



# TRAINING MODULE FOR BIODIVERSITY CONSERVATION IN SIKKIM

**TO ENHANCE CAPACITIES OF KEY STAKEHOLDERS FOR  
BIODIVERSITY CONSERVATION**

**Indian Institute of Public Administration, New Delhi**

## **PREFACE**

The Ministry of Environment, Forests and Climate Change (MoEF &CC), Government of India along with UNDP is implementing a new Global Environment facility (GEF) funded project: SECURE Himalaya (Securing Livelihoods, Conservation, Sustainable Use and Restoration of High Range Himalayan Ecosystems) in the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim, which aims to support the Government of India to effectively promote sustainable land and forest management in Alpine pastures and forests in high range Indian Himalayan ecosystems by adopting landscape based approach. One of the key focus areas of the project is the protection of snow leopard and their habitats and also securing livelihoods of people in region. Also, to demonstrate a matrix of best practices of high range Himalayan ecosystem and snow leopard conservation for scaling up and replicating in other landscapes nationally and globally.

Under the aegis of SECURE Himalaya project Indian Institute of Public Administration (IIPA), New Delhi executed a project titled “Assessment of capacities and training needs of key stakeholders for long-term effective biodiversity conservation, development and implementation of a capacity building framework to enhance capacities of key stakeholders in SECURE Himalayan Project landscapes in districts of Sikkim” sponsored by UNDP. This aimed to target key stakeholders such as government line departments, research and training institution, community institutions and NGOs in Sikkim for long term biodiversity conservation. The study involves training needs assessment, gap analysis and consecutively develop a strategy to incorporate a wide range of stakeholders and focus on bridging gaps at various levels.

In order to accomplish the objectives extensive stakeholder consultations were conducted to map the expectations and requirements of key stakeholders in project landscape. The Landscape includes Khangchendzonga National Park and the Tso-Lhamu Plateau in the northern Trans-Himalayan zone as a proposed conservation area. This landscape is of critical importance as a trans-boundary corridor for iconic high mountain species, snow leopard. The whole process is catalysed by expert’s opinion and accordingly, three training modules were developed with an objective to enhance the capacities of key stakeholders. One module is generic in nature and provide general information regarding biodiversity, conservation and mainstreaming. The other two modules are based on Agriculture & Biodiversity and Sustainable Tourism respectively as per state’s requirements.

## **EXECUTIVE SUMMARY**

The training module provides an overview of the importance of biodiversity conservation goals. It describes specific methods and approaches that can be used to achieve mainstreaming of biodiversity concerns into different development plans and programmes. These tools and strategies include incorporating biodiversity into different development plans by using sectoral strategies and tools as entry points for mainstreaming. The module consists of five sub modules. The first sub module is an introductory part that describes the concept of biodiversity and emphasises its importance for human wellbeing and ecosystem sustainability. It also highlights the uniqueness of Sikkim's biodiversity and threats to it.

The aim of the second sub-module titled "Methods of Conservation", is to create awareness among the stakeholders about the need, methods and strategies for the conservation of biodiversity, different purpose of action plans and laws and acts related to biodiversity conservation. In addition, case studies of biodiversity conservation from different regions are also given in this sub module to serve, as an effective tool box which can be used by the stakeholders to carryout biodiversity conservation activities in their respective areas.

The third sub-module titled "Community & Governance" explains the importance of community participation for conservation of biodiversity and explains the concept of Biodiversity Management Committees (BMC's), Joint Forest Management Committees (JFMC's) and Eco-Developmental committees (EDC) as well as their roles. It describes importance of People's Biodiversity Register (PBR), as well as highlights the concept of Intellectual Property Rights (IPR) and Geographical Indicators (GIs).

The fourth sub- module titled "Mainstreaming Biodiversity" explains the importance and need for mainstreaming biodiversity at all levels (policy, investment and practice) and across all sectors. It also elucidates ecosystem approach and Environmental Impact Assessment (EIA) for harmonizing development and biodiversity.

The fifth sub-module titled "SWOT Analysis", Strength, Weaknesses, Opportunities and Threats (SWOT) is a very simple and highly effective tool, which will help participants to identify strengths, weaknesses, opportunities and threats in each specific sector. This analysis will provide significant information that is helpful in identifying conservation priorities and defining management strategies to assure biodiversity conservation in specific sectors such as agriculture, tourism, horticulture and the like.

The module will create awareness about the importance of biodiversity and need for its conservation. It will help in capacity building among various stakeholders for mainstreaming biodiversity into developmental plans so that they are complementary with biodiversity conservation goals.

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## **LIST OF ABBREVIATIONS**

ACE	Autonomous Community Effort
BMC	Biodiversity Management Committee
CBD	Convention on Biological Diversity
CCA	Community Conserve Area
EDC	Eco-Development Committee
GBPIHeD	G. B. Pant Institute of Himalayan Environment and Sustainable Development
GI	Geographical Indicator
IBA	Important Bird Areas
IPR	Intellectual Property Right
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
KBR	Khangchendzonga Biosphere Reserve
KNP	Khangchendzonga National Park
NBA	National Biodiversity Authority
NGOs	Non-Governmental Organisation
PBR	People's Biodiversity Register
PTC	Police Training Centre
SBB	State Biodiversity Board
SBFP	Sikkim Biodiversity Conservation and Forest Management Project
SEA	Strategic Environmental Assessment
SFM	Sustainable Forest Management
SG	Sacred Groove
SWOT	Strength Weakness Opportunities and Threats
UNDP	United Nation Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

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## 1. Introduction to Training Module

The present training manual has been prepared by Indian Institute of Public Administration, New Delhi under the project “Assessment of capacities and training needs of key stakeholders for long-term effective biodiversity conservation, development and implementation of a capacity building framework to enhance capacities of key stakeholders in SECURE Himalayan Project Landscapes in Sikkim”. This manual is based on training needs analysis, extensive literature review, experts’ suggestions, feedbacks from participants and also caters to expectations of state nodal agency i.e. Department of Forest, Environment and Wildlife Management Department, Govt, of Sikkim.

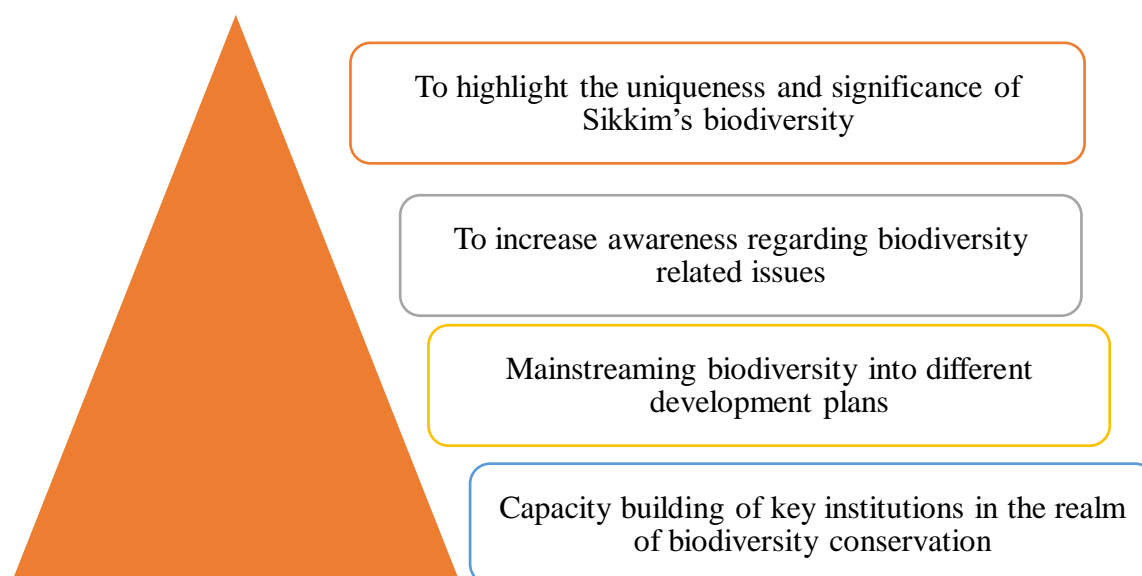
### Objective

The main objective of this manual is to train trainers of key stakeholders in the field of biodiversity conservation in the state of Sikkim. This manual also focuses on integrating biodiversity conservation concerns in development planning.

### Target Group

The target audience of this manual is trainers and educators including practitioners from government departments and NGOs.

### Training Objective





## **Module Outline**

This module contains 5 sub modules, which provide the audience with the content helpful in preparing for trainings focussing on biodiversity conservation:

- i. Sub Module 1: Introduction to Biodiversity
- ii. Sub Module 2: Methods of Conservation
- iii. Sub Module 3: Community and Governance
- iv. Sub Module 4: Mainstreaming Biodiversity
- v. Sub Module 5: SWOT Analysis

Other than this, two specific modules have also been developed on “Agriculture and Biodiversity” and “Sustainable Tourism” which would be helpful for specific concerned departments. At the end of the manual, general training agenda has also been given which can be customised according to nature of participants. In general, the training is design for 5 days, but this can be squeeze into less no. of days depending upon level of participants.

Apart from this training manual, two short videos have also been prepared. One is on importance of agro-biodiversity and other one is elaborating a case-study of sustainable eco-tourism. Such videos will be helpful in sensitizing general masses and local communities about the importance of biodiversity conservation and what role each individual can play into this.

## **2. Sub-Module 1: Introduction to Biodiversity**

The term biodiversity was coined by Walter G. Rosen in the year 1985 (Wilson, 1988) a contraction of “biological diversity”. It refers to variabilities among plants, animals and microorganisms. Biodiversity includes the number of different organisms and their relative frequency in an ecosystem. It also reflects the organisation of organisms at different levels. Biodiversity refers to the richness and variety of life of an area. It is the most complex and important feature of our planet. Without biodiversity, life would not sustain. Convention of Biological Diversity (CBD) defines biodiversity as “the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.”

Biodiversity is of enormous ecological and economic significance. Biodiversity underpins life on Earth and people are highly dependent on biodiversity in their daily lives. Biodiversity provides food, fodder housing, fuel, fibre and several other resources of great economic and commercial value including ecotourism. Therefore, it is very important to have a good knowledge of biodiversity and conserve it for ecological security, for the attraction of tourists and sustaining lives and livelihood of people dependent on biodiversity resources and mountain tourism. But due to anthropogenic interventions a potential threat to biodiversity is rapidly increasing. Human activities are disturbing both the structure and functions of ecosystem by altering native biodiversity. Patterns of infectious diseases are sensitive to these disturbances (WHO). Such negligence of biodiversity has resulted in widespread loss of biodiversity and environmental resilience. It is widely believed that the recent outbreak of COVID-19 originating from Wuhan in China is a result of increasing human contact and interaction with wild animals and decimation of biodiversity. A global biodiversity conference was supposed to be held this year to develop a decade-long ‘Post-2020 Biodiversity Framework’. But the outbreak of COVID-19 pandemic has severely jolted the whole world by posing existential risk to human species. It should be realised that all species, countries, economic and geopolitical issues are ultimately interconnected. Like COVID-19, impact and implications of climate change and biodiversity loss are not confined to any one country or a region.

For instance, deforestation drives wild animals closer to human populations, increasing the likelihood of zoonotic viral diseases. Also, the Intergovernmental Panel on Climate Change has warned that global warming is likely to accelerate the emergence of new viruses. Earlier, it seemed impossible to limit the pace of economic narrowly focused growth activities but this pandemic has forced everyone to slow down rather completely halted destructive human aggression on the environment. Within few days of global lockdown, air quality improved vastly and birds started chirping even in urban areas. As everything has come to a pause, mother earth has apparently started to rejuvenate. It must be realised that the humankind is not the only species living in the world; humans are only a co-passenger with a myriad of other species whose survival is important for human welfare. It is crucial to live in harmony with nature and ecosystem.

## Types of Biodiversity

Biodiversity can be classified into the following three types:

- a) **Genetic diversity:** It refers to the variations among the genetic resources of the organisms. Every individual of a particular species differs from each other in their genetic constitution. That is why there are different varieties of the same species as observed in rice, wheat, maize, millet, barley and other species.
- b) **Species diversity:** Species diversity refers to the variety of different types of species found in a particular area. It is the biodiversity at the most basic level. It includes all the species ranging from plants, animals and microorganisms.
- c) **Ecosystem diversity:** An ecosystem is a collection of living and non-living organisms and their interaction with each other. Ecosystem diversity refers to occurrence of different types of ecosystems in an area. Higher the ecosystem diversity in an area higher the biodiversity.

### 2.1 Concept of Ecosystem

The term ecosystem was first used by A.G. Tansley in 1935. An ecosystem is a self-sustaining community of living organisms comprising of biotic component, plants, animals and microbes connected functionally among themselves and interacting with their surrounding abiotic components - soil, water, nutrients, sunlight, weather and climate in a particular area.

### Types of Ecosystem

Ecosystems are broadly divided into two categories viz., natural and human managed. Natural ecosystems are those that are found in nature are further classified into terrestrial and aquatic ecosystems. Terrestrial ecosystems include forests, grasslands, deserts, and aquatic ecosystems include streams, rivers, lakes, ponds, estuaries, oceans, mangroves and swamps etc. Human managed ecosystems are formed as a result of human intervention and manipulation such as agroecosystems (agricultural fields), fruit and oil crop plantations, fish culture ponds, as well as cities, urban industrial complexes and aquarium that owe their creation entirely to human beings.

### 2.2 Concept of Ecosystem Services

Ecosystems provide a wide range of services that are essential for human survival, and wellbeing. Eco system services are of enormous value providing human society with many important benefits and services: for instance, insects pollinate our crops, birds disperse seeds, and fungi, worms and micro-organisms produce nutrients and fertile soils. Interactions between organisms and the physical environment influence our climate, water supplies and air quality, and help protect from extreme weather, including mitigation of natural disasters. These benefits are collectively known as ecosystem services which are basically of five basic types described in Table 2.1 given below.

Table 2.1 Ecosystem services provided by biodiversity

<b>Provisioning Services</b>
<ul style="list-style-type: none"> <li>• Food (e.g. fish, game, fruit)</li> <li>• Water (e.g. for drinking, irrigation, cooling)</li> <li>• Raw materials (e.g. fiber, timber, fuel wood, fodder, fertilizer)</li> <li>• Genetic resources (e.g. for crop improvement and medicinal purposes)</li> <li>• Medicinal resources (e.g. biochemical products, models and test organisms)</li> <li>• Ornamental resources (e.g. artisan work, decorative plants, pet animals, fashion)</li> </ul>
<b>Regulating Services</b>
<ul style="list-style-type: none"> <li>• Air quality regulation (e.g. capturing (fine) dust, chemicals, etc.)</li> <li>• Climate regulation (including Carbon-sequestration, influence of vegetation on rainfall, etc.)</li> <li>• Moderation of extreme events (e.g. storm protection and flood prevention)</li> <li>• Regulation of water flows (e.g. natural drainage, irrigation and drought prevention)</li> <li>• Waste treatment (especially water purification)</li> <li>• Erosion prevention</li> <li>• Maintenance of soil fertility (including soil formation)</li> <li>• Pollination</li> <li>• Biological control (e.g. seed dispersal, pest and disease control)</li> </ul>
<b>Habitat Services</b>
<ul style="list-style-type: none"> <li>• Maintenance of life cycles of migratory species (including nursery service)</li> <li>• Maintenance of genetic diversity (especially gene pool protection)</li> </ul>
<b>Cultural Services</b>
<ul style="list-style-type: none"> <li>• Aesthetic information</li> <li>• Opportunities for recreation and tourism</li> <li>• Inspiration for culture, art and design</li> <li>• Spiritual experience</li> <li>• Information for cognitive development</li> </ul>
<b>Supporting Services</b>
<ul style="list-style-type: none"> <li>• Nutrient cycling (Role ecosystems play in the flow and recycling of nutrients (e.g., nitrogen, sulphur, phosphorus, carbon) through processes such as decomposition and/or absorption)</li> <li>• Primary production (Formation of biological material by plants through photosynthesis and nutrient assimilation)</li> <li>• Water cycling (Flow of water through ecosystems)</li> </ul>

(Source: The Economics of Ecosystems and Biodiversity: The Ecological and Economic Foundations (TEEB D0), Chapter 1 and Appendix 2 and Millennium Ecosystem Assessment, 2005)

All of these services are vital for human well-being, and it is just not possible to replace them with technology if they are damaged. The only option that will ensure these benefits for us

and for the future generations is to reduce adverse human impacts on the natural world. So, that biodiversity and natural resources are conserved and have a chance to recover.

### **2.3 Concept of Endemism and Biodiversity Hotspots**

Endemism is the condition of being endemic, or restricted in geographical distribution to an area or region and found nowhere else. The area or region can vary in size, and is defined or identified in different ways. Endemism is not to be confused with indigenous, a term which refers to the origins of a species. Indigenous refers to where a group originated. A species can be both endemic and indigenous to an area. However, some species thrive and exceed the bounds of their original indigenous location. This means that the species is no longer endemic, but is still indigenous to the original area.

The concept of Biodiversity Hotspots was introduced by Norman Myers in 1988. These are places on Mother Earth that are extremely rich in biodiversity but yet deeply threatened. In order to qualify as a biodiversity hotspot, the area/region must fulfil two essential criteria:

- a) The area/region must contain at least 1,500 species of vascular plants found nowhere else on Earth (known as "endemic" species)
- b) The area/region had lost at least 70 percent of its primary native vegetation

### **2.4 Wetland Biodiversity**

Wetlands are areas where water covers the area land remains submerged under water either permanently all-round the year or temporarily for varying periods of time during the year. Wetlands are among the world's most productive ecosystems. They are cradles of biological diversity as they support countless species of plants and animals. They support high concentrations of birds, mammals, reptiles, amphibians, fish and invertebrate species. They are also important storehouses of plant genetic material. Wetlands provide tremendous economic benefits, for e.g. fisheries, water supply, agriculture, maintenance of nutrient retention and water table in floodplains, timber production, energy resources such as peat and plant matter, recreation and tourism opportunities.

Sikkim has many high-altitude wetlands for example Gurudongmar lake situated at an altitude of 5343m and Chholhamu lake situated at an altitude of 5300m. High altitude lakes occupy 40.79 percent of the total wetland area of state. A total of 534 high altitude wetlands have been identified in Sikkim covering an area of 3334 hectare (Sikkim ENVIS Centre).

Hight altitude wetlands regulate the flow of streams and buffer the downstream areas from floods and droughts. They also help in micro-climate regulation. These ecosystems are extremely rich in biodiversity as they provide habitats to many species. They provide critical water bird habitat, have fish resources and contributes significantly to the local economy apart from being prized tourist destinations. At present there is no Ramsar site in Sikkim but the process of applying for Ramsar site status for three wetland complexes has been initiated. These three sites are Tsomgo-Kupup and Gnathang wetland complex in East Sikkim, Tso Lhamu- Guru Dongmar - Gyam Tso-na wetland Complex in North Sikkim and Khecheopari Lake in West Sikkim.

## 2.5 Concept of Carrying Capacity

Carrying capacity is the number of organisms that an ecosystem can sustainably support. An ecosystem's carrying capacity for a particular species may be influenced by many factors, such as the ability to regenerate the food, water, atmosphere, or other necessities that populations need to survive.

Ecosystems cannot exceed their carrying capacity for a long period of time. In situations where the population density of a given species exceeds the ecosystem's carrying capacity, the species will deplete its source of food, water, or other necessities. For e.g. Before the colonization of North America by European powers wolves were the natural predators of North American deer. The European settlers considered the wolves as a threat to their children and livestock. This led to killing of wolves in large numbers. After the widespread elimination of wolves, the deer population multiplied out of control. The population of deer expanded until their need for food exceeded the environment's ability to regenerate their food. In many areas, this resulted in large numbers of deer starving until the deer population was severely reduced.

## 2.6 Sikkim's state profile

There are thirty-six biodiversity hotspots in the world recognized by United Nations Educational, Scientific and Cultural Organization (UNESCO). Out of these thirty-six biodiversity hotspots India owns four, namely-

- **Himalaya:** Includes the entire Indian Himalayan region (and that falling in Pakistan, Tibet, Nepal, Bhutan, China and Myanmar)
- **Indo-Burma:** Includes entire North-eastern India, except Assam and Andaman group of Islands (and Myanmar, Thailand, Vietnam, Laos, Cambodia and southern China)
- **Sundalands:** Includes Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines)
- **Western Ghats** and Sri Lanka: Includes entire Western Ghats (and Sri Lanka) (ENVIS Centre on Floral Diversity, 2015).

Sikkim Himalaya is a part of Himalayan Hotspot. It is located in the Eastern Himalayas and encompasses Lesser Himalaya, Central Himalaya and the Tethys Himalaya. It is renowned globally for its rich biodiversity, traditional knowledge associated with biological diversity and picturesque landscapes. Within a small geographical area, the state houses elevations ranging between 300m to 8598m. The state is flanked by Tibetan plateau in north because of which the northern part of Sikkim has close affinities with cold desert. The southern part of state has close proximity to Bay of Bengal, thereby having close resemblance with tropical moist forests. The diverse forest types include wet hill forests, deciduous forests, dense oak forests, conifer forests and exquisite rhododendron thickets giving way to alpine meadows. The diverse ecosystems of the state are tropical valleys, temperate montane habitat, alpine habitat and cold desert.

Nearly 45% of birds, 31% of mammals and 50% of the butterflies of the country are endemic to Sikkim. Approximately, 165 plant species have been first collected from here hence they are named after the state. The state possesses nearly one third of the countries flowering

plants. The Tso Lhamu plateau region supports significant population of Tibetan argali and Tibetan gazelle. India's only population of Southern Kiang is also found in Tso Lhamu plateau region. (M.L Arawatia and Tambe,2011)

It is home to nearly half of the nation's biodiversity and is endowed with 26% of flowering plants found in the country. About 72% of the Indian species of Rhododendrons are found here and hence it is called the cradle of Indian Rhododendrons. The State is endowed with rich floral and faunal diversity. Table 2.2 depicts the floral and faunal biodiversity of Sikkim at glance. While these figures are still not absolute, it may be kept in mind that this is only a part of the mega-fauna and flora.



Figure 2.1 Plant of Rhododendron

**Table 2.2: Sikkim biodiversity at a glance**

Biodiversity at glance			
Fauna	Number of species	Floral	Number of species
Mammals	>144	Flowering plants	5500
Bees	30	Orchids	557
Beetles	994	Rhododendrons	38
Birds	568	Conifers	16
Butterflies	689	Bamboos	28
Fishes	48	Ferns and allies	362
Frogs	16	Tree ferns	9
Lizards and snakes	92	Primula	30
Reptiles	33	Oaks	11
Amphibians	50	Medicinal plants	1681
		Lichens	506
		Magnolias	12
		Trees and tall bamboos	717
		Small grasses	257
		Bushes	112

(Source: [http://sikenvis.nic.in/database/biodiversity\\_776.aspx](http://sikenvis.nic.in/database/biodiversity_776.aspx))



The state is gifted with enormous water resources. The two major rivers of Sikkim are Teesta and Rangit. There are around 84 glaciers in Teesta river basin. The important glaciers in Sikkim are Zemu, Rathong and the Lhonak. The state of Sikkim is reckoned for many exquisite natural lakes in the world. Some of the important lakes of Sikkim are Tsomgo lake, Memencho lake, Khecheopalri lake, Gurudongmar lake, Ram Laxman Lake, Panch pokhari etc. The major soil types found in Sikkim are mountain meadow, brown red and yellow and laterite soil. The soils range from acidic to very acidic. Sikkim has habitats ranging from sub-tropical to cold deserts and has India's smallest bio-geographic province - Tso Lhamu plateau. Elevation plays a pivotal role in fashioning the ecosystems of the state. This is evident from the presence of Sal forests in the Rangit valley in the south to the temperate forests in the north, beyond which lie the trans-Himalayas and the cold desert of Tibetan plateau. The forest types of Sikkim can be classified into five major types: tropical, sub-tropical, temperate, alpine and sub-alpine.

Forests are a major land use in the state, occupying 3392 sq.km of the total geographical area of Sikkim. Around 47% of the state's total geographic area is under forest cover. Approximately 30% of the state's total geographic area is under protected area network with one national park, seven wildlife sanctuaries and one conservation reserve. The percentage area of protected areas in Sikkim is highest among all states in the country. (Forest Environment & Wildlife Management Department, Government of Sikkim, 2016). Approximate forest density in Sikkim: Very Dense Forest (7%), Moderately Dense Forest (31%), Open Forest (10%), Scrubs (4%) and Non-Forest (48%) (Source: India State of Forest Report 2015, FSI).



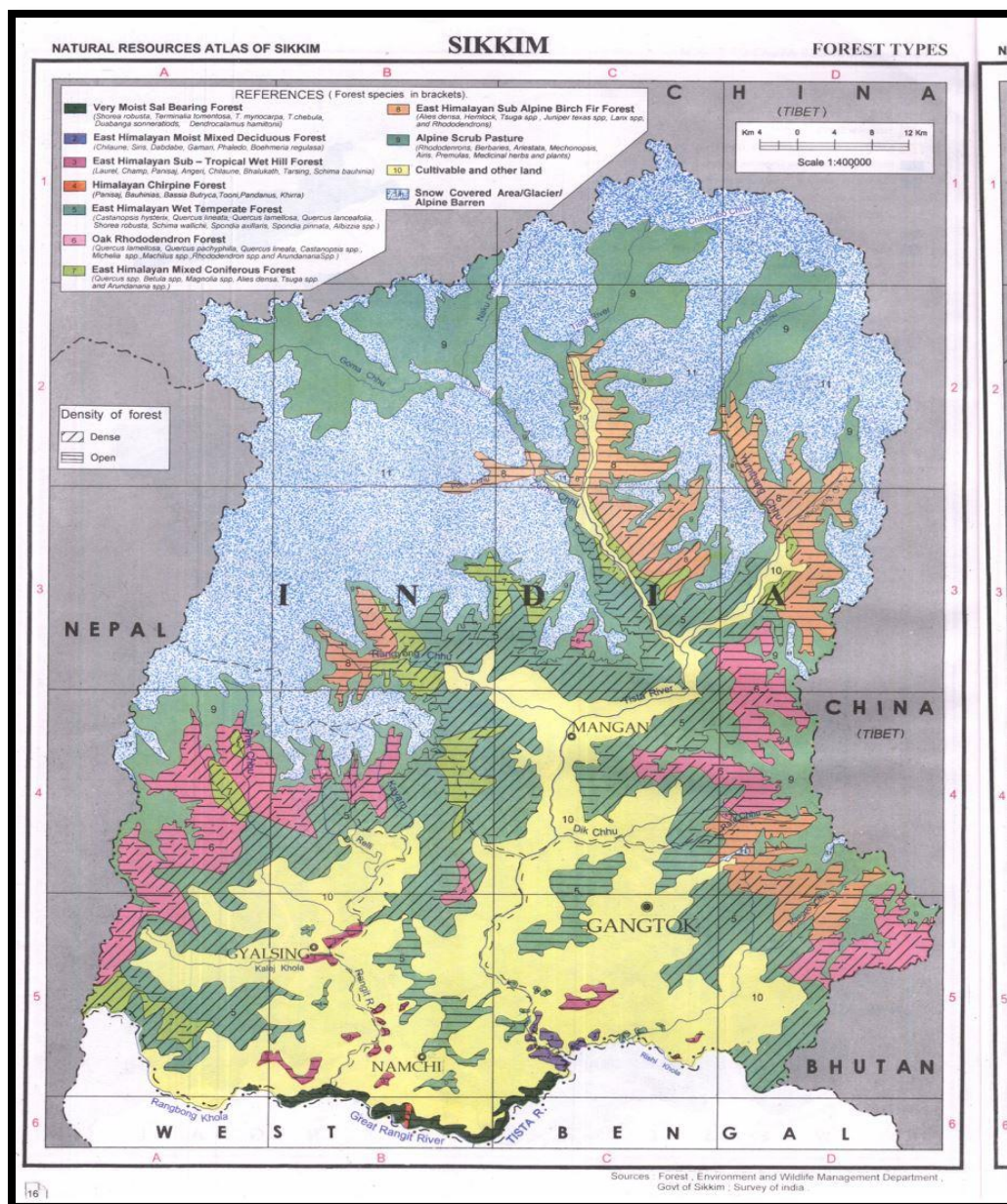


Figure 2.2: Forest types of Sikkim (Source: Forest, Environment and Wildlife Management Department, Govt. of Sikkim, Survey of India)

## 2.7 Threats to Sikkim's Biodiversity

The Biodiversity of Sikkim faces a number of threats due to a number of biotic and abiotic factors. Over the years Sikkim has seen an increase in the number of tourists along with speedy infrastructural development. Growing urban population combined with industrial development also pose a serious challenge to the environment. The impact of climate change has become a universal phenomenon and Sikkim is no exception. The climate change has led to melting up of glaciers, drying up of local springs, erratic rainfall patterns and migration of species to higher elevations. A change in climate can have far reaching consequences on diverse species, their distribution and ecology as a whole. In order to strengthen the biodiversity conservation initiative in the state it is extremely important to initiate remedial measures on the basis of threats. The threats to Sikkim's biodiversity are summarized below:

- i. **Deforestation:** There is excessive pressure on forest resources due to growing needs of urban and semi urban population. Approximately 47.80% of the state geographical area is under forest and tree cover but still deforestation and loss of habitats emerge as constant threats.
- ii. **Air pollution:** During the last decade the number of tourists coming to Sikkim have increased exponentially because of which a large number of vehicles move every day consuming tons and tons of fossil fuel and causing air pollution. These vehicles not only cause air pollution but they cause noise pollution as well. This will seriously affect flora and fauna in long run. especially along reserved forests and protected areas.
- iii. **Solid waste:** There is lack of safe and effective approaches and means for handling solid wastes in many parts of the state, including both residential areas and development areas. As a result, the solid waste is generally allowed to enter the natural streams thereby causing pollution and creating problem for the living organisms.
- iv. **Soil erosion:** Sikkim being a hill State with and unstable soil conditions often suffers from soil erosion due to biotic factors as well as natural factors. This is compounded by the very high rainfall, span over a large part of the year. The main causes of such erosion and landslides, which also destroy biodiversity of the area, are unplanned roads, hydro-electric projects and other development.
- v. **Poaching of animals and removal of plants and their parts:** Evidences suggest involvement of some local people as well as visitors from other parts of the country many a times engaged in poaching of animals and harvesting different types of wild plants such as of orchids and ferns, thus threatening many sensitive species. This is caused mostly due to lack of awareness and inadequate law enforcement. Tourism activities in protected areas can affect the wildlife in many ways for e.g. reducing the breeding chances, reducing the hunting chances etc.
- vi. **Medicinal plants:** Illegal collection of medicinal plants Majority of state host plants with great medicinal value. The conservation approaches, both in-situ and ex-situ mechanisms need further strengthening with strong scientific support and guidelines. It would be essential that the medicinal plant diversity is identified and documented and species tending to become endangered should be prioritized for immediate conservation.
- vii. **Inadequate law enforcement:** Enforcement agencies like Forest and Police etc do not have adequate manpower, training, mobility and requisite equipment to prevent or take cognizance of offences involving biodiversity. For e.g. the frontline staff of forest department is trained in Police Training Centre (PTC) and they lack understanding of biodiversity related issues.
- viii. **Climate change:** The impact of climate change has become a universal phenomenon and Sikkim is no exception. Climate change will lead to loss of a number of species. The increasing temperature will threaten the existence of Tibetan gazelle and southern kiang in North Sikkim. The change in the seasonal cycle due to climate change will affect the flowering thereby affecting the availability of food. With the shift of alpine vegetation northwards and land encroachment the man animal conflict will emerge



very strongly. In an ecosystem everything is intricately interrelated to each other the loss of even a single species can have far reaching consequences. Sikkim also has cultivated cash crops, such as the medicinal plants which are indigenous to this region, exotic orchids, big cardamom, Sikkim mandarin and livestock products. Changes in climate pose a threat to the production and productivity of these cash crops and livestock products, which are significant from the point of view of the livelihoods it provides to the people (Sikkim State Action Plan on Climate Change, 2011).

- ix. **Unplanned urbanization and tourism:** The state has emerged as a very popular tourist destination in recent years. This has been one of the most important drivers of urbanization. Inappropriate planning and limited implementations have led to deforestation, generation of garbage, construction on a large-scale, broadening of road development, construction and laying new roads which may prevent free movement of animals leading to fragmented populations of wildlife animals into smaller group. Every ecosystem has a carrying capacity. Carrying capacity is the largest population size that an ecosystem can sustainably support without degrading the ecosystem. Over the years rapid and unplanned development of urban centres has created excessive pressure on natural resources and affects the carrying capacity of the ecosystem in a negative way. If the carrying capacity of the ecosystem is surpassed this will have serious repercussions on the biodiversity.



Figure 2.3: Repercussions of Unplanned Tourism

- x. **Lack of awareness:** We cannot protect our biodiversity without awareness among the general public, students and teachers, and other stakeholders. Particularly the younger generation should have an understanding regarding the need for biodiversity

conservation. Knowledge and understanding of biological diversity and conservation is also necessary for schools and colleges and government departments and all sectors of society including politicians and policy makers.

- xi. Ignorance of traditional knowledge:** The local communities sustain a rich reservoir of traditional knowledge and indigenous practices. But they are gradually depleted as people have been adopting modern lifestyles and modern medicines. Documentation of traditional knowledge associated with biodiversity is by and large non-existent. For e.g. Most of the BMCs are not maintaining people's Biodiversity Registers (PBR).
- xii. Invasion of Alien species:** Accidental or otherwise introduction of invasive alien species affect the growth of native species because they hijack the resources of native species and grow exponentially. Therefore, this disrupts the functioning of entire ecosystem and affects the biodiversity severely. Many species like Ipomoea, Polygonum, Lantana and Eupatorium etc. have already spread over different parts of the state, as well as in sides of the protected areas. Others may make inroads if not checked.

### **3. Sub-Module 2: Methods of Conservation**

#### **3.1 Need for Biodiversity Conservation in Sikkim**

The biodiversity conservation efforts have intrinsic need under the multifarious threats associated with the climate change and the habitat destruction due to anthropogenic activities. Nonetheless, efforts targeted to biodiversity conservation also offer huge benefits for the wellbeing of the men and the society at large. No human activity is possible without the services provided by the biodiversity. The nature and biodiversity are but the irreplaceable cradle of the human civilisation. It is because of this aspect of the sustainability and development of both the men and nature that the biodiversity conservation becomes inseparable objective of the process of human development.

Biodiversity Conservation in the state of Sikkim further assumes special importance. Sikkim, the second smallest state in India situated in the Eastern Himalaya, is recognised as a biodiversity 'Hot Spot' of global significance. Rich but fragile biodiversity of Sikkim is under tremendous threat. Many natural and anthropogenic factor are responsible for the insurmountable and irreparable damage to this fragile Eastern Himalayan Ecosystem. Melting of glaciers due to global warming, floods, landslides, invasive hydrothermal projects, road construction, deforestation and the destruction of trees for fuel and domestic purposes, growth in tourism – these are only few of such factors adding tremendous pressure to the sustainability of this habitat. All these issues must be properly addressed in order to protect and conserve the unique biodiversity of the Sikkim Himalaya.

#### **3.2 Acts and Bylaws related to Biodiversity Conservation**

At the national level, various policy initiatives and various strategies have been formulated to integrate the socio-economic development with the biodiversity conservation. Indian Forest Act, 1927, Wildlife (Protection) Act, 1972, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1986 are some of the examples (Details are provided in the table 2).

The Environment (Protection) Act, 1986 prohibits all activity which adversely affects the biodiversity. India has provided legal sanctity to the biodiversity preservation efforts through the Wildlife (Protection) Act of 1972. The Act provides for four types of Protected Areas in India including Community Reserves. Research on equity studies in the Community Forest show that they help in combating adverse practices having negative impact on the existing forest resources. Besides, they strengthen the socio-economic fabric.

A milestone was achieved at a global level at the Earth Summit in 1992 when the multilateral CBD was adopted with three main goals of conservation of biodiversity, sustainable use of the natural resources and equitable sharing of benefits arising from use of the natural resources. The CBD is seen as an important convention for biodiversity along with its two supplementary agreements – the Cartagena Protocol and the Nagoya Protocol.

The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international treaty adopted on 29<sup>th</sup> January, 2000 and entered in force on 11<sup>th</sup> September, 2003. It concerns with the international movements of Living Modified Organisms (LMOs) resulting from modern biotechnology.

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity is a supplementary agreement to the Convention on Biological Diversity. It provides a transparent legal framework for the effective implementation of one of the three objectives of the CBD: the fair and equitable sharing of benefits arising out of the utilization of genetic resources. It was adopted on 29 October 2010 and entered into force on 12 October 2014.

In India, the Biological Diversity Act, 2002 is a comprehensive legislation enacted in pursuance of the CBD signed at Rio de Janeiro on June, 1992. The rules have been framed under the said act in 2004 and National Biodiversity Authority (NBA) has been formed. This act has been enacted for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters, connected therewith or incidental thereto.

**Table 3.1: Policy, Acts and Laws Pertaining to Biodiversity Conservation**

<b>Important Laws and Policy Pertaining to Biodiversity in India</b>	
<b>Policy/Law</b>	<b>Objectives/Major Provisions/ Salient Features</b>
Indian Forest Act, 1927	<ul style="list-style-type: none"> <li>Deals with four categories of forests namely (i) Reserve Forests (ii) Village Forests (iii) Protected Forests and (iv) Non-Government Forests</li> <li>Empowers the State Government to constitute any forest-land or waste-land as reserved forest and to issue notification in the official gazette</li> </ul>
Wild Life (Protection) Act, 1972	<ul style="list-style-type: none"> <li>The Wild Life (Protection) Act 1972 passed by the Parliament under article 252 of the Constitution at the request of eleven States</li> <li>provide a comprehensive national legal framework for</li> </ul>

Important Laws and Policy Pertaining to Biodiversity in India	
	<p>Wild Life protection</p> <ul style="list-style-type: none"> <li>• The Act adopts a two-pronged conservation strategy; Specified endangered species are protected regardless of location, and all species are protected in specified areas</li> </ul>
The Water (Prevention and Control of Pollution) Act, 1974	<ul style="list-style-type: none"> <li>• The main objectives of the Water Act are to provide for prevention, control and abatement of water pollution and the maintenance or restoration of the wholesomeness of water.</li> <li>• It is designed to assess pollution levels and punish polluters.</li> <li>• The Central Government and State Government have set up Pollution Control Boards to monitor water pollution.</li> </ul>
Forest (Conservation) Act, 1980	<ul style="list-style-type: none"> <li>• The Act deals with restriction on the de-reservation of forests or use of forestland for non-forest purposes</li> <li>• The main Objective of the Act is to provide for the conservation of forests and for matters connected thereto</li> <li>• The act provides stringent punishment for activities leading to deforestation</li> </ul>
Air (Prevention and Control of Pollution) Act (1981)	<ul style="list-style-type: none"> <li>• To provide for the prevention, control and abatement of air pollution.</li> <li>• The Central Board for the prevention and control of water pollution constituted under the water Act 1974 will also perform the functions of Central Board for the prevention and control of Air Pollution and similar State Board for the prevention and control of Air pollution in states and union territories.</li> <li>• It empowers the Central and State Boards to declare pollution control areas, restrictions on certain industrial units, limiting the emission of air pollutants, inspection, taking samples and analysis, penalties etc.</li> </ul>
Environment (Protection) Act, 1986	<ul style="list-style-type: none"> <li>• enacted under Article 253 of the Constitution which empowers the Parliament to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention or any decision made at any international conference, association or other body</li> </ul>
National Forest Policy, 1988	<ul style="list-style-type: none"> <li>• Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance</li> <li>• Checking soil erosion and denudation in the catchment areas of rivers, lakes, reservoirs</li> <li>• Increasing substantially the forest/tree cover in the country through massive afforestation and social forestry programmes,</li> <li>• Encouraging efficient utilisation of forest produce and maximising substitution of wood.</li> </ul>
The Noise Pollution (Regulation and Control) Rules, 2000	<ul style="list-style-type: none"> <li>• Under this Act, the legislation has divided all areas into 4 categories viz. Industrial Areas (A), Commercial Areas (B), Residential Areas (C) and Silence Zones (D).</li> </ul>



Important Laws and Policy Pertaining to Biodiversity in India	
	<ul style="list-style-type: none"> <li>The State Government shall take measures for abatement of noise including noise emanating from vehicular movements and ensure that the existing noise levels do not exceed the ambient air quality standards specified under these rules.</li> </ul>
The Biological Diversity Act, 2002	<ul style="list-style-type: none"> <li>For conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters, connected therewith or incidental thereto</li> <li>Enacted in pursuance of the CBD signed at Rio de Janeiro on June, 1992</li> <li>The Act has constituted a National Biodiversity Authority at the Centre with its head office at Chennai,</li> </ul>
The Scheduled Tribes and Other Forest Dwellers (Recognition of Forest Rights) Act, 2006	<ul style="list-style-type: none"> <li>The act is a comprehensive legislation which acknowledges rights of tribal communities over the forest of which they have been the inhabitants as inseparable element of overall biodiversity conservation.</li> </ul>
National Environment Policy, 2006	<ul style="list-style-type: none"> <li>To protect and conserve critical ecological systems and resources, and invaluable natural and man-made heritage</li> <li>To ensure equitable access to environmental resources and quality for all sections of society, and in particular, to ensure that poor communities, which are most dependent on environmental resources for their livelihoods</li> <li>To ensure judicious use of environmental resources to meet the needs and aspirations of the present and future generations.</li> <li>To integrate environmental concerns into policies, plans, programmes, and projects for economic and social development.</li> <li>To ensure efficient use of environmental resources in the sense of reduction in their use per unit of economic output, to minimize adverse environmental impacts.</li> <li>To apply the principles of good governance (transparency, rationality, accountability, reduction in time and costs, participation, and regulatory independence) to the management and regulation of use of environmental resources</li> </ul>

Sources: <https://indiacode.nic.in/bitstream/123456789/6705/1/india-forest-act.pdf>,  
[http://legislative.gov.in/sites/default/files/A1972-53\\_0.pdf](http://legislative.gov.in/sites/default/files/A1972-53_0.pdf),  
<https://indiacode.nic.in/bitstream/123456789/1760/1/198069.pdf>,  
[https://indiacode.nic.in/bitstream/123456789/4316/1/ep\\_act\\_1986.pdf](https://indiacode.nic.in/bitstream/123456789/4316/1/ep_act_1986.pdf),  
<http://asbb.gov.in/Downloads/National%20Forest%20Policy.pdf>,  
<https://indiacode.nic.in/bitstream/123456789/2046/1/200318.pdf>,  
<http://www.lawsindia.com/Industrial%20Law/K092.htm>,  
<https://indiacode.nic.in/bitstream/123456789/1760/1/198069.pdf>,  
[https://ibkp.dbtindia.gov.in/DBT\\_Content\\_Test/CMS/Guidelines/20190411103521431\\_National%20Environment%20Policy,%202006.pdf](https://ibkp.dbtindia.gov.in/DBT_Content_Test/CMS/Guidelines/20190411103521431_National%20Environment%20Policy,%202006.pdf) (accessed on 30<sup>th</sup> December, 2019).

Our Constitution as well as other legal documents like Indian Penal Code (IPC) also provide for the protection of the Environment. National Forest Policy 1988 and National Environment Policy also provides some policy framework for conserving our biodiversity.

A frame work of administrative arrangement exists in Sikkim to implement relevant provisions of these acts relating to biodiversity conservation. Besides, in 2001, Sikkim was included in a nationwide initiative launched by the Government of India and the NGO Kalpavriksha to formulate strategies and develop action plans for conserving biological diversity. This resulted into 2003 Sikkim Biodiversity Strategy and Action Plan. This is very comprehensive plan which covers various facets related to the biodiversity conservation in the state. Another ambitious initiative, the Sikkim Biodiversity Conservation and Forest Management Project (SBFP), assisted by the Japan International Cooperation Agency was launched in 2010. The project aims to strengthen biodiversity conservation activities and forest management capacity and simultaneously improve livelihood of the local people who are dependent on forests and are living in forest fringe areas. Project objectives are to be achieved by promoting sustainable biodiversity conservation, afforestation and income generation activities including eco-tourism for the community development. The project activities will be contributing to environment conservation and harmonized socio-economic development of the state.

Further, in 2017, the Government of Sikkim has notified the Sikkim Forest Trees (Amity and Reverence) Rules with the objective of promoting and reviving the age-old tradition of forging brotherhood relationship with trees. The rules that allows any person to associate with trees standing on his or her private land or on any public land by entering into a Mith/Mit or Mitini relationship with a tree or trees, in which case, the tree shall be called a ‘Mith/ Mit tree’. Biodiversity conservation efforts include protection, preservation and management of existing biodiversity as well as restoration of wildlife and natural resources like forests, high altitude grasslands and wetlands. The biodiversity across the globe is under tremendous pressure from human activities. Through the conservation efforts, not only the existing biodiversity is preserved, but there is chance of restoring the degraded ecosystems as well. The Biodiversity Conservation Efforts can be broadly categories into *In Situ* Conservation and *Ex Situ* Conservation.

**Table 3.2: In Situ and Ex Situ Biodiversitv Conservation**

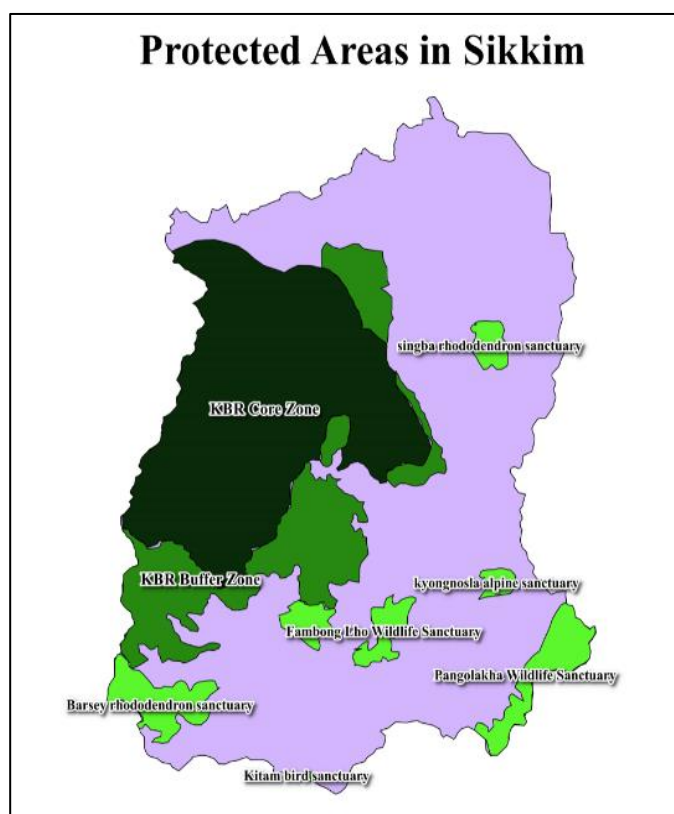
<b>Types of Biodiversity Conservation</b>	
<b><i>In Situ</i> Conservation</b>	<b><i>Ex Situ</i> Conservation</b>
<ul style="list-style-type: none"> <li>Protected Areas (Protected areas): National Parks, Sanctuaries, Biosphere Reserves</li> <li>Sacred Forests and Lakes</li> </ul>	<ul style="list-style-type: none"> <li>Seed Banks, Gene Banks</li> <li>Long-time Captive Breeding</li> <li>Animal Translocation</li> <li>Tissue Culture Banking</li> <li>Cryopreservation of Gametes and Embryos</li> <li>Botanical Gardens</li> <li>Zoological Gardens and Zoos</li> </ul>



### ***In Situ Conservation in Sikkim:***

The state has one National Park (Kanchendzonga), which is also a Biosphere Reserve, and seven wildlife sanctuaries (As shown in map and table 2.2). Khangchendzonga Biosphere Reserve (KBR) has also been listed under the list of UNESCO World Heritage Sites. These Protected Areas, combined, constitute roughly about 31 per cent of the total geographic areas of the state of 7096 sq. km. This makes Sikkim the state with highest percentage of Protected areas to its total geographical area in India. Beside these, the state has Areylungchok Musk Deer Conservation Zone, Blue Sheep Conservation Zone, Yongzokdrak Blue Sheep Conservation Zone, Tholung-Kishong Conservation Zone and Narsing Conservation Zone.

Though there are 227 lakes in the state, many of which are important for migratory birds, but none of them has been notified as a Ramsar Site so far.



**Figure 3.1: Protected Areas in Sikkim**

**Table 3.3: Protected areas in Sikkim**

Protected Areas in Sikkim				
Sr. No.	National Park/ Sanctuary	Year of Establishment	District	Area (km <sup>2</sup> )
1	Khangchendzonga National Park	1977	North and West	1784
2	Barsey Rhododendron Sanctuary	1998	West	104
3	Fambong Lho Wildlife Sanctuary	1984	East	51
4	Kitam Bird Sanctuary	2005	South	6
5	Kyongnosla Alpine Sanctuary	1977	East	31
6	Maenam Wildlife Sanctuary	1987	South	35
7	Pangolakha Wildlife Sanctuary	2002	East	124
8	Shingba (Rhododendron) Sanctuary	1984	North	43

Source: Website of Sikkim Forest Department: <http://www.sikkimforest.gov.in/> as accessed on 30th December, 2019.

### **Khangchendzonga National Park at Glance:**

The Khangchendzonga National Park (KNP) represents the third highest point of the Earth's surface. The national park has 18 major glaciers and over 17 high altitude lakes. The KNP contains floral and faunal elements akin to Palearctic and Oriental regions and in addition, it has a good representation of species endemic to Himalaya (Arrawatia & Tambe, 2011).

The Biosphere Reserve is situated in the Chungthang, Dzongu and Yaksam Ranges of North, West and South Districts of Sikkim covering roughly 1784 sq. km. Key Flora and Fauna: *Macaranga denticulate*, *Alnus nepalensis*, *Castanopsis tribuloides*, etc. are the plant species and Leopard, Himalayan Yellow Throated Marten, Red Panda, Musk Deer, Barking Deer, Himalayan Black Bear, etc. are the animal species inhabiting the National Park.

The park is faced with major challenges emanating from various anthropogenic activities (viz. grazing, poaching, habitat destruction etc.) and natural hazards (fire, erosion, floods, snow, weeds, wind, etc.). Nonetheless, various studies have pointed that population of some of the threatened species in the national park is increasing while population of others is stable. This reflect upon the success of the biodiversity conservation efforts in the National Park.



**Figure 3.2: Endangered, Vulnerable and Threatened Species of Sikkim**

From top, clockwise: Himalayan Black Bear (Vulnerable), Snow Leopard (Endangered), Himalayan Blue Sheep (Threatened), Dhole (Endangered), Red Panda (Endangered), Musk Deer (Endangered).

*Source of Images:* Website of Sikkim Forest Department: <http://www.sikkimforest.gov.in/> as

### ***Ex Situ* Conservation in Sikkim:**

The state has only one zoo, the Himalayan Zoological Park near Gangtok. The Zoo is inhabited by many endangered species of the region listed under Schedule 1 of the Wildlife (Protection) Act, 1972. The zoo is also engaged in taking up the conservation breeding of these endangered species with the ultimate objective of augmenting their population in the wild. The state does not have any formal botanical garden, but many pockets, like the 'State Biodiversity Park', Raj Bhavan Campus and Arboretum of G. B. Pant Institute of Himalayan Environment and Sustainable Development (GBPIHeD) at Pangthang, are habitat of good number of rare and endangered plant species.

There are proposals of establishing new protected areas as sites of *Ex Situ* Conservation in the State. Proposed Protected areas include Nimphu Wildlife Sanctuary (approximately 200 km<sup>2</sup>) and Fairrieatum Conservation Reserve (orchid reserve, and approximately 0.6 km). For the *Ex Situ* conservation efforts, Butterfly Park in North Sikkim as well as the conservation of flagship species of the state like Snow Leopard, Red Panda, and Musk Deer have been proposed. Conservation efforts are also extended.

The Biodiversity Conservation Efforts in the state can be further strengthened by:

- Bringing more areas under the legal sanctity by making them Protected Areas under the Wildlife Protection Act, 1972. For example, Dombang Gymnosperm Reserve, Nimphu Wildlife Sanctuary.
- Sikkim has 11 Important Bird Areas (IBA) as declared by Birdlife International. These areas should be brought under the ongoing *in situ* and *ex situ* conservation efforts.
- Strengthening biodiversity monitoring systems in the protected area network and reserve forests
- Strengthening the ongoing efforts to understand and avert the Man-Animal conflicts in biodiversity fragile zones.
- Developing a mechanism to identify and conserve sacred groves and other religious landscapes. For example, Devathan around springs
- Envisaging plans for sustainable development of the communities living in the fringe areas of the Protected areas
- Re-introducing the threatened plant and animal species in their ecological niches and habitats in targeted protected areas
- By promoting governmental and private conservation efforts for the habitat wildlife species outside the Protected areas
- Developing new *Ex Situ* Conservation Site. For example, Butterfly Park in the North Sikkim.

## **4. Sub-Module 3: Community and Governance**

### **4.1 Community Participation and Biodiversity Governance Models in India**

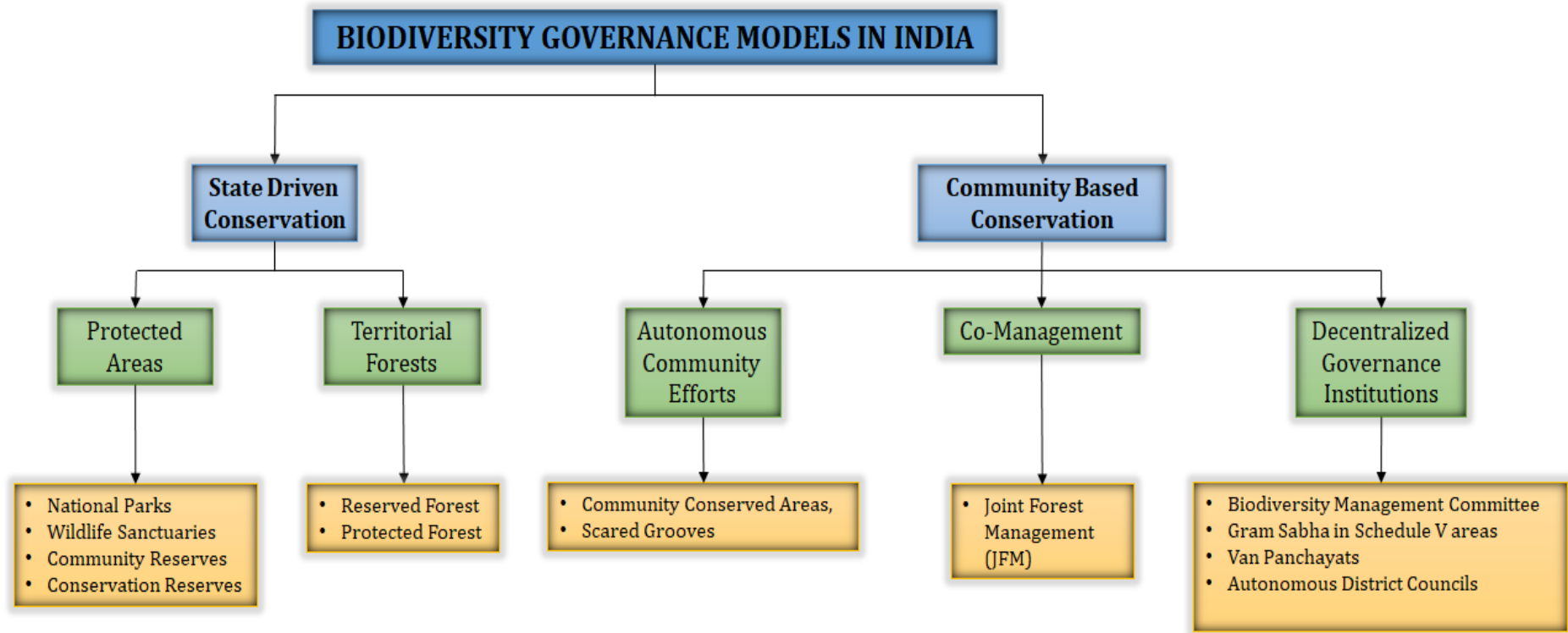
Policy makers and implementers sought an active involvement of members of the local communities in environmental conservation. The state driven conservation efforts can at best preserve representative sample of vast biodiversity confined in the Protected Areas. But it has limited scope owing to the prohibitive costs of preserving the biodiversity beyond the boundaries of the protected areas. Participatory approaches aim to fulfil a wide range of objectives in different contexts. Therefore, involving the communities in environmental conservation efforts culminate from the limitation of the state machinery to undertake gigantic task of holistic biodiversity conservation at grass-root level.

A symbiotic approach for the holistic biodiversity conservation is that of a Community-based conservation. It places greater emphasis on the mobilisation of the local communities living in harmony with their natural surroundings for the effective management and sustainable utilisation of the natural resources. Such integration of state driven and community-based biodiversity conservation strategy ensures preservation of the vast tract of biodiversity extending beyond the boundaries of formal protected areas into wider landscapes. Further, such initiatives put greater decision-making power in the hands of local communities – especially indigenous communities – about the judicious utilisation of natural resources.

In India, broadly, there are five models followed for biodiversity governance (figure 4.1). The two models – territorial forests and protected areas – fall within the protected area stream of biodiversity governance models. The other three models – autonomous community efforts, co-management of forests and decentralized governance of biodiversity – are more closely aligned with community-based conservation.

#### **4.1.1 Autonomous Community Efforts (ACE):**

These are initiated by communities for conservation and management of biological resources. They vary considerably in their models of governance, institutions and management objectives as well as their impact on biodiversity conservation. They broadly classified into two categories: 1) community conserved areas (CCAs) and 2) Sacred Groves (SGs). While the resources of SGs are extracted purely for religious purposes, resources of CCAs are generally appropriated for common use.



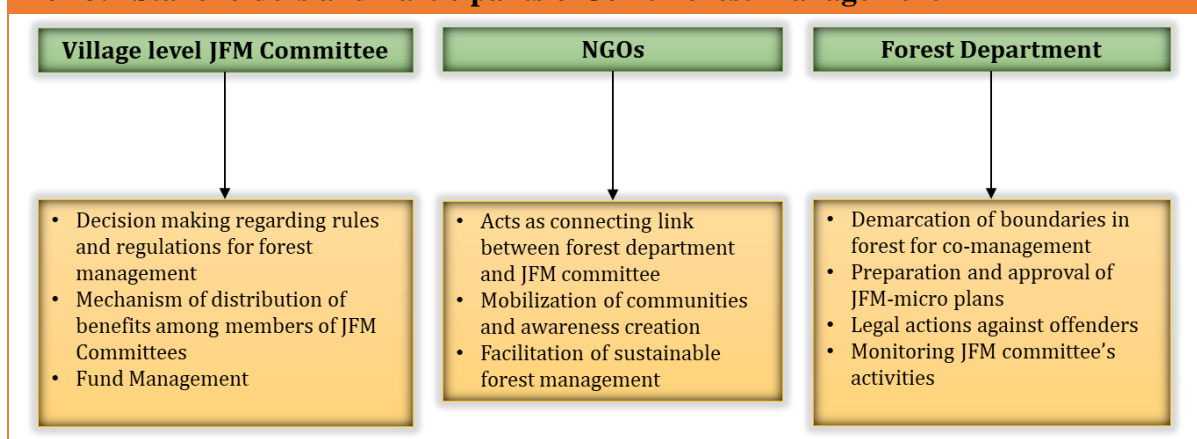
**Figure 4.1: Biodiversity Governance Models in India**



### 4.1.2 Co-Management of Natural Resources with States and Communities:

Forest dependent communities have always remained integral part of the conservation efforts in India. Nonetheless, the country has intensified the efforts of co-management of State-owned natural resources such as forests with community participation approach since 1980s. This idea received a major support in 1988 through formulation of the National Forest Policy which emphasised on the creation of a ‘massive people’s movement’ for conservation as well as equitable use of the natural resources. This had sowed the seeds of the Joint Forest Management (JFM). JFM is a co-management model involving both a State agency (Forest Department) and the community. It also has scope of engaging NGOs in state driven and community centric conservation initiatives. Under JFM, the state Forest Department enters into an agreement with the local community, which is allowed greater access to the forest resources as well as a share in revenue, in return for protection of the forests against unauthorized extraction, encroachment and damage. The programme was formally launched in 1990 and has grown to become one of the largest community forestry programmes in the world.

#### Box 3.1 Stakeholders and Participants of Joint Forest Management



Joint Forest Management Committees are operational in degraded forests/deforested areas which lay outside the protected areas. The communities have restricted access to the resources in the protected areas. The counterpart of JFMC, Eco Development Committees (ECDs) are the model of community driven conservation within the protected areas. They are village institutions that partner with protected area managers for the protection, preservation and propagation of wildlife in protected areas. They benefit from sustainable, non-consumptive resource use opportunities (e.g. ecotourism) that compensate for the loss of access to resources inside protected areas.

### 4.1.3 Decentralised Biodiversity Governance:

The 73rd Constitutional Amendment, along with the political decentralisation, gave the Panchayati Raj Institutions (PRIs) jurisdiction over social and farm forestry and Minor Forest Products (MFPs). Boost towards engagement of third tier governance institution in overall conservation efforts came from enactment of the Biological Diversity Act, 2002 (BD Act) which provides for the conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and related matters. The Act is implemented at national, state and local levels, through a decentralised three-tier system. The NBA is the nodal agency at the national level, the State Biodiversity Boards (SBBs) function at the state level and the at local level, Biodiversity Management Committees (BMCs) are constituted by local bodies – PRIs and urban local bodies – with the objectives of promoting conservation, sustainable use and documentation of biological diversity. One of the main functions of the BMC is the preparation of a People's Biodiversity Register (PBR) that contains comprehensive information on the availability and knowledge of local biological resources, their medicinal utility or any other traditional knowledge associated with them. PBR is a comprehensive document which contains information about availability and knowledge of local biological resources and their medical or any other uses. The method for preparation of PBR is developed by the NBR and is illustrated in figure 4.2.

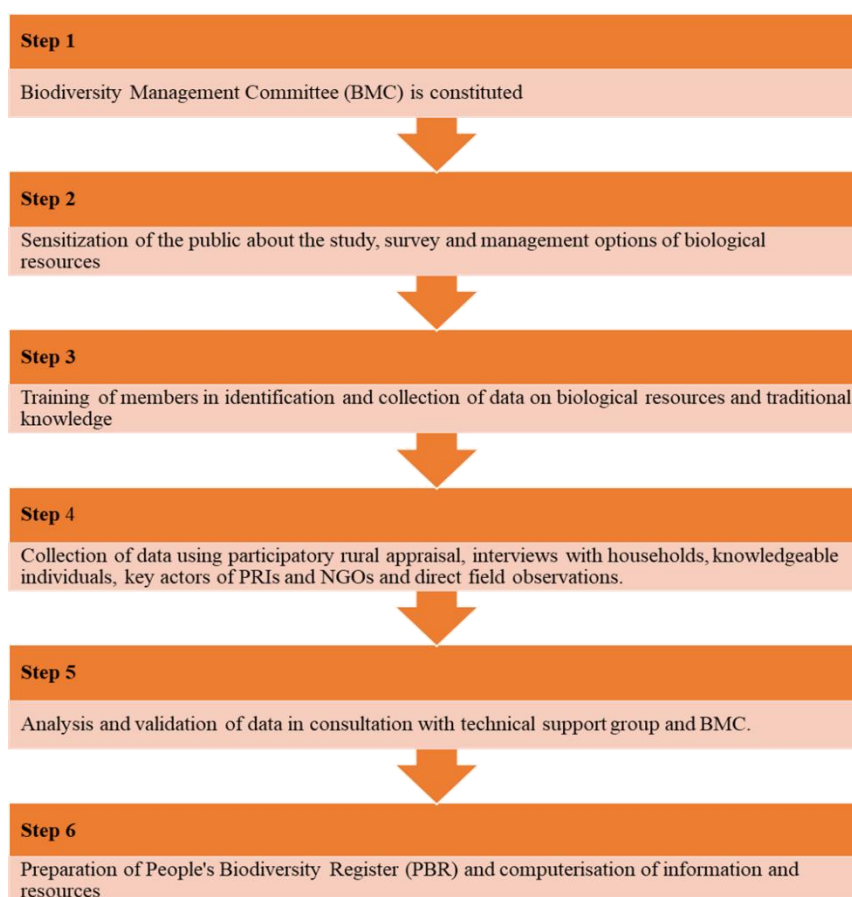


Figure 4.2: Method for preparation of PBR

The most important contribution of PBR is that of providing support to the claims of the local ownership of biodiversity and traditional knowledge. It is also an indispensable document for considering benefit sharing among the various stakeholders.

#### 4.2 Knowledge about IPR and GIs

The indigenous people live in harmony with their natural surroundings and away from the mainstream societies. They possess rich inheritance of traditional knowledge (TK) and biodiversity conservation methods, but they generally lack awareness about legal provisions which are formulated to protect their traditional knowledge. It is important that the right of the indigenous people and their traditional knowledge are legally protected through patents, copyrights, trademarks, plant variety protection and Geographical Indications<sup>1</sup> (GIs). Preparation of PBR is the first step towards protecting these rights.

There are various Legal Provisions in India to protect the traditional knowledge and related IPRs. These are: The Patents Act, 1970, the Designs Act, 2000, the Trade Marks Act, 1999, the Geographical Indications of Goods (Registration and Protection) Act, 1999 and Biodiversity act ion 2002

**Table 4.1: Legal Provisions for Protection of Traditional Knowledge and IPR in India**

Provisions for Legal Protection of Traditional Knowledge	
Act	Provision
The Patents Act, 1970	<ul style="list-style-type: none"> <li>An invention which, in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components”<sup>34</sup> is not an invention and, hence, not patentable.</li> </ul>
Biodiversity Act, 2002	<ul style="list-style-type: none"> <li>If a person applies for a patent for an invention based on biological resources and/or associated TK, permission of the NBA is required to be furnished, though this can be done even after the acceptance of the patent but before the sealing of the patent by the patent authority concerned.<sup>43</sup> This implies that the NBA has a decisive role on matters related to IPRs over TK associated with biological resources.</li> </ul>
The Geographical Indications of Goods (Registration and Protection) Act 1999	<ul style="list-style-type: none"> <li>The Act facilitates protection of collective rights of the rural and indigenous communities and their TK. By registering an item which is the product of TK as GI, it can be continued to be protected indefinitely by renewing the registration when it expires after a period of ten years.</li> <li>Under the Act, a GI cannot be assigned or transmitted thus</li> </ul>

<sup>1</sup> A patent is a form of intellectual property that gives its owner the legal right to exclude others from making, using, selling and importing an invention for a limited period of years, in exchange for publishing an enabling public disclosure of the invention. Copyright is the exclusive right given to the creator of a creative work to reproduce the work, usually for a limited time. A trademark (also written trade mark or trade-mark) is a type of intellectual property consisting of a recognizable sign, design, or expression which identifies products or services of a particular source from those of others. The creative work may be in a literary, artistic, educational, or musical form. Geographical Indications (GIs) are signs that identify goods originating in a specific locality, region or territory, and enjoy certain quality, reputation or characteristic adducible to the geographical origin



	<p>ensuring that it does not pass on to the hands of those who are not holders of the knowledge.</p> <ul style="list-style-type: none"> <li>• The Act also prohibits registration of a GI as a trade mark, thereby preventing appropriation of TK in public domain by an individual as a trade mark</li> </ul>
The Trade Marks Act, 1999	<ul style="list-style-type: none"> <li>• Two particular categories of trademarks are to identify the goods' geographic origin and assist in the protection of TK associated. This includes Certification and Collective marks.</li> <li>• Certification marks indicate that the product meets pre-established standards, which can be linked to its place of origin.</li> <li>• Collective marks distinguish the goods or services as having a connection with a specific group and can also imply a geographic origin.</li> </ul>

Source: [http://www.ipindia.nic.in/writereaddata/Portal/IPOAct/1\\_31\\_1\\_patent-act-1970-11march2015.pdf](http://www.ipindia.nic.in/writereaddata/Portal/IPOAct/1_31_1_patent-act-1970-11march2015.pdf),  
[http://www.ipindia.nic.in/writereaddata/Portal/IPOAct/1\\_43\\_1\\_trade-marks-act.pdf](http://www.ipindia.nic.in/writereaddata/Portal/IPOAct/1_43_1_trade-marks-act.pdf),  
<http://www.ipindia.nic.in/act-1999.htm> as accessed on 30<sup>th</sup> December, 2019.

## 5. Sub-Module 4: Mainstreaming Biodiversity

### 5.1 Importance of mainstreaming

The word mainstreaming means “inclusion or integration” of biodiversity conservation into development plans and strategy pertaining to agriculture, forestry mining, fisheries, infrastructure etc. Sustainable economic development and societal welfare cannot be ensured without conservation and sustainable use of biodiversity and efficient use of resources. The Convention on Biological Diversity (CBD) agreed at UN Earth Summit Conference at Rio De Jenerio 1992 has the following three objectives:

- i. Conservation of biological diversity,
- ii. Sustainable use of its components, and
- iii. Fair and equitable sharing of the benefits arising from commercial and other utilization of genetic resources.

The agreement covers all ecosystems, species, and genetic resources and India is a signatory to this convention.

#### BOX 1.

**Article 6 of the CBD states that each contracting party in accordance with its particular conditions and capabilities shall be liable to:**

- a) Developing national strategies, plans or programmes for the conservation and sustainable use of biological diversity; and
- b) Integrating the conservation and sustainable use of biodiversity into relevant sectoral or Cross-sectorial plans, programmes and policies.

Mainstreaming the biodiversity concerns into development plans is a challenging process. Earlier biodiversity issues and considerations were seldom appreciated and incorporated in development plans and proposals. Today there is an increasing realisation of the importance of biodiversity issues and their interlinkages with development activities (e.g. agriculture, mining, damming of rivers, road construction, tourism etc.) and land use practices that undermine biodiversity. The various economic activities being carried out these days have prominent impact on biodiversity across different levels. However, traditionally biodiversity conservation has been the business of nature enthusiasts and environmentalists only but now it is imperative to incorporate measures to safeguard biodiversity across all sectors and activities. Different sectors are interlinked. For example, prolonged use or overuse of chemical fertilizers leads to the degradation of soil fertility, crop quality, eutrophication of lakes and pollution of groundwater resources apart from adversely affecting habitats of wildlife species. Without mainstreaming biodiversity concerns into agriculture sector, it is impossible to protect soil fertility, and nutritional quality of crops. Mainstreaming biodiversity into planning and strategies would help in reducing the negative impacts of different economic and development activities on biodiversity. This will help in ameliorating the environmental quality and increasing the productivity.



Figure 5.1 Engagement with Local Stakeholders

## 5.2 Engagement trajectories

The focus of this module is to entail assistance in the implementation of biodiversity conservation goals in different planning, policies and programmes of Sikkim's development sectors along with the other interrelated objectives at different levels such as policy, practice and investment.

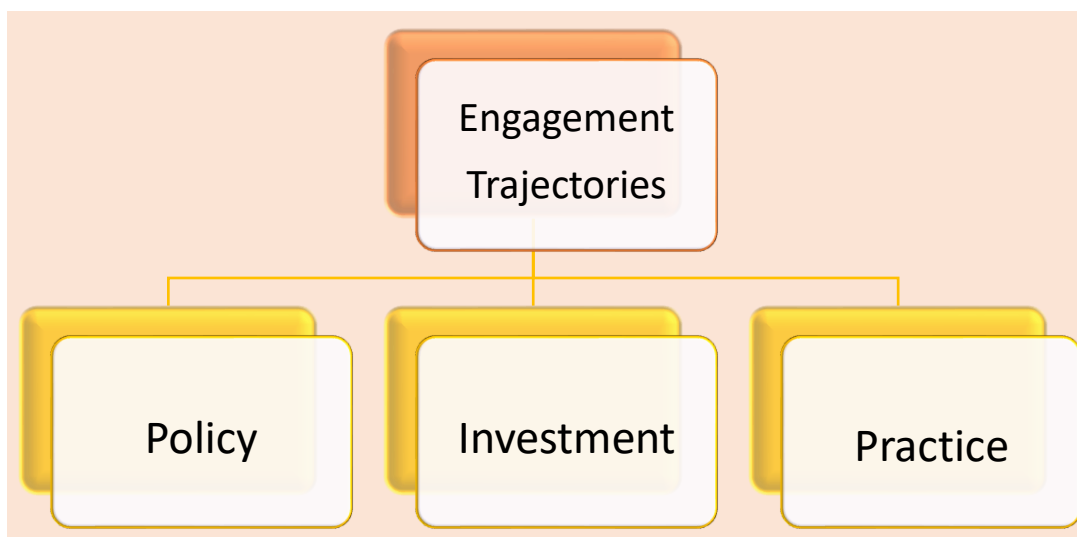


Figure 5.2: Engagement Trajectories

- I. **Policy:** The objective of policy engagement would ensure that policy makers at various governance levels take into account biodiversity conservation principles and approaches. Within the target state i.e. Sikkim, this module will help to engage with the development plans of different sectors to ensure that intervention opportunities based on biodiversity conservation principles and approaches are identified and prioritized for implementation.
- II. **Investment:** Engagement in investment domain would seek increased public and private sector investment in biodiversity conservation by work with corporate sector entities and leveraging funds from them. For example, Corporate Social Responsibility (CSR) funds can be used biodiversity conservation efforts.
- III. **Practice:** The objective of this module in practice domain would be to ensure that implementation of developmental programmes at various levels address underlying causes of biodiversity depletion and prevent those risk or causes. Work within the practice domain will focus on bringing improvements in the ways in which biodiversity planning and implementation is done.

### 5.3 Strategies to Mainstream Biodiversity into Different Sectors

Basic level mainstreaming entails a coherent **understanding of the relationship of a specific sector to the conservation and sustainable use of biodiversity** as well as its mechanisms, the will and ability to identify a win-win situation that can be beneficial to biodiversity and the sustainability of the specific sector thus catering to both the pertinent sectors. It also needs an elucidative clear understanding of how that sector is impacting biodiversity, providing ecosystem services and can be helpful in implementation of biodiversity conservation goals. To mainstream, there is a need to communicate with all the stakeholders, a strong and clear message should be sent to them which addresses the questions about “why people should care about biodiversity” and “how its sustainable use will help to improve the sectoral production, livelihoods, poverty and development of nation”. It also needs **active and effective**

**participation of keen stakeholders** not only from different levels of government, but also from the various sectors, which might potentially influence the environment. At very basic level, mainstreaming requires:

1. A coherent understanding and readily acceptance of the importance of a healthy environment to ensure well-functioning of all production sectors. This will include a wide range of strategies for communication, education and public awareness.
2. A well-planned mechanism in place to bring together representatives of numerous sectors in order to coordinate activities and address common concerns. This mechanism may take the form of, for example, a committee, a coordinating body (such as a steering group) or an interagency group.

#### **5.4 How to Mainstream**

Mainstreaming the concepts of biodiversity into development sectors requires the identification and **prioritization of “entry points”** that will entail an opportunity for inclusion of biodiversity-pertinent information and/or activities into sectoral operating processes. The main entry points are development and updating of various sectoral policies, strategies and tools. This also calls for **each sector having its own specific strategies, activities and tools** for addressing issues relevant to sustainability. Following are the explanation of some such tools:

- **Sectoral strategies, action plans and programmes:** All important sectors have their own action plans and programmes for example forest department has State Biodiversity Action Plan. Others sectors such as animal husbandry, tourism, agriculture also have their action plans but biodiversity conservation concerns in their sectoral plans are either missing, or poorly reflected. The sectoral plans need upgradation for mainstreaming of biodiversity concerns effectively by involving biodiversity professionals. The objective of mainstreaming biodiversity should be to promote long term sustainability of the concerned sector as well as to ensure biodiversity conservation - a win-win situation.
- **Mainstreaming biodiversity into guidelines and practices of different sectors:** Development sectors use a number of tools for achieving environmentally and socially sustainable resource management practices. These tools consist of some basic criteria, guidelines and good practices. The integration of the concepts of biodiversity into these tools can be achieved through the effective participation of biodiversity experts or personnel in their drafting or review.
- **Ecosystem Approaches:** Some sectors have their own ecosystem specific approaches, which are in adherence to the CBD ecosystem approach. For example, sustainable forest management (SFM) is complementary to the CBD ecosystem approach; as both of these approaches are formulated on the basic principles of sustainable development. In a similar way, other sectors can also complement this approach.
- **Environmental Impact Assessment (EIA):** EIA is a powerful tool for mainstreaming biodiversity into development planning as it incorporates biodiversity concerns in to the planning. EIAs and Strategic Environmental Assessments (SEAs) are used to ensure that projects, programmes and policies are economically viable, socially equitable and environmentally sustainable thus gauging the pertinent impacts of the project through a

holistic viewpoint. Implementation of EIA often inadequately addressed biodiversity concerns so for achieving mainstreaming of biodiversity would require a condition to ensure that EIA should be implemented in such a way that sound science and public participation will collectively form a foundation for sustainable development.

The use of above mentioned strategies or tools will assist in ensuring that several sectors and decision makers are accepting the biodiversity conservation goals, and this acceptance can be demonstrated only through the effective integration of biodiversity concerns into the day-by-day operations of pertinent sectors.

## 6. Sub-Module 5: SWOT Analysis

SWOT is a structured planning tool to evaluate strengths, weaknesses, opportunities and threats involved in a project or in a sector. It is a very useful tool for development planning. This is widely used in strategic decision support for business management, but recently it was also used for environmental management and assessment (Scolozzi et al., 2014). SWOT analysis is a very simple and highly effective tool that can be used not only by experts but also by general public. It helps to determine existing gaps, potentials and risks as well as to identify the desired direction of future development. Method of this analysis will remain same for every sector, only the thematic areas will change depending on the sector on which participants are working.

It is imperative to establish a policy design for biodiversity conservation through accounting for factors that may hamper or enable conservation of biodiversity, from both ecological and social perspective. To implement SWOT four basic groups will be formed and these will be put into two main groups:

<i>Internal factors (Strengths &amp; Weaknesses)</i>	<i>External factors (Opportunities and threats)</i>
<ul style="list-style-type: none"><li>• Internal factors are essential or inside to a region, society or project.</li><li>• They can be changed or influenced (can vary for different sectors)</li></ul>	<ul style="list-style-type: none"><li>• Factors that are outside of an analysed region or project</li><li>• We cannot influence</li></ul>

In this module a SWOT analysis based on biodiversity conservation is proposed in order to identify the internal and external factors supporting or threatening the conservation effectiveness of biodiversity (common tool for all development sectors) in Sikkim. This analysis will provide significant information as well as be helpful in identifying conservation priorities and defining management strategies to assure biodiversity conservation in all the important sectors such as agriculture, tourism, horticulture etc.

### Methodology:

Data Collection	SWOT Chart	Preparation of further strategy
<ul style="list-style-type: none"><li>• Collect information or data on current situation of a particular sector by carrying out surveys, interview etc.</li></ul>	<ul style="list-style-type: none"><li>• Draw a SWOT chart and evaluate the current situation by recognising the strengths, weaknesses, opportunities and threats.</li></ul>	<ul style="list-style-type: none"><li>• Promote or use strengths</li><li>• Eradicate weaknesses</li><li>• Use the existing opportunities</li><li>• Eliminate threat</li></ul>

**SWOT Analysis for Sikkim Biodiversity:** The below-mentioned SWOT chart is just an example to understand what factors will come under which category; these factors will vary from department to department (or stakeholders). Every stakeholder i.e. Government line

departments, research and training institutions, community institutions and NGOs should prepare their SWOT Chart taking reference from the below mentioned example. The chart has been prepared on the basis of UNDP capacity development scorecard and desktop research.

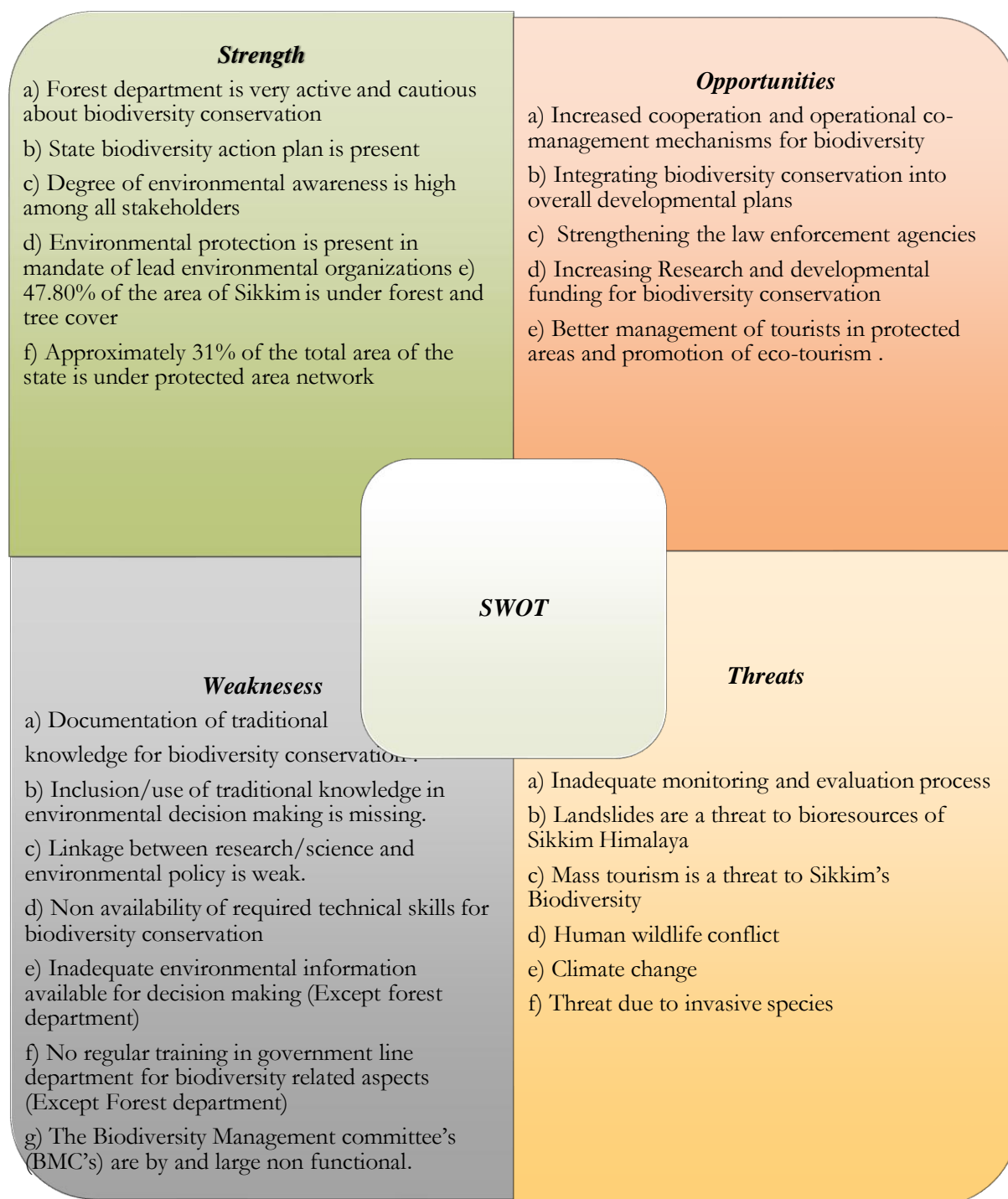


Figure 6.1: SWOT Analysis



## 7. Training Outline

The above-mentioned training modules are generic in nature and is suggested for all relevant key stakeholders. Other than this, two specific modules have also been developed as per the state's requirement. Table 7.1 gives a general outline of 5-day training programme for biodiversity conservation. This can be customized depending upon the level of participation and departments involved.

**Table 7.1 Outline of training Programme**

Days	Session	Topics Covered	Time
<b>Day 1</b>	<b>Inaugural Session</b>		
		Participants Introduction (Participants are expected to give brief introduction regarding institute and their job role)	20-25 min
	Session 1	Sub-module 1: Biodiversity & its importance	1 hr
	Session 2	Sub-module 2: Methods of Conservation	1 hr
	Session 3	Group exercise (Participants will be divided into groups depending upon area (e.g districts) and will be ask to identify potential threats to biodiversity in their selected region; then they will be asked to mention existing conservation measures. Brainstorm its effectiveness and suggest better feasible options) Followed by group presentation	2 hrs
<b>Day 2</b>	<b>Reflection from Day 1</b>		<b>20 min</b>
	Session 1	Module: Agriculture and Biodiversity	2 hr
	Session 2	Sub-module 3: Community and Governance	1 hr
	Session 3	Panel discussion: “Role of community and Governance in biodiversity conservation” Panellists: Representative of Govt. dept (e.g forest dpt.) Representative of active NGO's Representative of BMC's/JFMC's Followed by question and answer round	2 hr
<b>Day 3</b>	<b>Exposure visit to protect area/wildlife sanctuary/village with active BMC</b>		
<b>Day 4</b>	<b>Reflection from Day 3</b>		<b>20 min</b>
	Session 1	Module: Sustainable Tourism	1 hr
	Session 2	Sub module 4: Mainstreaming Biodiversity Concerns into development planning	1 hr
	Session 3	Brainstorming Session (Participants will work in groups for identification & prioritization of “entry points” in respective sectors	2 hr



		and have group discussions over mainstreaming)	
<b>Day5</b>	<b>Reflection from Day 4</b>		<b>20 min</b>
	Session 1	Sub Module 5: SWOT Analysis	1 hr
	Session 2	Group exercise (Participants will be divided into groups depending upon area of work, and then will be asked to evaluate strengths, weaknesses, opportunities & threats of selected sectors to identify desired direction of future development)	2 hr
	<b>Feedback and evaluation</b>		

Varied stakeholders are having different capacities and needs for mainstreaming biodiversity conservation into their respective departmental works. General module is suggested for every key stakeholder whereas training days can be customized depending upon the level of participants. Other specific modules should be provided to the concern stakeholders of that sector. Table 7.2 briefly describes the recommendations suggested for key stakeholders on the basis of Capacity Needs Assessment.

**Table 7.2: Recommendations based on Training Needs Analysis**

<b>S. No.</b>	<b>Department/Institution</b>	<b>Capacity Building scores (out of 45)</b>	<b>Comments</b>	<b>Module suggested</b>
1	Forest, Environment and Wildlife Management Department	29	Interdepartmental synergies are required specially with RMDD, frontline officers should be motivated to work in close coordination with local bodies. Training facility is available which can be used to conduct interdepartmental trainings	General Module, Module I and Module II
2	Sikkim University	22	To conduct policy-based research, provision of spatial and resource information base for planning, implementation and monitoring of forest and biodiversity management	General Module
3	G.B. Pant National Institute of Himalayan Environment and Sustainable Development Sikkim	24		General Module
4	The Mountain Institute Sikkim	22	Can organize regular programmes for community-based	General Module, Module I and

			organization on biodiversity conservation	Module II
5	Eco-tourism and Conservation Society of Sikkim	20		General Module and Module II
6	Kangchendzonga Conservation Committee	19	Capacitate more on local community groups for biodiversity conservation	General Module, Module I and Module II
7	WWF Sikkim	22		General Module and Module II
8	Department of Science, Technology and Climate Change, Sikkim	27	Department has infrastructure facility to conduct trainings, should focus on awareness programmes on biodiversity conservation	General Module and Module II
9	Human Resource Development Department, Sikkim	21	Stakeholder engagement should be increased and trainings should have monitoring and evaluation mechanism	General Module, Module I and Module II
10	Meteorological Centre, Sikkim	26	Not directly linked with biodiversity conservation, updated data should be provided for planning process	General Module
11	Food Security and Agricultural Development Department, Sikkim	16	Sensitize farmers regarding Importance of Agro-biodiversity, training should be provided	General Module and Module I
12	Horticulture and Cash Crop Development, Sikkim	17	Strengthen agrobiodiversity in production system	General Module and Module I
13	Department of Animal Husbandry, Livestock, Fisheries and Veterinary Services, Sikkim	16	Mainstream biodiversity concerns in on-going trainings related to livestock and poultry Management & Production	General Module and Module I
14	Rural Management and Development Department, Sikkim	10	Strengthen biodiversity conservation measures at grass-root level.	General Module, Module I and Module II
15	Energy and Power Department, Sikkim	16		General Module
16	Building and Housing Department, Sikkim	11	Biodiversity conservation lens should be put in development project	General Module and Module II
17	State Institute of Rural	05	Specific trainings for	General

	Development and Panchayati Raj, Jorethang Sikkim		biodiversity conservation should be conducted for senior and junior level officers and also for representatives of BMC & GPUs	Module, Module I and Module II
18	Tourism and Civil Aviation Department, Sikkim	09	Promote Eco-tourism and secure livelihood needs of locals	General Module and Module II
19	District Institute of Education & Training, Gangtok, Sikkim	10	Sensitization of local community for biodiversity conservation	General Module, Module I and Module II
20	National Research Center for Orchids, Sikkim	12	Promote research & innovation	General Module and Module I
21	Indian Cardamom Research Institute (ICRI) RRU, Tadong	15		General Module and Module I
22	Regional Ayurvedic Research Institute, Sikkim	07		General Module
23	Sikkim Government B.ed College, Soreng	05	Train Master Trainers which can further provide awareness among school children	General Module, Module I and Module II
24	Biodiversity Management Committee	16	Mainstreaming at grass-root level	General Module, Module I and Module II
25	Eco Development Committee	10	Mainstreaming at grass-root level	General Module, Module I and Module II
26	Gram Panchayat Units	05	Sensitize general masses	Through interactive sessions
27	Joint Forest Management committee	11	Strengthen relationship between local community and Govt. officials	General Module, Module I and Module II
28	Self Help Groups	06	Sensitize general masses	Through interactive sessions
29	Border Road Organization, Sikkim	0		
30	Defense	02		
31	Himalayan Mountaineering	02		

	Institute, Darjeeling			
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## 8. Training Evaluation

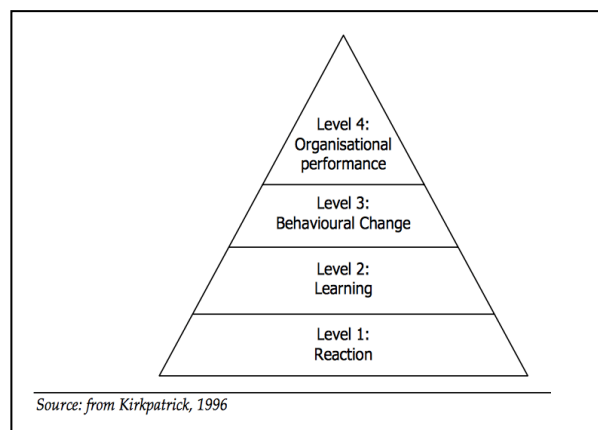
Training evaluation is a systematic process to analyse the efficacy of training programs. It provides specific information about a selected session, program for the purpose of determining value and decision making. Training evaluation helps will facilitate in analysis the training gaps and opportunities in training the participants. It collects information that can help determine improvements on training programs and help trainers decide how a certain program can be improved or customised as per target audience. The training evaluation process is essential to assess training effectiveness, help improve overall work quality, and boost employee morale and motivation.

### Four levels of training evaluation

**Level 1 (Reaction):** The objective for this level is straightforward, it evaluates how individuals react to the training model by asking questions that establishes the trainees' thoughts. Questions will figure out if the participant enjoyed their experience and if they found the material in the program useful for their work.

**Level 2 (Learning):** Evaluating at this level is meant to gauge the level participants have developed in expertise, knowledge, or mindset. Exploration at this level is far more challenging and time-consuming compared to level one.

**Level 3 (Behavioural change):** This level analyses the differences in the participant's behaviour at work after completing the program. Assessing the change makes it possible to figure out if the knowledge, mindset, or skills the program taught are being used the workplace. For the majority of individuals this level offers the truest evaluation of a program's usefulness. This level starts 3–6 months after training.



### Level 4 (Organizational performance):

Commonly regarded as the primary goal of the program, level four determines the overall success of the training model.

**Figure 8.1: Kirkpatrick's model of training evaluation**

### 8.1 Feedback Form

Training Title:

Date of training:

Location of training:

<b>Instructions: Please tick the appropriate option</b>	<b>Excellent</b>	<b>Very Good</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
1. The objectives of the trainings were achieved					
2. The content of the course was organised and easy to follow					
3. The trainers were well prepared and engaging					
4. The course length was appropriate					
5. The pace of the course was appropriate to the content and participants					
6. The group exercises were helpful					

7. What was most useful in the training?

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8. What was least useful in the training?

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9. What topics you would like to be included in this training?

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10. Any other comments?

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11. Please tick the appropriate option

Module	Highly Relevant	Relevant	Not at all Relevant
Module 1			
Module 2			
Module 3			
Module 4			
Module 5			

## Presentation for Training

### Training Programme on Biodiversity Conservation

#### OBJECTIVES



To highlight the uniqueness and significance of Sikkim's biodiversity



To increase awareness regarding biodiversity related issues



Mainstreaming biodiversity into different development plans



Capacity building of key institutions in the realm of biodiversity conservation

#### Training Module:

To enhance capacities of key stakeholders for biodiversity conservation



General Module : Biodiversity Conservation in Sikkim



Module I: Biodiversity and Agriculture



Module II: Sustainable Tourism for biodiversity Conservation

#### Sub Module I: Biodiversity and its importance

- General Introduction to biodiversity and ecosystem
- Importance of biodiversity
- Uniqueness of Sikkim's Biodiversity
- Potential threat to Sikkim's biodiversity

## Sub Module 2: Methods of Conservation

- Need for biodiversity conservation in Sikkim
- Brief introduction to policies, acts and laws pertaining to biodiversity conservation
- Examples of In-situ and Ex-situ conservation in Sikkim

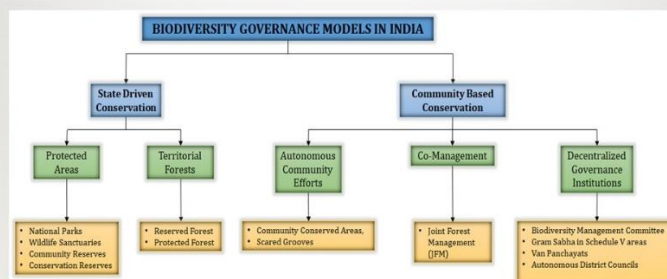
## Group Exercise

- Participants will be divided into groups (on the basis of districts or area of work)
- They will be asked to identify potential threats of concerned area, existing conservation measures
- Brainstormed regarding its effectiveness and suggest feasible options

Potential Threats	Existing Conservation measures	Effectiveness	More feasible options (if required)

## Sub Module 3: Community and Governance

- Community Participation and Biodiversity Conservation Models in India



## Panel Discussion

- “Role of Community and Governance in biodiversity conservation” with special context to Sikkim
- Panellists: Representative from Govt. Dept., active NGO's and BMC's/JFMC's
- Moderator is advised to ask each panellist about their perspective about community and governance, what are the challenges? And how this can be addresses?
- Followed by questions and answers

## Sub Module 4: Mainstreaming biodiversity

- Explaining why mainstreaming of biodiversity concerns into development planning is important
- Strategies for mainstreaming
- Approaches for mainstreaming: Ecosystem approach and Environment Impact Assessment
- Process of mainstreaming and prioritization of “entry points”

## Group Exercise

- Participants will be divided into groups (on the basis of area of work)
- They will be asked to brainstorm for identification & prioritization of entry points in respective sectors
- Followed by group presentation and discussion over mainstreaming

## Sub Module 5: SWOT Analysis

- SWOT is a structured planning tool to evaluate strengths, weaknesses, opportunities and threats involved in a project or in a sector.
- Explain the significance of using SWOT analysis for biodiversity conservation
- Methodology suggested

Data Collection	SWOT Chart	Preparation of further strategy
<ul style="list-style-type: none"><li>• Collect information or data on current situation of a particular sector by carrying out surveys, interview etc.</li></ul>	<ul style="list-style-type: none"><li>• Draw a SWOT chart and evaluate the current situation by recognising the strengths, weaknesses, opportunities and threats.</li></ul>	<ul style="list-style-type: none"><li>• Promote or use strengths</li><li>• Eradicate weaknesses</li><li>• Use the existing opportunities</li><li>• Eliminate threat</li></ul>

## Group Exercise

- Participants will be divided into groups (on the basis of area of work)
- They will be asked to evaluate strengths, weaknesses, opportunities and threats of selected sectors (for e.g., agriculture, forest etc..)
- Followed by group presentation



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