India as well as actions taken and constraints and agenda for action.
National Policy and macro-level action strategy on Biodiversity, 1999	Outlines a series of macro-level statements of policies, gaps and strategies needed for conservation and sustainable use of biodiversity.
National Agricultural Policy, 2000	Seeks to actualize the vast untapped growth potential of Indian agriculture, rural infrastructure, value addition, secure a fair standard of living for the farmers and agricultural workers, discourage migration to urban areas and face the challenges arising out of economic liberalization and globalization.
National Seeds Policy, 2002	Thrust areas include varietal development production, quality assurance, seed distribution and marketing, infrastructure facilities, etc.
National Policy for Farmers, 2007	Aims to improve viability of farming through sustained development of agriculture sector with the main goal to improve welfare of farmers and farm income.
National Livestock Policy, 2013	The main aim of this policy is to facilitate coordination between states and various policy interventions necessary for addressing some of the critical challenges of the Livestock sector.
National Wildlife Action Plan (2002-2016)	Calls for adoption and implementation of strategies, strengthening and enhancing the PA network, effective management of PAs, conservation of wild and endangered species and their habitats, restoration of degraded habitats outside PAs, control of poaching & illegal trade in wild animal and plant species, monitoring and research, HR development, ensuring peoples participation, awareness and education, wildlife tourism, domestic legislation and international conventions, enhancing financial allocation and integration with other sectoral programmes.
Comprehensive Marine Fishing Policy, 2006	Aims to maximize yield from marine fishery resources while balancing the development needs of the various categories of fishing communities.
National Environment Policy, 2006	Stated objectives include: (i) conservation of critical environmental resources; (ii) intra-generational equity: livelihoods security for the poor; (iii) inter-generational equity; iv) integration of environmental concerns in economic and social development; and (v) efficiency in environment resource use; (vi) environmental governance; and (vii) enhancement of resources for environmental conservation.



Policies plans and strategies	Brief outline of priorities
Environment Impact Assessment (EIA) Notification 2006	Defines categorization schedule for activities/projects and procedures for category A/B1 projects for environmental clearance and monitoring.
National Forestry Action Programme 2000-2020	Envisages developing coordinated programme for the sustainable management of forests and forest lands to meet the environmental, socio-economic and cultural need of the present and the future generations.
National Biotechnology Development Strategy (2007)	Calls for promotion of mass use of technologies for sustainable utilization of bio-resources.
National Forest Commission report, 2006	Contains 360 recommendations regarding forest policy, legal framework, forest administration, personnel management, organizations structure and function of the forestry and biological diversity sector etc.
Final Technical Report on National Biodiversity Strategy and Action Plan Project, 2005	Identified a detailed set of priority issues for the overall planning and governance as well as for the conservation of wild as well as domesticated biodiversity.
National Biodiversity Action Plan (2008)	Is a dynamic matrix for mainstreaming biodiversity concerns in the country developed in consultation with various stakeholders and by taking cognizance of legislative and policy framework.
National Action Plan on Climate Change (2008)	Eight national missions envisaged and among these four (national mission on water, sustaining Himalayan ecosystems, sustainable agriculture and Green India) are directly relevant to biodiversity conservation.
National Working Plan Code 2014 (*For Sustainable Management of Forests and Biodiversity in India*)	It provides guidelines for preparation of management plans of government, community and private forests and address aspects related to sustainable management of forest and biodiversity and environmental services.

Table. 4.2: Central Government Legislation relevant to Biodiversity conservation

Relevant key legislation	Key feature
Wildlife (Protection) Act, 1972 (with amendments 1992, 2002, 2003 & 2005)	Deals with protection of wildlife and habitats and provides for the protection of wild animals, birds and plants and related matters, with a view to ensuring the ecological and environmental security of the country.
Indian Forest Act, 1927	Designed for forest management and protection, the transit of forest and duty chargeable on timber and other forest produce.
Forest (Conservation) Act, 1980	Designed for the conservation of forest and related matters mainly related to transfer/use of forest land for non-forestry activities.
Environment (Protection) Act, 1986	Provide the protection of and improvement of environment (land, water and air) and related matters.
Biological Diversity Act, 2002	Provides for conservation of biological diversity, sustainable use of its components, and fair & equitable sharing of the benefits arising out of the commercial utilization of biological resources, traditional knowledge and related matters. It also provides for constitution of the institutions like National Biodiversity Authority (at National level), State Biodiversity Boards (at state level) and Biodiversity Management Committees (at local body level) for implementing this Act.
Biological Diversity Rules, 2004	Deals with operationalization of the Biological Diversity Act.
Protection of Plant Varieties and Farmers Rights Act (PPV & FR Act), 2001 and PPV & FR Rules, 2003	Provides for the establishment of an effective system for protection of plant varieties, the right of farmers and plant breeders, and to encourage the development of new varieties of plants and rules for implementation.
Indian Patent Act, 1970 with amendments- 2002 and 2005.	The Indian Patent (2nd amendment) Act 2002 and 3rd amendment act, 2005 provides for the protection of plant varieties and traditional knowledge from patenting and protecting the rights of the farmers & local communities including tribal.
The Scheduled Tribes and other Traditional Forest Dwellers (Forest Rights) Act, 2006	Recognizes and vests the traditional rights to forest dwelling communities over access to forest goods and occupation in forest lands.

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, legislations, plans and strategies which exhibit commitment of the state for conservation and sustainable management of the biological resources, some of which are given in Table-4.3.

Table. 4.3: State Level Policies, legislations, plans, strategies related to Biodiversity and relevant to Uttarakhand

Policies/Legislations etc	Key features
Bhotia Grazing Rules, 1927	For regulating grazing in the reserved and protected forests of Kumaon (presently entire Kumaon Division and Chamoli, Pauri and Rudraprayag districts of Garhwal Division) of cattle including sheep and goats belonging to Bhotias and other traditional grazers.
Uttar Pradesh Government's (erstwhile U.P. including Uttarakhand) Order on banning green felling of trees above 1000 m (1981) followed by order of Hon'ble Supreme Court of India's (1996)	Uttar Pradesh (UP) Government banned felling of green trees above 1000 m altitude vide Order No. 1913/1-81 dated 18.3.1981 which was extended from time to time. Meanwhile, Hon'ble Supreme Court of India banned green felling above 1000 m in all hill regions of UP (now Uttarakhand), Himachal Pradesh & West Bengal with certain relaxations.
Forest Policy of Uttarakhand, 2001	Uttarakhand developed its Forest Policy as per the National Forest Policy of 1988. The state policy focuses on creating environmental stability, conservation of biodiversity, afforestation for fulfillment of villager's requirement, poverty alleviation, increasing people's participation in forestry activities and strengthening the community institutions like Van Panchayat.
Uttaranchal State Van Panchayat Regulations, 2005	Van Panchayat Regulations/Rules (2005) enshrine the community rights over nearby forest to be managed by the community themselves.
Uttarakhand Plantation Policy, 2005	This policy gives emphasis on plantation of multiple species for environmental conservation (mainly soil & water), local utility (for fodder, fuel wood, food & medicine) and for income generation of the local community.
State Climate Change Council, Uttarakhand, 2011	Formulated with the mandate of preparing, approving, implementing and monitoring a work plan for climate change in the state. (Order No. 37/X-3-2010-13(12)/2009 dated 11th January, 2011) The Council is chaired by the Chief Secretary, Government of Uttarakhand with Forest and Rural Development Commissioner (FRDC) as the Vice-Chairperson and APCCF (Environment) as the Member-Secretary. The Council has representatives belonging to 27 departments/institutions as its member.
Uttarakhand State Action Plan on Climate Change (UAPCC), 2012	In line with the National policy on Climate change, Uttarakhand State has developed a comprehensive policy planning document setting out strategic orientations for adapting to and mitigating climate change impacts across all sectors. Through the UAPCC, the State Government commits itself to fostering inclusive, sustainable, and climate resilient growth and development of the State. This vision will be achieved through (a) charting a low carbon growth strategy and climate resilient development model; (b) integration of climate concerns into all aspects of development policy and implementation, and (c) ensuring complimentarily with and contributing to the national agenda on climate change.

Forestry sector of India is governed by a number of clearly defined laws/rules/ regulations for long. Thus, the KSLDCI project is required to have the operational structure and activity components taking into consideration such applicable laws/rules/ regulations. If necessary, the changes may need to be proposed for the betterment of the community based forest management in the project area. Furthermore, the policy decision manifested in the National and State level would also affect the environment in which the project would be implemented and apparently, the project would require to help all the three partner countries of KSLCDI to achieve objectives of the project.

For ensuring access and benefit sharing (ABS), India has taken significant legislative measures. The Biological Diversity Act, 2002 & Rules, 2004 that inter alia provides for regulating access to biological resources and associated traditional knowledge so as to ensure equitable sharing of benefits arising out of their commercial utilization has been dealt in detail separately (Section- 6).

The Protection of Plant Variety and Farmer's Right Act (PPV & FR Act), 2001 and the PPV & FR Rules 2003, provides for the protection of plant breeders right over new varieties developed by them and the entitlement of farmers to register and also to save, breed, use, exchange, share or sell the plant varieties, which they developed, improved and maintained over generations. The patent 2nd amendment act, 2002 and patent 3rd amendment act, 2005 provides for exclusion of plants and animals from the purview of patent (section 4e); exclusion of an invention which in effect is traditional knowledge (Section 4p); mandatory disclosure of the source and geographical origin of the biological material used in an invention (section 8 d); and provision for opposition to grant of patent or revocation of patent in case of non–disclosure or wrongful disclosure of the source of biological material and any associated knowledge thereto.

Pursuant to the CBD, a first major step was the development of a National policy and macro-level action strategy, 1999 that called for consolidating existing biodiversity conservation programmes and initiating new steps in conformity with the spirit of the convention. This was followed by implementation of a United Nations Development Program (UNDP)/Global Environment Facility (GEF) sponsored National biodiversity strategy and action plan project (NBSAP) during 2002-2004 that

yielded micro-level action plans adequately integrating cross cutting issues and livelihood security concerns. Besides, a number of policy and plans are relevant to the convention, such as National Forest Policy (NFP), 1988 setting goals and guidelines to areas under forest, National Conservation Strategy and policy statement on Environment and Development (1992) evaluating the nature and dimensions of environmental problem in India.

The National Agriculture Policy (2000) also intended to actualize vast untapped growth potential. The National Policy for farmers (2007) is mainly to protect and improve land, water, biodiversity and genetic resources essential for sustained increase in productivity and to strengthen the legal aspect of bio-piracy. The primary focus of the National Livestock Policy (2013) is on increasing livestock productivity and production in a sustainable manner and regulating import and export of livestock.

The Van Panchayat Rules was first enacted in 1931 under Section 28 (2) of the Indian Forest Act of 1927 and later on, major

revisions were made in 1976 and 2005. It provides broad guidelines for the supervision and management of forests under the control of Van Panchayats. These Forest Council rules lay down the broad parameters of management practices to be followed by the Van Panchayats.

Forest (Conservation) Act, 1980 with amendments made in 1988, is an Act to provide for the conservation of forests and for matters connected therewith or ancillary or incidental thereto. Restriction has been made on the de-reservation of forests or use of forest land for non-forestry purposes. Non-forestry purpose means the breaking up or clearing of any forest land or portion thereof for the cultivation of tea, coffee, spices, rubber, palms, oil-bearing plants, horticultural crops or medicinal plants; any purpose other than re-forestation/afforestation; but does not include any work relating or ancillary to conservation, development and management of forests and wildlife, namely, the establishment of check-posts, fire lines, wireless communications and construction of fencing, bridges and culverts, dams etc.

5

MAJOR POLICY INTERVENTIONS FOR BIODIVERSITY CONSERVATION AND MANAGEMENT IN UTTARAKHAND

5.1 Ban on Green Felling: Conflict between Science and Policy

A brief recap of events leading to ban on green felling, first in erstwhile Uttar Pradesh and later in the entire Himalayan region may be mentioned in order:

The forests of Uttarakhand are considered a vital natural resource because of their role in stabilizing soil of the mountains and protection of perennial water resources, which originate from them. The health of the forests of this region therefore has direct bearing on the welfare and wellbeing of the large number of people living the downstream plain regions of India. The coniferous forests comprising of Fir (*Abies pindrow*), Spruce (*Picea smithinia*), Deodar (*Cedrus deodara*), Kail (*Pinus wallichina*) and Chir pine (*Pinus roxburghii*) are major part of the forests and are major source of timber whereas, Banj Oak (*Quercus leucotrichophora*) and other temperate broad leaved species are major source of fodder and fuel wood (Burfal, 1988; Burfal, 2014).

The management of Himalayan forests in India has been based on the scientific principles in which the forests were felled under recognized and innovative Silvicultural practices. Before ban on green felling above 1000 m asl, the felling was carried out in coniferous forests in Periodic Blocks and Shelter-wood of Uniform systems. The systems implied felling in different stages i.e. seeding, intermediate and final felling (Burfal, 1988; Working Plans of various Forest Divisions in Uttarakhand). These selection system or Group selection system was also adopted in many places. Another objective of management was to extend the existing Deodar and Kail forests and to replace Fir and Spruce with these species wherever possible. The rotation was fixed at 100-120 years and the regeneration period of 20-30 years. Regeneration was to be obtained under shelter-wood, the mother trees being left sufficiently far apart to let in regeneration, but close enough to keep down weeds. Regeneration areas were closed for grazing and if natural regeneration was delayed, artificial measures were to be resorted to. In the various periodic blocks (PBs) regeneration/seeding felling, cleaning, thinning, and removal of remaining over-wood was prescribed. These felling operations were carried out based on silvicultural practices mentioned in the Working Plan of the respective forest division. The species mentioned above have been increasingly felled from the Himalayas for the supply of timber for commerce and industry of the country and for supply of fuel wood and making charcoal for local consumption.

The felling coupes were allotted to the private contractors by the Forest Department. The contractors were more interested to earn profit by engaging cheap labours from outside the local area. This led to resentment among the villagers. They sought to protect their livelihoods through the Gandhian method of Satyagraha or non-violence and resistance. Between 1970s and 1980s, the local resistance to the felling of trees in the forests spread throughout the state and became organized which came to be known as the "Chipko Movement". This resulted in putting ban on felling of Banj (*Quercus leucotrichophora*) and Burans (*Rohododendrum arboretum*) trees in the Himalaya region for the first time by the then Government of Uttar Pradesh vide its order no. 3641/14-1/1974 dated 25th May,

1974. Later on, considering the large scale resentments from the local people and on the advice of the Government of India, the Government of U.P. (undivided state of UP), imposed ban on all commercial green-felling vide its order no. 1913/1-81 dated March 18 1981. Apart from that, an expert committee was appointed vide Government Order no. 4955/14-2-72/80 dated 17.8.1981 to decide on weather felling should continue as per scientific prescriptions made in the working plans. This committee, headed by Prof Kaul recommended scientific felling in forest areas (Forest Department, UP, 1982). However, the ban was upheld by the government vide Government Order no. 6241/14-2-124/82 dated 21/8/1986 on the basis of envisaging difficulties that would be encountered. But hardly any felling was carried out even after the removal of ban or prohibition.

The ban was further extended by another G.O. No 6373/14-3-700(385)/93 dated 15/9/1993 followed by G.O. No. 9371/14-2-96-124/1982 dated 27/9/1996 which extended the ban for another 10 years. With the intervention of the Hon'ble Supreme Court in the matter of T.N. Godavarman Thirumulpad vs. Union of India (Writ Petition No. 202/1995), all kinds of felling were stopped in Himachal Pradesh and Hills of Uttar Pradesh and West Bengal vide its judgment and order dated 12.12.1996. However later on, Hon'ble Supreme Court relaxed its order (Clarification dated 20/1/1998) for meeting the rights and concessions of local population for bona fide use and instructed the state governments to appoint suitable committees for deciding the felling of dead, dying and diseased trees in the hilly regions of the states. Several Working Plans prepared after this order did not prescribe green felling owing to the above mentioned order. However, the Working Plan Officers have been prescribing felling as per silvicultural systems in vogue subject to the lifting of such ban in future.

Thus, from 1981, crops proposed for felling as per working plan prescriptions were not removed and the forest department continued to remove dead, dying and diseased trees only. In other words, for more than three decades, timber and other forest produce, which could have been worked scientifically according to the Working Plan prescriptions, has not been removed from the reserved/ protected forest areas because of the ban imposed on green felling. If such prescription was followed, fully or partially, forest revenue at the market rate could have accrued to the state of Uttarakhand and other hill states besides generating considerable employment to the local people and raw material for wood based industries. It is a straight loss which could be allowed to the states on this count alone (Tolia, 2015).

Study on Impact of Ban on Green Felling

The issue of scientifically reviewing the impact of the ban on green felling has been informally and formally discussed many a times and ultimately the Government of Uttarakhand, predominantly the hill districts of erstwhile Uttar Pradesh, decided to conduct a proper scientific study on impact of ban in varied aspects. Consequently, a project to study the impact of ban on green felling of Chir Pine was awarded to the Research wing of Uttarakhand Forest Department and simultaneously, another project to study the similar impact on Deodar, Kail and other species was awarded to the Forest Research Institute, Dehradun. The reports of these studies were completed in 2012 (Manoj Chandran, 2012) and in 2011 (Mishra, 2011) respectively. The recommendations of these studies are summarized below.

(a) Results of the study on the Impact of ban on green felling in Chir Pine (*Pinus roxburghii*) Forests

Under this study, the five most important recommendations made regarding green felling of Chir Pine forests are (Manoj Chandran, 2012):

i) For the production objective of forest management, scientific green felling of Chir Pine in fully regenerated sun (South) facing aspects of slopes is desirable;
ii) Shady slopes under pine should be left to nature and utilization if any should be left at the disposal of the people and their bona fide needs. However, the removal of Pine from already established climax oak forests may be done if protection to the oak forest can be ensured;
iii) There is huge potential for recovery of associate tree species in pine forests which can be achieved by proper protection of the existing rootstock, presently in the form of shrub like vegetation. There is also a good amount of valuable shrub species associates in Pine forests like *Woodfordia fructicosa, Berberis asiatica, Pyracantha crenulata* and *Rubus ellipticus*, which also require protection;
iv) Commercial removal of timber, whether green or dry, if required as a last resort for management purposes should happen only after meeting the bona fide demands, especially fuel wood of the stakeholder population, estimated by socio-economic surveys and not based on indents received for rights and concessions for timber; and
v) Chir pine forests may not be treated as a bad species or as an encroacher of other forest types, rather, the ecological role Chir Pine plays in its own habitat and the succession towards other climax forest communities should be understood. The pine forest are the major forest type in Uttarakhand Himalaya and the loss of Pine forests can have severe implications on the ecology and climate of the landscape.

Thus, the study recommends green felling in Chir Pine forests only in sunny slopes that too with established regeneration and to the extent of incremental volume growth in the growing stock minus the bona fide requirements of the local residents. Of course,

the permission from Hon'ble Supreme Court must be sought and obtained. This report does not recommend any type of commercial felling as per prevailing silvicultural system in any other kind of Chir Pine forests (i.e. Van Panchayats, Civil- Soyam and private forests) in Uttarakhand.

(b) Results of the study on impact of ban on green felling in Deodar, Kail, Spruce and Fir Forests

The findings and recommendations of this study carried out by Forest Research Institute, Dehradun (Mishra, 2011) is summarized below:

i) Both in felled and unfelled plots, the principal species dominate the vegetation at the tree level. Therefore no impact of ban on the composition of species at the tree level could be found;
ii) The diversity at shrub level is marginally higher in unfelled plots. Therefore, the ban on green felling has contributed to the regeneration of associated species in the understory;
iii) There is no significant difference between the unfelled and the felled plots as far as the herb level vegetation is concerned. More dominant shrub level vegetation seen in unfelled areas may suppress the herb level regeneration;
iv) The regeneration of principal species is much higher in the felled plots than in unfelled plots. The ban on felling in the forests under study has reduced the regeneration;
v) The felled plots have larger proportion of younger trees as compared to unfelled plots in the crop structure since the mature trees are not being removed due to ban on felling;
vi) The growing stock in unfelled Fir and Spruce forests are higher than in the felled ones. In case of Kail and Deodar forests, no definite conclusion could be drawn;

vii) The soil of unfelled Fir and Spruce coupes are marginally more acidic than the soils of the corresponding felled coupes;
viii) The soil carbon and organic matter content in the soil of unfelled coupe was found to be higher than in the felled ones; and
ix) The ban on green felling has not contributed to increased forest cover.

Recommendations of the Study Committee

Based on the findings of two study committee reports on existing ban, it is proposed to recommend on behalf of the Study Committee based on the analysis and the discussion which are as under:

First, as the study on the impact of ban on green felling of Chir Pine (*Pinus roxburghii*) (Manoj Chandran, 2012) has recommended that "scientific green felling of Chir pine in fully regenerated sun facing slopes" is desirable, it is recommended that appropriate steps may be taken to commence scientific green felling as per the Working Plan prescriptions. As the Ministry of Environment and Forests (MoEF) has the overall responsibility of ensuring compliance of the court order, the scientific recommendations made by this Committee may be made available for their consideration so that unscientific restrictions are not imposed on the use of forests which is a

major source of human livelihoods especially in the mountain regions.

Secondly, as the study committee consisting of FRI scientists (Mishra Committee), have also concluded unequivocally that "the ban on green felling has not contributed to increased forest, the regeneration of principal species is much higher in the felled plots than in unfelled plots and in both plots, the principal species dominate the vegetation at the tree level, therefore no impact of the ban on the composition of species at the tree level could be found." Accordingly, it may be concluded that the ban imposed on green felling of these species i.e. Deodar, Fir, Kail, Spruce etc has not been helpful in either increasing the available wood stock or improving the regeneration.

As the findings of these two research projects have taken up the issue of impact of the policy decisions regarding imposing the ban on green felling of trees in the forest ecosystem, these two could be taken as pilot studies to understand the impact of the silvicultural practices or Systems on the ecology of the forests. Undoubtedly, the findings of the two projects are likely to have significant and positive impact on the scientific management of the forests. If more research studies are taken up in future on similar lines and the environmental impact of Silvicultural practices are documented, logical conclusion may be derived based on scientific rationale (Tolia, 2013). .

5.2 Participatory Forest Management: Van Panchayat/Joint Forest Management - An unique policy decision for community participation

5.2.1 Van Panchayat

Van Panchayats (VPs) can be regarded as an institutionalized form of traditional forest management. Unique to Uttarakhand, these people-centric institutions are engaged in organized utilization and protection of forests and related natural resources by village communities.

History

The origin of Van Panchayats can be traced to the forest settlements carried out by the British restricting the community rights over local forests and increasing government control over forests. Following massive

protests by the local communities against the oppressive forest policies of the British, a Forest Grievance Committee was formed in 1921 to resolve the increasing conflicts between the state and the people. The major grievances of the people, as identified by the Committee in its report, were restrictions imposed on the lopping and grazing, the placing of boundary pillars too close to cultivated areas, the ban on putting fires in pine forests and the reservation of measured (*naap*) land.

At the recommendation of the Committee, reserve forests were reclassified into Class I and Class II forests. Class I forests mainly comprised of broad-leaved species, having little commercial value while Class II forests comprised of commercially valuable species such as Chir pine, Deodar etc. Class I forests were de-reserved and handed over to the Revenue Department and VPs were formed on these forest areas as well as on Civil & Soyam lands.

Legal status

The Van Panchayat Regulation, under the District Scheduled Act of 1874, was introduced in 1931 to govern the Van Panchayats. However, these rules were not applicable to Chakrata forests and forests within the erstwhile Tehri princely estate. The earliest VPs were constituted in Kumaon Division (which includes KSL part of India) and in Chamoli and Garhwal (now Pauri Garhwal) districts of Garhwal Division.

Prior to formation of Uttarakhand, the Van Panchayat Regulation Act, 1931, was revised in 1972 and 1976 and these revised rules were also applicable to Tehri and Chakrata. The formation of new state of Uttaranchal led to the enactment of *The Uttaranchal Panchayati Forest Rules 2001,* which resulted to significant curtailment of the autonomy of these community organizations and was an attempt to bring these institutions under the fold of the Joint Forest Management (JFM) as a World Bank supported JFM project was ongoing in the state. Later, the Uttaranchal Panchayati Forest Rules, 2005 were promulgated which sought to consolidate the two types of VPs that existed in the State; (a) VPs carved out of reserve forests and governed by the Indian Forest Act 1927, and; (b) VPs constituted on civil & soyam land and governed by the District Schedule Act 1931.

Constitution of Panchayati Forests (Village Forests)

On the application made by at least one fifth of the adult population residing in the revenue village, including any land bordering the village, which has been constituted as reserved forest or declared

as protected Forest or is a forest belonging to the Government, or on the resolution passed in the meeting of the concerned Gram Sabha (Village Council), the concerned Sub-Divisional Magistrate shall start the proceedings on the recommendation of the Forest Department for constitution of the Panchayati Forest of that village. It has also been provided in rules that no land shall be demarcated to be Panchayati Forest if half or more of the residents of the village or villages, within which the area lies, file objection to the scheme.

When the Panchayati forest is demarcated, the Sub-Divisional Magistrate shall call upon the adult residents of the village to assemble (General body assembly) for constituting a Management Committee for a term of five years. The Management Committee shall consist of nine members out of which four members shall be women. The Management Committee then elects a Sarpanch (Chairman) from amongst nine members of the committee.

Status of VPs in Uttarakhand

Until the year 2000, the state had a total number of 6,777 VPs covering nearly 400,000 ha (averaging approximately 60 ha per VP, 12% of the total forest area of Uttarakhand). Majority of these VPs were constituted for the entire Gram Sabha and all the revenue villages within the Gram Sabha had equal rights over VP forest.

However, subsequent State policies sought to increase the number of VPs and also to ensure that a VP may be constituted for all revenue villages with forests. Consequently, large number of new VPs was formed, especially between the 2001 and 2005, while at the same time multi-village Van Panchayats were re-organized. Presently, there are 12,089 VPs in 11 districts of Uttarakhand managing an area of over 545,000 ha (Van Panchayat Nideshika, 2007) comprising of about 16% of the total forest area of the State. As there are about 16,000 Revenue villages in the State, most of the villages with forests seem to have been covered and there is little scope of creation of new VPs.

5.2.2 Joint Forest Management in Uttarakhand

Prior to the formation of a separate state of Uttarakhand, Joint Forest Management (JFM) program was formulated in 1997 by the state of Uttar Pradesh. Funded by the World Bank, this program was introduced from 1st February, 1998 for a period of 5 years.

Legal status

JFM program was introduced after the erstwhile UP government enacted JFM

rules in 1997. However, subsequent to the formation of Uttarakhand in the year 2000, Uttaranchal Village Forest Joint Management Rules were enacted in 2001.

Status of JFM in Uttarakhand

The World Bank funded a JFM project during 1990s and 2000s, and the project was implemented in 35 Forest Divisions of Uttarakhand. A total of 1,217 Village Forest Committees (VFCs) and 98 Eco-Development Committees (EDCs) were formed covering an area of 2,649.52km^2 comprising of 2,061.66 km^2 of forest land and 587.86 km^2 of civil soyam and revenue land; a large number of VPs were included under the fold of JFM program and as many as 729 VFCs were formed in VPs (CAG, 2004-05).

Although this program was initially conceived as the first phase of a long term program but subsequent to the completion of first phase in July 2003, this program did not continue. However, there is lack of clarity regarding the future of the VFCs formed under this project and whether they were able to sustain beyond the project duration, particularly since Uttaranchal Panchayati Forest Rules, 2005 superseded the Uttaranchal Village Joint Forest Management Rules, 2001. Nevertheless, under the National Afforestation Program (NAP), a total of 37 Forest Development Agencies (FDAs) were formed and available statistics indicate that these FDAs are working with 644 VFCs in Uttarakhand (Forest Statistics, Uttarakhand, 2012).

5.3 Herbal Sector: Linking Science and Policy - making Process

5.3.1 Policy decisions

Uttarakhand (including the geographical area of the Indian part of the KSL) is one the Himalayan States which harbours many of the medicinal and aromatic plants (MAPs) in its varied topographical area. Realizing the importance of MAPs as source of biodiversity and its potential to contribute

significantly to enhance the economy of the local communities and capacity to generate employment and boost the industries in the herbal sector, the state of Uttarakhand has been projected as 'Herbal State' of India. To make it a reality, there is a need for striving excellence in the area of conservation and sustainable utilization of MAPs. A number of initiatives and policy decisions have been taken by the state government after consulting various concerned Government departments, Non-government organization (NGOs), Community based organizations (CBOs), Research and Development (R&D) institutions, farmers, traders, herbal practitioners and industrialist with the intent of making science as systematic pursuit of knowledge and making policy. Four important policy decisions related to conservation, harvesting, marketing and cultivation of MAPs in the state was taken by Uttarakhand Government as narrated in Table-5.3.1.

Table. 5.3.1: Herbal Sector Policy Decisions in Uttarakhand

Subject (Policy decision)	Referece of Uttarakhand Govt. Order	Brief outlines of priorities
Policy/Plan for Conservation, Development and Harvesting (CDH) of Medicinal and Aromatic Plants (MAPs) in Uttarakhand	G.O. No. 914/ FRD/2003, dated 23rd August, 2003 (FRDC Section0	CDH plan was adopted by Uttarakhand government for sustainable harvesting of medicinal plants mainly from Reserved Forest and Van Panchayats.
Procedure for Sustainable Harvesting of MAPs from the Forest Area of Uttarakhand State	G.O. No.761/ FRD/2004, dated 15th Dec., 2004 (FRDC Section)	By this order, on the basis of recommendations made by scientific organizations and experts, three lists of MAPs have been issued corresponding to species restricted for harvesting but supported for cultivation, species on which there is no restriction for collection and species open for collection with certain restrictions.
Establishment of MAPs Mandi (Sale Depots) to facilitate marketing of MAPs	G.O. No.105/ FRD/2004, dated 21st June, 2004	This government order has been issued to facilitate the sale of MAP & other NTFP by providing the establishment of three MAP Mandi (Sale Depots) to be managed by a committee headed by the Managing Director, Uttarakhand Forest Development Corporation. The order also includes detail on operational procedure and functions of these Sale Depots.
Procedure for Registration of Farmers for cultivation of MAPs and Simplification of transit of their produce.	G.O. No. 633/ XVI/05/5(89)/05, dated 10th May 2005.	This order makes provision for registration of farmers with HRDI to regulate cultivation of MAPs and provide them intensive & technical support. This order also simplifies the existing transit rules for MAPs so that the growers do not face any hardship during its transit.

Long term conservation and sustainable utilization of MAPs in the state was dependent on various factors mainly, *in-situ* conservation plan so as to strengthen effective *ex-situ* conservation measures backed by research and technical inputs from ecological, bio-technological and bio-prospecting related fields. Establishment of State Medicinal Plant Board (SMPB) in the state on the lines of National Medicinal Plant Board (NMPB) for coordination of various activities and technical inputs to various programmes was one of such steps taken by Uttarakhand State for becoming Herbal State. It went ahead by establishing Herbal Research and Development Institute (HRDI), Gopeshwar and Aromatic Plants Development Centre, Selakui (Dehra Dun). An ambitious Conservation, Development and Harvest (CDH) plan was evolved for implementation after brief research on the availability (population status) of medicinal plants in the different Forest Ranges of the reserve forest (outside Protected Areas). Several scientists and individuals from Botanical Survey of India (BSI), Central Institute for Medicinal and Aromatic Plants (CIMAP), Forest Research Institute (FRI), G. B. Pant Institute of Himalayan Environment and Development (GBPIHED), Indian Council of Forestry Research and Education (ICFRE), Wildlife Institute of India (WII) and state level institutions in addition to many NGOs (Navdanya, Chirag, CHEA) (GIZ-RED 2010) were focused to work on medicinal plants, their ecology and techniques of cultivation. Objectives and achievements of the individual sector have helped state to gain a sound position in the sector of medicinal plants; however, a lot remains to be accomplished. On the other hand, findings of a number of research works and its publication remains to be utilized in making further policy decisions. There is a need to bridge the gap in terms of coordination and communication between the researchers, policy makers and the implementing agencies.

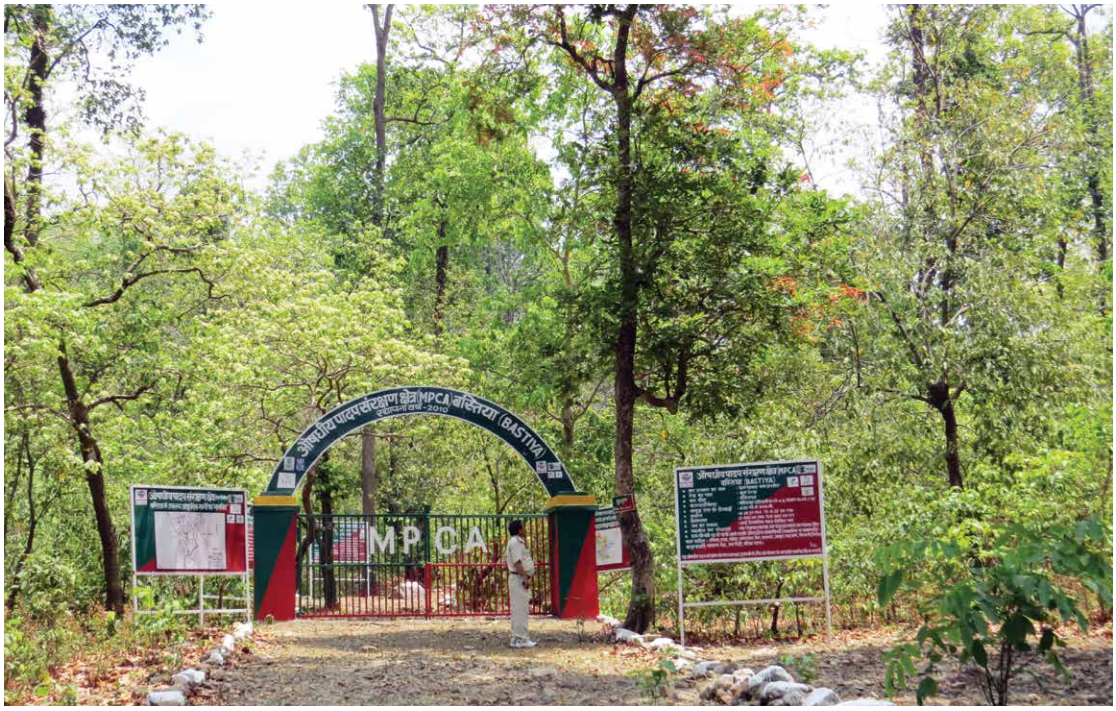
5.3.2 Role of Government Institutions

Uttarakhand Forest Department (UKFD)

The UKFD has been proactive in MAP sector by development of MAP nurseries and promoting its plantation under afforestation and reforestation drives. It has developed four herbal gardens in the state and plans to develop one each in every district. The UKFD has also taken steps to control collection of MAPs from wild by preparing three list (a) Species banned for collection (b) Open for collection and (c) Species which can be sustainably harvested. The UKFD has also incorporated management of NTFPs in the Working Plan prescriptions. Management of alpine grasslands which harbour wealth of MAPs have also come up in some of the revised Working Plans. A WII-UKFD collaborated project on 'Survey and Mapping of commercially important Medicinal and Aromatic Plants in Uttarakhand' was initiated in February 2008. A research team of WII had taken up a job to survey MAPs in the reserve forests of the state to suggest Conservation, Development and Harvest (CDH) plan; **Rapid Mapping Exercise** (Rawat et al. 2004).

State Medicinal Plants Board, Dehradun (SMPB), Dehra Dun

SMPB was established in the year 2001 under the Chairmanship of Hon'ble Chief Minister of the state. Being an umbrella body



in the state, it aims to establish coordination between programs funded by National Medicinal Plants Board (NMPB) and the institution/organization in the state. It promotes *in-situ* conservation and *ex-situ* cultivation of MAPs. It is also responsible for planning the policy of MAP sector in the state. The SMPB has also been responsible for implementation of about 200 contractual farming projects and some 75 promotional projects in the state. 'Chief Minister Uttarakhand Himalayan Herbal Mission' is being implemented, in which target is to add 50,000 farmers and encourage them to cultivate MAP in about 6500 ha land. It is implementing an important project on 'mainstreaming conservation and sustainable use of medicinal plant diversity in the state' with the support of State Forest Department in which seven medicinal plant conservation areas (MPCAs) have been developed in various forest types focusing few RET (Rare, Endangered & Threatened) medicinal plants. It also aims to develop a sustainable harvest protocol for highly traded MAPs in the state along with documenting traditional knowledge of the local community. Development of Community Knowledge Registers on health and Home Herbal Garden is underway. The board also looks into the proposals for funding by NMPB in the Central Sector Scheme for conservation, development and sustainable management of medicinal plants.

Herbal Research and Development Institute (HRDI), Gopeshwar, Chamoli

The HRDI was established as an autonomous institute of the state in 1993. The mission and vision of the institute was 'to develop the state as a leading herbal destination through integrated development of herbal and aromatic sector'. It was earlier designated as a Nodal agency for coordinating all initiatives related to development of this sector. The institute has initiated promotional cultivation of about 38 MAPs and approximately 3000 ha. of land has been put under MAP cultivation. Apart from that, approximately 20,000 MAP growers have been registered by the institute.

Centre for Aromatic Plants (CAP), Selaqui, Dehra Dun

CAP was established in 2003 as a centre for promotion of aromatic plant sector in the

state. This centre was established to enhance the economics of mountain specific products, value addition and marketing of aromatic crops. It is providing 50% subsidy for cultivation of aromatic crop and 90% subsidy for installing distillation unit. For buy back of aromatic oil, it has developed a corpus as revolving fund.

Uttarakhand Forest Development Corporation (UFDC)

UFDC was established in the year 2003 as a statutory body constituted by the State Government. The Corporation was formed for the better preservation, supervision, development and also for sustainable exploitation of forest produce and related issues within the State. The Corporation has been progressing forward not only in its financial aspect but also has taken a big leap in the direction of diversification of its activities. The Corporation has added the collection and disposal of minor minerals from the rivers situated inside reserved forest areas, collection and marketing of medicinal plants and eco-tourism in its works apart from the removal of trees as allotted by the Forest department.

It carries out collection of NTFP from allotted Forest Ranges. The other agencies which have been recently allotted forest ranges for collection of minor produce are Bhesaj Sangh, Kumaon Mandal Vikas Nigam (KMVN) and Garhwal Mandal Vikas Nigam (GMVN). It has developed **three herbal mandis** at Rishikesh, Ramnagar and Tanakpur for marketing of herbal produce. More than 60 collection and storage centres are also being established throughout the state in order to streamline the flow of MAP produce.

Bhesaj Vikas Ikai (Community Development Unit)

Bhesaj Vikas Ikai (BVI) was established in the year 1949 for the development of border districts through harvesting of MAPs. Presently, it is viable in all districts of the state, promoting the raising of planting material, training of farmers in cultivation and post harvesting of MAPs. Under BVI, a *Bhesaj Sangh* is also functional in each district of the state. The objective is sustainable collection of MAPs from the wild, marketing of these MAPs and making arrangements for availability of planting material of MAPs to the cultivators.

High Altitude Plant Physiology Research Centre (HAPPRC), Tungnath

The High Altitude Plant Physiology Research Centre was established in July 1979. The Centre has field station namely **Alpine Research Station at Tungnath** (3600 m asl) and an **analytical laboratory** at Srinagar (Garhwal). The Centre was established to cover development oriented research, training and teaching on survival, adaptation and productivity of mountain plants. Its objective was also to undertake fundamental and applied studies on mountain plants along with undertaking studies on conservation of endangered plant species and setting up demonstration units. It has some good publications also in the form of pamphlets of many high altitude MAPs with their cultivation techniques.

5.4 Yar-Tsa-Gumba (*Cordyceps sinensis*): Collection and Trade

Yar-Tsa-Gumba (*Cordyceps sinensis*) is one of the highly potential medicinal Caterpillar funguses which in recent years has become the most discussed and researched natural medicinal material. As on date, there is lack of adequate information on many aspects of this fungus, particularly in India and Nepal parts of the KSLCDI project. Yar-Tsa-Gumba is a

Tibetan name which means "Summer Grass and Winter Insect". *Cordyceps sinensis* is the result of a parasitic relationship between the fungus *Cordyceps* and larva of the ghost-moth (*Thitarodes / Hepialus*). *Cordyceps sinensis* was firstly identified and used by the herdsmen in different parts of the Tibetan plateau and the Himalayan region; however, it has recently become one of the most valued natural materials. It is known in the West primarily for its use in traditional Chinese medicine, where it is a prized ingredient but its roots are in traditional Tibetan medicine (Bhattarai, 2010).

The British mycologist Berkel, first described this Caterpillar fungus in 1843 as *Sphaeria sinensis*; Berk. Later in 1878, Saccardo renamed it as *Cordyceps sinensis*, hence the scientific name "*Cordyceps sinensis* (Berk) Sacc." is referred for the final form, which is the fruiting body of the fungus arising out of the dead body of a caterpillar (Devkota, 2006). Recently, some species under the genus *Cordyceps* have been transferred to a new genus named as *Ophiocordyceps*. Consequently, the species *Cordyceps sinensis* has become *Ophiocordyceps sinensis* (Bhattarai and Ghimire, 2006).

There are various reports indicating the number of *Cordyceps* species so far identified; ranging from 200 to more than 400 species. However, about 48 species of *Cordyceps* have been reported from Tibetan plateau and Himalayan region (Bhattarai, 2010, Negi, 2010). Although a number of *Cordyceps* species have been used in traditional medicines, *C. sinensis* is the most discussed and prioritized species and has been reported from four countries namely Bhutan, China, India, and Nepal, distributed along the Himalaya and Tibetan plateau. In India and Nepal, *C. sinensis* is found on the sub-alpine and alpine pastures in the altitudinal range of 3000 to 5000 m asl. As far as the partner countries of the KSLCDI project are concerned, in Nepal this caterpillar fungus

is found in some 20 high altitude districts including Darchula, Bajhang and Humla districts of KSLCDI project. In India, it is found in Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh (Sharma, 2004, Negi, 2010); and in China, it is found in nine South Central Provenances which also form part of KSLCDI project. Since the detailed reporting on species diversity, global distribution, lifecycle, biomedical parameters, pharmaceutical values and trade at international level is not within the scope of this report, therefore, emphasis has been made on distribution, collection and trade of Yar-Tsa-Gumba only within the KSL-India part of the project in the succeeding sub-paragraphs.

5.4.1 Distribution and Collection of Yar-Tsa-Gumba in KSL-India

The KSLCDI part of India is almost entire Pithoragarh district and a small part of Bageshwar district, however, the caterpillar fungus is found only in sub-alpine and alpine grasslands of Dharchula and Munsyari Development Blocks between altitudes ranging 3000-4000 m asl. This caterpillar fungus is also found in higher altitudes of Bageshwar district, but not in the project area under KSLCDI. Very limited studies have been conducted on distribution, collection and trade of *C. sinensis* in India; particularly part of KSL-India. Some of the recent studies and reporting specific to the KSL-India include that of Foundation for Ecological security (2003), Sharma (2004), Rawat (2005), Negi (2006), Negi (2010), Sinha & Manoj Chandran (2012) and Burfal & Manoj Chandran (2014). According to these reports, in KSL-India, the *C. sinensis* occur at places like Chiplakot in the confluence of Darma and Chaudas valleys, Sumdum, Philam, Bon, Baling, Dugtu and Daantu in Darma valley, Ralam valley & Panchachuli base, Johar valley (limited occurrence specially in Laspa, Poting & near Barjikang), and Namik in Dharchula-Munsyari region of District Pithoragarh, Uttarakhand. The most heavily exploited sites of this fungus include Marjhali Bugyal (alpine

pastures) in the Ralam valley, and Nagnidhura and Jhanthari in the Panchachuli basin. As major part of Darma and Chaudas valleys are in Askot Wild Life Sanctuary (a Protected Area), collection of all biological resources is prohibited in this area.

To regulate extraction of Yar-Tsa-Gumba, Government of Uttarakhand issued order/guidelines in 2002, which still exists. According to this order:

- Extraction/collection of Yar-Tsa-Gumba from Van Panchayats (Village Forest Councils) is not illegal;
- It should be done through Van Panchayats for which a committee of the Van Panchayats should be formed to frame rules for the regulation of extraction;
- Committee should monitor exploitation and that the overall power is vested in the Sarpanch (Headman of the Forest

Council). All this is to be carried out under the supervision of the concerning Conservator of Forests;

- Only right holders are allowed to extract from Van Panchayat area and no employed labour by contractors;
- The village institution or Van Panchayat would formally negotiate for and sell by resolution the collection of an Yar-Tsa-Gumba of the whole village;
- The Van Panchayat would retain up to 5% of the sale value as commission in order to meet its watch and ward expenses; and
- Village should also resolve to keep aside, in rotation, some areas that would not be extracted from in a given year, in order to allow regeneration.

However, it is observed that the Van Panchayats are facing difficulties to regulate extraction of this fungus as per the above mentioned guidelines. The phenomenon witnessed some of the classic fallouts; feuding between villages for territory, the common fabric being threatened by element of high value commerce, and even the mysterious disappearance of people.

Since Yar-Tsa-Gumba falls within the meaning of "Biological Resource" as defined under sec 2(c) of Biological Diversity Act, therefore it needs to be brought under the regime of access and benefit sharing (ABS) and regulated. Keeping in view the kind of problem involved with this "Biological Resource", the situation needs to be handled delicately. To resolve this sensitive issue, following measures may be taken after careful examination:

i) The formation of Biodiversity Management Committees (BMC) in the concerned Gram Panchayat from the jurisdiction of which Yar-tsa-gumba is extracted.
ii) To build the capacity of the BMCs (to the level of making it fully operational) in order to bring this "Biological Resource" (Yar-tsa-gumba) under the regime of ABS.
iii) The regulation of Yar-tsa-gumba by the BMCs as per the provisions of Biological Diversity Act/Rules and Guidelines.

"Bhutan Model" of collection and marketing of *Ophiocordyceps sinensis* (Yar-tsa-gumba) be studied from the point of view of its adoption in Indian conditions, if possible. It needs to be mentioned that in Bhutan, Government provides marketing facilities and allows its sale with certain conditions after certifying the product.

5.4.2 Trade in Yar-Tsa-Gumba

With time and increasing popularity and demand of the raw material, a new trend has been observed in the locality of its collection. The collection and selling of *Cordyceps* has emerged as a new source of income in the rural areas and along the

trade channel. However, despite its being an economic commodity, the exact dimension of its transaction has remained always non-transparent mainly due to its high price and certain security issues (Bhattarai, 2010).

In India, no regulation or legislation control the collection, trade and export of *C. sinensis* and the fungus is not in the Negative List of Export (Sharma, 2004). However, as far as its export outside the country is concerned, it attracts the provisions of the Biological Diversity Act/Rules and guidelines for the regulation of biological resource.

To regulate the trade on Yar-Tsa-Gumba, the Government of Uttarakhand has adopted the auction system through Uttarakhand Forest Development Corporation, but the response is very poor due to uncertainty and lack of transparency on the market value of this species. No one knows about its exact purchase price, the list of buyers and the royalty that should be paid to the collectors or Van Panchayats. As a result, illegal trade is flourishing. A study carried out by Negi (2010) reveal that the main route of trafficking starts from border town of Dharchula (which also falls under KSL-India), district Pithoragarh, from where through Nepal, it is finally marketed into China. It has been estimated that about 400-500 kg of Yar-Tsa-Gumba reaches Nepal/China from this border town of Dharchula annually. The flow of Yar-Tsa-Gumba at various levels can be summarized as under:

A. Local Level

- Field gatherers, mostly the villagers, who have now almost demarcated their own zone of jurisdiction, and often the Nepali labourers flood into these un-demarcated sites to collect this fungus.

- Primary collector, often from the village itself plays the role of an agent to the broker at the local level.

B. National or Regional Level

The contractor, who sits in the border township of Dharchula, often send agents directly to the sites of exploitation to procure or bargain a lower price for the commodity. He often also takes advance in millions of Rupees from the international brokers.

C. International Level

- Brokers, mostly Tibetans, trade Yar-Tsa-Gumba through Nepal to China, where it is exclusively used as one of the constituents of the Chinese medicine.

- Brokers sell the commodity directly to the pharmaceutical companies, mostly international.

5.5 New Agriculture Policy

Seeks to actualize the vast untapped growth potential of Indian agriculture, rural infrastructure, growth rate, value addition, secure a fair standard of living for the farmers & agricultural workers, discourage migration to urban areas, price protection for farmers, minimize fluctuations in commodity prices, generation& transfer of technology, dismantling restrictions on movement of agricultural commodities and face the challenges arising out of economic liberalization and globalization.

Though the new agriculture policy is in tune with the overall provisions of Convention on Biological Diversity (CBD) and that of Biological Diversity Act, 2002, yet there are some features in the New Agriculture Policy, which may need to be revisited and addressed. In New Agriculture Policy, there is a provision for "dismantling of restrictions on movement of agricultural commodities throughout country". But as per Biological Diversity Act, 2002 of India, there is a provisions of declaring certain commodities as "normally traded as commodities" and these normally traded as commodities are exempted from the provisions of the Biological Diversity Act,

2002 and rest are to be regulated under the BD Act, 2002.

The Biological Diversity Act, 2002 being an umbrella act and section 59 provides that the provisions of this Act shall be in addition to, and not in derogation of, the provisions in any other law, for the time being in force, relating to forests or wildlife. Thus, the provisions of Biological Diversity Act, 2002 may supersede the provisions of other Acts or Policies, if they come in conflict with each other. Therefore, as per Policy Interface, the New Agriculture Policy needs to be in tune with the CBD and particularly with that of Biological Diversity Act, 2002.

5.6 National Seed Policy, 2002

Thrust areas include varietal development of new improved variety of plant/seed in tune with market trends, its suitability for biotic and abiotic stresses, quality assurance, seed distribution and marketing, infrastructure facilities, safeguarding the interest of the Indian farmers, conservation of agro-biodiversity, *sui generis* system for intellectual property protection etc.

Thrust areas have been defined in National Seed Policy, 2002 and one of the thrust areas is "equitable sharing of benefit arising out of the use plant genetic resources that may accrue to the breeder from the commercialization of seeds/planting material of a new variety". As we are aware, the "fair and equitable sharing of the benefits arising out of the utilization of genetic resources" is one of the three objectives of CBD, which can become a driving force for the sustainable utilization and ultimately to the conservation of the biological diversity. The preamble of Biological Diversity Act, 2002 also provides for the "fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for the matter connected therewith".

The thrust area of the National Seed Policy needs to take into account the provisions of equitable sharing provided there in CBD and Biological Diversity Act, 2002 and that of Nagoya Protocol, which are applicable to the seeds too. So the seed Policy needs to be in conformity with CBD, Biological Diversity Act, 2002 and Nagoya Protocol.

Under the chapter 6 of the National Seed Policy, 2002, which speaks about the "transgenic plant varieties" again this policy has to be in tune with articles of CBD, provisions of Biological Diversity Act, 2002 and that of Cartagena Protocol on Biosafety to the CBD, which is an international agreement, aims to ensure the safe handling, transfer and use of living modified organisms (LMO) resulting from the modern biotechnology that may have adverse effect on biological diversity taking also into account risks to human heath.

5.7 National Policy For Farmers, 2007

Aims to improve viability of farming through sustained development of agriculture sector with the main goal to improve welfare of farmers and farm income and to protect and improve land, water, biodiversity and genetic resources essential for sustained increase in the productivity, profitability and stability of major farming systems by creating and economic stake in conservation. Under chapter "support services", sub head "inputs and services", there is a provision for the integration of chemical pesticides in the integrated pest management system (IPM). Though the use of pesticide has its importance in the production of agriculture crops but also has negative impacts on the biodiversity particularly insect diversity, which gets eradicated from the system. Therefore, policy needs to factor in the conservation concerns of other elements of biodiversity while proposing the use of chemical pesticides.

Under the chapter "special categories of farming", sub head "genetically modified (GM) crops" the policy on this issue needs to be in tuned with CBD, Biological Diversity Act, 2002 and that of Cartagena Protocol.

6

ACCESS AND BENEFIT SHARING: NAGOYA PROTOCOL AND POLICY/LAWS OF THE GOVERNMENT OF INDIA

The Nagoya Protocol on Access and Benefit Sharing (ABS) seeks to regulate the commercial utilization of genetic resources and associated traditional knowledge by requiring their users to obtain prior informed consent (PIC) of the provider country and/or community holders of these resources and knowledge and share the benefits arising from such utilization with the country and/or community, as the case may be (details on Nagoya Protocol has been summarized in Section-3.3 of this report). India, became a Party to the CBD in early 1994, enacted the "Biological Diversity Act 2002" in the year 2003 and notified the "Biological Diversity Rules" in 2004. The Nagoya Protocol, which was signed by India on 11th May, 2011, ratified on 9th October, 2012, finally became an international legal instrument on 12th October, 2014 when 51 countries ratified ABS. In pursuance of the Nagoya Protocol, National Biodiversity Authority (NBA), Government of India notified an important "Regulations" on 21st November, 2014 (Anonymous, 2014), namely: *"Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014"* (hereinafter called ABS Regulations 2014).

6.1 Biological Diversity Act and Nagoya Protocol

The Biological Diversity Act focuses on biological resources from the context of their commercial utilization that corresponds to the utilization of genetic resources in the Nagoya Protocol. Section 3, 4 & 6 of the Biological Diversity Act 2002 and ABS Regulations 2014 along with the respective State Rules lay down process for access to Indian biological resources and/or associated traditional knowledge. The Act includes provisions to regulate the commercial utilization and bio-survey/ bio-utilization of biological resources and associated knowledge by non-Indian entities to obtain prior approval from National Biodiversity Authority (NBA) and share the benefits arising from such utilization with India (relevant communities providing such resources and associated knowledge). The ABS agreements currently being signed and implemented by NBA directly correspond to provisions under Article 6 and 7 of the Nagoya Protocol. Biological Diversity Act seeks to operationalize Article 17 of the Nagoya Protocol in the form of an agreement that contains most of the data required in an internationally recognized certificate of compliance (IRCC).

Secondly, the Nagoya Protocol requires fair and equitable sharing of benefits arising from commercial utilization of genetic resources and associated traditional knowledge in accordance with the domestic laws of the country from where these resources and knowledge are accessed. Access to biological resources, IPR protection, transfer of research results and third party transfer attract specific benefit sharing requirements with the users under Biological Diversity Act. Section 21 of the Act and Rule 20 of the Biological Diversity Rules corresponding to the article 5, and 12 of the Nagoya Protocol ensure that benefits derived from the utilization of biological resources and associated knowledge from India are shared with the benefit claimers in the country (including communities through local Biodiversity Management Committees). The Act also provides for decentralization of the benefit sharing. Section 27, 32, 42-47 of BD Act provides for establishment of National Biodiversity Fund, State Biodiversity Fund and Local Biodiversity Fund to ensure that the benefits accrued are appropriately managed and used at different levels. Section 43 of the Act provides for constitution and management of the local biodiversity fund through the Biodiversity Management Committees (BMCs) at the local body level. The benefit sharing mechanism has been further elaborated under Regulations 3, 4, 5 and 15 of the ABS Guidelines 2014 notified by the Government of India (Anonymous, 2014).

The third important provision made under Article 15 of the Nagoya Protocol require the users of genetic resource and associated traditional knowledge to comply with the access requirements of the provider country from where such resources and knowledge is accessed. The Biological Diversity Act, through Section 55, 56, 57 envisage clear penal provisions for non-compliance.

Fourth main issue highlighted in the Nagoya Protocol is about "capacity building and awareness" (Article-21, 22). The NBA and SBBs focus on capacity building and awareness for implementation of the Biological Diversity Act through range of actions. These include capacity building training programme, development of docket, language material supporting BMCs and stakeholders for better understanding of the Act.

6.2 Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations (2014)

The biological Diversity Act and the Rules notified therein, lays down clear, predictable and transparent process for access to biological resources and/or associated traditional knowledge. However, in pursuance

of the Nagoya Protocol, National Biodiversity Board (NBA) in consultation with Government of India notified an important "Regulations" on 21st November, 2014 (Anonymous, 2014), namely *"Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014"*. These guidelines are based on the following three main legislations enacted by the Government of India, namely: Biological Diversity Act, 2002 & Rules, 2004, Protection of Plant Variety and Farmer's Right Act 2001 (PPV &FRA) and Indian Patent Act, 1970 (as amended from time to time). These guidelines further simplify the understanding of the laws/regulations applicable in India. The salient points included in the guidelines are highlighted as under (Anonymous, 2014):

i) Procedure for access to biological resources and/or associated Traditional Knowledge (TK) for research;
ii) Procedure for access to biological resources for commercial utilization or for bio-survey and bio-utilization for commercial utilization;
iii) Mode of benefit sharing for access to biological resources, for commercial utilization or for bio-survey and bio-utilization for commercial utilization;
iv) Option of benefit sharing (by trader or manufacturer) on purchase price of the biological resource accessed for commercial utilization - Between 1 to 3 percent for traders and 3 to 5 percent for manufacturers or,

When the biological resources are accessed for commercial utilization or for bio-survey and bio-utilization leading to commercial utilization, the user manufacturers have also been given option to pay the benefit sharing ranging from 0.1 to 0.5 percent, at the following graded percentages to be worked out based on the **annual gross ex-factory sale minus government taxes** as given below:

- Up to Rs 10 million - benefit sharing component to be 0.1%
- From Rs 10 million to 30 million – Benefit sharing to be 0.2%, and
- Above Rs 30 million - Benefit sharing to be 0.5%.

v) Collection of fees, if levied by BMC for accessing or collecting any biological resource for commercial purpose from the area falling within its territorial jurisdiction, shall be in addition to the benefit sharing payable to the NBA/SBB under these regulations;
vi) Procedure for transfer of results of research relating to biological resources;
vii) Mode of benefit sharing for transfer of results of research;
viii) Procedure for obtaining Intellectuals Property Rights (IPR);
ix) Mode of benefit sharing in case of IPR;
x) Obligations of applicant in the event of commercialization of IPR;
xi) Procedure for transfer of accessed biological resource and/or associated knowledge to third party for research/ commercial utilization;
xii) Mode of benefit sharing for transfer of accessed biological resource and/or associated knowledge to third party for research/commercial utilization;
xiii) Conducting of non-commercial research or research for emergency purposes outside India by Indian researchers/ Government institutions;
xiv) Determination of benefit sharing;
xv) Sharing of benefits; and
xvi) Processing of applications received by NBA/SBB

6.3 Protection of Traditional Knowledge related to Biological Resources

The importance of traditional knowledge (TK) of the indigenous communities is now known to the World. With the realization of this importance comes the need to protect this knowledge and to prevent its misappropriation. During past few years, ample amount of discussions and debates on the subject of

protecting traditional knowledge as intellectual property, have been happening at the WTO, Conference of Parties at the Convention on Biodiversity (mainly at Nagoya in 2010) etc. Some of the Governments in the discussion condemned the IPR (Intellectuals Property Rights) framework in its present structure saying that it does not provide satisfactory protection to traditional knowledge. Emphasis was given to secure legitimacy and stop its misappropriation.

6.3.1 Biological Diversity Act & Traditional Knowledge (TK)

India has quite rich and flourishing traditional knowledge and this knowledge can be used in various ways in different sectors like pharmaceuticals, agriculture, veterinary science etc. To check the misappropriation of this rich knowledge, some *sui generis* system such as benefit-sharing schemes can be taken up. To protect the TK related to biological resources and encourage the concept of benefit-sharing so as to benefit indigenous people as well, provisions have been made in the Biological Diversity Act of India. Section 6(1) of this Act requires that no person shall apply for IPR in India or outside, for any invention based on any research or information on a biological resource obtained from India without previous approval from NBA (without making an IPR application and getting approval). Section 6(2) provides for imposition of benefit sharing fee or royalty or both and also imposing conditions including the sharing of financial benefits arising out of the commercial utilization of such rights.

6.3.2 Indian Patent Act & TK

Considering that the Biological Diversity Act will not suffice to protect TK and the formal "Indian Patent Act, 1970" framework in its available structure is inadequate to provide effective protection to TK, the Indian Patent Act was amended in 2002 & 2005. The amended Patent Act acknowledges the value of TK and contains various provisions that prescribe protection to TK. Under Section 3(p) of the Patent Act – "an invention which in effect is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components is not patentable". In addition, provisions have also been incorporated to include non-disclosure or wrongful disclosure of the same and anticipation of invention by available local knowledge, including *"oral knowledge"*, as one of the grounds for opposition as also for revocation of patent [Section-25(k)]. The Act also mandates the disclosure of the source and geographical origin of the biological material in the patent specification when the invention claimed is based on biological material [Proviso to Section-10(ii) (D) of the Indian Patent Act].

6.3.3 Guidelines for Processing Patent Applications

Considering that there is need to take due care and diligence be exercised while processing patent applications related to TK and/or biological materials, the Office of the Controller General of Patents, Designs, & Trademarks, Government of India, issued detailed guidelines, namely "**Guidelines for Processing of Patent Applications Related to Traditional Knowledge and Biological Material**" on 18th December, 2012 (Anonymous, 2012). In addition to this, the "Guidelines on Access to Biological

Resources and Associated Knowledge and Benefit Sharing Regulations, 2014" issued by NBA (detail under Para 6.2 of this report) also contain detail procedure for patenting and sharing of benefits with respect to TK related to biological resources.

6.3.4 Traditional Knowledge Digital Library (TKDL) of India

After the Neem patent controversy, the need to protect the traditional knowledge of India gained importance. India has taken an initiative through Traditional Knowledge Digital Library (TKDL), which helps the examiners of Patent Offices to search for any information regarding substance or practice while granting patents and they can deny the grant of patent, if the substance or practice is included in TKDL list as Indian traditional knowledge

The Traditional Knowledge Digital Library (TKDL) of India is a collaborative project between the National Institute of Science Communication and Information Resources (NISCAIR), Council of Science and Industrial Research (CSIR), Ministry of Science and Technology and Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy, Ministry of Health and Family Welfare, Government of India. TKDL involves documentation of the Knowledge available in public domain on traditional knowledge from the existing literature related to Ayurveda, Unani and Siddha in digitized format in five international languages namely English, French, German, Spanish and Japanese.

The TKDL, provides information on traditional knowledge existing in the country, in languages and format understandable by Patent Officers (IPOs), so as to prevent the grant of wrong patents. The TKDL thus, acts as bridge to reach at knowledge in a language easy to retrieve. It is of enormous benefit in developing the TK further and checking bio-piracy. The Government of India, on 29th June, 2006, has approved to provide the access of TKDL database for IPO, under non-disclosure agreement, between CSIR and respective IPO. The access for TKDL has been given to European Patent Office (having 35 member states), German Patent Office and USPTO (the agreement which was signed in November, 2009). After this citation, TKDL references as prior art have led to significant stride towards achieving the goal of preventing misappropriation of Indian Traditional Knowledge. The TKDL has become a model for other countries as defensive protection of their TK from misappropriation. Present status of transcription of the Traditional medicine formulation in the TKDL is as under which maintains more than 2,44,000 transcriptions on Indian Traditional Medicine formulation:

Discipline	No. of books (including volumes) viewed for transcription	Transcriptions
Ayurveda	75	93,280
Unani	10	1,33,470
Siddha	50	16,764
Yoga	15	1,346
Total	150	2,44,860

Source: TKDL of India (www.tkdlindis.com)

7

TRANSBOUNDARY ISSUES

The Indian part of KSL, lies in the North-easten part of Uttarakhand bordering Western Nepal and South-Western Tibet, which exhibit prevalent trans-boundary connections. Being located at tri-juncture, the landscape has 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. However, in this part of the report, emphasis is given only on the trans-boundary issues related to conservation of genetic resources & its sustainable use, ABS and trade on the biological resources of the landscape under consideration.

7.1 Common/ Identical Habitat of threatened Species

The KSL is home of many globally threatened and regionally protected faunal species. It has been reported that there are about 20 mammalian species and 21 bird species that are globally or regionally significant and are protected within different countries of the KSL (FAR, 2011). Within the KSL, there are six globally threatened mammals and six globally threatened bird species. These include Red

Panda (*Ailurus fulgens*), Himalayan Wolf (*Canis himalayansis*), Musk Deer (*Mosschus chrysogaster*), Tibetan Antelope (*Pantholops hodgsonii*), Blue Sheep (*Pseudois nayyaur*) and Snow Leopard (*Panthra uncial* syn. *Uncia uncia*). Among the birds, the critically endangered species include Red-headed vulture (*Sarcogyps calvus*), endangered Soker falcon (*Falco cherrug*), Egyptian Vulture (*Neophron percnopterus*), Cheer Pheasant (*Caltreus wallichii*), Himalayan Monal (*Lophophorus impejanus*) and Tibetan Snow Cock (*Tetraogallus tibetanus*).

The major threat to fauna is habitat loss, which has implications for predator-prey dynamics, breeding, and migration. Habitat loss in the landscape occurs due to deforestation, overgrazing and development of roads & Hydro-Electric projects. Tourism is another cause of habitat loss/degradation, for example, the cleaning of faunal habitats for tourist infrastructure, the trampling of faunal habitats by tourists & pilgrims and the disturbance of nesting/breeding habitats.

7.2 Poaching and illegal trade

Poaching of wildlife for illegal trade is a significant threat to faunal diversity in KSL India. Species particularly prone to poaching are common Leopard (*Panthera pardus*), Snow Leopard, Tibetan Antelope and Red Panda (for their pelts), Musk Deer (for musk pods), and Black Bear (for bile). The products of these wild animals fetch very high cost in the international market. High market value fueled by poverty, high demand, as well as weak law enforcement in the region attribute to illegal poaching and trade.

Although there is need for more detailed research on the flora, an initial assessment indicates that there are at least 20 globally threatened or regionally protected plant species in KSL area (FAR, 2011). Other than habitat loss and degradation, the unsustainable harvesting of plants, particularly for trade, is a major threat to floral diversity in KSL. Plants with high trade value are usually uprooted or harvested prematurely, often preventing propagation. Plants of high trade value include *Bergenia ciliate, Nardostachys gradiflora, Niopicrorhisa scrophulariiflora,* and *Swertia chirayita*. Edible plant species harvested from the wild include *Arisaema erubescens* (tuber), *Norchella species* (whole plant), *Rosa macrophylla* (roots) and *Sorbus cuspidate* (fruit).

7.3 Project Snow Leopard

The Government of India is implementing Project Snow leopard (*Panthera uncia*) to help conserve this specie and its habitat in the entire range within the country (Anonymous, 2007). For the state of Uttarakhand, the northern parts of Askot Wildlife Sanctuary that form part of KSL-India have been identified as priority area for the implementation of this project. The project visualizes the overall conservation of the high altitude ecosystem of a landscape level. In KSL target area, trans-boundary cooperation from each regional partner is a necessity as the alpine and sub-nival ecosystems of all the three partner countries of this landscape is natural habitat of this flagship specie.

Similar project and trans-boundary cooperation would be required on the conservation of aquatic ecosystem in the lower part of the landscape for the

conservation of the Golden Mahaseer (*Tor putitora*). Another wild animal that needs trans-boundary cooperation for conservation/ protection is Musk Deer.

Among the floral species, trans-boundary cooperation for conservation of critically endangered species including Yar-Tsa-Gumba due to excessive/illegal/immature collection and illegal trade across the border of partner countries of KSL is required.

7.4 Trans-boundary Trade

Both legal and illegal trans-boundary trade occurs throughout the KSL area. There still exists trans-boundary legal trade on various biological resources like live animals [mainly sheep/goat, horse, Yak (*Bos grunniens*) etc.], animal products such as wool, Yak tail, pelt of sheep/goat etc and plant products mainly Yar-Tsa-Gumba (*Cordycep species*), Chura (*Aesandra butyracea*), Ritha (*Sapindus mukorossi*), Lichen (*Evarnastrium serratum*) along with some high value medicinal plants as mentioned elsewhere in this report.

The traders involved in the illegal trade take advantage of the porous borders of the region. There is no data on the quantity of wildlife products exported or imported by poachers from these regions across India-Nepal-China borders, however, the illegal trade across the Sino-Nepal and Indo-Nepal border is thriving. Wildlife and its products are in high demand as they are used in both Tibetan medicine and traditional Chinese medicine (Yi-Ming et al., 2000, Sharma, 2004, FAR, 2011, Negi, 2006, Negi, 2010). In addition, many Himalayan plant species are also used for prepration of active ingredients used in Ayurvedic and herbal medicines, which are regionally and globally popular (FAR, 2011). The extent of irregular collection and illegal trade of Yar-Tsa-Gumba across India-Nepal border has already been highlighted in Section 5.4 of this report.

Therefore, trans-boundary cooperation is necessary and essential to deal with this issue as it has ramification for the conservation of environment and biological diversity.

8

DISCUSSION

8.1 Biodiversity

The KSL-India landscape harbours diverse ecosystems and diverse vegetation types ranging from tropical to sub-alpine and alpine meadows. An estimation of floral and faunal diversity of KSL-India landscape has already been given in this report (Section 2.2.2). It has also been reported that there are 195 plant species which are endangered/rare/vulnerable and 35 faunas categorized as critically endangered/endangered/vulnerable/near threatened (Sinha & Manoj Chandran, 2012). Under section 38 of Biological Diversity Act, Government of India by notification has prohibited collection of 16 plant species and 15 animal species (except for research purpose) from Uttarakhand, majority of which are found in the KSL-India region (UBB, 2012). State Government of Uttarakhand has also prohibited collection of 34 medicinal & aromatic plant species (MAP) from Uttarakhand (Sinha & Manoj Chandran, 2012).

The **basic issue** is whether these policy decisions involving restrictions for collection and listing of species under various IUCN

categories are based on scientific studies? Concluding the literature on vascular flora of the KSL-India region by various authors (Sahani & Raizada, 1957; Samant & Pangtey, 1993; Dhar et al., 1997; BCRLIP, 2008; Rawal et al., 2012) reveal that Indian part of the 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. Above conclusions on status of floral population in KSL-India region is further strengthened by the findings of a report on External evaluation of the activities of Botanical Survey of India (BSI) for the period of 11th Five Year Plan (2007-2012) by Forest Research Institute (FRI), Dehradun. According to this report (BSI, 2013) the status of the exploration as on 31st March, 2012 was as under (Table: 8.1).

The information given in Table: 8.1 show that except Pteridophytes, the status of exploration of plant species is very poor in Uttarakhand. The status of Non-Flowering plants (except Pteridophytes) appears to be more critical. Moreover, since the areas to be explored are mostly inaccessible & remote, therefore, major part of KSL- India remained floristically underexplored.

Table 8.1: Status of Exploration of Plant Species in Uttarakhand by BSI (as on 31.03.2012)

Order	Group	Status of Exploration*		
Flowering Plants		Well Explored (>70%)	Explored (40-70%)	Being Explored (<40%)
	Angiosperms		√	
	Gymnosperms		√	
Non - Flowering Plants				
	Pteridophytes	√		
	Bryophytes			√
	Lichens			√
	Fungi			√
	Algae (Fresh water)	√ (Only Doon Valley)		√ (Rest of the area)

**Means percentage of the geographical area of Uttarakhand*

Source: 11th Five Year Plan Evaluation report of the BSI (BSI, 2013).

Similarly, according to the "Fauna of Uttarakhand (Part-I, Vertebrates), published by Zoological Survey of India (ZSI, 2010), up to 2006, total 44 sites were surveyed by ZSI in Pithoragarh District, i.e. KSL-India landscape. If one examines this list of sites surveyed, it appears that most of the remote areas and inner Himalayan sites of the district still remains to be surveyed.

The exploration/survey status of the KSL-India as described above reveal that the policy decisions regarding prohibiting collection of plant species and IUCN categorization of plant and animal species are not based on the adequate scientific reasoning. There is an urgent need to assess the population of various MAPs & NTFPs at micro level. The policy decisions, mainly related to restricting collection of medicinal & aromatic plants and other NTFPs may be revised based on the study results. It would be appropriate to prepare CDH plans for their sustainable/ scientific management and harvesting rather than making policies based on presumptions and ambiguous reporting.

8.2 Yar-Tsa-Gumba

About fifteen to twenty years back (close to the end of Nineteenth century) by some local people called Khampa (a Tibetan race), this fungus was collected from high altitude areas of the Kumaon hills. The month of May-June happens to be the peak months for the exploitation of this specie, which may extend to the third week of July. Due to very high market value of this species (approx. ₹ 50,000/- in 2001, which has gone up to ₹ 8,00,000/- per kg in 2014 at village site), the alpine meadows, which harbor this specie, have experienced heavy exploitation, not only of the specie in demand (*Codyceps sinensis*) but many other medicinal and aromatic plants too, which has resulted in the sharp decline of the yield of this fungus. Thousands of people from villages head towards the alpine meadows where the snow melts during May to scour the earth for these fungus infected lipid larva. Children too take off from schools to collect this fungus. People take leave from the military service to join their families in the 'prospecting'. According to a survey (Negi, 2010), approximately 80% of the population of each neighboring villages is involved in the collection of Yar-Tsa-Gumba (some labourors even hired from Nepal & other places), which sometimes start from mid April. Thus thousands of people occupy every cave, rock overhangs or in colonies of tents with their families for about one to two months. The amount of fuel wood burnt in high meadows for cooking food and to generate warmth for themselves in the cold alpine nights has, no doubt, caused serious damage to the fragile and slow-growing vegetations. This activity has greatly disturbed the habitat of the Musk Deer and other animals and birds associated with it (Foundation for Ecological Security, 2003). Although the Government of Uttarakhand has tried to regulate the collection of Yar-Tsa-Gumba through Van Panchayats and marketing through Forest Development Corporation and Kumaon Mandal Vikas Nigam (Section: 5.4), but these regulations have proved to be ineffective. The unregulated over-exploitation of Yar-Tsa-Gumba and its associated activities are great threat not only to the existing species but also to the entire ecosystem of this sub-alpine & alpine region.

There is need to carry out detail micro level survey in the entire region of distribution of all kinds of *Cordyseps* species along with other associated vegetation within Uttarakhand (including KSL-India) and carry out studies to understand their life cycle and ecology so as to develop model for sustainable management including its collection with ecological approach which may include detailed CDH plan of *Cordyseps* species along with other MAPs/NTFPs.

8.3 Sustainable Management of Forests and Biodiversity

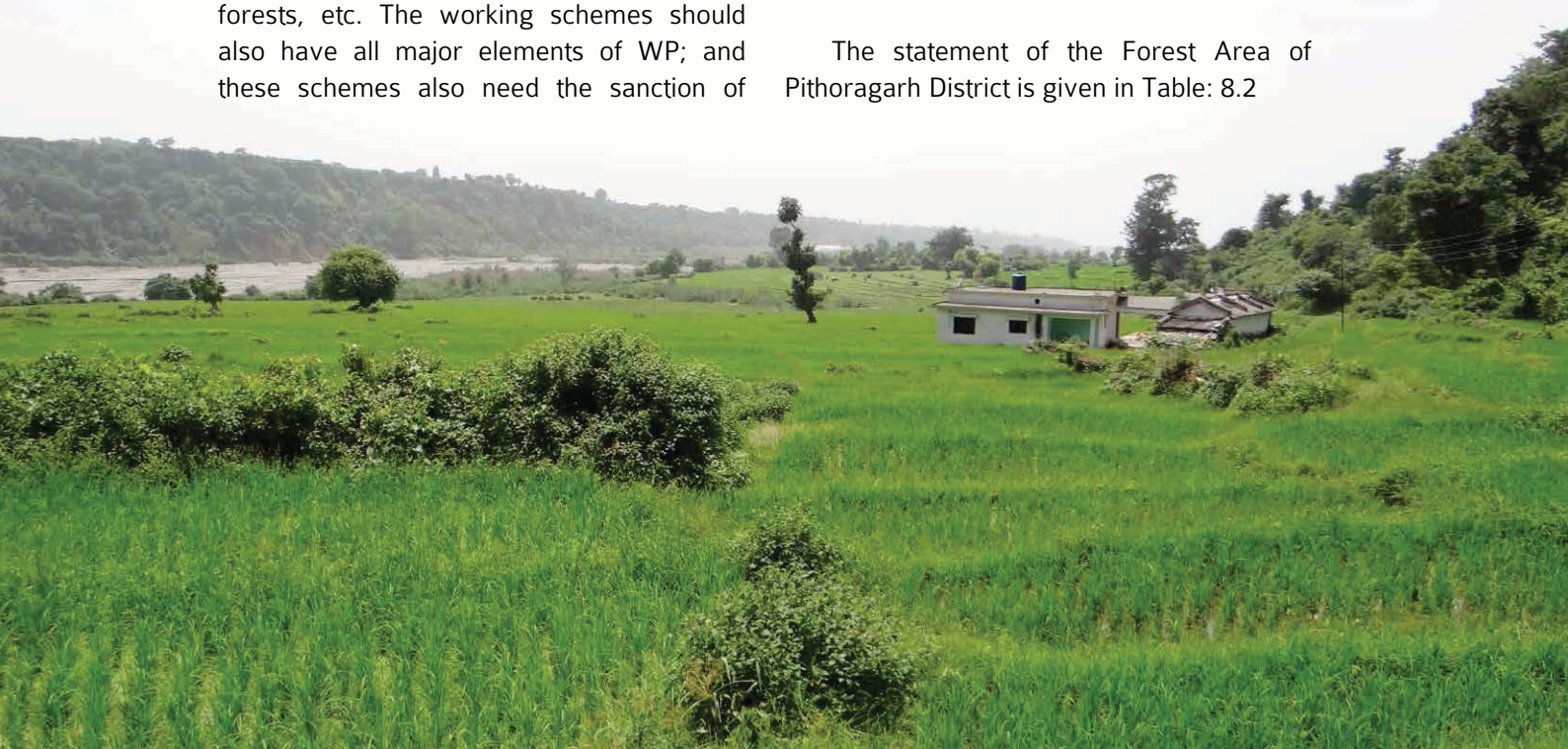
In India, all Forests are scientifically managed under the prescription of a Working Plan (WP)/Scheme prepared under the guidelines given in National Working Plan Code based on the principles of sustainable forest management under recognized and innovative silvicultural practices. The National Working Plan Code 2004 (issued by MoEF in 2004), has now been revised and renamed as "National Working Plan Code 2014 (*For sustainable management of forests and biodiversity*). The authority as designated by the Ministry of Environment, Forests & Climate Change, Government of India, approves the Working Plans (WPs) which are generally for a period of 10 yrs. Generally, no timber harvesting and other activities are done in any forest area without an approved WP. In Uttarakhand, working Plans have been prepared for all the 26 Territorial Forest and WL Divisions which are under the administrative control of UKFD (Uttarakhand Forest Statistics , 2012), and they are regularly revised after 10 years.

While detailed WP is to be prepared for larger areas like reserved forests and Civil/Soyam forests, working schemes are prepared for smaller areas for a specific purpose or areas like private, village (or say Van Panchayats), municipality, cantonment forests, etc. The working schemes should also have all major elements of WP; and these schemes also need the sanction of competent authority designated by the Ministry of Environment, Forests & Climate Change (MoEF & CC), Govt. of India (National Working Plan Code 2014).

The provision of Composite Management Plan (CMP) for the village forests/Panchayati Forests has been made under Van Panchayat Rules (2005). According to this provision of Van Panchayat Rules, a Divisional Forest Officer shall prepare a CMP for all the village forests/Panchayati Forests within its jurisdiction for a period of 05 years and get it approved by the concerned Conservator of Forests. The Management Committee of a VP has to prepare a micro-plan on the basis of the guiding principles given in the CMP for the management and protection of the VP forests. The micro-plan is to be approved firstly by the General Body and finally is to be sanctioned by the concerned Sub-Divisional Forest Officer before being implemented by the Management Committee.

In case of Uttarakhand, as per the provision made in the National Working Plan Code, all VP forests and Civil & Soyam Forests (CSFs) should have WPs or working schemes approved by MoEF for any operations to be carried out in these forests. According to the VP Rules 2005, all VPs should have approved micro-plan prescriptions which are to be followed for operations.

The statement of the Forest Area of Pithoragarh District is given in Table: 8.2



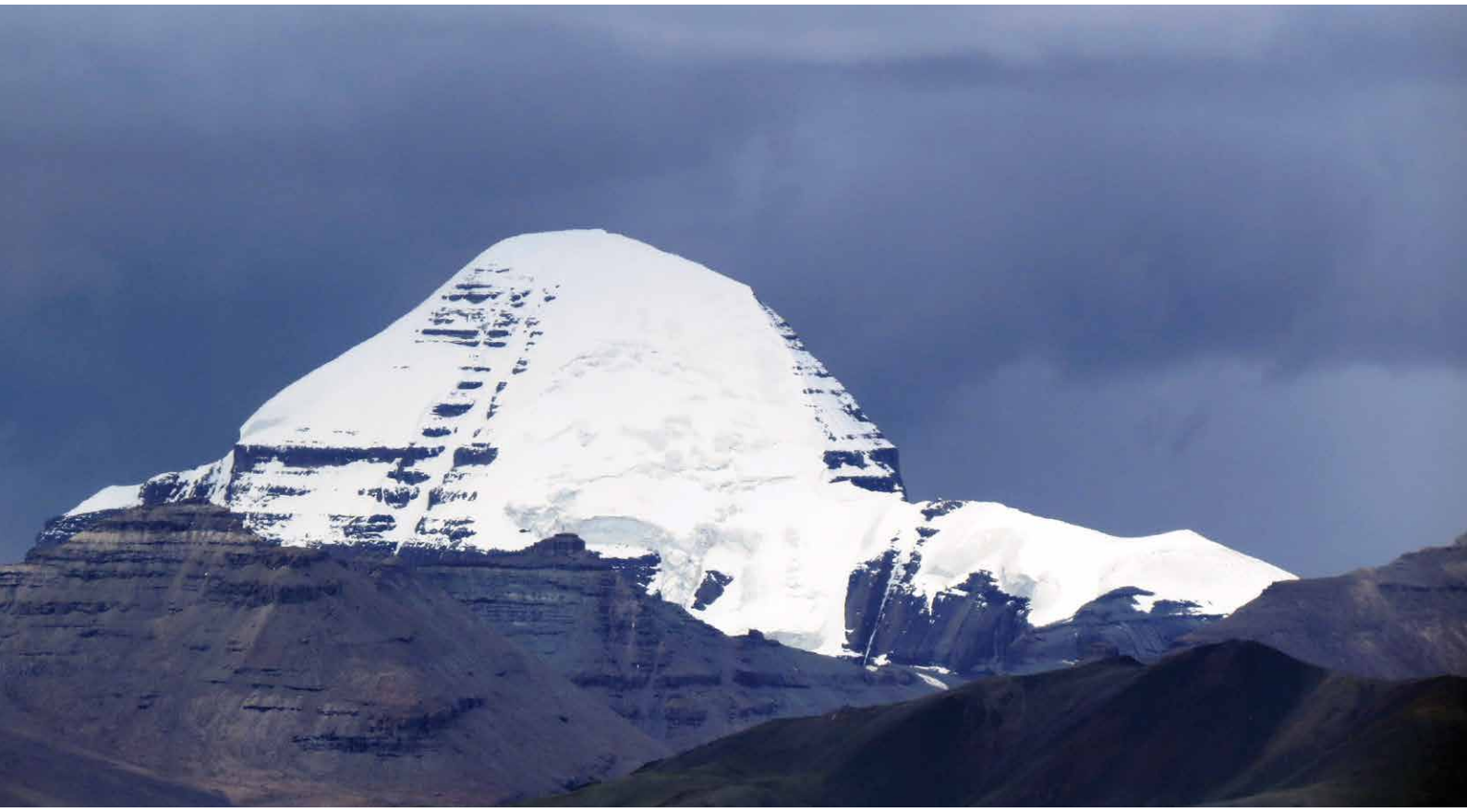


Table. 8.2: Statement of the forest area of district Pithoragarh Geographical area of the District: 7,09,000 ha

Legal Status	Category	Area (ha)	% of the total forest area	% of geographical area of the district
Reserved Forest (RF)	Reserved forest	79,853	14.78	11.26
Protected Forests (PF)	Civil Forests	41,748	7.73	05.89
	Van Panchayat	2,72,905	50.52	38.49
	Vested Forests	1,193	0.22	0.17
	Unclassed forests	1,44,451	26.74	20.37
	Total of PF	4,60,297	85.22	64.92
Total Forest Area (RF+PF)		5,40,150	100	76.18

Source: Working Plan of Pithoragarh Forest Division (2011-2021); Uttarakhand Forest Statistics (2014)

Information given in Table: 8.2 indicates that about 76 % of the geographical area of the district is forest, out of which about 15% only is RF and the legal status of the rest of about 85% forest area of the district is Protected Forest. The area of Reserved Forests of KSL part of India (both Pithoragarh & Bageshwar Forest Divisions), which were earlier part of the erstwhile East Almora Forest Division, are regularly managed under the provisions of WPs since 1924, when the first WP was prepared for the period 1924-1934. The latest WP for the Pithoragarh Forest Division has been prepared for the period 2011 to 2021 by Sinha & Manoj Chandran (2012) and for Bageshwar Forest Division for the period 2009 to 2019 by Shah & Sharma (2009). However, presently neither working plans

nor working schemes have been prepared for any category of the Protected Forests which comprises about 85% of the total forest area of the KSL-India landscape. Micro-Plans have also not been prepared for all the VPs. However, micro-plan have been prepared for those VPs where work under the National Afforestation Programme (known as "FDA projects") were carried out or are in progress under the operational guidelines of this programme. In VP forests and also Civil forests, various operations like removal of dead & fallen trees, resin tapping, collection of NTFP (including MAPs), soil & water conservation works and plantation works are carried out under various schemes (some of the NGOs are also working in the VP areas) without any approved working plan/ working scheme or composite plans (by GoI) which may also amount to the violation of the directions of the Hon'ble Supreme Court of India and provisions of the National Working Plan Code. Therefore, attention needs to be given to cover entire Protected Forest area of the KSL-India and entire state under working plan or working scheme and/or composite plan.

8.4 Ban on Green Felling

The matter related to ban on green felling of trees in Uttarakhand has been narrated in Section: 5.1 of this report. It may be recalled that in the milestone judgment of Hon'ble Supreme Court in the matter of T.N. Godavarman (dated 12.12.1996), the felling of trees in all forest was 'suspended' except those carried out in accordance with the Working Plans of the State Governments duly approved by the Central Government. The issue related to the working plans have also been dealt with extensively in another order dated 15.01.1998 of Hon'ble Supreme Court. However, in case of Uttarakhand, Himachal Pradesh and hilly areas of West Bengal, restriction on green felling above 1000 m altitude was further made by Hon'ble Court except for meeting the demand of the right holders. Preparation of working plan and the management of forests as per the WP prescriptions has remained integral since long. Presently, there are several working plans in Uttarakhand, where the forest areas are situated above 1000 m altitude (including those of Pithoragarh and Bageshwar Forest Divisions representing KSL India) for which recommendation for

felling of trees has been made in WP but are not actually implemented.

The findings of the two research projects (impact of ban on green felling - see Section-5.1) regarding imposing the ban on green felling of trees in the forest ecosystem, could be taken as pilot studies to understand the impact of the Silvicultural practices on the ecology of the forests. Undoubtedly, the findings of the two projects are likely to have significant positive impact on the Scientific Management of the forests. If more such research studies could be taken up on similar lines and documented, then sustainable practices could be evolved based on scientific rationale. Arguably, if there is any possibility of lifting or partially allowing feeling of trees within the overall ambit of the forest & other laws, the same would certainly ease the burden of availability of an important raw material for the infrastructural development of the State. Reaching at logical conclusion for the long term sustainability of the biological resources in forests based on scientific rationale i.e. by conducting studies/research is the need of the hour.

8.5 Biological Diversity Act (2002)

Even though the Biological Diversity Act was enacted in 2003, its provisions are yet to be fully and effectively implemented. This progressive legislation has the potential to address the lacunae in several aspects relating to conservation and management of biodiversity and associated traditional knowledge. However, its implementation is proving to be quite difficult. This act provides for setting up of a National Biodiversity Authority (NBA) at national, State Biodiversity Boards (SBBs) at state and Biodiversity Management Committees (BMCs) at local body levels. The act also stipulates preparation of People's Biodiversity Registers (PBRs) by the BMCs involving local people with guidance from SBBs/NBA, for documenting biological resources/biodiversity and traditional knowledge relating to biodiversity. The preparation of PBRs across the country is an enormous task.

Considering the status of constituting BMCs and preparation of PBRs within the area of KSL-India, there are 640 Gram Panchayats and four Nagar Nigams/ Municipalities in Pithoragarh district. In accordance with the provisions of the Biological Diversity Act, 644 BMCs should be constituted and same number of PBR needs to be prepared. As per the guidelines issued by NBA, an amount of Rs 60,000/- is required for the constitution of BMC. Apart from that, an amount of ₹ 1.50 lakh is required for the preparation of PBR for the BMC formed at Gram Panchayat level in Uttarakhand. However, after ten years of constitution of SBB in Uttarakhand, the task of constitution of BMCs and preparation of PBRs is not encouraging. There may be limitations (including financial) but the programme needs to be implemented in a phased manner by addressing the limitations. Therefore, the activities related to the constitution of BMC, its capacity building, preparation of PBR may be taken up by SBB Uttarakhand aggressively so that the task of implementation of ABS may be taken up at the level of BMC only.

There has been some difference of opinion over the jurisdiction of BMCs on the Reserve Forest areas for the purpose of implementation of Biological Diversity Act and Rules. In this regard, it has been argued that there cannot be an area in the state/country which does not fall under the jurisdiction of some local body or the other. If that be the case, then every forest area, irrespective of its ownership lies within the territorial boundary of some local body or the other. Since BMCs are constituted at the level of local bodies, therefore, the forest areas including the area of Reserve Forest can be said to be falling under the jurisdiction of some BMC or the other for the purpose of implementation of Biological Diversity Act and Rules. However, this may further be verified from the legal authorities

of the state. It may be added that in the process of documentation of bio-resources/ biodiversity in the respective PBR, the status of bio-resources/ biodiversity existing in the entire jurisdiction of the local body (including forest areas) are also documented.

The old age institution of Van Panchayat (more than 12089 in 11 districts of the state) exists and is functional in case of Uttarakhand. The issue related to the possible conflict of interest between the newly constituted BMCs at the level of Gram Panchayat (7950 in the state) and the Van Panchayats have been perceived by a class of people. In case of Uttarakhand (including area of KSL-India), there exists more than one Van Panchayat (Many a times more than two) within the jurisdictions of every local body with or without overlapping areas. It is pertinent to mention that most of the Van Panchayats of the state are benefited from the revenue generated by way of management of small portion of reserved forest handed over to the Van Panchayats by the Forest department. Members of the Van Panchayat & the Forest Officials perceive the possibility of conflict of interest between these two institutions (BMC and VP) specially with respect to the sharing of benefits, which needs to be addressed.

For this, the mechanism of benefit sharing as provided under Nagoya Protocol and the provision made under Biological Diversity Act/Rules/Guidelines need to be revisited. In the process of benefit sharing, the user agency of the biological resource has the obligation to pay ABS amount to the agency providing the biological resource. Since Van Panchayat is the provider of biological resource, therefore, it does not have the responsibility to pay anything. In fact, the money/resource generated by way of ABS and received from the user agency, shall be deposited in the bank account of BMC which shall be used for the conservation and sustainable use of bio-resource within the territory of the local body. In fact, the

BMC including the Van Panchayat (falling within the territory of BMC) both, shall be benefitted from the revenue generated by way of compliance of ABS, which is over and above any benefit derived through any other mode. Therefore, there does not seem to be any clash of interest between the institution of the BMCs and the Van Panchayats.

A reasonably sound institutional infrastructure is in place for adequate coverage of biodiversity concerns with specific mandates and activity profiles of existing institutes. However, there is a need for improving inter-sectoral coordination inter alia through continuous review and revision of their mandates, and networking of these institutions to ensure adequate coverage of biodiversity concerns and issues and also to avoid duplication/overlapping of

efforts. There is a need for human resource development and capacity building for scientific management of biodiversity.

8.6 Traditional Knowledge

Details on protection of TK related to biological resources has been dealt with under Section 6.3 of this report. From perusal of the text related to TK as was discussed at Nagoya in 2010, provisions made in BD Act (2002) and amended version of Indian Patent Act (2002 & 2005), it is clear that all these protocols and legal provisions recognize the value of TK. However, the main challenges are: firstly, to survey and document TK related to biological resources and identify its real owner; secondly, to simplify the process of protection of TK; and thirdly, to regulate access to TK and benefit sharing mechanism.

The documentation of traditional knowledge available in our ancient texts is being undertaken by Council of Scientific and Industrial Research (CSIR), in the form of a computerized database called Traditional Knowledge Digital Library (TKDL) which is to be supported by PBRs. Preparation of PBRs is expected to document the un-coded oral traditional knowledge of local people. However, even after 13 years of notification of BD Act (2002), the progress of preparation of PBR is very slow. At the national level there are about 250,000 Gram Panchayats (Village Councils) more than 3250 urban councils for which PBR needs to be prepared, but till now (as on 2.9.2015) only 2485 PBRs have been prepared (NBA, 2015). In Uttarakhand, there are about 7950 Gram Panchayats & 72 urban councils, against which only 30 PBRs are in place. Considering that this (documentation of TK through PBR) would be a stupendous and time consuming exercise, there is a need for an All India Coordinated Project on Traditional Knowledge for documenting the un-coded, oral traditional knowledge of local people, especially of little-known biological resources of potential economic value. As far as access to TK, patenting and benefit sharing are concerned, provisions & procedures for these are clearly mentioned in the BD Act (2002), BD Rules (2004), PPVD & FR Act (2001), Indian Patent Act (as amended in 2002, 2005) and the guidelines issued for processing of patent applications related to traditional knowledge & biological resources (Anonymous, 2012) and ABS regulation guidelines (Anonymous, 2014), but needs awareness down to BMC level.

8.7 Access to Biological resources and Benefit sharing (ABS)

Various provisions made in the Indian Forest Policy (1988), Indian Forest Act (1927), Panchayati Van Niyamawali, Uttarakhand (2005), PPV &FR Act (2001), Forest Rights Act (2006) and Biological Diversity Act (2002) attract the issues related to access to biological

resources and benefit sharing, which could be briefly discussed as:

a) Section 4.3.4 of the National Forest Policy, 1988 emphasizes the protection of rights and concessions with regard to the utilization of forest resources by tribal and poor people living within or close to forest dwellings. It also recognizes customary laws by stating that the holders of customary rights & concessions in forest areas should be involved to identify themselves with the protection and development of forests from which they derive benefits. Section 4.6 of the policy, which focuses on the relationships between tribal people and forests, encourage agencies responsible for forest management to associate tribal people in protection, regeneration and development of forests and provide them with employment.

b) Under the Indian Forest Act (1927), in Uttarakhand, local villagers have right to collect fuel wood, fodder, non-timber forest produce for their bona fide use and graze cattle within the permissible limits of the Reserve Forests, as prescribed in the Working Plans. In addition, timber for construction of house, cow-shed and agricultural implements are also allotted as "Hak-Hakook" (rights & concessions) which were fixed at the time of forest settlement to the villages free of cost. The admissible rights & concessions are mostly village wise and are documented in the Working Plan of concerned Forest division and at the Range level in the Register of Rights & Concessions. There is provision of distributing about 75470 $m^3$of timber annually from Reserved Forests to the villagers free of cost (Uttarakhand Forest Statistics, 2012). In addition there is provision to provide timber on concessional rates (which is about 25% of the market rates) to the villagers, if their need is not met by the timber allotted free of cost. In Protected Forests, the villagers have access to all forest produce without any restriction unless some activities or tree or forest produce is restricted by special notification. However, there is no provision to share the revenue or benefit earned from these forests with the villagers. Although at the time of forest settlement, the quantity of timber earmarked for distribution to the villagers free of cost was about 75470 m^3, Hon'ble Supreme Court vide its order in 1996/97 cut down this quantity by 58% and allowed only about 32000 m^3 of timber to be distributed annually free of cost. Not only that, presently the annual volume of timber allotment free of cost has been reported to be approx. 15364 m^3 which is about 20% of the original volume fixed at the time of settlement. The status of distribution of timber on rights to the villagers in Pithoragarh Forest Division, i.e. Pithoragarh District of the KSL-India is also very discouraging. The total original volume of timber admissible as right is 2993 m^3 which was reduced to about 1117 m^3 as per the order of Hon'ble Supreme Court. But average volume of timber distributed annually during the period 2001 to 2011 is only about 547 m^3 which is 20% of the original volume and 50% of the reduced volume of timber admissible free of cost (Sinha & Manoj Chandran, 2012). The main reason for such a low quantity of timber distributed free of cost has been visualized as: firstly, in many cases the timber allotted to the villagers are far from the villages resulting into very high transportation cost (mostly carried by head load); secondly, the allotted trees are dry & uprooted having poor quality of timber to be used for construction of houses; and thirdly, many villages are not documented as right holders to avail this facility. Therefore, it is urgently needed to review and rationalize the rights & concessions admissible from the reserve forests to the villagers so that at least the timber allotted free of cost at the time of settlement could be restored.

In addition, clarification about the rights & concessions from the Protected (civil and soyam) forests also needs urgent attention of the state Government

c) In KSL-India, grazing management is regulated by a legally based formal system of property rights, permits, and rules that determine who is allowed to graze animal, when, how many they can graze and when they can move from one grazing area to another. The earliest one of this kind is – "The Bhotia Grazing Rules of 1927" (Anonymous, 1927) to regulate grazing in the reserved and protected (also known as civil) forests of the Kumaon Civil Division (presently whole of Kumaon Division and Chamoli, Rudraprayag & Pauri districts of Garhwal Division), of cattle including sheep and goats, belonging to Bhotias (of all classes), Tibetans, Danpuries, residents of Kumaon, Garhwal and Nainital. These grazing rules mainly facilitated the migratory grazers and cattle used as pack animal for the purpose of carriage. Uttarakhand Government is processing to revise these rules since 2006, but it is yet to be made operational. The Working Plans of the Forest Divisions also include prescriptions on grazing according to the prevalent laws. However, in practice it is observed that parallel to the Government regulations, there are informal rules followed by the pastoralists as they negotiate access to different grazing areas from customary right-holders.

d) The issues related to property rights for the medicinal & aromatic plants (MAPs) and other non-timber forest produce (NTFPs) remained neglected and social arrangements for their management and harvest did not evolve well. In the Indian part of KSL, local communities rely heavily on the collection of MAPs and NTFPs such as medicinal plants/aromatic plants, resin, lichen, moss grass and caterpillar fungus, among others. Collection is regulated by authorized agencies like Forest Department, revenue department and Van Panchayats. As described in

Section 5.3, Uttarakhand Government, in collaboration with communities, has drawn up plans to address the issue of sustainable harvesting and equitable sharing of resources. For example, a Conservation Development and Harvesting Plan (CDH Plan) was adopted by Uttarakhand state Government for sustainable harvesting of the MAPs. Under this plan, areas rich in rare MAPs are to be demarcated for conservation to enhance the gene pool, other areas are to be selected for successful plantation for future use and some areas abundant in certain species of MAPs are selected for regulated harvest on rotational basis. But this innovative and progressive concept based on scientific rationale by and large has remained as concept only. Due to lack of detailed survey of the MAPs at micro-level, it is difficult to operate on this concept in the field.

e) The Panchayati Van Niyamawali, Uttarakhand (2005) gives complete freedom to the Van Panchayat for access, use and sale of the forest produce within the provision of the approved management plan/composite management plan/micro plan. The Van Panchayat Rules indicate that the VP's net income from the sales of timber and NTFP and other sources (e.g., compensations, fees, etc.) shall be deposited in Panchayat Forest Fund and distributed and utilized in the following manner:
   - 30% to Gram Panchayat (GP) for project of public utility;
   - 40% to VP for maintenance of VP; and
   - 30% to VP for local utility projects and their maintenance.

Since 30% contribution to GP is a significant contribution and this reduces the incentives of VP to improve and maintain its productivity, therefore, this policy may be revisited.

Majority (about 60%) of the Van Panchayats have small areas (<15.00 ha) [in Pithoragarh district of the KSL-India], about 59% VPs are having <15.00 ha area] to protect and manage, which is insufficient to meet their requirements of fuel, fodder and timber. Therefore, the minimum sustainable area of a VP should be estimated depending on the human population and livestock population and their dependency on forest resources and in order to ensure sustainable management of forests adjacent to such VPs, if needed the VP area should be extended to the Civil and Soyam forests and Reserved Forests as per the provision of the Van Panchayat Rule 2005. Further, in the context of village and area development, the role of VPs is negligible; VPs may be assigned greater responsibility for their own village development.

f) Another community based organization which has been empowered under law for access, use, sale and sharing the benefits derived out of the commercial use of biological resources, is "Biodiversity Management committees (BMCs)" to be constituted at each local body level (see section-4, section-6.1 & section-8.2 of this report). Under section-41(2) of the BD Act, provision has been made that the National Biodiversity Authority and State Biodiversity Boards shall consult the concerning BMCs while taking any decision relating to the use of biological resources and TK associated with such resources occurring within the territorial jurisdiction of concerned BMC. Secondly, under section 41(3) of this Act, BMCs have been empowered to levy charges by way of collection fees from any person for accessing or collecting any biological resource for commercial purpose from areas falling within its territorial jurisdiction. However, it would be possible to make these provisions operational in the field only if BMCs are constituted and operationalized by way of capacity building. Therefore, under

KSLCDI project, effort should be made to constitute BMCs in all 644 local bodies and organize training programmes for the members of BMCs; otherwise the basic objective of associating local communities in the conservation and sustainable use of biological resources may be defeated.

g) The **Scheduled Tribes and other Traditional Forest Dwellers (Recognition of forest Rights) Act, 2006** is one of the most important and progressive act of recent years having provisions that promote the rights of local communities on natural resource management. In section 3 of this Act and its Rules 2007, emphasis has been made for recognition and vesting of 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 have not been recorded. However, the pace of implementation of this community friendly act in Uttarakhand including KSL part of India is not encouraging. Therefore, it is recommended that the provisions of Scheduled Tribes and other Traditional Forest Dwellers (Recognition of forest Rights) Act, 2006 may be implemented in letter and spirit.

8.8 Man - Animal conflict

Increasing forest cover in some areas of KSL-India and emigration of villagers to cities has resulted in the conversion of agricultural land to forests. As consequence of this change in land use pattern, the frequency of damaging agricultural crops by wild herbivores, monkey, wild boar, porcupine and black bears has increased. Crops are severely damaged and there are higher incidences of human-carnivore confrontations. The invasion of alien species such as *Lantana* and *Ageratina* has also decreased the availability of fodder in forest areas resulting in the reduction of the hunting grounds for carnivores such as common leopard. Increased lopping has resulted in loss of acorns (fruit of oak trees) and other wild fruits, which are major food source for herbivores such as wild boars, monkeys, and bears. Moreover, the wild areas are fragmented due to fencing, road construction, construction of Hydro - Power projects and other developmental activities and wild animal such as leopards are forced to look for food in the villages where they prey on domestic animals and occasionally on human beings also. Villagers retaliate by demanding the elimination rather than the conservation of these wild animals. Villagers sometimes trap leopards, porcupine and wild boars who roam in their settlements.

Another conflict (within KSL-India) is due to notification of Askot Wildlife Sanctuary (AWLS) in 1986 which covers an area of 600 km^2 as mentioned in the intention notification which was without consultation with the local communities inhabiting in that region. It comprises of the reserve forests of Askot Range (289 km^2), 225 km^2 of Civil and Van Panchayat areas and 85 km^2 of Agricultural land of 111 villages. It is one of the largest PAs in the Himalayan upper region. Although recently, lands belonging to 111 villages have been taken out of the sanctuary area by the Government after years of confrontation but the issue related to the traditional migratory grazers/shepherds and other local villagers, who depend for their livelihood on collection of medicinal plants and other NTFPs as well as other rights & concessions, (which the local communities were availing at the time of notification of sanctuary) still remains unsettled. Another overriding concern of the people related to AWLS is that while the sanctuary was intended to be notified for an area of 600 km^2, the digitization and mapping of the PA actually done, showed that the notified area is over 2,900 km^2 (BCRLIP, 2008). Due to restrictions under the Wildlife (Protection) Act, 1972 and its amendments including restrictions imposed by Hon'ble Supreme Court of India in February 2000, even the collection of fodder grass and dead

wood are restricted. This impinges upon the very sustenance of life of these agrarian and forest dependent communities.

8.9 Trans-boundary Cooperation

As highlighted under Section 7.0 (Trans-boundary Issues) of this report, there is wide range of issues which are common among the three partner countries of KSL. Ecosystem management is essential for the conservation of biodiversity as well as the sustainable use of resources. For example, the home range of many globally and regionally threatened wildlife species, such as the Snow Leopard (*Panthera uncia*), Eurasian Otter *(Lutra lutra*), Assamese Macaque (*Macaca assamensis*), Himalayn Musk Deer (*Moschus chrysogaster*), Common Leopard (*Panthera pardus*) and many other migratory birds extend beyond the political boundaries of the landscape. Issues of trans-boundary habitat loss and protection as well as issues of illegal logging, trade in wildlife products, and trade in endangered medicinal plants can only be addressed regionally through trans-boundary cooperation.

Another area of concern which needs immediate attention for trans-boundary cooperation is conservation, collection and trade of high valued Yar-Tsa_Gumba (*Cordyseps* species); mainly in India and Nepal. In both of these countries, this caterpillar fungus collection is unscientific, irregular and very badly managed by the controlling authorities. The unscientific collection and extensive human activities during collection is adversely affecting the habitat of the host caterpillar and many other species including some globally and regionally threatened floral species. Moreover, due to lack of proper marketing and trade related policies between the KSL countries (for *Cordyceps* species) and very porous border (mainly between India and Nepal), despite the hardships being faced by the communities during collection (including death of human beings), the local dealers and businessmen are benefited from the hard- collected Yar-Tsa-Gumba by selling them in the international market at very high price and paying the collectors/communities comparatively very low.

Another area of concern for the KSL partner countries is related to Convention on Biological Diversity (CBD) and Nagoya Protocol (see Section-3.3 of this report). Nagoya protocol on access and benefit sharing (ABS) entered into force on 12.10.2014. All the three partner countries of KSL, i.e. China,

Nepal and India have become party to the CBD between 1992 and 1994. However, as far as Nagoya Protocol is concerned, India has signed it on 12-06-2011 (ratified on 23-11-2012) and has also become party to the Protocol on 21-02-2014. But China and Nepal are still in the process of ratification of Nagoya Protocol. Therefore, as far as Trans-boundary Cooperation concerning provisions of the CBD is concerned, all three countries may not have much difficulty in developing mechanism for co-operation on conservation and sharing of scientific knowledge. However, for access to genetic resources and traditional knowledge pertaining to the compliance of ABS, the partner countries may face some difficulty. However, as per the available information, China and Nepal are moving ahead for the ratification of Nagoya Protocol. The success indicator of the KSLCDI project, specifically ABS component, shall be boosted with the ratification of Nagoya Protocol by China and Nepal also.

8.10 Science - Policy - Interface

In this report, three Sections (Sec-3, Sec.-4 & Sec.-5) have been devoted on the subject matter of Science-Policy-Interface focusing on issues like biodiversity conservation, sustainable management of biological resources and access to genetic resources and benefit sharing. In Section-3, attempt has been made to describe the general concept of science-policy-interface and efforts made at international level through various provisions of CBD, Nagoya Protocol and by establishing international organization like "The Intergovernmental Science-Policy-Protocol on Biodiversity and Ecosystem Services (IPBES)" in 2012 for sharing strategies and policies for conservation, sustainable use and benefit sharing of the biological resources. This section also includes an account of the platforms available in India at National level which could be used as source of scientific knowledge for interaction and policy decisions. Section-4 of this report reviews

various National and state (Uttarakhand) level policies, laws, programmes related to biodiversity conservation and its sustainable use including legal and customary/traditional rights & concessions prevalent to the local communities and constraints therein. In section-5, it has been analyzed that to what extent some of the major policy decisions taken in the state of Uttarakhand related to biodiversity conservation and sustainable management and measures taken for their implementation are based on scientific findings and interaction between the scientific community and policy makers. This issue has been also discussed in various sub-sections of this Section.

If we critically review all above descriptions stated in various sections of this report, it appears that many policy decisions taken in past were scientifically not sound. There are three main reasons for this gap: firstly, scientific knowledge on biological resources on Himalayan region including the KSL part of India are inadequate which include incomplete survey & inventory of the resources, lack of study related to ecology, ecosystem & its function, lack of scientific study related to sustainable management of biological resources (with exception of some commercially valuable timber species such as *Pinus roxburghii, Cedrus deodara* etc.), lack of studies on high altitude grasslands etc. Secondly, whatever data, scientific studies/ findings, assessment and comprehensive reports are available; the mechanism to combine different data sets and scientific knowledge to be used in applied policy making is not properly developed. Thirdly, there is lack of coordination between the scientific communities and politician and bureaucrats responsible for policy decisions.

The government could benefit from the input and advice received from scientific sector, but on the other hand, scientific community needs to know what exactly is required from them. Often it is debated that whose responsibility it is to approach the other first - scientists or policy-makers? It may not be possible for the policy makers to be exposed to all outstanding scientific information; therefore, it would be a practical option that though knowledge is created by science, it should be the responsibility of the scientific community to communicate the knowledge to policy makers. However, there should not be any second opinion that 'if one wants to have policies that pass the test of time, one need policies to be knowledge based'.

To overcome uncertainty, it is needed that both, the scientific and policy maker communities should reach out each other through regular interactions, improve data collection methods and increase funding for data collection and diffusion. To strengthen the evaluation of policies using scientific issues, there is need to create and strengthen multi-sectoral bodies that include civil society and allow scientists to interface with policymakers.

For KSL countries, to strengthen regional cooperation to enable policies and knowledge management progress together, there is need to review, synthesize, assess and critically evaluate relevant information, research works and knowledge generated in the past and which would be generated in future by the Governments, academia, scientific organizations & institutes, universities, non-governmental organizations as well as indigenous people and local communities, and private sectors. For that, it would be an appropriate step to establish a regional knowledge sharing platform in one of the partner countries to support evidence based decisions so as to help all three partner countries in taking policy decisions.

9

SUMMARY

Summary

Kailash Sacred Landscape (KSL) is an important cultural and religious landscape having unique ecological diversity. To maintain the cultural and environmental integrity of the KSL area and to develop a knowledge base to build a regional conservation framework and implementation program, a trans-boundary initiative named as "Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI)", a long term programme, has been launched as a collaborative effort of International Center for Integrated Mountain Development (ICIMOD), Kathmandu, and three regional countries (China, India and Nepal). This programme has three broad objectives namely to enhance cooperation among the regional member countries; to increase collection of climate change data in KSL; and to recognize & strengthen local capacity for community based participation in conservation and sustainable development.

For implementation of KSLCDI project, each partner country has nominated focal Ministry as nodal agency. For India, the focal Ministry is "The Ministry of Environment, Forest & Climate Change, Government of India" (MOEF) and the G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) has been identified as 'Lead Institute' for implementation of this programme in India. For KSLCDI programme, a "Regional Programme Implementation Plan" (RPIP) has been prepared with five main components which include:

i) Innovative livelihood and climate change adaptation;
ii) Ecosystem management for sustaining services;
iii) Access and benefit sharing for the development of resilient communities;
iv) Long-term conservation and environmental monitoring; and
v) Regional cooperation, enabling policies, and knowledge management.

For implementing the programme under third Component i.e. Access and Benefit Sharing (ABS), an agreement has been signed between G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) and Uttarakhand Biodiversity Board (UBB). Under the provisions of this agreement, UBB commissioned a study namely ***"Study on science-policy-interface focusing on issues like Access-Benefit-Sharing (ABS) and trans-boundary issues for contribution to policy paper"*** which could be helpful in developing policies related to conservation and sustainable use of biological resources and in promoting ABS with specific reference to KSL part of India and KSL region.

The Kailash Sacred Landscape (KSL) spreads across a vast region that includes remote portions of the Tibet Autonomous Region of China (TAR China) and contiguous areas of Nepal and India. This area is historically, ecologically, and culturally inter-connected. The landscape exhibits great variability and heterogeneity geographically and culturally. The KSLCDI region is spread over an area of about 31,252 km^2 located within the remote south-western portion of Tibet Autonomous Region of China (10,843 km^2), adjacent districts of far Western region of Nepal (13,289 km^2), and the North-Eastern flank of Uttarakhand State in northern India (7,120 km^2). The region harbours a high diversity of flora and fauna of both regional and global significance.

The summary of the study is given below

1. The Study Area: The Indian portion of the KSL target landscape is situated at the North-Eastern flank of the Uttarakhand State comprising of entire Pithoragarh District (6,826 km^2) and a small portion of Bageshwar District (294 km^2) having common boarder with Nepal and TAR China comprising four major hydrological units namely the Panar-Saryu (350 km^2), the Saryu-Ramganga (1,500 km^2), the Gori-Kali (2,750 km^2), and the Dhauli-Kali (2,650 km^2) watersheds. A distinct bio-climatic zonation is evident across an elevation gradient that ranges from above 430 m asl to almost 7,000 m asl. The total human population of this area is more than 48,300. Approximately 74% of the area is forest land (actual forest cover is only about 29%); about 11% is agricultural land (including horticulture); and about 5.6% is uncultivated land. The landscape comprises of a significant area under permanent grazing and other pasture lands (25%) and under mountain/ snow cover/glaciers & barren lands (28%) whereas habitation & other settlements is only about 1.5%. The KSL-India landscape consists of one Protected Area, i.e. Askot Wildlife Sanctuary (AWLS) covering an area of 600 km^2.

2. Biodiversity: The Indian part of KSL is rich in crop diversity having about 211 different varieties of food crops grown in this landscape which include: 105 cereals/pseudo cereals, 21 pulse crops, 10 oil yielding plants along with 31 vegetable and 31 fruit plants. There is rich diversity of forest/wild plant species distributed into four main bioclimatic zones ranging from sub-tropical, through temperate and sub-alpine to alpine. About 3170 species, 288 families and 1341 genera of plant species have been reported from this region including 234 near endemic and 24 endemic species, 10 species listed in Red Data Book and 11 species having small population.

There are significant sensitive habitats and/or areas (e.g., the timber line zones of the Panchchuli Basin and the Ralam Valley) that are recognized priority sites. Over 172 species are used by local communities, which have a significant amount of indigenous knowledge based on traditional ecological knowledge. The area is very rich in terms of the diversity of medicinal and aromatic plants (MAPs). Several botanical hotspots are known in the area, particularly in the alpine zone (above 3,500 m asl).

Fauna reported in KSL-India part include about 90 fish species, 19 reptiles, 9 amphibians, 193 birds and 38 mammals. The IUCN list of species reported as threatened for this area include 3 which are critically endangered, 7 endangered, 7 vulnerable, and 18 that are near-threatened.

This area is particularly rich in cultural diversity having proud history and many cultural traditions. Different sacredness values within the landscape have contributed to the conservation of biodiversity in the area. In addition to the main pilgrimage routes and associated cultural heritage sites, there are many sites regarded as sacred, religious, or otherwise culturally significant.

3. Policy and legislations: Forestry sector of India is governed by a number of clearly defined laws and regulations since long. Thus, KSLCDI project is required to have the operational structure and activity components taking into consideration such applicable laws and regulations. If necessary, the changes may be proposed to achieve the project objectives and for the betterment of the community based forest management in the project area. Furthermore, the policy decision manifested in the National and State level would also affect the environment in which the project would be implemented. Some of the laws which have direct influence on biodiversity and are discussed and evaluated in this report include: National

Forest Policy (1988), National Agriculture Policy (2000), National Seed Policy (2002), National Environment Policy (2006), National Policy for Farmers (2007), National Livestock Policy (2013), Indian Forest Act (1927), Wild Life Protection Act (1972 & amendments 1992, 2002, 2003 & 2005), Forest Conservation Act (1980), Biological Diversity Act (2002) & Rules (2004), PPV & FR (2001) & Rules (2003), Forest Rights Act (2006), Patent Act (1970 & its amendment 2002 & 2005), National Action Plan on Climate Change (2008) and State Policy & Acts such as Uttaranchal Forest Policy (2001), Uttaranchal State Van Panchayat Regulations (2005), Bhotia Grazing Rules, 1927 etc.

4. Policy decisions: In continuation of the policy decision taken in 1980 by the then state government of Uttar Pradesh to restrict green felling of trees above 1000 m asl, which has a direct influence on the hill region of Uttarakhand, Hon'ble Supreme Court of India in 1996 further continued this ban. This ban has restricted even to carry out silvicultural operations in all forests above 1000 m altitude in Uttarakhand including KSL part of India. This policy decision has adversely affected those species which are light demanding and need certain percentage of opening for regeneration. In the light of the recommendations of various committees constituted in the past and two studies carried out recently by Uttarakhand Forest Department (2012) and FRI, Dehradun (2011) regarding impact of ban on green felling above 1000 m altitude, this issue may be taken up for further scientific study.

Second major & one of the most important decisions policy decision taken by the State Government under the provisions of Van Panchayat Rules 1931, 1976 and 2005 pertains to the participatory/community based forest management which has resulted into the constitution of 12089 Van Panchayats (VPs) in Uttarakhand including 1666 VPs within the KSL part of India vesting complete authority on VPs for management, access and use of forest produce in that area. However, about 60% of these VPs are having <15.00 ha area which is not sufficient to meet villagers need. Therefore, study may be conducted on the status of such forest areas (increase/ decrease in its biodiversity status) managed by the Van Panchayat. Based on the results of such study, further decision with respect to the minimum sustainable area of VP may be estimated and if needed, the VP area may be extended, for which provision has been made in Panchayati Van Regulation, 2005.

Third important policy decision taken by the Uttarakhand Government is related to the herbal sector specifically for close coordination and interaction between the researchers and policy makers. These include introduction of CDH plan for conservation, sustainable management & collection of medicinal & aromatic plants (MAPs); categorization of MAPs in three category, viz. species restricted for harvesting but supported for cultivation, species open for collection with some restrictions and species on which there is no restriction for collection; registration of farmers for cultivation of MAPs and simplifying transit rules; strengthening the research institutes related to herbal sector; establishment of MPCAs (medicinal plan conservation areas); and establishing sale depots to facilitate the collectors and growers of MAPs/NTFPs for sale of their produce.

Fourth major policy decision is with respect to the regulation of collection of Yar-Tsa-Gumba (*Cordyseps* species) through VPs and its marketing through Forest Corporation. Both the decisions were not based on proper survey and science related to this specie. This has resulted in over-exploitation and illegal trade leading to the damage of habitat and ecosystem. There is need to have detailed study on this subject before planning for its regulation and other aspects of conserving biodiversity.

5. Access and benefit sharing (ABS): Various provisions made in the National Forest Policy (1988), Indian Forest Act (1927), Panchayati Van Niymawali, Uttarakhand (2005), PPV & FR Act (2001), Forest Rights Act (2006) and Biological Diversity Act (2002) attract the issues related to access to biological resources and benefit sharing. There are provisions of distribution of timber free of cost and grazing rights to the villagers under Indian Forest Act, 1927 from the reserved forest. With certain safeguards, there are unlimited rights for use of forest produce from the protected forests. Van Panchayat regulations vest authority on VPs for management and use of biological resources. However, for the purpose of better co-ordination between the BMC and other institutions such as Van Panchayats, study may to be conducted (along with the recommendations) for generating synergy between institutions.

The Nagoya Protocol (2010) on Access and Benefit Sharing (ABS)) seeks to regulate the commercial and research utilization of genetic resources and associated traditional knowledge by requiring their users to secure the prior informed consent of the country and/ or community. India, became a Party to the CBD in 1994, enacted the "Biological Diversity Act" in 2003 and notified the "Biological Diversity Rules" in 2004. The Nagoya Protocol was signed by India on 11th May, 2011, ratified on 9th October, 2012 and finally became a party to this protocol on 12th October, 2014. In pursuance of the Nagoya Protocol, National Biodiversity Board (NBA) in consultation with Government of India notified an important regulation on 21st November, 2014 namely *"Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014"*.

To check the misappropriation of the rich Traditional Knowledge (TK) of India, provision has been made to develop alternative measures like *sui generis* system and benefit-sharing schemes in Biological Diversity Act & Rules. However, processing ABS issues within the KSL partner countries may face some difficulty in the absence of ratification of Nagoya Protocol by partner countries. To strengthen the issues related to protection of TK, the Indian Patent Act (1970) has been amended in 2002 & 2005 followed by a detailed guidelines (2012). However, there is need to speed up the process of constitution of Biodiversity Management Committees (BMCs) and preparation of People's Biodiversity Register (PBR) which have important bearing on the compliance of ABS. The development of Traditional Knowledge Digital Library (TKDL) of India which has information on about 2,50,000 transcriptions of the traditional medicine formulation have facilitated to check bio-piracy and processing patenting of TK.

6. Trans - boundry co-operation: There are wide ranges of issues common among the three countries of the KSL. Ecosystem management is essential for both the conservation of biodiversity and the sustainable use of resources. There are number of rare, endangered and threatened plant, wild animal & bird species having common habitat in the areas of KSL partner countries, therefore there is need to take some measures to increase trans-boundary co-operation between China, India and Nepal to ensure habitat connectivity and to protect species that suffer from over exploitation, poaching and illegal trade on plant and wildlife product. Considering that trans-boundary trade and tourism relationship is one of the most effective measures for sustained cooperation between partner countries, there is need to explore possibility for resumption of trade and tourism through Munsiyari-Milam route and Untadhura-Kingri Bingri pass (which is part of KSL-India).

7. Science-Policy-Interface: There are gaps between the scientific communities, policy makers, implementing agencies and scientific findings. Whereas some of the policies promote scientific reasoning such as making mandatory to have approved management plans for carrying out any activity in a forest area, introduction of CDH plan for sustainable management & harvesting of MAPs, constitution of VPs to encourage participatory/community forest

management, promoting cultivation of indigenous agricultural crops etc, but some of them could not be implemented due to lack of resources. At the same time, if there are available scientific knowhow, the same may not convince the policymakers while framing the policies or policy makers may take *adhoc* decisions without scientific reasoning. To reduce the gap between the science and policy in the state of Uttarakhand, need for a state level knowledge sharing platform preferably under Uttarakhand Biodiversity Board or UCOST (Uttarakhand Council of Science and Technology) with a separate unit on biodiversity & ecosystem has been felt. For ensuring continuous flow of reliable data/ information on identified parameters so as to help policy planners and decision makers, there is need to frame a **Comprehensive Environmental Monitoring Plan** (CEMP) for KSL-India.

For KSL countries, to strengthen regional co-operation to enable policies and knowledge management related to biodiversity and environment progress together, it would be an appropriate step to establish a **Regional Knowledge Sharing Platform** in one of the partner countries to support evidence-based decision making at Regional, State and National level of all the three partner countries on the lines of IPBES (Intergovernmental Science-Policy-Platform on Biodiversity and Ecosystem Services).

10

RECOMMENDATIONS

(A) Biodiversity status and conservation

1) Considering that the floral and faunal species in KSL-India region is highly under explored, it is recommended that exploration/ survey/inventory of the floral and faunal species in the Indian part of KSL should be carried out on priority so that it could attain the status of well-explored, as entire conservation and management strategy will depend on the knowledge related to their status.
2) Based on the outcome of the exploration, it is recommended that the IUCN and CITES categorization of the plant and animal species for the geographical area of KSL-India should be revised (presently it is based on limited knowledge) and subsequently the policy decisions related to restricting collection of medicinal & aromatic plants and other NTFPs should be reconsidered as the local population (majority belonging to BPL families) are dependent on them for their livelihood.

3) Although some important policy decisions have been taken for promoting herbal sector in the state of Uttarakhand but there is a need to assess the population of various MAPs & NTFPs at micro-level and then policies to be made for *in-situ* and *ex-situ* conservation of plant species including sustainable use of plant species based on their scientific management and harvesting.
4) It is recommended that the traditional cropping system, livestock husbandry practices, traditional agro practices and cultivation of land races in the region should be adopted as an adaptation measure for climate change.
5) To conserve various edible and commercially exploited wild fruit species and develop them for maximum benefit of the local communities, it is recommended that measures for developing techniques for domestication and large scale cultivation of these species be taken on pilot basis in KSL-India region along with the measures to increase productivity and improve quality. Some of these species which could be taken on priority are: *Myrica esculenta, Pyrus pashia, Prunus paddam, Morus serrata, Prunus nepalensis, Carylus jacquemontii, Rubus ellipticus, Berberis species, Zynthoxylum armatum, Pyracantha crenulata, Rosa sericea, Hippophae salicifolia,* and *Hippopae tibetana.*

(B) Biodiversity Management

6) Protection and management of biological resources in KSL requires strengthening of the communities and local bodies. This could be accomplished by the development and implementation of scientific management plans by

locally responsible authorities with the participation of local communities. However, presently out of 5,40,150 hectare of legally notified forest land, only 15% are Reserved Forests and are covered by scientifically prepared regular management plans, but rest of the 85% forest lands which are under protected forest (including Van Panchayats) are not covered by any management plan or management schemes, in spite of being mandatory as per National Working Plan Code 2004 and 2014. There is also direction from Hon'ble Supreme Court of India that all forests other than RF should also have Working plans or working schemes approved by Government of India for any operation to be carried out in these forests. It is therefore recommended that for entire Protected Forest (PF) of KSL-India and whole of the Uttarakhand including VPs, working plans and/or working schemes should be prepared on priority to carry out various activities in PFs.

7) In the light of the findings of the two research projects namely - impact of ban on green felling of *Pinus roxburghii* forests (Manoj Chandran, 2012) and on *Cedrus deodar - Pinus walliachiana* forest (Mishra, 2011) which have been discussed earlier, it is recommended that these two studies be assessed and critically evaluated in terms of the possibility of lifting or partially allowing felling of trees within the overall ambit of the forest laws. It should also be considered from the angle of availability of raw material for the infrastructural development for the State including KSL-India.
8) Considering that the findings of the above mentioned two studies (related to the impact of ban on green felling of trees on forest ecosystem) are likely to have significant and positive impact on the Scientific Management of the forests, it is recommended that these two studies should be taken as pilot studies to understand the impact of the Silvicultural Practices on the ecology of the forests, and more research/ studies should be taken up on the similar lines. The study on the environmental impact of the silvicultural practices may also be documented and good practices evolved so as to preserve and improve the quality of environment based purely on scientific rationale.
9) It is recommended that the work on Conservation Development and Harvesting Plan (CDH Plan) which was adopted by Uttarakhand state government for sustainable harvesting of the MAPs in 2004, should be taken up on priority covering entire geographical area of KSL-India. The areas rich in rare MAPs should be demarcated for conservation to enhance the gene pool. Other areas may also be selected for successful plantation and other interventions for future use. Areas abundant in certain species of MAPs should be selected for regulated harvest on rotational basis.

(C) Yar-Tsa-Gumbu (*Cordyseps* species)

10) There is need to carry out detailed survey at micro level in the entire region of distribution of all *Cordyseps* species along with other associated vegetation within Uttarakhand. Studies related to the life cycle may also be conducted to understand the ecology for developing models of sustainable management including collection of species with ecological approach and detailed CDH plan.
11) It is recommended that extension programmes and awareness campaigns should be carried out among the villagers to educate them about the best mode of collection, to minimize the adverse impact on the fragile ecosystem and ensure sustained regeneration of this valuable species.

12) As the provision made by State Government for regulating collection of Yar-Tsa-Gumba through Van Panchayats and marketing through Uttarakhand Forest Development Corporation seems to be ineffective, it is recommended that the present policy of collection and marketing of Yar-Tsa-Gumba be reviewed. Considering unregulated crowd visiting the sub-alpine and alpine regions, Government may consider deployment of Indo-Tibetan Boarder Police (ITBP) in these areas during two months (from May to mid-July) for regulating the crowd and bad elements.

13) "Bhutan Model" for the collection and marketing of *Ophiocordyceps sinensis* (Yar-tsa-gumba) also need to be studied, wherein, the Government provides marketing facilities, certification of the product and finally allow the sale with certain conditions. It is recommended that this model along with other existing models may be studied with the objective of regulating it in Indian conditions.

(D) Grazing

14) Livestock grazing is a major management issue that needs to be addressed in the policy at landscape level. It is recommended that guidelines for sustainable livestock grazing should be developed and adopted in KSL-India after appropriate consultation with the local communities. It is also recommended that the carrying capacity of various Bugyals (sub-alpine & alpine grass lands) should be worked out and accordingly grazing policy for Bugyals be framed to reduce further degradation of this fragile ecosystem.

(E) Human-Wildlife Conflict

15) To ensure local community support in conservation and in protecting endangered large carnivores from retaliatory killings, it is recommended that a number of site specific measures should be attempted with the support of local communities including community-level supervised grazing, rotational grazing, strengthening of night shelters for livestock, livestock

insurance schemes, strengthening of indigenous crop protection methods etc. In addition to that, avenue for generating additional livelihood options may be created for the economic development of local communities which may also reduce dependency on natural resources (including poaching and irregular/illegal collection of MAPs/NTFPs) and help to strengthen wildlife conservation and protection.

16) In light of a strict and restrictive legal regime in the Askot Wildlife Sanctuary areas, it is suggested that effort should be made by the concerned authorities in consultation with the local communities to address the issues including settlement of rights & concessions at the earliest to make conservation efforts sustainable and a success.

17) At present, though there are provisions to compensate loss of human life and livestock by wild animals but compensation for the damage to property and agricultural/ horticulture crops are made only, if it is done by the elephants. In hilly region of Uttarakhand including KSL part of India, a considerable loss to crop and property is done by monkeys, porcupines, wild boars and Himalayan black bears for which, there are no provision for compensation. It is recommended that advisory note for taking policy decision may be sent to the State Government for considering the payment of compensation in case of loss/ damage caused by any wild animal to reduce the resentment among the people and minimize retaliatory killing of wild animals.

(F) CBD and Biological Diversity Act (2002) & Rules (2004)

18) Considering that the progress of constitution of BMCs in Uttarakhand including KSL-India part is very low (out of 7950 Gram Panchayats, only 824 BMCs constituted), it is recommended that at least in the Indian part of KSL, constitution of BMCs in all Gram Panchayats be completed as early as possible preferably within a period of two years. Since the consent of the concerned BMC is mandatory for implementation of various provisions of BD Act including ABS, therefore it is required. For this, Uttarakhand Biodiversity Board need be strengthened to the level that not only BMCs are constituted but they are also made operational and fully functional (by launching capacity building training programmes) so that they could significantly contribute to the conservation & sustainable use of biological resources and also in the implementation of ABS.

19) Alike constitution of BMCs, the pace of preparation of the PBRs is also very slow, it is recommended that along with the constitution of BMCs, preparation of the PBRs should be taken up on priority to work towards achieving the basic objectives of CBD and Biological Diversity Act/Rules/Guidelines.

20) A reasonably sound institutional infrastructure (NBA, SBBs, BMCs) is in place for adequate coverage of biodiversity concerns with specific mandates and activity profiles of existing institutes. However, there is a need for improving inter-sectoral coordination inter alia through continuous review and revision of their mandates and networking of these institutions to ensure adequate coverage of biodiversity concerns and issues and also to avoid duplication/overlapping of efforts. There is also need for awareness and capacity building mainly at BMC level and at the level of field functionaries of stakeholder departments.

(G) Traditional Knowledge (TK)

21) Considering the progress made in the preparation of PBRs and provision made in BD Act regarding the documentation of TK in PBR, it appears to be stupendous

and time consuming exercise. Therefore, it is recommended that there should be a State Coordinated Project on Traditional Knowledge for documenting the un-coded, oral traditional knowledge of local people, especially of little-known bio-resources of potential economic value. As far as access to TK, patenting and benefit sharing are concerned, provisions & procedures for these are laid down in BD Act (2002), BD Rules (2004), PPVD & FR Act (2001), Indian Patent Act amendment (2002, 2005) and the guidelines issued for processing of patent applications related to traditional knowledge & biological resources and ABS regulations guidelines (Notification, 2014), but needs awareness raising and percolation of knowledge to BMC level.

22) In the Indian part of the KSL, effort has been made by the State Government and individuals to document TK of this region. It is recommended that all the relevant literature/documentation on TK of this region be reviewed & evaluated and their status in the Traditional Knowledge Digital Library (TKDL) of India should be examined for adding them in the list of this digital library.

(H) Access to Biological Resources and Benefit Sharing (ABS)

23) Considering that the volume of timber distributed annually free of cost to the local villagers of Uttarakhand presently is less than 20% of the timber sanctioned free of cost from the reserved forests at the time of forest settlement (whereas the local community is fighting mostly to have more rights on forest produce), it is recommended that the State Government should appoint a committee on priority to find out the cause of this huge gap and review the existing rights & concessions and find ways to rationalize the distribution of timber to be allotted free of cost to the local people of Uttarakhand. In addition, clarification about the rights & concessions from the Civil and Soyam forests also need urgent attention of the State Government.

24) Considering that the issue related to Intellectual Property Rights specially the TK with respect to the medicinal & aromatic plants (MAPs) and other non-

timber forest produces (NTFPs) remained neglected, it is recommended that the State Government in consultation with UBB should review such rights of local people under the regime of Biological Diversity Act & Rules of India.

25) In Uttarakhand including KSL-India, grazing management is regulated by a legally based formal system of property rights, permits, and rules in the reserved forest area, but in practice it is observed that these rules are not followed both by the forest department and communities and parallel to the Government regulations, there are informal rules followed by the pastoralists as they negotiate access to different grazing areas from customary right-holders. It is recommended that in the light of the considerable socio-economic changes which have prevailed after creation of Uttarakhand, the grazing rights of local communities and grazing regulations in reserved as well as protected forests should be reviewed by the State Government.

26) "The Bhotia Grazing Rules, 1927" mainly facilitates the migratory grazers by notifying the migratory routes, camping places and forest area to be grazed, however, presently most of the camping sites are encroached and grazing areas fragmented. Therefore, it is recommended that the Bhotia Grazing Rules, 1927 should be reviewed by the State Government.

27) The Van Panchayat is one of the most progressive legally constituted community based institution having access to entire biological resources of its area. In Uttarakhand, 12089 Van Panchayats (including 1666 VPs within KSL- India) has been constituted having authority to manage, access and use forest produce within the identified area. However, about 60% of these VPs are having <15.00 ha area which is not sufficient to meet villagers need. Therefore, it is recommended that study may be conducted on the status of such forest areas (increase/decrease in its biodiversity status) managed by the Van Panchayats. Based on the results of such study, further decision with respect to the minimum sustainable area of VP may be estimated and if needed, the VP area may be extended, for which provision has

been made in Panchayati Van Regulation, 2005.

28) "Biodiversity Management committees (BMCs)" have been empowered under law to regulate access for commercial use and sharing the benefits arising out of the commercial utilization of biological resources. However, it would be possible to make these provisions operational in the field, only if BMCs are strengthened through capacity building to the level whereby they are able to discharge the responsibilities and legal obligations as provided in BD Act/rules/guidelines. Therefore, it is strongly recommended to strengthen the capacity of the BMCs and other stakeholders by organising training programmes at regular intervals round the year.

(I) Trans-boundary Cooperation

29) As there are number of rare, endangered and threatened wild animals and bird species having common habitat in the KSL partner countries, it is recommended that some urgent measures be taken to increase trans-boundary co-operation between China, India and Nepal to ensure habitat connectivity and to protect species that suffer from poaching and illegal wildlife trade. Trans-boundary co-operation would also be required on the conservation of aquatic ecosystem in the lower part of the landscape for the conservation of the Golden Mahaseer (*Tor putitora*).

30) Considering that *Cordyceps* species (Yar-Tsa-Gumbu) is very high valued species having occurrence in all the three KSL partner countries but is under threat due to over-exploitation and illegal trade, it is recommended that a multinational "Cordyceps Research and Development Centre" may be initiated in one of the partner countries with involvement of key research organizations and experts from each country for managing research, developing common policy for regulating trans-boundary trade ensuring its conservation and sustainable harvesting.

31) It is recommended that measures should be taken to facilitate and encourage regional information sharing and trans-boundary cooperation for conservation of globally threatened species and sites of ecological and cultural significance.

32) Considering that trans-boundary trade and tourism relationship is one of the most effective measures for sustained cooperation, it is recommended that there is need to explore possibility of resuming trade and tourism through Munsiyari-Milam route, through Untadhura-Kingri Bingri pass (which is part of KSL-India).

(J) Science-Policy-Interface

33) As mentioned earlier in this report, there are gaps between the scientific communities and policy makers as well as implementing agencies and scientific findings. Whereas some of the policies promote scientific reasoning but could not be implemented due to lack of scientific knowledge, on the other hand, if there are scientific knowhow, the same could not convince the policymakers while framing the policies. To reduce such gaps between the science and policy in the state of Uttarakhand, it is recommended that a state level knowledge sharing platform should be established preferably under Uttarakhand Biodiversity Board with a separate unit on 'Biodiversity & Ecosystem'. This platform should review, synthesize, assess and critically evaluate relevant information, research works and knowledge generated in the past and which would be generated in future by the Governments, academia, scientific organizations & institutes, universities, non-governmental organizations as well as indigenous people & local communities and private sectors to support evidence based decision making by the concerned policy makers and the implementing agencies.

34) For ensuring continuous flow of reliable data/information on identified parameters so as to help policy planners and decision makers, it is recommended that a Comprehensive Environmental Monitoring Plan (CEMP) for KSSL-India part should be framed.

35) For KSL countries to progress together, strengthen regional cooperation, enable policy and knowledge management related to biodiversity and environment, it would be an appropriate step to establish a regional knowledge sharing platform in one of the partner countries to support evidence-based decision making at Regional, State and National level on the line of IPBES (Intergovernmental Science-Policy-Platform on Biodiversity and Ecosystem Services).


ऐतिहासिक जौलजीवी मेले में
आपका हार्दिक स्वागत
एवं अभिनंदन


पवित्र कैलाश भू-क्षेत्र संरक्षण
Kailash Sacred Landscape Conservation and Devel
Kailash Landscape - INDIA

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