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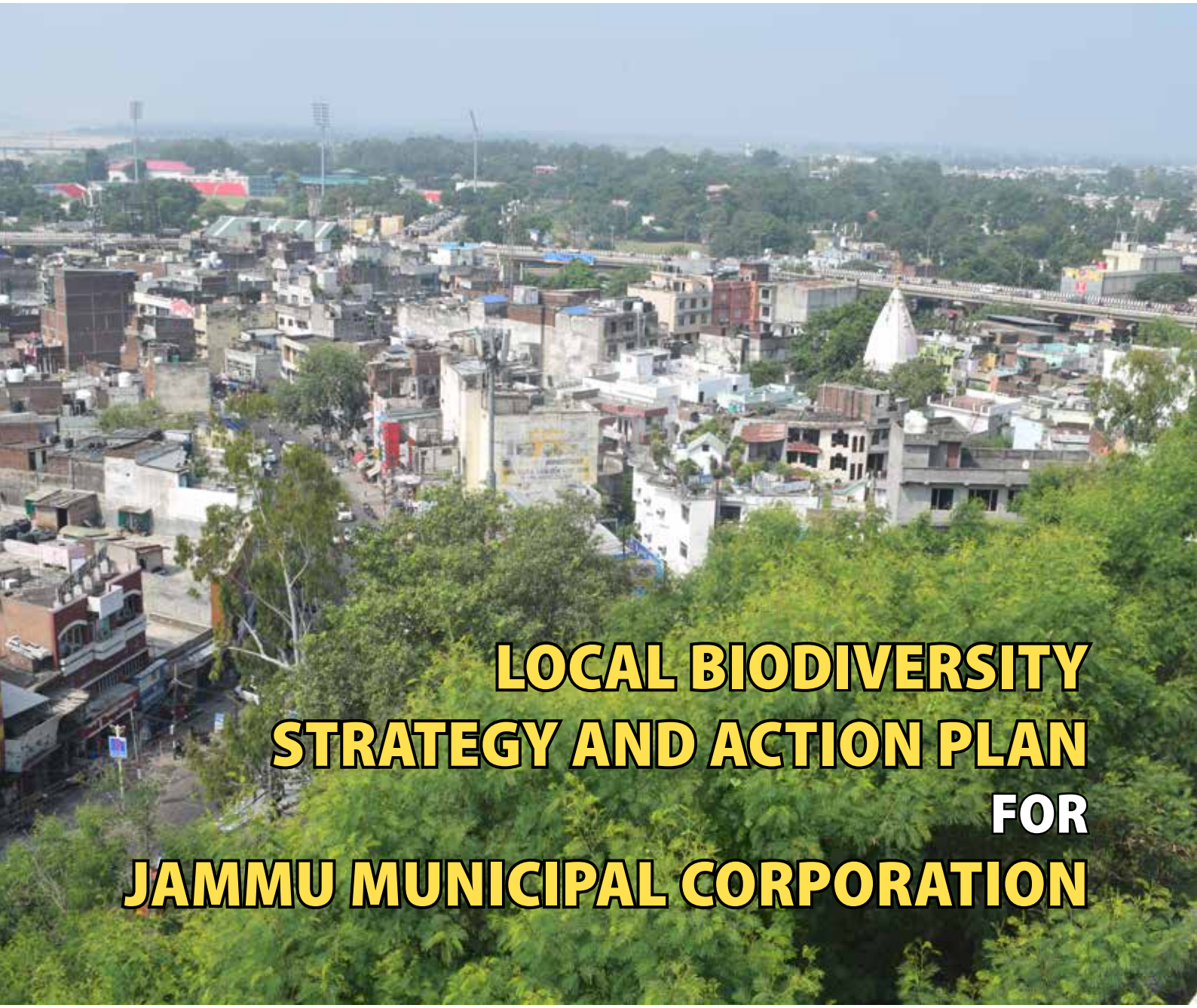

LOCAL BIODIVERSITY STRATEGY AND ACTION PLAN FOR JAMMU MUNICIPAL CORPORATION

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The authors would also like to thank all the stakeholders and the inputs that they provided during the workshops and interactions. Financial support from the BMUV supported INTERACT Bio project is duly acknowledged.


(1792 - 1858)

Message - Mayor, Jammu Municipal Corporation

I welcome the development of the LBSAP for our Jammu city. Biodiversity means abundant and varied wildlife, and strong, healthy natural areas. The people of Jammu value our rich natural areas and vibrant wildlife. We all are committed to promoting healthy urban living, while conserving ecologically sensitive areas and the creatures that share our urban space.

This document will generate awareness about how and what can be done to protect and conserve biodiversity and will add to the conservation programmes in the city. I want all people in Jammu city to live in a space in which the air is clean, green areas are accessible, wildlife is conserved and urban regeneration makes it possible to make the city even greener. I also want to share our knowledge and expertise in urban ecology and also learn from other cities. I extend my thanks to J&K Biodiversity Council and ICLEI - Local Governments for Sustainability, South Asia for their efforts to develop the LBSAP and congratulate all those who were involved in the project for bringing out this document. I would also like to thank the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), through the IKI initiative for the financial support.

Rajinder Sharma

Rajinder Sharma
Hon'ble Mayor, Jammu

Message - Principal Secretary to Government, Department of Department of Forest, Ecology & Environment, J & K

The Local Biodiversity Strategy and action Plan provides a guiding strategy and suggests actions for the local governments for mainstreaming of concerns on biodiversity conservation in planning and sustainable development of cities. LBSAP aims to implement the objectives of Convention on Biological Diversity (CBD) at the city level and help in managing overall biodiversity of the city through a micro level planning strategy with the involvement of people.

I am happy to note that a participatory approach has been followed for the development of Local Biodiversity Strategy & Action Plan for Smart City of Jammu involving consultation meetings and workshops with various stakeholders at the city level to identify focus areas and prioritization of drivers impacting the biodiversity and various ecosystems within the city. The plan aims to strike a balance between developmental priorities and ecological security of the city through conservation of its natural resources with the participation of stakeholders to ensure sustainable development.

The LBSAP highlights the important areas for action and intends to prioritize efforts to achieve sustainable development. This will go a long way in mainstreaming biodiversity concerns while planning the development of Jammu Smart City and act as a guiding tool for the city administrators.

I commend the efforts of J&K Biodiversity Council and ICLEI - Local Governments for Sustainability, South Asia for their handwork in developing the LBSAP for Jammu Smart City under the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMUV) supported INTERACT-Bio project.

Dheeraj Gupta, IAS

Dheeraj Gupta, IAS
Principal Secretary to Government,
Department of Forest, Ecology &
Environment, J&K

Message - PCCF & HOFF, J&K Forest Department / Chairman, J&K Biodiversity Council

The Local Biodiversity Strategy and Action Plan (LBSAP) provides vital information on city's biodiversity profile, policies and laws related to biodiversity and environmental governance besides providing the vision, guiding principles, focus areas and associated strategic goals.

LBSAP aims at preserving the rich biodiversity of Jammu by translating international and national biodiversity policies and targets into implementable action plans at the micro level. I am confident that the LBSAP will provide strategic guidance and support the effective management of various ecosystem services and city's vibrant biodiversity.

I compliment the officials of J&K Biodiversity Council and ICLEI - Local Governments for Sustainability South Asia for developing the LBSAP of Jammu. I would also like to acknowledge the financial support extended to ICLEI - Local Governments for Sustainability, South Asia from the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), through the INTERACT-Bio Project. The support provided by Jammu Municipal Corporation is also acknowledged.

I encourage all stakeholders especially the City Administration for proper implementation of the recommendations of this plan to ensure its success. I am hopeful that LBSAP shall help Jammu Municipal Corporation to achieve optimal management of biodiversity and ecosystem services.

Dr. Mohit Gera, IFS

Dr. Mohit Gera, IFS
PCCF & HoFF, J&K Forest Department /
Chairman, J&K Biodiversity Council

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List of Abbreviations

ACE	Autonomous Community Efforts
ADC	Autonomous District Council
AYUSH	Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy
BMC	Biodiversity Management Committees
BMUV	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit
BSI	Botanical Survey of India
CBD	Convention on Biological Diversity
CCA	Community Conserved Area
COP	Conference of Parties
CSO	Civil Society Organisation
DEERS	Department of Environment, Ecology and Remote Sensing
EEZ	Exclusive Economic Zone
EPA	Environment Protection Act, 1986
GAD	General Administration Department
GBF	Global Biodiversity Framework
GEF	Global Environment Facility
GI	Geographical Indication
GIS	Geographic Information System
HRD	Human Resource Development
ICLEI	International Council for Local Environmental Initiatives
IEC	Information, Education and Communication
IIIM	Indian Institute of Integrative Medicine
IUCN	International Union for Conservation of Nature
JDA	Jammu Development Authority
JFM	Joint Forest Management
JFMC	Joint Forest Management Committees
J&K	Jammu and Kashmir
J&KFRI	Jammu and Kashmir Forest Research Institute
JMC	Jammu Municipal Corporation

JMR	Jammu Metropolitan Region
JSCL	Jammu Smart City Limited
LBSAP	Local Biodiversity Strategy and Action Plan
MoEF	Ministry of Environment and Forests
MoEFCC	Ministry of Environment, Forests and Climate Change
NA	Natural Asset
NBAP	National Biodiversity Action Plan
NBSAP	National Biodiversity Strategy and Action Plan
NBT	National Biodiversity Target
NEP	National Environmental Policy
NGO	Non-Governmental Organisation
NRSC	National Remote Sensing Centre
PBR	People's Biodiversity Register
PCCF	Principal Chief Conservator of Forests
PRI	Panchayati Raj Institution
RWA	Resident Welfare Association
SBSAP	State Biodiversity Strategy and Action Plan
SCBD	Secretariat of the Convention on Biological Diversity
SFM	Sustainable Forest Management
SG	Sacred Grove
STP	Sewage Treatment Plant
TEEB	The Economics of Ecosystems and Biodiversity
TPCG	Technical and Policy Core Group
UEED	Urban Environmental Engineering Department
UT	Union Territory
VPC	Village Plantation Committee
ZSI	Zoological Survey of India

Executive Summary

The Local Biodiversity Strategy and Action Plan (LBSAP) for the City of Jammu articulates through the method by which to implement the vision, strategic objectives and actions necessary for conservation and protection of biodiversity in the city. The LBSAP is a tool, with which local governments (Jammu Municipal Corporation in this case), its various departments, and the local community can work together to deliver continued action for biodiversity stewardship.

This LBSAP is based on the inputs received during multiple consultation meetings at the city and ward levels and discussions with councillors of the Municipal Corporation, and subject matter experts. The LBSAP of Jammu comprises of six chapters. The first chapter on introduction deals with the background, scope, objectives, methodology and format of the LBSAP. The second chapter provides a brief profile of the city of Jammu. The third chapter deals with biodiversity of Jammu city. The fourth chapter highlights major policies/strategies/legislations that are related to biodiversity conservation at the national and local levels. The fifth chapter deals with various achievable actions under separate goals for the maintenance, conservation and sustainable use of biodiversity under each focus area or ecosystem. The sixth chapter provides a glimpse of various major tools that can support the implementation of LBSAP in Jammu.

Jammu city is the winter capital of the Union Territory of Jammu and Kashmir and is also the second most populated city of the Union Territory. Environmental protection and management in the city are influenced by a number of drivers and forces that shape the growth and development of the city.

The LBSAP of Jammu sets out a framework and a plan of action for conservation and sustainable use of biological diversity and equitable sharing of benefits derived from this use. It provides an overview of key issues, constraints and opportunities, identified during the extensive consultation meetings carried out with various stakeholders in the city.

The city has defined its LBSAP vision as 'Jammu City envisions a future that balances economic priorities with ecological security of the city through conservation of its cultural and natural heritage, ecological practices, a focus on enhancing and conserving the city's natural resources, including waterbodies, and climate-smart infrastructure, with participation of resident communities'. The city has also identified eight focus areas. This LBSAP suggests appropriate actions, comprising of both soft and hard measures to address issues faced in each of these focus areas.

1. Introduction

1.1. Background of LBSAP

An LBSAP is a guiding strategy with specific actions suggested for the local governments[1] to achieve "optimal and realistic governance and management of biodiversity and ecosystem services" (Avlonitis *et al.* 2012). An LBSAP, in essence, is the local equivalent of National and State Biodiversity Strategy and Actions Plans (NBSAPs and SBSAPs- refer Annexure 8.2 and 8.3). The NBSAP is the primary instrument of the national governments for implementing the Convention on Biological Diversity (CBD) while Sub-National BSAPs are increasingly being developed and implemented at various levels. At the 10th Conference of Parties (COP 10) to the CBD, decentralized plans in the form of an LBSAP was recognized in the decision X/22 (Convention on Biological Diversity 2010).

1.2. Scope and Objectives of LBSAP

An LBSAP is useful for local governments in many ways. LBSAP is more specific in terms of actions and deadlines when compared with NBSAP and SBSAP. The LBSAP helps in translating international and national biodiversity policies and targets into implementable action plans at the local level.

1.3. Methodology Used in the Preparation of LBSAP

A participatory and scientifically informed approach was followed for the development of the LBSAP of Jammu.

1.3.1. Consultation Workshops

Consultation meetings at the city level were initiated in 2021. Detailed meetings with specific intention to develop LBSAP were conducted between August 2021- November 2022. In the city level workshops critical ecosystems (Focus Areas) within the city were identified and the current health status of those ecosystems was discussed and ranked on a scale from Very Good to Very Poor. Following this, prioritization of the drivers that impact the health of the ecosystems was carried out. This information formed the foundation for the development of the LBSAP.

1. Local government could be any government body under the state. However, here the term is used to denote the city government.

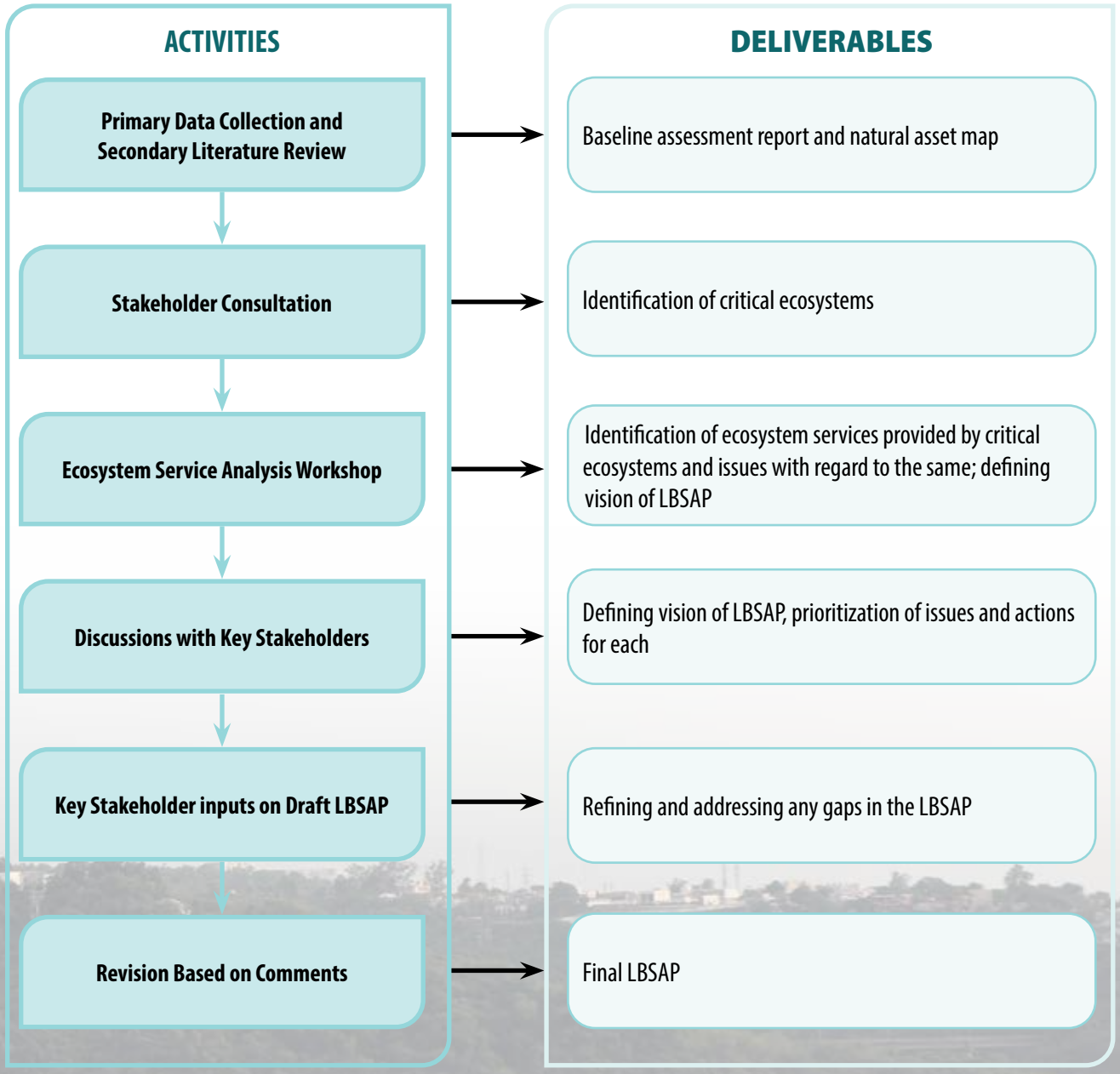


Figure 1: LBSAP development process

1.4. Format of LBSAP

The LBSAP of Jammu is divided into six chapters. The introductory chapter provides a background to LBSAP, scope and objectives, methodology used, and format of the LBSAP. The second chapter discusses the city profile of Jammu. The third chapter deals with biodiversity profile of the city of Jammu. The fourth chapter discusses various policies and laws related to biodiversity and environmental governance at the international, national, state and city level. The fifth chapter deals with the vision, guiding principles, focus areas, various strategic goals and actions related to each focus area. The sixth chapter provides a glance of various major tools that can support the implementation of LBSAP in Jammu.

2. Jammu City Profile

Jammu city is the winter capital of the Union Territory (UT) of Jammu and Kashmir. It is also the second most populated city of the UT. The city is the largest in Jammu district and is constituted as the headquarters of the district. River Tawi bisects the city of Jammu into old city, developed at the right bank of the river and the new city, situated at the left bank of the river (Jammu Development Authority, 2017). It is surrounded by the Himalayas in the north and the northern-plains in the south. The city further shares a boundary with the adjoining Samba district. The city lies between the coordinates of 32° 44′ 9 N latitude and 74° 52′ 9 E longitude (Anon n.d.) at a lower elevation of 326 meters in comparison with other towns and cities of the UT of Jammu and Kashmir. Jammu is spread over an approximate area of 240 sq.km and is divided into 75 wards (Jammu Municipal Corporation) n.d.). It has the epithet of "City of Temples" and is one amongst the most visited place in the UT.

2.1. Population

As per the Census of India 2011, the city of Jammu has a total population of 502,197 (Census of India, 2011). About 53 percent of the total city population is represented by males whereas females constitute about 47 percent of the total population. The average literacy rate of the city of Jammu is approximately 90 percent. The total population of the urban agglomeration, Jammu Metropolitan Region (JMR) is 657,314. The city of Jammu contributes to 64 percent of the total urban population of the region and is therefore, designated as a primate city since 2011 (Jammu Development Authority, 2017). In addition, Jammu district has the second highest urban population after Srinagar in the UT of Jammu and Kashmir. The city of Jammu is also home to a large Kashmiri Hindu population.

In contrast to its administrative counterpart i.e. the city of Srinagar (Census of India, 2011b), Jammu city, has a majority Hindu population (81.19 percent) (Census of India, 2011a). Sikhs constitute 8.83 percent of the city population, followed by Muslims (7.95 percent), Christians (1.35 percent), Jains (0.33 percent) and Buddhists (0.05 percent). The most commonly spoken language in the city of Jammu is Dogri, Punjabi and Hindi.

Box 1: Jammu Municipal Corporation Vital Statistics

Area

240 km^2

Population

502,197 people (Census 2011)

Population Density (UT)

45 persons/km^2

Climate

The city is characterized of possessing a humid subtropical climate. Average daily temperature recorded in the months of May, June and July range between 24.9°C and 41.7°C, whereas January is regarded as the coldest month with temperature falling to 1.3°C.

Main land cover and land uses

Built-Up (63.42%), Plantation (13.10%), Agriculture (11.12%), Forests (9.98%), Parks (1.51%), Wasteland (0.73%) and Water body (0.15%) are the major land use and land cover classes in Jammu city (Parry et al., 2018).

2. In this document, we consider ecosystems as focus areas where the intervention of the local government is needed for biodiversity conservation.

2.2. Environmental Context

Jammu city experiences extremely hot summers and cold winters (Census of India, 2011a). The city possesses a humid subtropical climate. Average daily temperature recorded in the months of May, June and July range between 24.9°C and 41.7°C, whereas January is regarded as the coldest month with temperature falling to 1.3°C (Census of India, 2011a). The southwest monsoon brings an adequate amount of rainfall in the city during the months of June to September with an annual average of 1,246 mm.

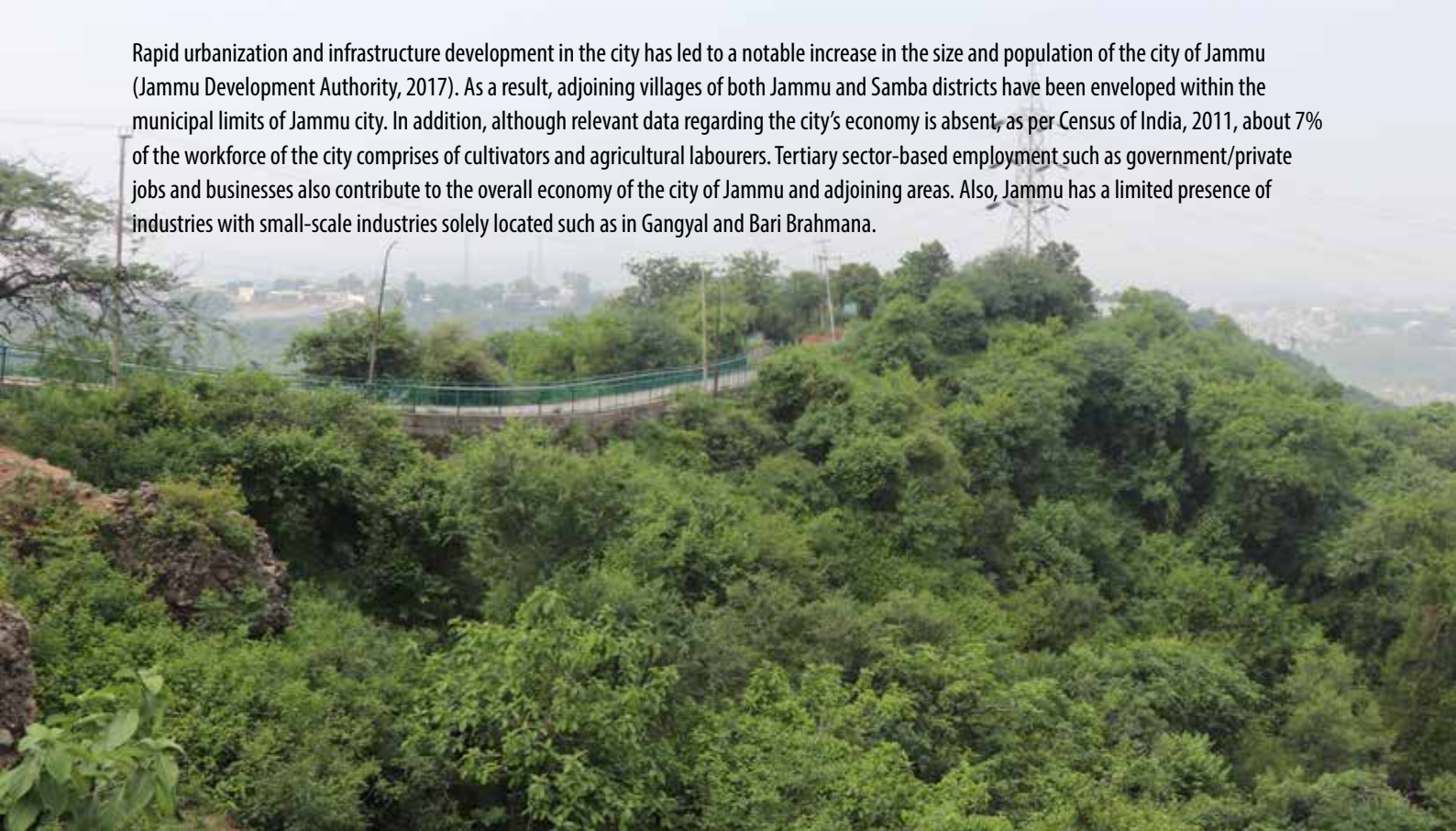
Jammu city, the headquarters of the Jammu district, is positioned on an undulating terrain in the Sub-Himalayan region which is divided into two parts namely, the Outer Plains and the Outer Hills of Shivaliks (Jammu Development Authority, 2017). The Outer Plains have an average altitude of 340m and are characterized by water-deficient soils (Jammu Development Authority, 2017). The areas of the Jammu city mostly on the left bank of the river and those which fall within the Kandi belt are constituted in the region of the Outer Plains. The Outer Hills of Shivaliks, also known as the foot hills of Himalaya, enclose the city boundary at the north-east and south-east sides. These hills typically have subtle slope, covered with rocks and stones. Mostly the areas that fall within the right bank of the River Tawi lie at these hills of Shivaliks.

Both the Outer Plains and the Shivalik foot hills, constituting the city of Jammu, possess a peculiar topographical feature known as khads (Jammu Development Authority 2017). Khads are seasonal in nature and represent ravines and gullies that run through these two geographic units. Khads, mainly the- Gair Mumkin Khad, also constitute the major drainage channels of Jammu and provide protection against flash floods in the city.

2.3. Socio-Economic and Cultural Context

Jammu city is the main economic hub of the administrative division of Jammu (Jammu Development Authority, 2017). The city of Jammu reflects a vast cultural heritage with the existence of old historical buildings viz. Bahu Fort, Amar Mahal and Mubarak Mandi Palace. The city is also well-known for the production of high-quality Basmati rice in Ranbir Singh Pura area, situated at a close proximity to the city. Owing to the presence of major holy shrines such as Shri Mata Vaishno Devi and Amarnath in the adjoining region, tourism is one of the most important industries in the city. As the city of Jammu is well-regarded for its regional connectivity, leading up the way to Kashmir valley and Ladakh, it is used as a transit city in the local area. The city houses one of the northern-most railway terminus and airport. Hence, revenue generation through tourism significantly contributes to the local economy.

Rapid urbanization and infrastructure development in the city has led to a notable increase in the size and population of the city of Jammu (Jammu Development Authority, 2017). As a result, adjoining villages of both Jammu and Samba districts have been enveloped within the municipal limits of Jammu city. In addition, although relevant data regarding the city's economy is absent, as per Census of India, 2011, about 7% of the workforce of the city comprises of cultivators and agricultural labourers. Tertiary sector-based employment such as government/private jobs and businesses also contribute to the overall economy of the city of Jammu and adjoining areas. Also, Jammu has a limited presence of industries with small-scale industries solely located such as in Gangyal and Bari Brahmana.



3. State of Jammu's Biodiversity

The city of Jammu has abundance of natural resources in the form of forested hill slopes, River Tawi, orchards and agricultural farms (Jammu Development Authority, 2017). The city is located in the tropical climate zone and an interspersed trail of forests running from north-eastern side to the south-eastern side of the city forms an important component of the local vegetation.

Although an inventory of both flora and fauna has been well-documented for various lakes, National Parks and Wildlife Sanctuaries that come under the jurisdiction of UT of Jammu and Kashmir, a complete biodiversity profile for the city of Jammu is absent. However, to provide a glimpse of the flora and fauna inhabiting the city of Jammu, a brief description is mentioned below.

3.1. Natural Asset Map

ICLEI-Local Governments for Sustainability, South Asia as part of the BMUV supported INTERACT-Bio project, has prepared a natural asset map of Jammu city. This map depicts the blue-green infrastructure within the city region. The natural assets mapped include urban green areas like grounds, graveyards, parks and gardens, golf courses, avenue tree cover, irrigation canals, agricultural areas including rice fields, agroforestry plantations, orchards, vegetable cultivation, and natural ecosystems such as marshes, water bodies, River Tawi and its vegetation, scrub forest and forests (Figure 2). The area falling under various land use classes has also been calculated (Table 1). In order to inculcate interest of the citizens as well as the lawmakers, in biodiversity, an illustrated natural asset map was also prepared by ICLEI South Asia (Figure 3). This illustrated map represents the natural and cultural assets in an aesthetically appealing manner.

Table 1: Area wise distribution of land use classes (inside JMC boundary)

NA Class	Area (In ha)
Open ground	192.98
Park/ Garden	169.61
Golf course	95.26
Avenue tree cover	171.85
Paddy Cultivation	3694.80
Terrace cultivation	45.88
Mixed cultivation	295.76
Agroforestry plantation	117.26
Orchard	130.60
Vegetable cultivation	51.85
Marshes	13.79
Sparse vegetation	543.58
Pond/Water body	10.60
River	239.30
Riverine vegetation / River bank	302.30
Flood Channel /Irrigation canal	9.00
Graveyard	8.89
Scrub forest	227.45
Forest / Natural vegetation	413.00
Total	**6733.76**

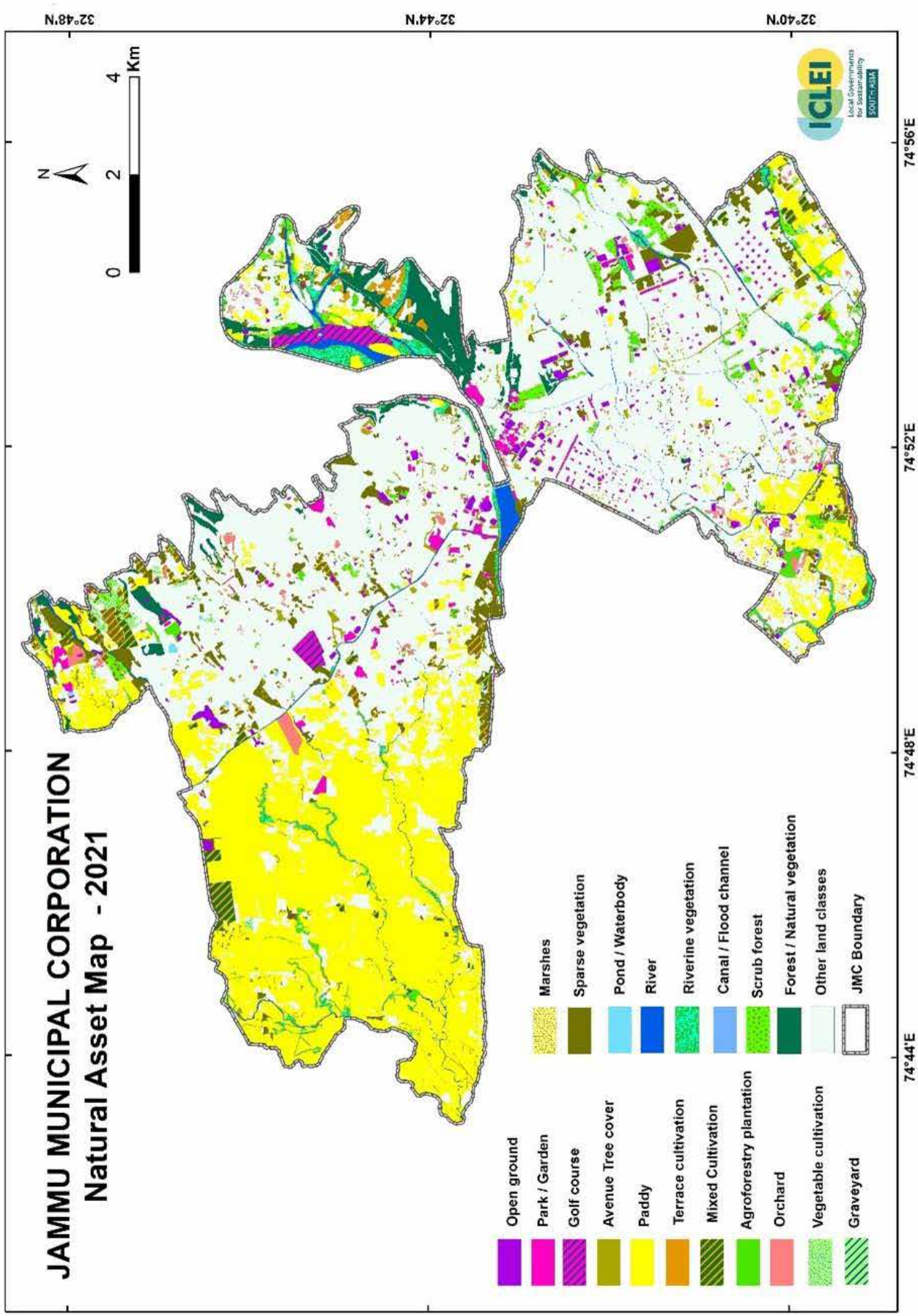


Figure 2: Natural Asset Map of Jammu City

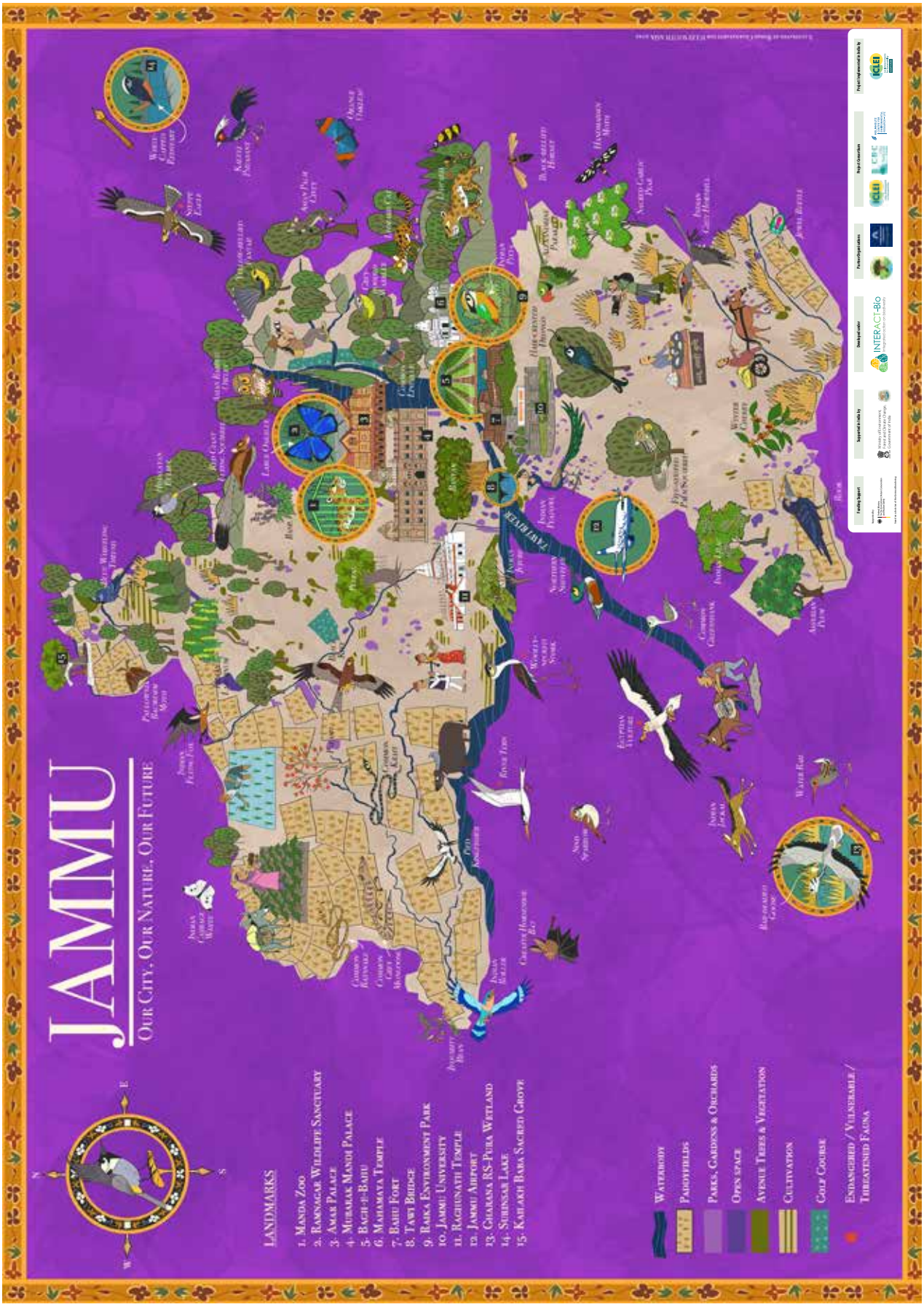


Figure 3: Illustrated Natural Asset Map of Jammu City

3.2. Flora

A total of 304 species of vascular plants have been reported from Jammu (Gupta 2018; Jammu and Kashmir Biodiversity Council n.d.; Kour et al. 2014). Some of the fruit-bearing tree species found in the city of Jammu include *Mangifera Indica* (Mango), *Litchi chinensis* (Litchi), *Psidium guajava* (Guava), *Vitis vinifera* (Grapes), *Emblica officinalis* (Amla), *Citrus sinensis* (Sweet orange), *Citrus limon* (Lemon), *Carica papaya* (Papaya) and *Punica granatum* (Pomegranate). Other deciduous tree species found in Jammu city include *Terminalia chebula*, T*erminalia bellirica*, *Eucalyptus grandis*, *Albizia lebbeck*, *Toona ciliata*, *Populus ciliata*, *Dalbergia sissoo*, *Mallotus philippensis*, *Butea monosperma*, *Dodonaea viscosa*, *Vachellia nilotica*, *Tectona grandis* and *Senegalia catechu*. Some of these have been introduced on experimental basis, long time back.

The city of Jammu also has 68 invasive plant species (Gupta 2018; Kour et al. 2014). A few of them include, *Acacia farnesia*, *Ageratum conyzoides*, *Amaranthus viridis*, *Anagallis arvensis*, *Bidens pilosa*, *Canna indica*, *Cassia tora*, *Ipomoea cylindrical*, *Ipomoea carnea*, *Lantana camara* and *Opuntia stricta*.

The city of Jammu also has planted magnolias viz. *Magnolia liliiflora*, *Magnolia soulangeana*, mostly found in avenue plantations and in parks and gardens (Bhatti and Gupta, 2015).

3.3. Fauna

The city of Jammu has rich faunal diversity. A total 220 bird species have been recorded in the city of Jammu (Sohil and Sharma 2019, 2020; Suhail, Ahmad, and Ahmad 2020; Sulliva et al. 2009). Some of the different kinds of birds found in the city region include waterfowl such as, Dendrocygna javanica (Lesser Whistling-duck) and *Tadorna ferruginea* (Ruddy Shelduck), pigeons and doves such as, *Columba livia* (Rock Pigeon) and *Streptopelia chinensis* (Spotted Dove), cuckoos such as *Centropus sinensis* (Greater Coucal) and *Cuculus canorus* (Common Cuckoo), shorebirds such as *Burhinus indicus* (Indian Thick-knee), *Vanellus vanellus* (Northern Lapwing) and *Calidris pugnax* (Ruff) and herons, ibis and allies such as, *Ardea cinerea* (Grey Heron), *Ardea purpurea* (Purple Heron) and *Bubulcus ibis* (Cattle Egret).

Mammals recorded from the city and its surrounds include *Rattus tanezumi* (Tanezumi rat), *Tatera indica* (Indian gerbil) and *Scotozous dormeri* (Dormer's bat) (Ahmad et al. 2020; IUCN 2019; Kait and Sahi 2010).

There are about 85 species of butterflies found in the city of Jammu (Sharma and Sharma, 2017; Sheikh, Awan, and Parey, 2021; Sheikh and Parey, 2019) such as *Hasora chromus* (Common Banded Awl), *Spialia galba* (Indian Grizzled Skipper), *Erionota torus* (Banana Skipper) and *Parnara bada* (Ceylon Swift).

Reptiles recorded from Jammu include *Hemidactylus brookii* (Brook's house gecko), *Calotes versicolor* (Indian Garden Lizard), *Mabuya dissimilis* (Striped Grass Skink), *Varanus bengalensis* (Indian Monitor Lizard), *Eryx Johnii* (Earth boa), *Bungarus caeruleus* (Common Krait) and *Naja naja* (Common Indian Cobra) (Manhas, Raina, and Wanganeo, 2016).

The City Biodiversity Index of Jammu documented 45 species of mammals, 244 birds, 16 reptiles, and 85 butterflies (ICLEI South Asia, 2022).

3.4. Agrodiversity

The city of Jammu, a part of Jammu district falls under the low altitude subtropical zone (JK – 1) agro-climatic zone of Jammu region (Agriculture Production and Farmers Welfare Department n.d.). Given the presence of outer hills in the region and the suitable dominance of brown hill soil, the principal cereal crops/fruits grown include pulses, paddy, maize, wheat and oats while the fruits grown include mango, guava, litchi, pear, Indian gooseberry, Indian jujube and grapes.

A wide variety of agricultural and horticultural crops are being produced in the UT of Jammu and Kashmir (Department of Ecology Environment & Remote Sensing 2017). High quality Basmati rice, Rajmash, Black Caraway (zeera) is indigenously grown in the Jammu region. Basmati rice

grown in R.S Pura of Jammu division is of great economic significance to the UT. Basmati 370, Pusa Sugandha, Sanwal Basmati, Ranbir Basmati, RR – 564 (Department of Ecology Environment & Remote Sensing 2017) along with the newly introduced Jammu Basmati 118, 123 and 136 comprise the high yielding varieties of rice cultivated locally (Asian News International, 2021).

In subtropical Jammu, crossbred cows (Jersey, Holstein Friesian) and non-descript local cows are found. Apart from Murrah, the local Buffalo, also known as Gujjari Buffalo, are reared by the traditional Gujjar community, as a domestic water buffalo for dairy production and draught purposes. The Bhakarwali goat is common in the Jammu region and used for milk, meat and fibre under the low input system. Local breeds of horses and mules are used as draught animals. Chabro is a multi-coloured dual-purpose chicken raised in the city along with hybrid broilers. Members of minority communities raise Yorkshire pigs for meat (Jammu and Kashmir Biodiversity Council n.d.; Kour et al., 2018).

4. Obligations and Responsibilities

There is an extensive set of International, National and State policies and treaties that exist and will affect the implementation of the LBSAP of Jammu. This section provides an overview of the relevant national and state level policies and guidelines. Before outlining these policies and guidelines, a brief description of the biodiversity governance model in India, suggested by Krishnan *et. al.,* 2012 is provided.

4.1. Biodiversity Governance Models in India

There are broadly five types of biodiversity governance models that aid in conservation, sustainable use, and fair and equitable sharing of biological resources across different landscapes in India (Krishnan *et al.* 2012). Of the five models, two – territorial forests and protected areas– fall under the protected area type of biodiversity governance models. The other three – autonomous community efforts, co-management of forests and decentralized governance of biodiversity – are considered more closely under community-based conservation.

1. **Territorial forests:** Nearly a fifth of India's geographical area is classified as forest land. Territorial forests are classified into two main categories – reserved and protected forests – that mainly differ in the extent of rights and privileges accorded to the local people. The management of territorial forests is presently based on the principles of sustainable forest management (SFM) through working plans, emphasizing conservation and meeting subsistence needs of local communities as per the National Forest Policy issued in 1988.

2. **Protected areas:** Protected areas cover around 4.9 percent of the country's geographical area. With the enactment of the Wildlife (Protection) Act, 1972 and the launch of Project Tiger in 1973 this network began to gain more ground and post the 1980s after the biogeographic classification for the country was developed, many more protected areas, including coastal and marine protected areas, were established. Since the 1990s, there have been attempts to introduce a participatory approach in the management of protected areas as seen from the 'Community Reserves' and 'Conservation Reserves' established.

3. **Autonomous community efforts:** Autonomous Community Efforts (ACE) are initiated by communities for conservation and management of biological resources. ACEs in India can be broadly classified into two categories – 1) Community Conserved Areas (CCAs) and 2) Sacred Groves (SGs). In many areas of the North Eastern states, Autonomous District Councils (ADCs) play a central role in the management of natural resources.

4. **Co-management of forests:** Co-management of state-owned natural resources such as Joint Forest Management (JFM) involves the State Forest Department entering 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. There are presently over 118,000 Joint Forest Management Committees (JFMCs) that protect/manage around 23 million hectares of forest lands.

5. **Decentralized governance of biodiversity:** The Panchayati Raj Institutions (PRI) which govern rural areas have a three-tier structure with Gram Sabha and Gram Panchayat as the basic unit, which are usually at the level of a village. The Constitution (73rd Amendment) Act, 1992 has included minor forest produce, social forestry, farm forestry and fisheries as subjects devolved to the PRIs. The PRIs play an important role in the implementation of the Biological Diversity Act, 2002. Presently, 244,727 Biodiversity Management Committees (BMCs) are functioning across 28 states. Local self-government institutions have a particularly significant role in the implementation of several laws that are important from a biodiversity conservation perspective, most notably the Panchayats (Extension to the Scheduled Areas) Act, 1996 and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

From the description of different types of biodiversity governance models, it is evident that "forest" is the primary focus of biodiversity conservation in India. Though the decentralized governance model has the option to include biodiversity outside the forest regime, it is not clearly mentioned. However, biodiversity outside forests, particularly urban biodiversity has got much attention in India in the past. The National Biodiversity Strategy and Action Plan prepared by Kalpavriksh in 2003 has a sub thematic plan on urban biodiversity. It discusses various aspects of urban biodiversity and city planning strategies around urban biodiversity (Rane, 2003).

4.2. National Level Policies, Guidelines and Legislation

4.2.1. Environment and biodiversity policy frameworks

India has developed a robust legislative and policy framework for biodiversity governance which includes protection, conservation as well as sustainable use, access and benefit sharing. Protection of the environment, including biodiversity, is enshrined in the Constitution of India. It instructs both the Government and citizens to take appropriate steps in this direction. The policy framework for biodiversity governance comprises a number of sector-specific and cross-sectoral policy statements issued over the years. Some of the key policy statements include (i) National Forest Policy, 1988 which is redrafted in 2018[2]; (ii) National Conservation Strategy and Policy Statement on Environment and Development, 1992;(iii) National Agriculture Policy, 2000; (iv) National Seeds Policy, 2002; (v) National Environment Policy, 2006; (vi) National Water Policy, 2012; and (vii) National Marine Fishing Policy, 2017. Agriculture, fishery and water related policies are detailed in the subsequent section (Refer Table 2).

4.3. Key Legislations

4.3.1. Environmental and biodiversity laws

India has well defined laws and policies on environment and biodiversity (wild). Environmental protection is represented within the Constitution of India in Article 48A (Protection and improvement of environment and safeguarding of forests and wildlife) and Article 51(A) (g) 3 (to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures). Important laws relating to the environment, forests and biodiversity include The Indian Forest Act, 1927; The Forest (Conservation) Act, 1980; The Joint Forest Management (JFM) Circular, 1990; The Wildlife (Protection) Act, 1972; The Environment (Protection) Act, 1986; The Water (Prevention and Control of Pollution) Act, 1974; The Air (Prevention and Control of Pollution) Act, 1981, Biological Diversity Act, 2002. Some major initiatives taken in the country to improve implementation mechanisms are Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights Act, 2006); setting up of the Wildlife Crime Control Bureau; Green India Mission; Mahatma Gandhi National Rural Employment Guarantee Act; and setting up the National Fisheries Development Board, 2006. Biodiversity has been mainstreamed in the agricultural sector through the following legal instruments Bio-safety Regulatory Framework in India; The Seeds Act, 1966 as amended up to 1972; The Insecticides Act, 1968, as amended up to 2000; The Protection of Plant Varieties and Farmers' Rights Act, 2001 (Ministry of Environment and Forests, 2002).

Table 2: Relevant National and subnational level legislations / policies / strategies

Legislation / Policy / Strategy	Description
National	
National Forest Policy, 1988	Protection, conservation and development of forests giving weight to the protective role of forests in maintaining ecological balance and environmental stability
National Draft Forest Policy, 2018	"Shifts the approach towards forestry in India – specifically, from a local community- and ecology-centric approach emphasised in the 1988 policy to focusing on timber and forest-based industries" (Agarwal 2018). Other focuses are on economic valuation of ecosystem services, forest certification, national forest ecosystem management information system and incorporation of climate change concerns in all forest and wildlife areas working/management plans and Community Ecosystem Management Plans
National Conservation Strategy and Policy Statement on Environment and Development, 1992	Views development policies from environmental perspectives and the support policies and systems required
National Agriculture Policy, 2000	Promotes technically sound, economically viable, environmentally non-degrading, and socially acceptable use of natural resources for the sustainable development of agriculture

2. The draft is not yet finalized. For the approved version of the draft policy, please visit this link

Legislation / Policy / Strategy	Description
National Seeds Policy, 2002	Protects the interest of farmers and encourage conservation of agro-biodiversity
National Environment Policy, 2006	Dominant theme is the sustainable use of natural resources
National Biodiversity Action Plan, 2008 and Addendum, 2014	Enlists actions that can be taken to protect and enhance biodiversity
National Water Policy, 2012	Integrated perspective in the planning and management of water resources, issues such as adapting to climate change, conservation of river corridors etc. are dealt with
National Marine Fishing Policy, 2017	Ensures the health and ecological integrity of the marine living resources of India's Exclusive Economic Zone (EEZ) through sustainable harvests
Article 48A in the Constitution of India	Protection and improvement of environment and safeguarding of forests and wildlife
Article 51(A)(g) in the Constitution of India	Protects and improves the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures
The Indian Forest Act, 1927	Consolidates the law relating to forests, the transit of forest-produce and the duty leviable on timber and other forest-produce
The Forest (Conservation) Act, 1980	Adopted to protect and conserve forests
The Joint Forest Management (JFM) Circular, 1990	Shifted the emphasis of the forest sector towards preservation and regeneration through co-management of forests, in which villagers cooperate to protect forests in exchange for a share in the usufruct and final harvest.
The Wildlife (Protection) Act, 1972	Protection to listed species of flora and fauna and establishes a network of ecologically-important protected areas.
The Environment (Protection) Act, 1986	Empowers the national government to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare
The Water (Prevention and Control of Pollution) Act, 1974	Represents India's first attempts to comprehensively deal with environmental issues. Conforms closely with the EPA, 1986
The Air (Prevention and Control of Pollution) Act, 1981	Means for the control and abatement of air pollution
Biological Diversity Act (2002)	Conservation of biological resources and associated knowledge as well as facilitating access to them in a sustainable manner and through a just process.
Wetlands (Conservation and Management) Rules, 2010	Drafted to ensure better conservation and management and to prevent degradation of existing wetlands in India
National Mission for Sustaining the Himalayan Ecosystem	Goals to prevent melting of the Himalayan glaciers and to protect biodiversity in the Himalayan region
Green India Mission	Afforestation of six million hectares of degraded forest lands and expanding forest cover from 23 to 33 percent of India's territory.

Legislation / Policy / Strategy	Description
National Mission for Sustainable Agriculture	Promotes climate adaptation in agriculture
Sub-National	
The Jammu and Kashmir State Forest Corporation Act, 1978	Provisions for the establishment and constitution of a Corporation for better conservation, supervision and management of forests and forest produce within the former State of Jammu and Kashmir (Government of Jammu and Kashmir n.d.).
The Jammu and Kashmir Kahcharai Act, 2011	Ensures sustainable grazing by laying down provisions related to the movement of livestock, cess, collection of village kahcharai, powers of revenue officers as well as offences and penalties in respect to kahcharai (Government of Jammu and Kashmir, 2011).
The Jammu and Kashmir Fruit Nurseries (Licensing) Act,1987	Provides for the licensing and regulation of fruit nurseries in the former state of Jammu and Kashmir (Directorate of Horticulture, 1987).
The Jammu and Kashmir Mulberry Protection Act, 1949	Provides for the protection of mulberry trees and prohibition of possession of mulberry wood. In addition, it includes provision related to the right of silkworm rearers to use mulberry leaves growing on other or U.T land. The Act also details out offences, penalties and procedure related to the mulberry tree. (Government of Jammu and Kashmir, 1949a).
The Jammu and Kashmir Preservation of Specified Trees Act, 1969	Provides for the growth, conservation and protection of certain tree species (Government of Jammu and Kashmir, 1969). Such species of trees hold special importance for the economic welfare of the former state of Jammu and Kashmir and are thus, included under the Act.
The Jammu and Kashmir Prohibition on Conversion of Land and Alienation of Orchards Act, 1975	Enacted to restrict the conversion of land and alienation of orchards without any prior permission in the former state of Jammu and Kashmir (Government of Jammu and Kashmir, 1975).
The Jammu and Kashmir Vegetable Seeds Act, 1952	Provisions for effective management and control of the production and trade in vegetable seeds (Government of Jammu and Kashmir,1952).
The Jammu and Kashmir Water Supply Act, 1963	Holds provision for the regulation of water supply in the UT for domestic, commercial and public purposes (Government of Jammu and Kashmir, 1963).
The Jammu and Kashmir Animal Disease (Control) Act, 1949	Provides for effective control and prevention of diseases affecting animals (Government of Jammu and Kashmir, 1949b).
Jammu and Kashmir Water Resources (Regulation and Management) Act, 2010	Provides for the consolidation of law relating to water use and consumption, water supply, irrigation, conservation, protection and sustainable management of water, establishment of the State Water Resources Regulatory Authority and flood control and prevention (Government of Jammu and Kashmir, 2010).
The Jammu and Kashmir State Fisheries Act, 1903	Allows the UT Government to prohibit any acts of fishing by any of the recognized modes of fishing and at any specified area (Government of Jammu and Kashmir, 1903) through punishable offences and penalties with respect to restricted activities.
The J& K Cattle Trespass Act, 1920	Concerned with the amendment of law relating to trespasses by cattle (Government of Jammu and Kashmir, 1920).
The Jammu and Kashmir Willow (Prohibition on Export and Movement) Act, 2000	Provides for the prohibition of export and movement of willow wood outside the state of Jammu and Kashmir and for connected matters (Government of Jammu and Kashmir, 2000c).

Legislation / Policy / Strategy	Description
Jammu and Kashmir Biological Diversity Rules, 2015	Details the functions and responsibilities of the Jammu and Kashmir Biodiversity Board and Biodiversity Management Committees including that of the Chairperson and other members (Government of Jammu and Kashmir, 2015). In addition, the rules list out the restriction on activities related to access to biological resources as well as the procedure regarding application and operation of UT Biodiversity Fund. Overall, the rules provide for protection, conservation and management of biological resources in a sustainable manner.
The Jammu and Kashmir (Rehabilitation of Degraded Forests and Village Plantations) Rules, 1992	Includes the provision of establishment of the Village (Rehabilitation of Degraded Forests) Committees and Village plantation (Protection and Management) Committees along with their functions and responsibilities (Government of Jammu and Kashmir, 1992). The Rules aim to promote afforestation activities on degraded lands by undertaking an agreement under Jammu and Kashmir Social Forestry Project.
Jammu and Kashmir State Environmental Policy, 2018	Intends to conserve, protect and restore the environment of the UT through sustainable management of its ecosystem and natural resources (Department of Ecology Environment and Remote Sensing, 2018). The Policy also aims to ensure equitable access to environmental resources in order to improve the quality of life for all sections of society and consolidate environmental concerns in policy making for economic welfare and social development. Overall, the policy is based on the three principles of sustainable development namely, socially acceptable, economically viable and environmentally sound.
Jammu and Kashmir State Forest Policy, 2011	Provides for the conservation of biodiversity including wide variety of flora and fauna inhabiting the natural forests (Government of Jammu and Kashmir, 2011), restoration of degraded forests in order to optimize productivity and ensure continued flow of ecosystem goods and services and proper maintenance of forest vegetation and soil, extension of tree cover outside natural forests and utilization of climate change mitigation and adaptation potential of forests.
Local	
Draft Building Code (Jammu Division), 2020	Requires buildings to conform to provisions of J&K Forest, Wildlife and Bio-Diversity Act and Rules (Town Planning Organisation, 2020).
Jammu Tree Authority, 2020	This five-member tree authority is constituted by the General Administration Department (GAD) for the preservation of trees within the jurisdiction of JMC (The Kashmir Walla, 2020). The Authority is responsible for obtaining declaration from owners/occupants about the number and kind of trees in their land to specify the standards as per the locality and type of land.
Jammu and Kashmir Municipal Corporation Act, 2000	Concerned with the implementation of schemes and functions pertaining to the matters including urban forestry, protection of the environment, promotion of ecological aspects as well as provision of urban amenities such as parks, play grounds and gardens (Government of Jammu and Kashmir, 2000a).
Jammu Smart City Proposal, 2017	Aims to develop the city of Jammu into a "sustainable and economically vibrant city focusing on tourism, quality of life and trade by leveraging its heritage and location" (Housing & Urban Development Department, 2017). Some of the projects include green infrastructure development like public parks, rainwater harvesting and street plantations.

4.4. Institutional Environment in Jammu

Jammu Municipal Corporation (JMC): JMC is mandated to carry out multiple functions and duties within the municipal limits of Jammu city. These functions include health and sanitation, sewage disposal and drainage, water supply, urban planning, development of parks and green spaces and revenue.

Jammu Development Authority (JDA): The Authority is responsible for the preparation and implementation of Master Plan in the city of Jammu. The Master Plan envisions the sustainable development of the city of Jammu and includes environmental and suitable ecological development as one of its planning principles. The Master Plan also lays emphasis on the conservation of forests, rivers and lakes existing in the city.

Jammu and Kashmir Forest Department: This Department headed by the Principal Chief Conservator of Forests (PCCF) deals with the protection, management and conservation of forests in the UT of Jammu and Kashmir. Under the East circle of Jammu region, the department is responsible for the management of forests falling under the jurisdiction of city of Jammu.

Urban Environmental Engineering Department (UEED): Jammu and Kashmir UEED is responsible for undertaking the works of construction of sewerage and drainage as well as the protection of environment against natural disasters and anthropogenic pressure in the urban areas of the UT including the city of Srinagar. The UEED is also concerned with the construction of sewerage treatment plants (STP) to ensure flow of treated and unpolluted water into the local water bodies.

Jammu and Kashmir Biodiversity Council: The Government of Jammu and Kashmir set up a biodiversity council to conserve biological diversity, sustainably use its components and fairly and equitably share the benefits arising out of use of biological resources and knowledge. The biodiversity council which functions in consultation with National Biodiversity Authority is headed by the PCCF of the UT, comprising a total of ten members. The council maintains a People's Biodiversity Register (PBR) in every Panchayat and Municipal Corporation of the UT of Jammu and Kashmir.

Jammu Smart City Limited: This city agency aims to transform Jammu into a "sustainable and economically vibrant city focusing on tourism, quality of life and trade by leveraging its heritage and location". One of the main objectives of the Smart City Mission in Jammu includes environmental sustainability by promoting rainwater harvesting, use of solar energy, development of parks and increasing green cover.

4.5. Status of the NBSAP and SBSAP

4.5.1. NBSAP

In 1999, India released its National Policy and Macro Level Action Strategy on Biodiversity, in response to becoming a Party to the Convention on Biological Diversity (Ministry of Environment and Forests, 1999). This document was meant to provide the framework for preparing detailed action programmes at the micro level for conservation and sustainable use of biodiversity in the country. Between 2000 and 2003, as part of an externally funded Global Environment Facility (GEF) project, the Ministry of Environment and Forests (MoEF) initiated the development of the National Biodiversity Strategy and Action Plan (NBSAP) (TPCG and Kalpavriksh, 2005). The exercise was considered one of the largest participatory exercises in the country under which 33 state level, 10 eco-region level, 18 local level and 13 thematic action plans were prepared. The NBSAP was released as a final technical report in 2004. During this time the Biological Diversity Act was enacted in 2002 (Ministry of Environment and Forests, 2002) and the rules notified in 2004. In 2006, India adopted its National Environment Policy, as a result of which in 2008, the National Biodiversity Action Plan (NBAP) was developed (Ministry of Environment and Forests, 2008). As the NBAP of 2008 was drafted prior to the CBD Strategic Plan for Biodiversity 2011-2020, it was updated in 2014 with an addendum (Ministry of Environment and Forests 2014).The NBAP Addendum primarily comprises of 12 National Biodiversity Targets (NBTs) (Table 3) which link with the Aichi Biodiversity Targets. The NBTs were also crafted to crosslink with the 175 actions of the NBAP 2008 allowing for monitoring and reporting at a national level and contributing at an international level to Aichi targets. More information on India's NBTs and NBAP can be found in Annexure 8.2.

While the NBAP provides good overview of the state of biodiversity and the issues at hand, it reads more like a broad strategy paper and lacks decisive and well formulated action plans to address the issues. The plans for sustainable use and benefit sharing are missing and the new developments as a result of the Forest Rights Act, 2006 are not incorporated (Faizi, 2013). In order to impede the monitoring of the NBTs, timelines within the plans are flexible and objectives of the plan can only be enforced through schemes and programs of the relevant ministries. So far in India, mainstreaming of biodiversity has achieved some success in the forestry sector which is directly under the control of the MoEFCC, however in sectors such as agriculture, and water resources it is proving to be more challenging.

With the 10th Conference of Parties calling for the development of second generation NBSAPs, India needs set the focus of its strategy on the implementation mechanism, measurable targets and the incorporation of the biodiversity-poverty reduction linkage. Mainstreaming of biodiversity can be improved by focusing on improving sectoral ownership at the central and state level and increasing vertical cooperation. Furthermore, by reaching out to NGOs and the civil society to contribute to the process, enhanced implementation of the NBTs and a more comprehensive NBSAP will be possible.

Table 3: National Biodiversity Targets

	**TARGET 1:** By 2020 a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
	**TARGET 2:** By 2020 values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation strategies.
	**TARGET 3:** Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalised and actions put in place by 2020 for environmental amelioration and human well-being.
	**TARGET 4:** By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritised invasive alien species are managed.
	**TARGET 5:** By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.
	**TARGET 6:** Ecologically representative areas under terrestrial and inland water, and coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services and conserved effectively and equitably, based on protected area designation and management and other area-based conservation measures are integrated into the wider landscapes and seascapes, covering over 20 % of the geographic area of the country by 2020.
	**TARGET 7:** By 2020, genetic diversity of cultivated plants, farm livestock and their wild relatives, including other socio-economically as well as culturally valuable species, is maintained and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
	**TARGET 8:** By 2020, ecosystem services, especially those relating to water, human health, livelihoods and well-being are enumerated and measures to safeguard them are identified, taking into account the needs of women and local communities, particularly the poor and vulnerable sections.
	**TARGET 9:** By 2015, Access to Genetic Resources and the Fair and Equitable Sharing of benefits arising from their utilization as per the Nagoya protocol are operational, consistent with national legislations.
	**TARGET 10:** By 2020, an effective, participatory and updated national biodiversity action plan is made operational at different levels of governance.
	**TARGET 11:** By 2020, national initiatives using communities' knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.
	**By 2020:** Opportunities to increase the availability of financial, human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the strategy for resource mobilization is adopted.

(Source: Ministry of Environment, Forest and Climate Change, 2014)

At the CBD COP15 held in Montreal Canada in December 2022, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted by 188 governments including India. The GBF consists of four global goals and 23 targets to protect nature and halt extinction by 2030 (SCBD, 2022). India will need to revise its NBTs to align with the new framework, the agreed upon goals and the targets within the new 2030 timeframe.

4.5.2. SBSAP

The Jammu and Kashmir BSAP (State Forest Research Institute J&K, 2003) encompasses a set of biodiversity-related guidelines and future actions directed toward the sustainable use, management and conservation of its biological resources (Directorate of Environment and Remote Sensing n.d.). The document also presents a detailed account of flora and fauna and aquatic and terrestrial ecosystems including forests, lakes and wetlands existing in the UT. An analysis of the factors causing degradation of biodiversity in the UT including intensive agricultural practices, urbanization, infrastructure development and introduction of hybrid varieties of crops is also made. Strategies outlined are general and include ones for conservation of both wild and domesticated biodiversity conservation, awareness, training and education, along with what steps must be taken by the State Forest Research Institute. A sector wise action plan is suggested for the following sectors

- Assessment of Natural resources and Land use planning
- Access to Local Germplasm and Traditional Knowledge
- In-situ Conservation
- Ex-situ Conservation
- Institutional reforms
- Legislative reforms
- Education, Public Awareness and Training
- Research and Development
- National and International Cooperation

In addition, the action plan emphasizes on active participation and co-ordination amongst all stakeholders such as government organizations and departments, academic institutions, private groups, NGO's and the general public to support its proper implementation.

5. Vision and Guiding Principles for LBSAP of Jammu

This section encompasses the overarching vision, as well as guiding principles. The overarching strategy for a LBSAP consists of a 'Vision' and clearly defined 'Focus Areas'.

5.1. Vision

The Vision is a short descriptive statement of the desired future state of biodiversity within the local municipality. The Vision is intended to provide direction to the plan as well as provide inspiration and motivation. It ideally articulates an optimal future scenario to strive towards and should be both concise and ambitious yet realistic and achievable. A compelling vision can provide a powerful means to galvanize city-wide cross-sectoral support for an LBSAP objectives to achieve the vision.

Vision of Jammu City for LBSAP

"Jammu City envisions a future that balances economic priorities with ecological security of the city through conservation of its cultural and natural heritage, ecological practices, a focus on enhancing and conserving the city's natural resources, including waterbodies, and climate-smart infrastructure, with participation of resident communities."

5.2. Guiding Principles

The guiding principles for achieving the vision are:

1. Jammu's ecological and cultural history is unique as evidenced by its folklore where nature and people coexist peacefully. This should carry forward as the main focus in the conservation plans and activities.
2. Heritage structures including the city's vast and interconnected water bodies and sacred groves should be restored to their former status.
3. Integration of up-to-date scientific knowledge, principles of traditional environmental management and climate-resilient development should be applied for the conservation and protection of local biodiversity.
4. Local communities should be engaged for the conservation and management of the remaining natural areas in order to harness existing local and traditional knowledge and raise awareness of biodiversity issues.

5.3. Focus Areas

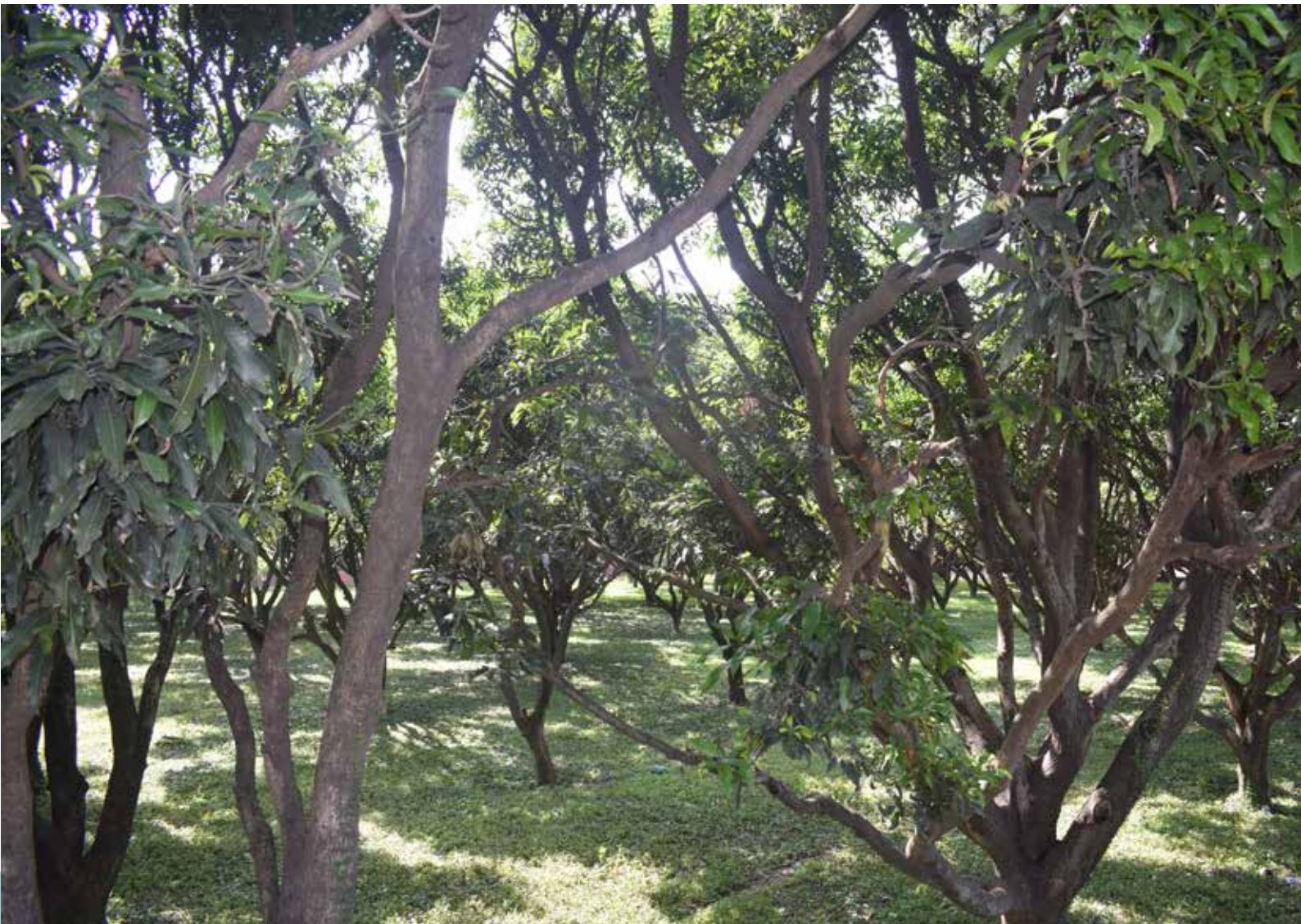
LBSAP Focus Areas are intended to be planned, deliberate and focused efforts required to achieve the Vision. Most importantly, the Focus Areas established should reflect the priorities of the stakeholders, within the context of the established Vision to help create a common sense of purpose. The eight Focus Areas for the LBSAP are outlined below in the Table 4. Unlike in some other LBSAPs from cities across the world, this LBSAP used important ecosystems as focus areas instead of developing few defined areas for action. These ecosystems are the ones which are reported to be under serious threat of biodiversity loss due to various developmental and anthropogenic activities in the city. The goals and actions plans were developed based on these threats identified in consultation with various stakeholders in the city (Refer Annexure 8.4).

Table 4: Jammu LBSAP Focus Areas

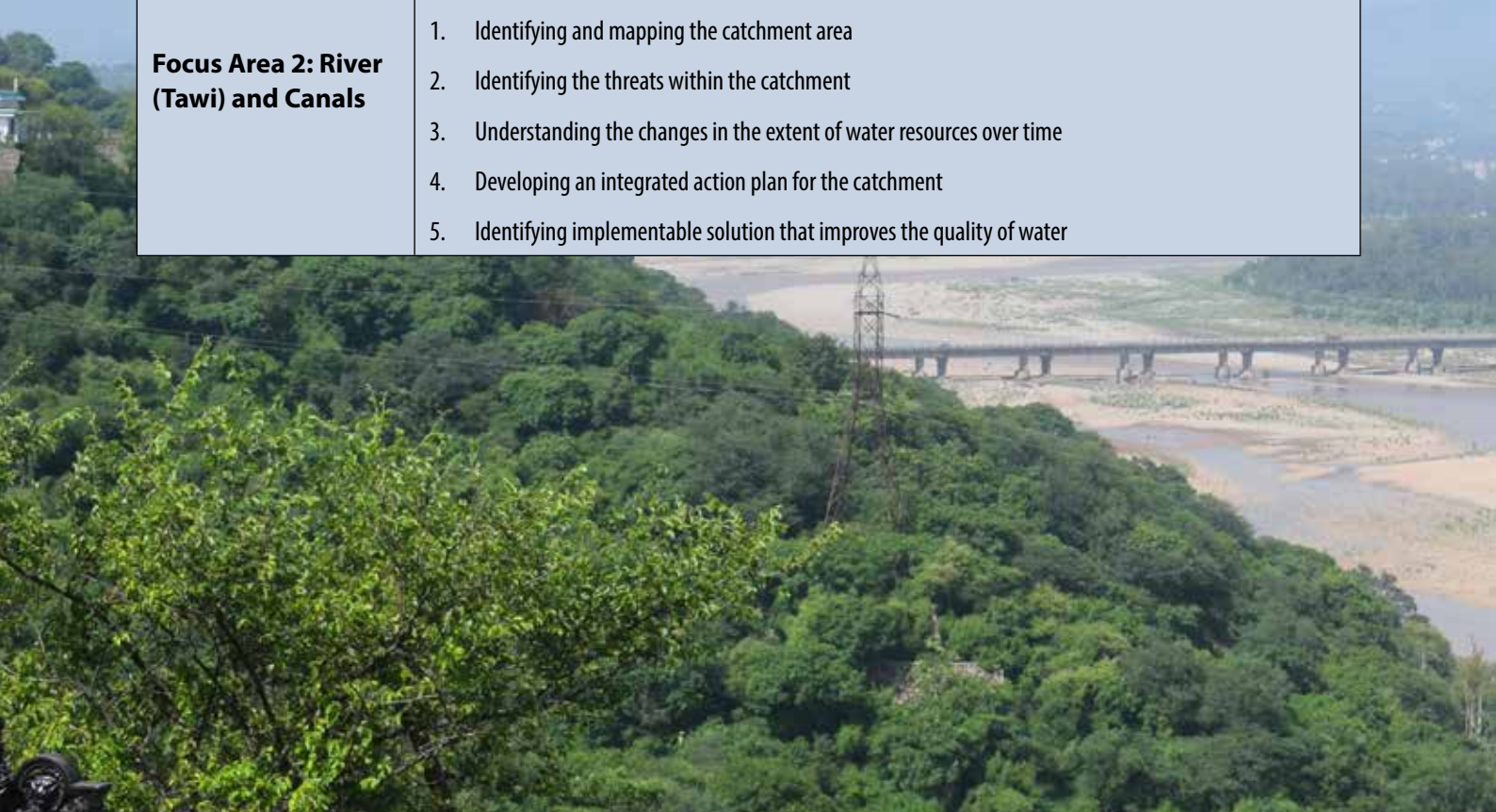
Sl. No.	Focus Areas
1	Forests and Hills
2	River (Tawi) and Canals
3	Ponds
4	Agriculture
5	Sacred Groves
6	Urban green spaces (Parks, Gardens, Institutional green spaces)
7	Kandi belts
8	Khads

5.4. Biodiversity Goals

LBSAP Goals refer to well defined targeted statements that give clarity, direction and focus to the LBSAP. These goals constitute the core LBSAP and are closely aligned with the National Biodiversity Action Plan, and ultimately the Aichi Biodiversity Targets. The 20 goals for the Jammu LBSAP under eight focus areas, along with guiding notes to provide further context for the selected goals, are outlined below:



Biodiversity Goals	
Focus Area 1: Forests and Hills	**Goal 1.1:** Establish the state of the natural and biological resources within this ecosystem **Guiding Notes:** This goal aims at: 1. Documenting and creating a repository of biodiversity 2. Improving access to and awareness of the natural and biological wealth for the purpose of city planning and future conservation activities
	Goal 1.2: Improve the quality and extent of forest cover **Guiding Notes:** This goal aims at: 1. Identifying threats to the forest extent and quality 2. Developing interventions that will lead to an improvement of the same 3. Improve connectivity between forested spaces
	Goal 1.3: Improve community participation and knowledge in decisions related to protection and conservation of Forested areas in the city region **Guiding Notes:** This goal aims at: 1. Strengthening public participation in the management of forests ad forest hills 2. Linking and enhancing traditional knowledge in administration and management of the ecosystem
	Goal 1.4: Improve institutional convergence for better decision making **Guiding Notes:** This goal aims at: 1. Streamlining financial and human resources for the management of forests and forested hills 2. Developing stronger integrated management protocols and plans
Focus Area 2: River (Tawi) and Canals	**Goal 2.1:** Strengthen climate resilience through sustainable water management **Guiding Notes:** This goal aims at: 1. Identifying and mapping the catchment area 2. Identifying the threats within the catchment 3. Understanding the changes in the extent of water resources over time 4. Developing an integrated action plan for the catchment 5. Identifying implementable solution that improves the quality of water



Biodiversity Goals	
	Goal 2.2: Conserve River Tawi **Guiding Notes:** This goal aims at: 1. Developing a detailed plan for the protection and conservation of the river 2. Restoring the degraded and polluted areas of the river 3. Implementing scientifically-informed riverbank restoration actions 4. Reducing mining impacts on water body health
	Goal 2.3: Restoring Jammu Canals **Guiding Notes:** This goal aims at: 1. Developing a comprehensive canal management plan that guides the protection and maintenance of the same 2. Identifying, arresting or mitigating sources of pollution
Focus Area 3: Ponds	**Goal 3.1:** Establish the extent of the existing pond network within the city **Guiding notes:** This goal aims at: 1. Documenting the area of ponds within the city 2. Making the information on ponds available for city planning
	Goal 3.2: Restore ponds with public participation **Guiding notes:** This goal aims at: 1. Improving public consultation and local involvement in the protection and conservation of water bodies 2. Democratizing natural resource management 3. Injecting traditional management techniques into mainstream management
Focus Area 4: Agriculture	**Goal 4.1:** Restore, protect and manage existing agricultural lands **Guiding notes:** This goal aims at: 1. Enhancing the food security base of the city 2. Protecting agricultural lands within the city 3. Exploration of biodiversity friendly methods of cultivation
	Goal 4.2: Promote organic farming and other biodiversity friendly methods of cultivation **Guiding notes:** This goal aims at: 1. Promoting organic methods of cultivation 2. Protecting the existing agri-biodiversity 3. Reducing reliance on chemical farming inputs 4. Improving livelihood of farmers

Biodiversity Goals	
Focus Area 5: Sacred Groves	**Goal 5.1:** Protection of existing sacred groves **Guiding notes:** This goal aims at: 1. Inventorying and identifying existing sacred groves in the city 2. Improving awareness around these 3. Building community participation in the conservation of the same
	Goal 5.2: Establishment of new sacred groves **Guiding notes:** This goal aims at: 1. Establishing innovative greening and conservation strategies 2. Involvement of religious institutions in conservation activities 3. Protection of native species
Focus Area 6: Urban green spaces (Parks, gardens, institutional gardens)	**Goal 6.1:** Enhance quality of urban green spaces **Guiding notes:** This goal aims at: 1. Scientifically informed greening activities within the city 2. Shifting the focus from ornamental introduced varieties to functional indigenous species 3. Waste management within urban green spaces
	Goal 6.2: Increased investment in green space development and maintenance **Guiding notes:** This goal aims at: 1. Providing a comprehensive plan for reducing pollution in the city in next 5 years 2. Promoting private investment in urban green spaces 3. Protecting green spaces by generating revenue from the same
Focus Area 7: Kandi belts	**Goal 7.1:** Improved management of kandi belts **Guiding notes:** This goal aims at: 1. Delineating the extent of kandi belts which lie within the jurisdiction of the city and improving the management efforts 2. Improving governance mechanisms for effective management 3. Developing protective legislation and policies to check encroachment, deforestation and degrading agricultural practices
	Goal 7.2: Community involvement in effective management of kandi belts **Guiding notes:** This goal aims at: 1. Cultivating an understanding of the value of and sensitivity towards kandi belts 2. Inculcating nature values among the local populace

Biodiversity Goals	
Focus Area 8: Khads	**Goal 8.1:** Establish existing area of khads within the city limits **Guiding notes:** This goal aims at: 1. Understanding the total area of this unique landuse. 2. Developing a geo-referenced map with these details.
	Goal 8.2: Improving the ecological services provided by khads **Guiding notes:** This goal aims at: 1. Identifying various threats impacting the health of this ecosystem 2. Developing interventions that will lead to an improvement of the same

5.5. Actions Supporting the Goals

The Actions included in this LBSAP directly link to the Biodiversity Goals outlined above. Actions defined herein factors in (1) what steps need to be taken to reach the goal and how to get there (2) who is responsible for the actions; and (3) broad timeframe for the completion of each action.

Table 5: Actions linked with the biodiversity goals for Jammu city

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
Focus Area 1: Forests and Hills				
Goal 1.1 Establish the state of the natural and biological resources within this ecosystem	1. Documenting the biodiversity wealth through systematic, taxa-specific surveys and development of an online database of species inventories and maps	BMC, J&K Biodiversity Council, J&K Forest Research Institute, Zoological Survey of India, Botanical Survey of India, Subject Matter Experts, Academic institutions, NGOs, Indian Armed Forces, JMC	Two years	Long-term
	2. Identification of hotspots of degradation and associated drivers	BMC, Zoological Survey of India, Botanical Survey of India, Subject Matter Experts, NGOs, BMC, RWAs, local community, Academic institutions, NRSC, Disaster Management Authority, JMC	One year	Long term
	3. Demarcation of the boundaries of forest and hill ecosystems on GIS platforms	Academic institutions, J&K Forest Department, J&K Biodiversity Council, NGOs, National Remote Sensing Centre (NRSC)	One year	Long-term
	4. Involvement of citizens and NGOs through citizen science platforms or city-wide campaigns	NGOs, Academic institutions, J&K Biodiversity Council, BMC, JMC	Continuous	Long-term
	5. IEC materials and awareness programs on the importance and fragility of these ecosystems targeting tourists and pilgrims	Tourism Department, NGOs, Academic institutions, JMC, J&K Biodiversity Council	Continuous	Long-term
	6. Long-term research partnerships with educational and academic institutions	BSI, ZSI, J&K Forest Department, J&K Forest Research Institute, NGOs, Academic institutions, Jammu University, Local researchers	Continuous	Medium-Long-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
Goal 1.2 Improve the quality and extent of forest cover within these ecosystems through better management	1. Invasive plant species documentation, distribution mapping and risk assessment	BSI, ZSI, J&K Forest Department, J &KFRI, NGOs, Academic institutions, Citizens, Local researchers, J&K Biodiversity Council, JMC	One year	Short-term
	2. Watershed management through catchment area treatment including soil conservation activities	J&K Forest Department, Department of Soil & Water Conservation, J&K FRI, Jal Shakti Department, Indian Armed Forces, JMC, NGOs, Academic institutions, Local researchers, Local community	Continuous	Long-term
	3. Landslide management	J&K Forest Department, Department of Soil & Water Conservation, Jal Shakti Department, Ministry of Road Transport and Highways, Indian Armed Forces, JMC	Continuous	Long-term
	4. Development of site-specific restoration packages including policy recommendations and implementation of the same	J&K Forest Department, J&K FRI, Subject Matter Experts, Academic institutions, J&K Biodiversity Council, JMC NGOs, BMC, JSCL	Five years	Medium- Long term
	5. Identification of potential corridors for wildlife movement	J&K Forest Department, J&K Biodiversity Council, JMC, NGOs, Academic institutions, Citizens, Local researchers	Yearly	Long-term
	6. Identification of OECMs or Biodiversity Heritage Sites	J &K Forest Department, J&K Biodiversity Council, JMC, NGOs, Academic institutions, Citizens, Local researchers, JDA, JSCL	Annual	Short-term
Goal 1.3 Improve community participation and knowledge in decisions related to protection and conservation of Forested areas in the city region	1. Updation of traditional Knowledge in People's Biodiversity Register for Jammu city through public participation	J&K Forest Department, J&K Biodiversity Council, J&K FRI, NGOs, BMC, DEERS, Department of Social Forestry	Continuous	Long Term
	2. Public consultation for biodiversity-related activities and decisions undertaken within city	JMC, J&K Forest Department, J&K Biodiversity Council, J&K FRI, Urban Development Department, Department of Social Forestry	Continuous	Short term
	3. Capacity development of local community in building climate resilience and disaster management through nature-based solutions	NGOs, Academic institutions, BMC, JMC, J&K Biodiversity Council, UT Disaster Management Authority, SDRF	Continuous	Long-term
	4. Mandate yearly educational visits to natural areas in educational curriculum	Educational boards, JMC, J&K Forest Department, J&K Biodiversity Council, Educational institutions, DEERS	One year	Long-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
Goal 1.4 Improve institutional convergence for better decision making	1. Harmonize the actions of all role-players through strategic planning, inter-departmental meetings and joint annual budget planning	JMC, J&K Forest Department, J&K Biodiversity Council, Road and Transport Department, Concerned departments of ULB and UT	Continuous	Long-term
	2. Appropriate awareness raising, institutional arrangements and capacity building activities	HRD/Technical/Skill Development Institutes, NGOs	Continuous	Short-term
Focus Area 2: River Tawi and Canals				
Goal 2.1 Strengthen climate resilience through sustainable water management	1. Mapping the catchment area	Department of Soil and Water Conservation, NGOs, Irrigation and Flood control (Jal Shakti) Department, BMC, JMC	One Year	Short-term
	2. Identification of drivers of degradation within the catchment	J&K Forest Department, NGOs, Irrigation and Flood control (Jal Shakti) Department, Jammu Development Authority, JMC, BMC	One Year	Short-term
	3. Develop integrated water resource management plan at the catchment level	Department of Soil and Water Conservation, NGOs, Irrigation and Flood control (Jal Shakti) Department, Local citizens, CSOs, District administration; PRIs; Village plantation committee (VPCs)	One Year	Long-term
	4. Implementation of environmentally friendly stormwater management policies that reduce the impact on aquatic ecosystems	JMC, NGOs, CSOs, Academic institutions, Irrigation and Flood control (Jal Shakti) Department, Jammu Development Authority, J&K Biodiversity Council	Two years	Long-term
Goal 2.2 Conserve River Tawi	1. Declaration of catchment area as an Ecologically Sensitive Area	J&K Biodiversity Council, Irrigation and Flood control (Jal Shakti) Department, Jammu Development Authority, Urban Development Department, JMC	Three years	Long-term
	2. Regulation and monitoring of construction activities in the catchment and flow areas of the river	J&K Forest Department, J&K Biodiversity Council, Irrigation and Flood control (Jal Shakti) Department, Jammu Development Authority, Urban Development Department, JMC	Continuous	Long-term
	3. Undertaking hydrological studies to determine the carrying capacity and extraction limit and mining threshold capacity of the river	NGOs, Academic institutions, JMC, J&K Biodiversity Council	Two years	Long-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
	4. Undertaking eco-friendly riverfront redevelopment	Jammu Development Authority, Urban Development Department, JMC, JSCL, J&K Biodiversity Council	Three-Five Years	Medium- Long term
	5. Developing sand and gravel mining guidelines that maintain the river equilibrium with the application of sediment transport principles in determining the locations, period and quantity to be extracted	J&K Mining Department, JMC, DEERS, SIA	One year	Medium-term
Goal 2.3 Restoring Jammu Canals	1. Desilting, deweeding and application of Nature-based Solutions for canal restoration	Jammu Development Authority, Urban Development Department, JMC, JSCL, Irrigation and Flood control (Jal Shakti) Department, Urban Environmental Engineering Department, J&K Biodiversity Council	Continuous	Short-Medium term
	2. Prevention of sewage discharge in the canals through establishment of decentralized sewage treatment plants at various hotspots- both industrial and domestic	Jammu Development Authority, Urban Development Department, JMC, JSCL, Urban Environmental Engineering Department, Pollution Control Board	Continuous	Short-Medium term
	3. Prevention of solid waste disposal in canals by household-level segregated waste collection and establishment of decentralized organic waste treatment supplemented by targeted awareness programs	JMC, JSCL, NGOs, Academic institutions	Continuous	Short-Medium term
	4. Development of canal management plan that guides the protection and maintenance of the same	Jammu Development Authority, Urban Development Department, JMC, JSCL, Urban Environmental Engineering Department, Pollution Control Board, NGOs, Academic institutions, J&K Biodiversity Council	One year	Long-term
Focus Area 3: Ponds				
Goal 3.1 Establish the extent of the existing pond network within the city	1. GIS based documentation of the existing pond network within the plains and kandi belts and community spaces around the same	BMC, NGOs, Academic institutions, JMC, J&K Biodiversity Council, J&K Department of Soil and Water Conservation	One year	Short-term
	2. Identify drivers of degradation and threats to existing pond network	BMC, NGOs, Academic institutions, JMC, J&K Department of Soil and Water Conservation	One year	Short-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
Goal 3.2 Restore ponds with public participation	1. Development of action plans for revival and restoration of ponds with community inputs, under the leadership of a Pond Restoration Cell, housed in JMC	PRI, BMC, NGOs, Academic institutions, JMC, Religious organisations	One year	Long-term
	2. Plantation of indigenous species around ponds, establishing plastic free zones around the ponds	BMC, NGOs, JMC, Community, Religious organisations, JSCL, Department of Soil and Water Conservation	One year	Short-term
	3. Formation of neighbourhood-based pond associations in appropriate wards or ward clusters preferably with some link to the Baradri system for regular monitoring of pond health	BMC, NGOs, JMC, Community, Religious organisations	Two years	Short-term
Focus Area 4: Agriculture				
Goal 4.1 Restore, protect and manage existing agricultural lands	1. Mapping of existing agricultural lands and documentation of crops grown	J&K Agriculture Department, J&K Revenue Department, Town Planning Department	One year	Short-term
	2. Policy support for urban agriculture including crop insurance, incentives, traditional seed banks	J&K Agriculture Department, J&K Horticulture Department, JMC, JDA, UEED, Financial Institutions, Banks, Micro-financing organisations	Two years	Long-term
	3. Promoting home gardens, kitchen gardens and terrace gardens through revision of provisions in building bye laws	JMC, JDA, Town Planning Department, BMC, RWAs	One year	Medium-term
	4. Awareness generation on schemes and subsidies relevant to urban farming	J&K Agriculture Department, JMC, JSCL, NGOs, School and college students	Continuous	Short-term
	5. Research into managing monkey menace within city	Academic institutions, NGOs, J&K Wildlife Protection Department, JMC, JSCL,	Three years	Short-term
Goal 4.2 Promote organic farming and other biodiversity friendly methods of cultivation	1. Promotion of use of biopesticides and organic manure production and use (through subsidies)	J&K Agriculture Department, J&K Horticulture Department, JMC, IIIM Jammu, JDA	Continuous	Short-Medium term
	2. Research on agro-forestry options that can be implemented in the paddy fields of the city	IIIM Jammu, Academic institutions, NGOs, JMC, Department of Social Forestry	Three-Five years	Medium-term
	3. Development of package of practices and value addition mechanisms	J&K Agriculture Department, J&K Horticulture Department, JMC, IIIM Jammu, Academic institutions, NGOs	Two years	Medium-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
	4. Development of market chain and market linkages	J&K Agriculture Department, J&K Horticulture Department, JMC, IIIM Jammu, Academic institutions, NGOs	Two years	Medium- term
	5. GI tag for Basmati rice	J&K Agriculture Department, J&K Horticulture Department, JMC, IIIM Jammu, Academic institutions, NGOs	Two years	Long-term
Focus Area 5: Sacred Groves				
Goal 5.1 Protection of existing sacred groves	1. Documenting the existing sacred groves in the city along with locations and stakeholders	JMC, AYUSH, Schools and educational institutions, NGOs, Religious institutions, Academic institutions, Local community, BMC	One year	Short-term
	2. Protection and management of sacred groves	JMC, AYUSH, Schools and educational institutions, NGOs, Religious institutions, Academic institutions, Local community, BMC	One year	Short-term
	3. Awareness generation among locals and tourists on the relevance and significance of sacred groves through heritage walks, pictorial handbooks on the biodiversity, cultural and medicinal use importance of scared groves	JMC, J&K Tourism Department, JSCL, Jammu Development Authority, Religious institutions, NGOs, BMC	Continuous	Medium-term
	4. Improved waste management within sacred groves	JMC, Religious institutions, NGOs, Local community, BMC	Continuous	Short-term
	5. Exploring innovative financial models for conservation of groves such as 'Adopt a grove/ tree' etc.	Religious institutions, NGOs, Schools and Educational institutions, Universities, AYUSH, Corporates, JMC	One year	Medium-term
Goal 5.2 Establishment of new sacred groves	1. Conducting participatory appraisals with stakeholders to identify new sites for sacred groves to be established within the city	AYUSH, JMC, Religious institutions, NGOs, Schools and Educational institutions, Jammu University, Mata Vaishno Devi University, BMC	One year	Short-term
	2. Developing community managed local nurseries with saplings of species unique to sacred groves	J&K Forest Department, AYUSH, JMC, BMC, RWAs	Three-Five years	Medium-term
	3. Forging partnerships with religious institutions, NGOs and schools to undertake plantation drives within sites identified to establish new sacred groves	Religious institutions, NGOs, Schools and Educational institutions, JMC	Continuous	Medium-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
Focus Area 6: Urban Green Spaces				
Goal 6.1 Enhance quality of urban green spaces	1. Undertaking scientifically informed plantations of indigenous species and maintenance of the same	JMC, J&K Forest Department, Floriculture Department, JSCL, BMC, J&K Department of Social Forestry	Continuous	Long-term
	2. Establishment of city-level nurseries of native trees	JMC, J&K Forest Department, J&K Floriculture Department, JSCL, J&K Department of Social Forestry	Three-Five years	Medium term
	3. Development of corridors to connect key biodiversity hotspots and improve existing network of green spaces	JMC, J&K Forest Department, J&K Floriculture Department, JSCL, BMC, Subject Matter Experts, J&K Department of Social Forestry	Three-Five years	Medium-Long term
	4. Improved waste management within pubic parks and gardens by implementing ban on plastic within these spaces and awareness campaigns	JMC, J&K Forest Department, J&K Floriculture Department, JSCL, UEED, J&K Pollution Control Committee	Continuous	Medium-Long term
	5. Geotagging of trees over 50 years old and maintenance of a database of the same	JMC, J&K Forest Research Institute, Floriculture Department, JSCL, Academic institutions, BMC	Two years	Long-term
Goal 6.2 Increased investment in green space development and maintenance	1. Development of green space management plans (including business cases for private sector investment)	NGOs, RWAs, , Landscape architects, JMC, Jammu Smart City Limited, J&K Horticulture Department, Subject Matter Experts including Environmental Economists	One year	Long-term
	2. Promoting private sector investment in new green space development and rejuvenation of existing parks	JMC, Corporates, NGOs, Financial institutions, BMC	Two years	Medium-term
Focus Area 7: Kandi Belts				
Goal 7.1 Improved management of kandi belts	1. Mapping of existing kandi belt and identification of the degradation levels and drivers of the same	Rural Development and Panchayati Raj Department, J&K Forest Department, NGOs, Academic institutions, District Administration, JMC, J&K Department of Soil & Water Conservation	One year	Medium-term
	2. Developing a kandi belt management and eco-restoration policy and action plan	Rural Development and Panchayati Raj Department, J&K Forest Department, NGOs, Academic institutions, JMC, Irrigation and Flood Control Department, Revenue Department, Town Planning Department, Farmers, Local community, District Administration, J&K Department of Soil & Water Conservation	Two years	Medium-Long term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
	3. Implementation of actions proposed under the restoration package including appropriate soil and water conservation measures	Rural Development and Panchayati Raj Department, J&K Department of Soil & Water Conservation, JMC, NGOs, Academic institutions, Irrigation and Flood Control Department, Farmers, Local community, District Administration	Five years	Long-term
Goal 7.2 Community involvement in effective management of kandi belts	1. Awareness generation among farmers and citizens on ecological significance of kandi belts through workshops, street plays, focus group discussions etc.	NGOs, Academic institutions, J&K Forest Department, JMC, J&K Agricultural Department, District Administration, J&K Biodiversity Council, J&K Department of Soil & Water Conservation, Department of Wildlife Protection	Continuous	Medium-term
	2. Development and use of IEC material (boards, banners, pamphlets, radio, television campaigns and children's handbooks) for awareness generation	NGOs, Academic institutions, J&K Forest Department, JMC, J&K Agricultural Department, District Administration, BMC, Schools, J&K Department of Soil & Water Conservation, Department of Wildlife Protection	Continuous	Medium-term
	3. Formation of local-citizen led farmer groups responsible for management of kandi belts adjacent to their land parcels	NGOs, Academic institutions, J&K Forest Department, JMC, J&K Agriculture Department, Local community, Farmers, District Administration, BMC	One year	Medium-term
	4. Revival of kulhs or kuhals system of social irrigation in kandi belt	Farmers, local community, Irrigation and Flood Control Department, District Administration, JMC	5 years	Long-term
Focus Area 8: Khads				
Goal 8.1 Establish existing area of khads within the city limits	1. Survey and mapping of boundaries of khads within cities and their ownership pattern	Revenue Department, Panchayati Raj Institution, NGOs, Academic institutions, JMC, Rural Development and Panchayati Raj Department	One year	Medium-term
	2. Identification of flood hazard zones within the khads	Irrigation and Flood Control Department, NGOs, Academic institutions, JMC, Rural Development and Panchayati Raj Department, BMC	One-Two years	Short-term
Goal 8.2 Improving the ecological services provided by khads	1. Assessment of the biodiversity and the ecosystem services provided by khads through participatory appraisals	NGOs, Academic institutions, JMC, Subject Matter Experts, BMC	One year	Short-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/Long-term)
	2. Undertaking actions like delineating no-construction zones especially for highly prone flooding zones of khads, restriction of mining in khads and prevention of solid waste dumping	JMC, JDA, Urban Development Department, JSCL, Rural Development and Panchayati Raj Department, District Administration	One year	Short-term
	3. Undertaking restoration activities including soil conservation and plantation in khads	Department of Soil & Water Conservation, NGOs, Irrigation and Flood Control, JMC, JDA	Three- Five Years	Long term

6. Tools to Support Implementation of LBSAP

This section provides links to various tools that can support the implementation of LBSAP of JMC. The tools provided in this section are limited. We encourage the implementers to make use of various other tools that would help to deal with the local issues.

6.1. Natural Asset Map

ICLEI South Asia has developed the Natural Asset Map of Jammu city under the INTERACT-Bio project. This map shows the blue-green infrastructure of the city on the geographic information systems (GIS) platform. In order to communicate the significance of the ecosystems in the city to the citizens, an illustrated natural asset map has also been developed for Jammu. The infrastructure mapped includes the urban green areas like grounds, graveyards, parks and gardens, Golf courses, Avenue tree cover, irrigation canals, agricultural areas including rice fields, agroforestry plantations, orchards, vegetable cultivation, and natural ecosystems such as marshes, water bodies, River Tawi and its vegetation, scrub forest and forests. By providing a visual interpretation of the existing urban ecosystems, the map will help the city to plan better and include biodiversity conservation into consideration while planning developmental activities.

6.2. NBSAP - LBSAP Guidelines

The LBSAP is the local-level version of National Biodiversity Strategy and Action Plans (NBSAPs), the principal instrument used by national governments for implementing the Convention on Biological Diversity. Guidelines for development and implementation of National, Sub National and Local Biodiversity Strategies and Action Plans is a recently developed toolkit by ICLEI. It comprises of guidelines for development of Biodiversity Strategy and Action Plans at National, Sub National and Local levels. These guidelines have been accepted by the Secretariat of the Convention on Biological Diversity. For more details please visit: https://cbc.iclei.org/tools/

6.3. NBSAP of India

The NBSAP is an important instrument for implementing the Convention on Biological Diversity at the national level. Following the CBD mandate, the government of India prepared a macro-level statement of policies and strategies for conservation and sustainable use of biodiversity. Following this the MoEFCC implemented the externally aided NBSAP project from 2000-2004. Later by updating the macro level statement of policies document and by using the final technical report of the NBSAP project and the National Environmental Policy (NEP), Government of India prepared a National Biodiversity Action Plan (NBAP) in 2008 and Addendum in 2014. The NBAP 2008 identifies threats and constraints in biodiversity conservation taking into cognizance the existing legislations, implementation mechanisms, strategies, plans and programmes, based on which action points have been designed. For more details please visit: https://tinyurl.com/y9w3unal

6.4. SBSAP of Jammu and Kashmir

The SBSAP of Jammu and Kashmir is the sub-national instrument for the UT of J&K (previously a State) which establishes a framework its policy relating to the conservation and sustainable use of its biological resources. The document profiles the UT's physical features and its ecology providing background context, identifies the issues and threats faced by its biodiversity, identifies major stakeholders and ongoing initiatives along with conducting a gap analysis. Finally encompasses a set of biodiversity-related guidelines, strategies and future actions directed toward the sustainable use, management and conservation of its biological resources.

6.5. TEEB Manual

The Economics of Ecosystems and Biodiversity (TEEB) Manual for Cities was prepared based on the TEEB reports and ICLEI and IUCN's Local Action for Biodiversity Project. The manual has information tailored specifically for cities, which highlights how a focus on ecosystem services and their valuation can create direct benefits for cities. It also provides specific case studies and stepwise guidance on how to do this. For more details please visit: https://tinyurl.com/on5w9um

6.6. Kunming-Montreal Global Biodiversity Framework

The Global Biodiversity Framework (GBF) builds on the Strategic Plan 2011-2020 and Aichi targets to guide global action on nature through until 2030. The framework is said to be more inclusive, SMART and complex in its addressal of biodiversity loss, restoration of ecosystems and protection of indigenous rights. This will be achieved through four goals to be achieved by 2050 and 23 targets to be met by 2030 (SCBD, 2022).

The Goals which align with the vision for 2050 are:

GOAL A
The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels;

The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

GOAL B
Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

GOAL C
The monetary and non-monetary benefits from the utilization of genetic resources, and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments.

GOAL D
Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal global biodiversity framework are secured and equitably accessible to all Parties, especially developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of 700 billion dollars per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for Biodiversity.

Table 6: Kunming-Montreal Global Biodiversity Framework 23 targets

TARGET 1
Ensure that all areas are under participatory integrated biodiversity inclusive spatial planning and/or effective management processes addressing land and sea use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.
TARGET 2
Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.
TARGET 3
Ensure and enable that by 2030 at least 30 per cent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities including over their traditional territories.
TARGET 4
Ensure urgent management actions, to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.
TARGET 5
Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spill-over, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities.
TARGET 6
Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 percent, by 2030, eradicating or controlling invasive alien species especially in priority sites, such as islands .
TARGET 7
Reduce pollution risks and the negative impact of pollution from all sources, by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: reducing excess nutrients lost to the environment by at least half including through more efficient nutrient cycling and use; reducing the overall risk from pesticides and highly hazardous chemicals by at least half including through integrated pest management, based on science, taking into account food security and livelihoods; and also preventing, reducing, and working towards eliminating plastic pollution.
TARGET 8
Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solution and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.
TARGET 9
Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.

TARGET 10
Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches contributing to the resilience and long-term efficiency and productivity of these production systems and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.
TARGET 11
Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as regulation of air, water, and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and ecosystem-based approaches for the benefit of all people and nature.
TARGET 12
Significantly increase the area and quality and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature and contributing to inclusive and sustainable urbanization and the provision of ecosystem functions and services.
TARGET 13
Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, and facilitating appropriate access to genetic resources, and by 2030 facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.
TARGET 14
Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, fiscal and financial flows with the goals and targets of this framework.
TARGET 15
Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:
(a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains and portfolios;
(b) Provide information needed to consumers to promote sustainable consumption patterns;
(c) Report on compliance with access and benefit-sharing regulations and measures, as applicable;
in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production.
TARGET 16
Ensure that people are encouraged and enabled to make sustainable consumption choices including by establishing supportive policy, legislative or regulatory frameworks, improving education and access to relevant and accurate information and alternatives, and by 2030, reduce the global footprint of consumption in an equitable manner, halve global food waste, significantly reduce overconsumption and substantially reduce waste generation, in order for all people to live well in harmony with Mother Earth.
TARGET 17
Establish, strengthen capacity for, and implement in all countries in biosafety measures as set out in Article 8(g) of the Convention on Biological Diversity and measures for the handling of biotechnology and distribution of its benefits as set out in Article 19 of the Convention.
TARGET 18
Identify by 2025, and eliminate, phase out or reform incentives, including subsidies harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least 500 billion United States dollars per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.

TARGET 19
Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, by 2030 mobilizing at least 200 billion United States dollars per year, including by:
(a) Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least US$ 20 billion per year by 2025, and to at least US$ 30 billion per year by 2030;
(b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances
(c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;
(d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, benefit-sharing mechanisms, with environmental and social safeguards
(e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises,
(f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity
(g) Enhancing the effectiveness, efficiency and transparency of resource provision and use;
TARGET 20
Ensure that the best available data, information and knowledge, are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent, in accordance with national legislation.
TARGET 21
Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders.
TARGET 22
Ensure gender equality in the implementation of the framework through a gender-responsive approach where all women and girls have equal opportunity and capacity to contribute to the three objectives of the Convention, including by recognizing their equal rights and access to land and natural resources and their full, equitable, meaningful and informed participation and leadership at all levels of action, engagement, policy and decision-making related to biodiversity.
TARGET 23
By 2030, determine cross-sectoral goals and sector-specific goals for sustainable use, and put in place effective legal and policy measures to achieve them, based on ecosystem approaches, environmental principles and close cooperation with users of biodiversity in order to produce gains for biodiversity and human health and well-being

The framework will be implemented primarily through the development of national and local level goals and targets, formulation of regional biodiversity strategies and action plans such as LBSAPs as well as facilitation of periodic review and monitoring of progress at the global scale.

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8. Annexures

8.1. Check List of Species Belonging to Various Taxa found in Jammu

Bird Species

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
Waterfowl					
1	Anatidae	Lesser Whistling-Duck	*Dendrocygna javanica*	Resident	Yes
2	Anatidae	Bar-headed Goose	*Anser indicus*	Winter	No
3	Anatidae	Ruddy Shelduck (Brahminy Duck)	*Tadorna ferruginea*	Winter	Yes
4	Anatidae	Garganey	*Spatula querquedula*	Winter	Yes
5	Anatidae	Northern Shoveler	*Spatula clypeata*	Winter	Yes
6	Anatidae	Gadwall	*Mareca strepera*	Winter	Yes
7	Anatidae	Indian Spot-billed Duck	*Anas poecilorhyncha*	Resident	Yes
8	Anatidae	Mallard	*Anas platyrhynchos*	Winter	Yes
9	Anatidae	Northern Pintail	*Anas acuta*	Winter	Yes
10	Anatidae	Green-winged Teal (Common Teal)	*Anas crecca*	Winter	Yes
11	Anatidae	Common Pochard	*Aythya ferina*	Winter	No
Grouse, Quail, and Allies					
12	Phasianidae	Black Francolin	*Francolinus francolinus*	Summer	No
13	Phasianidae	Grey Francolin	*Francolinus pondicerianus*	Resident	Yes
Grebes					
14	Podicipedidae	Little Grebe	*Tachybaptus ruficollis*	Winter	Yes
Pigeons and Doves					
15	Columbidae	Rock Pigeon (Blue Rock Pigeon)	*Columba livia*	Resident	Yes
16	Columbidae	Eurasian Collared-Dove	*Streptopelia decaocto*	Resident	Yes
17	Columbidae	Spotted Dove	*Streptopelia chinensis*	Resident	Yes
18	Columbidae	Laughing Dove (Little Brown Dove)	*Streptopelia senegalensis*	Resident	Yes
19	Columbidae	Yellow-footed Green-Pigeon	*Treron phoenicopterus*	Summer	Yes
20	Columbidae	Oriental Turtle-Dove	*Streptopelia orientalis*	Summer	No
21	Columbidae	Red Collared-Dove (Red Turtle-Dove)	*Streptopelia tranquebarica*	Summer	No
22	Columbidae	Asian Emerald Dove	*Chalcophaps indica*	Vagrant	Yes
Cuckoos					
	Cuculidae	Greater Coucal	*Centropus sinensis*	Resident	Yes
25	Cuculidae	Asian Koel	*Eudynamys scolopaceus*	Summer	Yes
26	Cuculidae	Common Hawk-Cuckoo	*Hierococcyx varius*	Summer	Yes
27	Cuculidae	Pied Cuckoo (Jacobin Cuckoo)	*Clamator jacobinus*	Summer	Yes
28	Cuculidae	Common Cuckoo	*Cuculus canorus*	Summer	Yes
29	Cuculidae	Grey-bellied Cuckoo	*Cacomantis passerinus*	Summer	Yes
Rails, Gallinules, and Allies					
30	Rallidae	Eurasian Moorhen	*Gallinula chloropus*	Resident	Yes
31	Rallidae	Eurasian Coot	*Fulica atra*	Winter	Yes
32	Rallidae	Grey-headed Swamphen (Purple Swamphen)	*Porphyrio poliocephalus*	Resident	Yes
33	Rallidae	White-breasted Waterhen	*Amaurornis phoenicurus*	Resident	Yes
Cranes					
34	Gruidae	Common Crane	*Grus grus*	Winter	No
Shorebirds					
35	Burhinidae	Indian Thick-knee (Indian Stone-curlew)	*Burhinus indicus*	Resident	Yes
36	Burhinidae	Black-winged Stilt	*Himantopus himantopus*	Winter	Yes
37	Charadriidae	River Lapwing	*Vanellus duvaucelii*	Resident	No

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
38	Charadriidae	Northern Lapwing	*Vanellus vanellus*	Winter	Yes
39	Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	Resident	Yes
40	Charadriidae	White-tailed Lapwing	*Vanellus leucurus*	Winter	Yes
41	Charadriidae	Yellow-wattled Lapwing	*Vanellus malabaricus*	Winter	No
42	Charadriidae	Kentish Plover	*Charadrius alexandrinus*	Winter	No
43	Charadriidae	Little Ringed Plover	*Charadrius dubius*	Resident	Yes
44	Scolopacidae	Ruff	*Calidris pugnax*	Winter	Yes
45	Scolopacidae	Temminck's Stint	*Calidris temminckii*	Winter	Yes
46	Scolopacidae	Little Stint	*Calidris minuta*	Passage	No
47	Scolopacidae	Common Snipe	*Gallinago gallinago*	Winter	Yes
48	Scolopacidae	Common Sandpiper	*Actitis hypoleucos*	Resident	Yes
49	Scolopacidae	Green Sandpiper	*Tringa ochropus*	Resident	Yes
50	Scolopacidae	Common Greenshank	*Tringa nebularia*	Winter	Yes
51	Scolopacidae	Marsh Sandpiper	*Tringa stagnatilis*	Passage	Yes
52	Scolopacidae	Wood Sandpiper	*Tringa glareola*	Winter	Yes
53	Scolopacidae	Common Redshank	*Tringa totanus*	Winter	Yes
54	Glareolidae	Oriental Pratincole	*Glareola maldivarum*	Passage	No
55	Glareolidae	Small Pratincole	*Glareola lactea*	Winter	Yes
Gulls, Terns, and Skimmers					
56	Laridae	Whiskered Tern	*Chlidonias hybrida*	Summer	Yes
57	Laridae	River Tern	*Sterna aurantia*	Winter	Yes
Storks					
58	Ciconiidae	Woolly-necked Stork	*Ciconia episcopus*	Winter	No
59	Ciconiidae	Black Stork	*Ciconia nigra*	Winter	Yes
Cormorants and Anhingas					
60	Phalacrocoracidae	Little Cormorant	*Microcarbo niger*	Resident	Yes
61	Phalacrocoracidae	Great Cormorant	*Phalacrocorax carbo*	Resident	Yes
62	Phalacrocoracidae	Indian Cormorant (Indian Shag)	*Phalacrocorax fuscicollis*	Winter	No
Herons, Ibis, and Allies					
63	Ardeidae	Grey Heron	*Ardea cinerea*	Winter	Yes
64	Ardeidae	Purple Heron	*Ardea purpurea*	Winter	Yes
65	Ardeidae	Great Egret	*Ardea alba*	Winter	Yes
66	Ardeidae	Intermediate Egret	*Ardea intermedia*	Winter	Yes
67	Ardeidae	Little Egret	*Egretta garzetta*	Resident	Yes
68	Ardeidae	Cattle Egret	*Bubulcus ibis*	Resident	Yes
69	Ardeidae	Indian Pond-Heron	*Ardeola grayii*	Resident	Yes
70	Ardeidae	Black-crowned Night-Heron	*Nycticorax nycticorax*	Resident	No
71	Ardeidae	Black Bittern	*Ixobrychus flavicollis*	Winter	Yes
Long Leg Waders					
72	Threskiornithidae	Red-naped Ibis (Indian Black Ibis)	*Pseudibis papillosa*	Winter	No
Vultures, Hawks, and Allies					
73	Pandionidae	Osprey	*Pandion haliaetus*	Winter	No
74	Accipitridae	Black-winged Kite (Black-shouldered Kite)	*Elanus caeruleus*	Resident	Yes
75	Accipitridae	Egyptian Vulture	*Neophron percnopterus*	Resident	Yes
76	Accipitridae	Oriental Honey-buzzard (Crested Honey Buzzard)	*Pernis ptilorhynchus*	Summer	Yes

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
77	Accipitridae	Himalayan Griffon (Himalayan Vulture)	*Gyps himalayensis*	Resident	Yes
78	Accipitridae	Eurasian Griffon (Griffon Vulture)	*Gyps fulvus*	Resident	Yes
79	Accipitridae	Steppe Eagle	*Aquila nipalensis*	Winter	Yes
80	Accipitridae	White-eyed Buzzard	*Butastur teesa*	Summer	Yes
81	Accipitridae	Eurasian Marsh-Harrier	*Circus aeruginosus*	Winter	Yes
82	Accipitridae	Hen Harrier	*Circus cyaneus*	Winter	Yes
83	Accipitridae	Shikra	*Accipiter badius*	Resident	Yes
84	Accipitridae	Black Kite	*Milvus migrans*	Resident	Yes
85	Accipitridae	Long-legged Buzzard	*Buteo rufinus*	Winter	Yes
86	Accipitridae	Cinereous Vulture	*Aegypius monachus*	Winter	No
87	Accipitridae	Indian Spotted Eagle	*Clanga hastata*	Winter	No
88	Accipitridae	Booted Eagle	*Hieraaetus pennatus*	Resident	Yes
89	Accipitridae	Eurasian Sparrowhawk	*Accipiter nisus*	Resident	Yes
90	Accipitridae	Besra	*Accipiter virgatus*	Vagrant	No
Owls					
91	Strigidae	Spotted Owlet	*Athene brama*	Resident	Yes
92	Strigidae	Short-eared Owl	*Asio flammeus*	Winter	Yes
93	Strigidae	Indian Scops-Owl	*Otus bakkamoena*	Resident	Yes
94	Strigidae	Asian Barred Owlet	*Glaucidium cuculoides*	Resident	Yes
95	Tytonidae	Barn Owl	*Tyto alba*	Resident	Yes
96	Strigidae	Collared Scops-Owl	*Otus lettia*	Passage	Yes
Hoopoes					
97	Upupidae	Eurasian Hoopoe	*Upupa epops*	Resident	Yes
Hornbills					
98	Bucerotidae	Indian Grey Hornbill	*Ocyceros birostris*	Resident	Yes
Kingfishers					
99	Alcedinidae	Common Kingfisher (Small Blue Kingfisher)	*Alcedo atthis*	Resident	Yes
100	Alcedinidae	White-throated Kingfisher	*Halcyon smyrnensis*	Resident	Yes
101	Alcedinidae	Pied Kingfisher	*Ceryle rudis*	Resident	Yes
Bee-eaters, Rollers, and Allies					
102	Meropidae	Green Bee-eater	*Merops orientalis*	Summer	Yes
103	Meropidae	Blue-tailed Bee-eater	*Merops philippinus*	Summer	Yes
104	Coraciidae	Indian Roller	*Coracias benghalensis*	Summer	Yes
Barbets and Toucans					
105	Megalaimidae	Coppersmith Barbet	*Psilopogon haemacephalus*	Resident	Yes
106	Megalaimidae	Brown-headed Barbet (Large Green Barbet)	*Psilopogon zeylanicus*	Resident	Yes
107	Megalaimidae	Great Barbet	*Psilopogon virens*	Resident	Yes
108	Megalaimidae	Blue-throated Barbet	*Psilopogon asiaticus*	Resident	No
Woodpeckers					
109	Picidae	Eurasian Wryneck	*Jynx torquilla*	Resident	Yes
110	Picidae	Black-rumped Flameback (Lesser Goldenbacked Woodpecker)	*Dinopium benghalense*	Resident	Yes
111	Picidae	Fulvous-breasted Woodpecker	*Dendrocopos macei*	Resident	Yes
112	Picidae	Scaly-bellied Woodpecker	*Picus squamatus*	Summer	No
113	Picidae	Brown-capped Woodpecker	*Picoides nanus*	Resident	No

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
114	Picidae	Himalayan Woodpecker	*Dendrocopos himalayensis*	Vagrant	No
115	Picidae	Rufous-bellied Woodpecker	*Dendrocopos hyperythrus*	Vagrant	Yes
Falcons and Caracaras					
116	Falconidae	Eurasian Kestrel (Common Kestrel)	*Falco tinnunculus*	Resident	Yes
117	Falconidae	Peregrine Falcon	*Falco peregrinus*	Resident	Yes
Parrots, Parakeets, and Allies					
118	Psittaculidae	Alexandrine Parakeet	*Psittacula eupatria*	Resident	Yes
119	Psittaculidae	Rose-ringed Parakeet	*Psittacula krameri*	Resident	Yes
120	Psittaculidae	Plum-headed Parakeet	*Psittacula cyanocephala*	Resident	Yes
121	Psittaculidae	Red-breasted Parakeet	*Psittacula alexandri*	Vagrant	Yes
Cuckooshrikes					
122	Campephagidae	Long-tailed Minivet	*Pericrocotus ethologus*	Passage	Yes
123	Campephagidae	Small Minivet	*Pericrocotus cinnamomeus*	Resident	Yes
Fantails					
124	Rhipiduridae	White-throated Fantail	*Rhipidura albicollis*	Resident	Yes
Drongos					
125	Dicruridae	Black Drongo	*Dicrurus macrocercus*	Resident	Yes
126	Dicruridae	Ashy Drongo	*Dicrurus leucophaeus*	Summer	Yes
127	Dicruridae	Hair-crested Drongo (Spangled Drongo)	*Dicrurus hottentottus*	Resident	Yes
Shrikes					
128	Laniidae	Isabelline Shrike	*Lanius isabellinus*	Winter	No
129	Laniidae	Bay-backed Shrike	*Lanius vittatus*	Winter	No
130	Laniidae	Long-tailed Shrike	*Lanius schach*	Resident	Yes
131	Laniidae	Grey-backed Shrike	*Lanius tephronotus*	Summer	No
132	Laniidae	Brown Shrike	*Lanius cristatus*	Vagrant	No
Jays, Magpies, Crows, and Ravens					
133	Corvidae	Rufous Treepie	*Dendrocitta vagabunda*	Resident	Yes
134	Corvidae	House Crow	*Corvus splendens*	Resident	Yes
135	Corvidae	Large-billed Crow	*Corvus macrorhynchos*	Resident	Yes
136	Corvidae	Common Raven (Northern Raven)	*Corvus corax*	Resident	Yes
Fairy Flycatchers					
137	Stenostiridae	Yellow-bellied Fantail	*Chelidorhynx hypoxanthus*	Winter	Yes
138	Stenostiridae	Grey-headed Canary-Flycatcher	*Culicicapa ceylonensis*	Winter	Yes
Tits, Chickadees, and Titmice					
139	Paridae	Cinereous Tit (Great Tit)	*Parus cinereus*	Resident	Yes
Larks					
140	Alaudidae	Ashy-crowned Sparrow-Lark (Ashy-crowned Finch-Lark)	*Eremopterix griseus*	Resident	Yes
141	Alaudidae	Bengal Bushlark	*Mirafra assamica*	Resident	Yes
142	Alaudidae	Eurasian Skylark	*Alauda arvensis*	Winter	Yes
143	Alaudidae	Oriental Skylark	*Alauda gulgula*	Winter	Yes
144	Alaudidae	Crested Lark	*Galerida cristata*	Resident	Yes
Cisticolas and Allies					
145	Cisticolidae	Common Tailorbird	*Orthotomus sutorius*	Resident	Yes
146	Cisticolidae	Grey-breasted Prinia	*Prinia hodgsonii*	Resident	Yes
147	Cisticolidae	Ashy Prinia	*Prinia socialis*	Resident	Yes

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
148	Cisticolidae	Plain Prinia	*Prinia inornata*	Resident	Yes
149	Cisticolidae	Zitting Cisticola	*Cisticola juncidis*	Resident	No
150	Cisticolidae	Striated Prinia	*Prinia crinigera*	Winter	No
151	Cisticolidae	Rufous-fronted Prinia	*Prinia buchanani*	Passage	No
Martins and Swallows					
152	Hirundinidae	Grey-throated Martin (Plain Martin)	*Riparia chinensis*	Resident	Yes
153	Hirundinidae	Barn Swallow	*Hirundo rustica*	Resident	Yes
154	Hirundinidae	Wire-tailed Swallow	*Hirundo smithii*	Winter	Yes
155	Hirundinidae	Streak-throated Swallow	*Petrochelidon fluvicola*	Winter	Yes
156	Hirundinidae	Red-rumped Swallow	*Cecropis daurica*	Summer	Yes
Bulbuls					
157	Pycnonotidae	Red-vented Bulbul	*Pycnonotus cafer*	Resident	Yes
158	Pycnonotidae	Himalayan Bulbul (White-cheeked Bulbul)	*Pycnonotus leucogenys*	Resident	Yes
159	Pycnonotidae	Himalayan Black Bulbul	*Hypsipetes leucocephalus*	Summer	No
Leaf Warblers					
160	Phylloscopidae	Hume's Warbler	*Phylloscopus humei*	Resident	Yes
161	Phylloscopidae	Sulphur-bellied Warbler	*Phylloscopus griseolus*	Summer	Yes
162	Phylloscopidae	Common Chiffchaff	*Phylloscopus collybita*	Resident	Yes
163	Phylloscopidae	Grey-hooded Warbler	*Phylloscopus xanthoschistos*	Resident	Yes
164	Phylloscopidae	Lemon-rumped Warbler (Pale-rumped Warbler)	*Phylloscopus chloronotus*	Winter	Yes
165	Phylloscopidae	Green Warbler	*Phylloscopus nitidus*	Summer	Yes
166	Phylloscopidae	Greenish Warbler	*Phylloscopus trochiloides*	Summer	Yes
167	Phylloscopidae	Western Crowned Warbler	*Phylloscopus occipitalis*	Winter	Yes
Sylviid Warblers					
168	Sylviidae	Asian Desert Warbler	*Sylvia nana*	Winter	Yes
169	Sylviidae	Lesser Whitethroat	*Sylvia curruca*	Resident	Yes
Parrotbills, Wrentit, and Allies					
170	Paradoxornithidae	Yellow-eyed Babbler	*Chrysomma sinense*	Resident	Yes
White-eyes, Yuhinas, and Allies					
171	Zosteropidae	Indian White-eye (Oriental White-eye)	*Zosterops palpebrosus*	Resident	Yes
Tree-Babblers, Scimitar-Babblers, and Allies					
172	Timaliidae	Black-chinned Babbler	*Cyanoderma pyrrhops*	Resident	Yes
Laughingthrushes and Allies					
173	Leiothrichidae	Common Babbler	*Turdoides caudata*	Resident	No
174	Leiothrichidae	Jungle Babbler	*Turdoides striata*	Resident	Yes
Treecreepers					
175	Certhiidae	Bar-tailed Treecreeper	*Certhia himalayana*	Winter	Yes
		Starlings and Mynas			
176	Sturnidae	European Starling (Common Starling)	*Sturnus vulgaris*	Resident	Yes
177	Sturnidae	Asian Pied Starling (Pied Myna)	*Gracupica contra*	Resident	Yes
178	Sturnidae	Brahminy Starling	*Sturnia pagodarum*	Resident	Yes
179	Sturnidae	Common Myna	*Acridotheres tristis*	Resident	Yes
180	Sturnidae	Bank Myna	*Acridotheres ginginianus*	Resident	Yes
181	Sturnidae	Chestnut-tailed Starling	*Sturnia malabarica*	Winter	Yes

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
182	Sturnidae	Jungle Myna	*Acridotheres fuscus*	Resident	Yes
183	Sturnidae	Rosy Starling	*Pastor roseus*	Summer	No
Thrushes					
184	Turdidae	Black-throated Thrush	*Turdus atrogularis*	Passage	Yes
185	Turdidae	Grey-winged Blackbird	*Turdus boulboul*	Winter	Yes
186	Turdidae	Tickell's Thrush	*Turdus unicolor*	Vagrant	Yes
Old World Flycatchers					
187	Muscicapidae	Indian Robin	*Copsychus fulicatus*	Resident	Yes
188	Muscicapidae	Oriental Magpie-Robin	*Copsychus saularis*	Resident	Yes
189	Muscicapidae	Bluethroat	*Luscinia svecica*	Winter	Yes
190	Muscicapidae	Blue Whistling-Thrush	*Myophonus caeruleus*	Resident	Yes
191	Muscicapidae	Plumbeous Redstart	*Phoenicurus fuliginosus*	Winter	No
192	Muscicapidae	Black Redstart	*Phoenicurus ochruros*	Resident	Yes
193	Muscicapidae	Chestnut-bellied Rock-Thrush	*Monticola rufiventris*	Resident	No
194	Muscicapidae	Siberian Stonechat (Common Stonechat)	*Saxicola maurus*	Resident	Yes
195	Muscicapidae	Pied Bushchat	*Saxicola caprata*	Resident	Yes
196	Muscicapidae	Grey Bushchat	*Saxicola ferreus*	Resident	Yes
197	Muscicapidae	Brown Rock Chat (Indian Chat)	*Oenanthe fusca*	Resident	Yes
198	Muscicapidae	Variable Wheatear	*Oenanthe picata*	Winter	Yes
199	Muscicapidae	Verditer Flycatcher	*Eumyias thalassinus*	Summer	Yes
200	Muscicapidae	Slaty-blue Flycatcher	*Ficedula tricolor*	Resident	Yes
201	Muscicapidae	Red-breasted Flycatcher	*Ficedula parva*	Winter	Yes
202	Muscicapidae	Blue-capped Redstart	*Phoenicurus coeruleocephala*	Winter	No
203	Muscicapidae	Blue-capped Rock-Thrush	*Monticola cinclorhyncha*	Summer	No
204	Muscicapidae	White-capped Redstart	*Phoenicurus leucocephalus*	Winter	No
205	Muscicapidae	Asian Brown Flycatcher	*Muscicapa dauurica*	Vagrant	No
206	Muscicapidae	Blue-fronted Redstart	*Phoenicurus frontalis*	Winter	Yes
207	Muscicapidae	Blue-throated Flycatcher	*Cyornis rubeculoides*	Summer	Yes
208	Muscicapidae	Orange-headed Thrush	*Geokichla citrina*	Winter	Yes
209	Muscicapidae	Desert Wheatear	*Oenanthe deserti*	Winter	No
Sunbirds and Spiderhunters					
210	Nectariniidae	Purple Sunbird	*Cinnyris asiaticus*	Summer	Yes
211	Nectariniidae	Crimson Sunbird	*Aethopyga siparaja*	Winter	Yes
Estrildids					
212	Estrildidae	Indian Silverbill (White-throated Munia)	*Euodice malabarica*	Resident	Yes
213	Estrildidae	Scaly-breasted Munia (Spotted Munia)	*Lonchura punctulata*	Resident	Yes
214	Estrildidae	Tricolored Munia	*Lonchura malacca*	Vagrant	No
Old World Sparrows					
215	Passeridae	House Sparrow	*Passer domesticus*	Resident	Yes
216	Passeridae	Yellow-throated Sparrow (Chestnut-shouldered Petronia)	*Gymnoris xanthocollis*	Resident	Yes
Wagtails and Pipits					
217	Motacillidae	Grey Wagtail	*Motacilla cinerea*	Winter	Yes
218	Motacillidae	Western Yellow Wagtail	*Motacilla flava*	Winter	Yes
219	Motacillidae	Citrine Wagtail	*Motacilla citreola*	Resident	Yes

Sl. No.	Family	Common Name	Scientific Name	Migrant	Urban
220	Motacillidae	White-browed Wagtail (Large Pied Wagtail)	*Motacilla maderaspatensis*	Winter	No
221	Motacillidae	White Wagtail	*Motacilla alba*	Resident	Yes
222	Motacillidae	Paddyfield Pipit	*Anthus rufulus*	Winter	Yes
223	Motacillidae	Long-billed Pipit	*Anthus similis*	Winter	Yes
224	Motacillidae	Tawny Pipit	*Anthus campestris*	Passage	No
225	Motacillidae	Rosy Pipit	*Anthus roseatus*	Winter	No
226	Motacillidae	Olive-backed Pipit	*Anthus hodgsoni*	Vagrant	No
227	Motacillidae	Water Pipit	*Anthus spinoletta*	Winter	Yes
228	Motacillidae	Tree Pipit	*Anthus trivialis*	Winter	No
Finches, Euphonias, and Allies					
229	Fringillidae	Yellow-breasted Greenfinch	*Chloris spinoides*	Winter	Yes
Nightjars					
230	Caprimulgidae	Savanna Nightjar	*Caprimulgus affinis*	Vagrant	Yes
Old World Pittas					
231	Pittidae	Indian Pitta	*Pitta brachyura*	Summer	Yes
Old World Orioles					
232	Oriolidae	Indian Golden Oriole	*Oriolus kundoo*	Summer	Yes
Monarch Flycatchers					
233	Monarchidae	Indian Paradise-Flycatcher	*Terpsiphone paradisi*	Summer	Yes
Reed Warblers and Allies					
234	Acrocephalidae	Blyth's Reed Warbler	*Acrocephalus dumetorum*	Summer	Yes
235	Acrocephalidae	Paddyfield Warbler	*Acrocephalus agricola*	Winter	No
Flowerpeckers					
236	Dicaeidae	Thick-billed Flowerpecker	*Dicaeum agile*	Summer	Yes
237	Dicaeidae	Pale-billed Flowerpecker	*Dicaeum erythrorhynchos*	Winter	Yes
Bush Warblers and Allies					
238	Cettiidae	Brownish-flanked Bush Warbler	*Horornis fortipes*	Resident	Yes
Buttonquail or Hemipodes					
239	Turnicidae	Barred Buttonquail	*Turnix suscitator*	Vagrant	Yes
		Weavers			
240	Ploceidae	Baya Weaver	*Ploceus philippinus*	Resident	Yes
Accentors					
241	Prunellidae	Black-throated Accentor	*Prunella atrogularis*	Winter	Yes
242	Aegithinidae	Common Iora	*Aegithina tiphia*	Resident	Yes
243	Rostratulidae	Greater Painted-Snipe	*Rostratula benghalensis*	Winter	Yes
244	Emberizidae	Red-headed Bunting	*Emberiza bruniceps*	Passage	No

Flowering Plant Species

Sl. No.	Family	Scientific Name	Status
1	Anacardiaceae	*Mangifera indica*	Native
2	Sapindaceae	*Litchi chinensis*	Introduced
3	Myrtaceae	*Psidium guajava*	Introduced
4	Vitaceae	*Vitis vinifera*	Introduced
5	Phyllanthaceae	*Phyllanthus emblica*	Native
6	Rutaceae	*Citrus × aurantium*	Introduced
7	Rutaceae	*Citrus reticulata*	Native
8	Rutaceae	*Citrus aurantifolia*	Native
9	Rutaceae	*Citrus × limon*	Introduced
10	Rutaceae	*Citrus medica*	Introduced
11	Rutaceae	*Citrus jambhiri*	Native
12	Rutaceae	*Citrus limettoides*	Introduced
13	Rutaceae	*Citrus floridana*	Introduced
14	Rutaceae	*Citrus deliciosa*	Introduced
15	Rutaceae	*Limonia acidissima*	Native
16	Rhamnaceae	*Ziziphus mauritiana*	Native
17	Rhamnaceae	*Ziziphus jujuba*	Introduced
18	Malvaceae	*Grewia asiatica*	Native
19	Lythraceae	*Punica granatum*	Introduced
20	Annonaceae	*Annona squamosa*	Introduced
21	Boraginaceae	*Cordia myxa*	Native
22	Apocynaceae	*Carissa carandas*	Native
23	Rosaceae	*Malus domestica*	Introduced
24	Rosaceae	*Pyrus communis*	Introduced
25	Rosaceae	*Prunus persica*	Introduced
26	Rosaceae	*Prunus salicina*	Introduced
27	Rosaceae	*Fragaria ananassa*	Introduced
28	Moraceae	*Morus alba*	Introduced
29	Moraceae	*Ficus carica*	Introduced
30	Moraceae	*Artocarpus lacucha*	Native
31	Moraceae	*Artocarpus heterophyllus*	Native
32	Caricaceae	*Carica papaya*	Introduced
33	Combretaceae	*Terminalia chebula*	Native
34	Combretaceae	*Terminalia bellirica*	Native
35	Myrtaceae	*Eucalyptus grandis*	Introduced
36	Fabaceae	*Albizia lebbeck*	Native
37	Meliaceae	*Toona sureni*	Native
38	Salicaceae	*Populus ciliata*	Native
39	Pinaceae	*Pinus roxburghii*	Native
40	Fabaceae	*Dalbergia sissoo*	Native
41	Fabaceae	*Senegalia catechu*	Native
42	Euphorbiaceae	*Mallotus philippensis*	Native
43	Fabaceae	*Butea monosperma*	Native
44	Sapindaceae	*Dodonaea viscosa*	Introduced
45	Fabaceae	*Vachellia nilotica*	Native

Sl. No.	Family	Scientific Name	Status
46	Lamiaceae	*Tectona grandis*	Native
47	Apocynaceae	*Carissa spinarum*	Native
48	Boraginaceae	*Varronia dichotoma*	Introduced
49	Dioscoreaceae	*Dioscorea bulbifera*	Native
50	Phyllanthaceae	*Phyllanthus emblica*	Native
51	Moraceae	*Ficus palmata*	Native
52	Salicaceae	*Flacourtia indica*	Native
53	Malvaceae	*Malva parviflora*	Introduced
54	Cucurbitaceae	*Momordica dioica*	Native
55	Solanaceae	*Physalis peruviana*	Introduced
56	Alismataceae	*Sagittaria graminea*	Introduced
57	Apocynaceae	*Telosma pallida*	Native
58	Asphodelaceae	*Aloe vera*	Introduced
59	Acanthaceae	*Justicia adhatoda*	Native
60	Acanthaceae	*Barleria cristata*	Native
61	Lamiaceae	*Vitex negundo*	Native
62	Poaceae	*Bambusa bambos*	Native
63	Lamiaceae	*Ocimum tenuiflorum*	Native
64	Poaceae	*Oryza sativa*	Introduced
65	Poaceae	*Zea mays*	Introduced
66	Fabaceae	*Vigna radiata*	Native
67	Fabaceae	*Vigna mungo*	Native
68	Poaceae	*Cenchrus americanus*	Introduced
69	Poaceae	*Triticum aestivum*	Introduced
70	Fabaceae	*Vicia lens*	Native
71	Fabaceae	*Cicer arietinum*	Introduced
72	Fabaceae	*Pisum sativum*	Introduced
73	Liliaceae	*Allium cepa*	Introduced
74	Brassicaceae	*Brassica juncea*	Introduced
75	Brassicaceae	*Brassica napus*	Introduced
76	Linaceae	*Linum usitatissimum*	Introduced
77	Solanaceae	*Solanum tuberosum*	Introduced
78	Pedaliaceae	*Sesamum indicum*	Native
79	Poaceae	*Saccharum officinarum*	Introduced
80	Solanaceae	*Capsicum annuum*	Introduced
81	Solanaceae	*Solanum lycopersicum*	Introduced
82	Malvaceae	*Abelmoschus esculentus*	Native
83	Cucurbitaceae	*Cucumis sativus*	Native
84	Cucurbitaceae	*Lagenaria siceraria*	Introduced
85	Cucurbitaceae	*Momordica charantia*	Native
86	Fabaceae	*Phaseolus vulgaris*	Introduced
87	Brassicaceae	*Brassica oleracea*	Introduced
88	Amaranthaceae	*Beta vulgaris*	Native
89	Brassicaceae	*Raphanus sativus*	Introduced
90	Apiaceae	*Daucus carota*	Native

Sl. No.	Family	Scientific Name	Status
91	Brassicaceae	*Brassica rapa*	Introduced
92	Fabaceae	*Trifolium vavilovii*	Introduced
93	Poaceae	*Avena sativa*	Introduced
94	Poaceae	*Sorghum bicolor*	Introduced
95	Fabaceae	*Vigna unguiculata*	Introduced
96	Amaranthaceae	*Chenopodium album*	IAS
97	Cyperaceae	*Cyperus rotundus*	Native
98	Poaceae	*Echinochloa crus-galli*	IAS
99	Fabaceae	*Medicago denticulata*	Native
100	Poaceae	*Phalaris minor*	Native
101	Fabaceae	*Lathyrus Aphaca*	Native
102	Poaceae	*Cenchrus setigerus*	Native
103	Cannabaceae	*Cannabis sativa*	Introduced
104	Poaceae	*Cynodon dactylon*	Native
105	Poaceae	*Avena sativa*	Introduced
106	Poaceae	*Echinochloa colona*	Native
107	Poaceae	*Sorghum halepense*	Native
108	Amaryllidaceae	*Allium humile*	Native
109	Lythraceae	*Lagerstroemia indica*	Introduced
110	Annonaceae	*Monoon longifolium*	Native
111	Cupressaceae	*Thuja occidentalis*	Introduced
112	Cupressaceae	*Juniperus erecta*	Native
113	Salicaceae	*Salix babylonica*	Introduced
114	Myrtaceae	*Callistemon lanceolatus*	Introduced
115	Euphorbiaceae	*Hevea brasiliensis*	Introduced
116	Cupressaceae	*Cupressus atlantica*	Introduced
117	Fabaceae	*Saraca asoca*	Native
118	Sapotaceae	*Manilkara kauki*	Introduced
119	Moraceae	*Ficus benghalensis*	Native
120	Meliaceae	*Azadirachta indica*	Introduced
121	Sapindaceae	*Koelreuteria paniculata*	Introduced
122	Dilleniaceae	*Dillenia indica*	Native
123	Fabaceae	*Bauhinia × blakeana*	Introduced
124	Casuarinaceae	*Casuarina equisetifolia*	Native
125	Fabaceae	*Delonix regia*	Introduced
126	Platanaceae	*Platanus orientalis*	Introduced
127	Bignoniaceae	*Jacaranda mimosifolia*	Introduced
128	Rubiaceae	*Neolamarckia cadamba*	Native
129	Apocynaceae	*Plumeria Alba*	Introduced
130	Magnoliaceae	*Magnolia grandiflora*	Introduced
131	Arecaceae	*Hyophorbe lagenicaulis*	Introduced
132	Euphorbiaceae	*Macaranga cuspidata*	Introduced
133	Rutaceae	*Aegle marmelos*	Native
134	Proteaceae	*Grevillea robusta*	Introduced
135	Magnoliaceae	*Magnolia champaca*	Native
136	Myrtaceae	*Syzygium cumini*	Native
137	Putranjivaceae	*Putranjiva roxburghii*	Native
138	Poaceae	*Gigantochloa atter*	Introduced
139	Oleaceae	*Jasminum officinale*	Native
140	Passifloraceae	*Passiflora princeps*	Introduced
141	Moraceae	*Ficus erecta*	Introduced
142	Araceae	*Epipremnum aureum*	Introduced
143	Apocynaceae	*Nerium oleander*	Native
144	Malvaceae	*Hibiscus rosa sinensis*	Native
145	Bignoniaceae	*Tecoma stans*	Introduced
146	Rubiaceae	*Ixora coccinea*	Native
147	Euphorbiaceae	*Euphorbia pulcherrima*	Introduced
148	Rosaceae	*Rosa canina*	Introduced
149	Rosaceae	*Rosa damascena*	Introduced
150	Rosaceae	*Rosa foetida*	Introduced
151	Rosaceae	*Rosa centifolia*	Introduced
152	Moraceae	*Ficus starlight*	Native
153	Moraceae	*Ficus benjamina*	Native
154	Rubiaceae	*Mussaenda erythrophylla*	Introduced
155	Oleaceae	*Nyctanthes arbor-tristis*	Native
156	Oleaceae	*Jasminum multiflorum*	Native
157	Apocynaceae	*Tabernaemontana divaricata*	Native
158	Nyctaginaceae	*Bougainvillea spectabilis*	Introduced
159	Bignoniaceae	*Tecomaria capensis*	Introduced
160	Solanaceae	*Cestrum nocturnum*	Introduced
161	Rubiaceae	*Gardenia jasmenodes*	Native
162	Euphorbiaceae	*Acalypha poiretii*	Introduced
163	Verbenaceae	*Duranta erecta*	Introduced
164	Rutaceae	*Murraya paniculata*	Native
165	Jasminum humile	*Chrysojasminum humile*	Native
166	Solanaceae	*Datura stramonium*	Introduced
167	Euphorbiaceae	*Jatropha integerrima*	Introduced
168	Crassulaceae	*Kalanchoe blossfeldiana*	Introduced
169	Asparagaceae	*Chlorophytum comosum*	Introduced
170	Lythraceae	*Cuphea hyssopifolia*	Introduced
171	Commelinaceae	*Tradescantia pallida*	Introduced
172	Araceae	*Monstera deliciosa*	Introduced
173	Asparagaceae	*Dracaena trifasciata*	Introduced
174	Asparagaceae	*Dracaena reflexa*	Introduced
175	Araceae	*Syngonium podophyllum*	Introduced
176	Lamiaceae	*Coleus vettiveroides*	Native
177	Iridaceae	*Gladiolus grandiflora*	Introduced
178	Asteraceae	*Dahlia pinnata*	Introduced
179	Verbenaceae	*Verbena officinalis*	Introduced
180	Caryophyllales	*Dianthus arrostii*	Introduced
181	Caryophyllaceae	*Dianthus sachalinensis*	Introduced

Sl. No.	Family	Scientific Name	Status
182	Caryophyllaceae	*Dianthus barbatus*	Introduced
183	Polemoniaceae	*Phlox pilosa*	Introduced
184	Violaceae	*Viola tricolor*	Introduced
185	Asteraceae	*Tagetes erecta*	Introduced
186	Balsaminaceae	*Impatiens balsamina*	Invasive
187	Brassicaceae	*Clypeola jonthlaspi*	Introduced
188	Asteraceae	*Zinnia elegans*	Introduced
189	Asteraceae	*Helianthus annuus*	Introduced
190	Asteraceae	*Dahlia pinnata*	Introduced
191	Malvaceae	*Alcea rosea*	Introduced
192	Solanaceae	*Petunia × atkinsiana*	Introduced
193	Asteraceae	*Gazania rigens*	Introduced
194	Asteraceae	*Gaillardia aristata*	Introduced
195	Amaranthaceae	*Celosia argentea*	Introduced
196	Lamiaceae	*Salvia splendens*	Introduced
197	Veronicaceae	*Antirrhinum charidemi*	Introduced
198	Asteraceae	*Chrysanthemum morifolium*	Introduced
199	Portulacaceae	*Portulaca grandiflora*	Introduced
200	Apocynaceae	*Catharanthus roseus*	Introduced
201	Apocynaceae	*Alstonia scholaris*	Native
202	Malvaceae	*Bombax ceiba*	Native
203	Fabaceae	*Pongamia pinnata*	Native
204	Bignoniaceae	*Kigelia africana*	Introduced
205	Fabaceae	*Senna siamea*	Introduced
206	Fabaceae	*Erythrina variegata*	Native
207	Lythraceae	*Lagerstroemia speciosa*	Native
208	Dipterocarpaceae	*Shorea robusta*	Native
209	Moraceae	*Ficus elastica*	Native
210	Arecaceae	*Washingtonia filifera*	Introduced
211	Apocynaceae	*Tabernaemontana divaricata*	Native
212	Arecaceae	*Dypsis lutescens*	Introduced
213	Araucariaceae	*Araucaria heterophylla*	Introduced
214	Arecaceae	*Bismarckia nobilis*	Introduced
215	Lamiaceae	*Clerodendrum splendens*	Introduced
216	Euphorbiaceae	*Croton scabiosus*	Native
217	Oleaceae	*Jasminum sambac*	Native
218	Euphorbiaceae	*Euphorbia milii*	Introduced
219	Bignoniaceae	*Mansoa alliacea*	Introduced
220	Bignoniaceae	*Pyrostegia venusta*	Introduced
221	Combretaceae	*Combretum indicum*	Native
222	Polygonaceae	*Antigonon leptopus*	Invasive
223	Asparagaceae	*Dracaena mahatma*	Native
224	Asparagaceae	*Agave amica*	Introduced
225	Fabaceae	*Cassia fistula*	Native
226	Fabaceae	*Erythrina variegata*	Native

Sl. No.	Family	Scientific Name	Status
227	Salicaceae	*Salix alba*	Introduced
228	Rosaceae	*Rosa acicularis*	Introduced
229	Fabaceae	*Vachellia nilotica*	Introduced
230	Araceae	*Lemna minor*	Native
231	Convolvulaceae	*Ipomoea acanthocarpa*	Introduced
232	Malvaceae	*Ceiba speciosa*	Introduced
233	Oleaceae	*Nyctanthes arbor-tristis*	Native
234	Rubiaceae	*Hamelia patens*	Introduced
235	Aizoaceae	*Mesembryanthemum nodiflorum*	Introduced
236	Apocynaceae	*Alstonia scholaris*	Native
237	Malvaceae	*Pterospermum acerifolium*	Native
238	Araucariaceae	*Araucaria columnaris*	Introduced
239	Combretaceae	*Terminalia elliptica*	Native
240	Liliaceae	*Lilum asiatica*	Native
241	Myrtaceae	*Syzygium cumini*	Native
242	Fabaceae	*Vachellia farnesiana*	Invasive
243	Amaranthaceae	*Achyranthes aspera*	Invasive
244	Asteraceae	*Ageratum conyzoides*	Invasive
245	Amaranthaceae	*Alternanthera philoxeroides*	Invasive
246	Amaranthaceae	*Alternanthera pungens*	Invasive
247	Amaranthaceae	*Amaranthus viridis*	Invasive
248	Primulaceae	*Anagallis arvensis*	Invasive
249	Papaveraceae	*Argemone mexicana*	Invasive
250	Asteraceae	*Bidens pilosa*	Invasive
251	Apocynaceae	*Calotropis procera*	Invasive
252	Cannaceae	*Canna indica*	Invasive
253	Cannabaceae	*Cannabis sativa*	Invasive
254	Fabaceae	*Cassia occidentalis*	Invasive
255	Cleomaceae	*Cleome viscosa*	Invasive
256	Convolvulaceae	*Cuscuta reflexa*	Invasive
257	Cyperaceae	*Cyperus difformis*	Invasive
258	Cyperaceae	*Cyperus iria*	Invasive
259	Solanaceae	*Datura innoxia*	Invasive
260	Poaceae	*Echinochloa colona*	Invasive
261	Asteraceae	*Eclipta prostrata*	Invasive
262	Pontederiaceae	*Eichhornia crassipes*	Invasive
263	Asteraceae	*Emilia sonchifolia*	Invasive
264	Euphorbiaceae	*Euphorbia heterophylla*	Invasive
265	Euphorbiaceae	*Euphorbia hirta*	Invasive
266	Amaranthaceae	*Gomphrena serrata*	Invasive
267	Poaceae	*Imperata cylindrica*	Invasive
268	Convolvulaceae	*Ipomoea carnea*	Invasive
269	Convolvulaceae	*Ipomoea nil*	Invasive
270	Convolvulaceae	*Ipomoea pes-tigridis*	Invasive
271	Convolvulaceae	*Ipomoea quamoclit*	Invasive

Sl. No.	Family	Scientific Name	Status
272	Verbenaceae	*Lantana camara*	Invasive
273	Fabaceae	*Leucaena leucocephala*	Invasive
274	Malvaceae	*Malvastrum coromandelianum*	Invasive
275	Martyniaceae	*Martynia annua*	Invasive
276	Malvaceae	*Melochia corchorifolia*	Invasive
277	Nyctaginaceae	*Mirabilis jalapa*	Invasive
278	Cactaceae	*Opuntia stricta*	Invasive
279	Oxalidaceae	*Oxalis corniculata*	Invasive
280	Asteraceae	*Parthenium hysterophorus*	Invasive
281	Solanaceae	*Physalis angulata*	Invasive
282	Portulacaceae	*Portulaca oleracea*	Invasive
283	Polygonaceae	*Rumex dentatus*	Invasive
284	Salviniaceae	*Salvinia molesta*	Invasive
285	Fabaceae	*Sesbania bispinosa*	Invasive
286	Malvaceae	*Sida acuta*	Invasive
287	Solanaceae	*Solanum nigrum*	Invasive
288	Solanaceae	*Solanum viarum*	Invasive
289	Linderniaceae	*Torenia fournieri*	Invasive
290	Zygophyllaceae	*Tribulus terrestris*	Invasive
291	Asteraceae	*Tridax procumbens*	Invasive
292	Malvaceae	*Triumfetta rhomboidea*	Invasive
293	Typhaceae	*Typha angustifolia*	Invasive
294	Malvaceae	*Urena lobata*	Invasive
295	Asteraceae	*Xanthium strumarium*	Invasive
296	Asteraceae	*Youngia japonica*	Invasive
297	Fabaceae	*Prosopis juliflora*	Invasive
298	Asteraceae	*Erigeron canadensis*	Invasive
299	Asteraceae	*Ageratum houstonianum*	Invasive
300	Apiaceae	*Heracleum lanatum*	Invasive
301	Urticaceae	*Urtica dioica*	Invasive
302	Fabaceae	*Senna tora*	Invasive
303	Euphorbiaceae	*Ricinus communis*	Invasive
304	Lamiaceae	*Mesosphaerum suaveolens*	Invasive

Butterflies

Sl. No.	Family	Common Name	Scientific Name
1	Hesperidae	Common Banded Awl	*Hasora chromus*
2	Hesperidae	Indian Grizzled Skipper	*Spialia galba*
3	Hesperidae	Banana Skipper	*Erionota torus*
4	Hesperidae	Indian Palm Bob	*Suastus gremius*
5	Hesperidae	Ceylon Swift	*Parnara bada*
6	Hesperidae	Bevan's Swift	*Borbo bevani*
7	Hesperidae	Small Branded Swift	*Pelopidas mathias*
8	Hesperidae	Yellowspot Swift	*Polytremis eltola*
9	Hesperidae	Golden Angle	*Caprona ransonnettii*
10	Hesperidae	Common Redeye	*Matapa aria*
11	Papilionidae	Common Mormon	*Papilio polytes*
12	Papilionidae	Lime Butterfly	*Papilio demoleus*
13	Papilionidae	Common Mime	*Chilasa clytia*
14	Papilionidae	Common Bluebottle	*Graphium sarpedon*
15	Papilionidae	Common Jay	*Graphium doson*
16	Pieridae	Common Gull	*Cepora nerissa*
17	Pieridae	Common Jezebel	*Delias eucharis*
18	Pieridae	White Orangetip	*Ixias marianne*
19	Pieridae	Yellow Orangetip	*Ixias pyrene*
20	Pieridae	Mottled Emigrant	*Catopsilia pyranthe*
21	Pieridae	Common Emigrant	*Catopsilia pomona*
22	Pieridae	Common Grass Yellow	*Eurema hecabe*
23	Lycaenidae	Bright Sunbeam	*Curetis bulis*
24	Lycaenidae	Common Lineblue	*Prosotas nora*
25	Lycaenidae	Tailless Lineblue	*Prosotas dubiosa*
26	Lycaenidae	Common Cerulean	*Jamides celeno*
27	Lycaenidae	Dark Cerulean	*Jamides bochus*
28	Lycaenidae	Forgetmenot.	*Catochrysops strabo*
29	Lycaenidae	Zebra Blue	*Leptotes plinius*
30	Lycaenidae	Dark Grass Blue	*Zizeeria karsandra*
31	Lycaenidae	Pale Grass Blue	*Pseudozizeeria maha*
32	Lycaenidae	Lesser Grass Blue	*Zizina otis*
33	Lycaenidae	Black-spotted Pierrot	*Tarucus balkanicus*
34	Lycaenidae	Striped Pierrot	*Tarucus nara*
35	Lycaenidae	Hazara Pierrot	*Tarucus hazara*
36	Lycaenidae	Indian Cupid	*Everes lacturnus*
37	Lycaenidae	Red Pierrot	*Talicada nyseus*
38	Lycaenidae	Bright Babul Blue	*Azanus ubaldus*
39	Lycaenidae	Dull Babul Blue	*Azanus uranus*
40	Lycaenidae	Common Hedge Blue	*Acytolepis puspa*
41	Lycaenidae	Dusky Hedge Blue	*Oreolyce vardhana*
42	Lycaenidae	Gram Blue	*Euchrysops cnejus*
43	Lycaenidae	Small Grass Jewel	*Freyeria putli*
44	Lycaenidae	Plains Cupid	*Luthrodes pandava*
45	Lycaenidae	Common Silverline	*Spindasis vulcanus*
46	Lycaenidae	Common Shot Silverline	*Spindasis ictis*

Sl. No.	Family	Common Name	Scientific Name
47	Lycaenidae	Large Oakblue	*Arhopala amantes*
48	Lycaenidae	Common Acacia Blue	*Surendra quercetorum*
49	Lycaenidae	Silverstreak Blue	*Iraota timoleon*
50	Lycaenidae	Common Onyx	*Horaga onyx*
51	Lycaenidae	Brown Onyx	*Horaga viola*
52	Lycaenidae	Plains Blue Royal	*Tajuria jehana*
53	Lycaenidae	Cornelian	*Deudorix epijarbas*
54	Lycaenidae	Common Guava Blue	*Virachola isocrates*
55	Lycaenidae	Slate Flash	*Rapala manea*
56	Lycaenidae	Indian Red Flash	*Rapala iarbus*
57	Riodinidae	Double-banded Judy	*Abisara bifasciata*
58	Nymphalidae	Blue Tiger	*Tirumala limniace*
59	Nymphalidae	Common Tiger	*Danaus genutia*
60	Nymphalidae	Striped Blue Crow	*Euploea mulciber*
61	Nymphalidae	Common Crow	*Euploea core*
62	Nymphalidae	Common Palmfly	*Elymnias hypermnestra*
63	Nymphalidae	Bamboo Treebrown	*Lethe europa*
64	Nymphalidae	Common Bushbrown	*Mycalesis perseus*
65	Nymphalidae	Dark-branded Bushbrown	*Mycalesis mineus*
66	Nymphalidae	Common Threering	*Ypthima asterope*
67	Nymphalidae	Jewel Fivering	*Ypthima lisandra*
68	Nymphalidae	Common Castor	*Ariadne merione*
69	Nymphalidae	Common Jester	*Symbrenthia lilaea*
70	Nymphalidae	Yellow Pansy	*Junonia hierta*
71	Nymphalidae	Blue Pansy	*Junonia orithya*
72	Nymphalidae	Lemon Pansy	*Junonia lemonias*
73	Nymphalidae	Chocolate Soldier	*Junonia iphita*
74	Nymphalidae	Orange Oakleaf	*Kallima inachus*
75	Nymphalidae	Danaid Eggfly	*Hypolimnas misippus*
76	Nymphalidae	Pallas's Sailer	*Neptis sappho*
77	Nymphalidae	Chestnut-streaked Sailer	*Neptis jumbah*
78	Nymphalidae	Common Sergeant	*Athyma perius*
79	Nymphalidae	Commander	*Moduza procris*
80	Nymphalidae	Common Baron	*Euthalia aconthea*
81	Nymphalidae	Tabby	*Pseudergolis wedah*
82	Nymphalidae	Common Nawab	*Polyura athamas*
83	Nymphalidae	Anomalous Nawab	*Polyura agraria*
84	Nymphalidae	Black Rajah	*Charaxes solon*
85	Nymphalidae	Tawny Coster	*Acraea violae*
86	Nymphalidae	Common Leopard	*Phalanta phalanta*
87	Nymphalidae	Angled Castor	*Ariadne aridone*
88	Nymphalidae	Double-brnaded Crow	*Euploea sylvester*
89	Nymphalidae	Common Beak	*Lebythea lepita*
90	Nymphalidae	Dark Evening Brown	*Melanitis phedima*
91	Nymphalidae	Common Fourring	*Ypthima huebneri*
92	Nymphalidae	Himalayan Tabby	*Pseudergolis wedah*
93	Papilionidae	Paris Peacock	*Papilio paris*
94	Pieridae	Lemon Emigrant	*Cataopsilia crocale*

Reptiles

Sl. No.	Family	Common Name	Scientific Name
1	Gekkonidae	Brook's house gecko	*Hemidactylus brookii*
2	Gekkonidae	Yellow-green house gecko	*Hemidactylus flaviviridis*
3	Gekkonidae	Asian house gecko	*Hemidactylus frenatus*
4	Agamidae	Indian garden lizard	*Calotes versicolor*
5	Scincidae	Striped grass skink	*Mabuya dissimilis*
6	Scincidae	Bronze grass skink	*Mabuya macularia*
7	Varanidae	Indian monitor lizard	*Varanus bengalensis*
8	Boidae	Common sand boa	*Gongylophis conicus*
9	Boidae	Earth boa/Red boa	*Eryx Johnii*
10	Elapidae	Common krait	*Bungarus caeruleus*
11	Elapidae	Common Indian cobra	*Naja naja*
12	Colubridae	Buffed striped keelback	*Amphiesma stolatum*
13	Colubridae	Rat snake	*Ptyas mucosa*
14	Colubridae	Banded kukri snake	*Oligodon amensis*
15	Typhlopidae	Brahminy worm snake	*Ramphotyphlops braminus*
16	Viperidae	Russell's viper	*Daboia russelii*

Mammals

Sl. No.	Family	Common Name	Scientific Name
1	Vespertilionidae	Mount Popa pipistrelle	*Pipistrellus paterculus*
2	Muridae	Indian gerbil	*Tatera indica*
3	Hyaenidae	Striped hyena	*Hyaena hyaena*
4	Muridae	Little Indian field mouse	*Mus booduga*
5	Muridae	House mouse	*Mus musculus*
6	Muridae	Lesser bandicoot rat	*Bandicota bengalensiswardii*
7	Muridae	Himalayan rat	*Rattus pyctoris*
8	Cervidae	Indian muntjac	*Muntiacus vaginalis*
9	Muridae	Chestnut rat	*Niviventer fulvescens*
10	Manidae	Indian pangolin	*Manis crassicaudata*
11	Vespertilionidae	Grey long-eared bat	*Plecotus austriacus*
12	Herpestidae	Small Indian mongoose	*Herpestes auropunctatus*
13	Muridae	Black rat	*Rattus rattus*
14	Viverridae	Small Indian civet	*Viverricula indica*
15	Vespertilionidae	Javan pipistrelle	*Pipistrellus javanicus babu*
16	Megadermatidae	Greater false vampire	*Megaderma lyra*
17	Ursidae	Asian black bear	*Ursus thibetanus*
18	Canidae	Golden jackal	*Canis aureus*
19	Vespertilionidae	Indian pipistrelle	*Pipistrellus coromandra*
20	Muridae	Earth-colored mouse	*Mus terricolor*
21	Sciuridae	Northern palm squirrel	*Funambulus pennantii*
22	Canidae	Red fox	*Vulpes vulpes*
23	Muridae	House mouse	*Mus musculus*
24	Rhinolophidae	Greater horseshoe bat	*Rhinolophus ferrumequinum*
25	Pteropodidae	Indian flying fox	*Pteropus giganteus leucocephalus*
26	Cercopithecidae	Rhesus macaque	*Macaca mulatta*
27	Soricidae	House shrew or Grey musk shrew	*Suncus murinus*
28	Vespertilionidae	Leisler's bat	*Nyctalus leisleri*
29	Herpestidae	Grey mongoose	*Herpestes edwardsii*
30	Felidae	Leopard cat	*Prionailurus bengalensis trevelyani*
31	Leporidae	Desert hare	*Lepus tibetanus*
32	Vespertilionidae	Hutton's tube-nosed bat	*Murina huttoni huttoni*
33	Hystricidae	Indian porcupine	*Hystrix indica*
34	Mustelidae	Yellow-throated marten	*Martes flavigula*
35	Soricidae	Eurasian pygmy shrew	*Sorex minutus*
36	Felidae	Leopard	*Panthera pardus*
37	Soricidae	House shrew or Grey musk shrew	*Suncus murinus*
38	Vespertilionidae	Hemprich's long-eared bat	*Otonycteris hemprichii*
39	Pteropodidae	Leschenault's rousette	*Rousettus leschenaultii leschenaultii*
40	Viverridae	Asian palm civet	*Paradoxurus hermaphroditus*
41	Pteropodidae	Greater short-nosed fruit bat	*Cynopterus sphinx*
42	Mustelidae	Himalayan stoat or Ermine	*Mustela erminea*
43	Mustelidae	Siberian weasel	*Mustela sibirica*
44	Mustelidae	Mountain weasel	*Mustela altaica*
45	Pteropodidae	Indian flying fox	*Pteropus giganteus leucocephalus*

8.2. National Biodiversity Action Plan (NBAP)

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

ADDENDUM 2014 TO NBAP 2008

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

ADDENDUM 2014 TO NBAP 2008

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FOREWORD

India is a megadiverse country that harbours 7-8% of all recorded species, including over 45,000 species of plants and 91,000 species of animals, on only 2.4% of the world's land area. Biodiversity forms the cornerstone of ecosystem functions and services that support millions of livelihoods in the country. India has been persevering in its efforts to conserve this vital biodiversity and ecosystems. As a Party to the Convention on Biological Diversity (CBD) that mandates parties to prepare a national biodiversity strategy and action plan for implementing the Convention at the national level, India developed a National Policy and Macrolevel Action Strategy on Biodiversity in 1999. Subsequent to the adoption of the National Environment Policy (NEP) in 2006, a National Biodiversity Action Plan (NBAP) was developed through a comprehensive inter-ministerial process in 2008. India's NBAP is broadly aligned to the global Strategic Plan for Biodiversity 2011-2020 adopted under the aegis of CBD in 2010. Using the Strategic Plan as a framework, India has now developed 12 National Biodiversity Targets through extensive stakeholder consultations and public outreach. I am pleased to note that India is among the select countries that have now developed their own National Biodiversity Targets, which now form an Addendum to the NBAP 2008. This document together with the NBAP 2008 forms the blueprint for biodiversity conservation in the country.

Implementing the NBAP will be a challenging task and calls for active involvement of several other Ministries. Stewardship at the highest level of governance will be a key ingredient to success. People's participation will remain central to its successful implementation with active support at the individual level of citizens throughout the country.

I congratulate all those who were involved in this task which has been undertaken with support from a Global Environment Facility project implemented by the National Biodiversity Authority (NBA). I wish to place on the record my deep appreciation for the overall supervision provided by Dr R. Rajagopalan, Secretary, the guidance and support of Shri Hem Pande, Additional Secretary and Chairman, NBA, and the diligent efforts put in by Dr Sujata Arora, Director, Ministry of Environment, Forests, & Climate Change, in this endeavor. I also appreciate the efforts put in by Dr V.B. Mathur, Director, Wildlife Institute of India (WII) and his project team in preparing this document during India's Presidency of the eleventh Conference of the Parties to the CBD.

(Prakash Javadekar)
Minister of State (Independent Charge)
Environment, Forests and Climate Change
Government of India

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We would like to take this opportunity to express our sincere gratitude to the Secretaries of the 23 Ministries/Departments of the Government of India, namely, Department of Space, Ministry of Agriculture, Ministry of Chemicals and Fertilizers, Ministry of Coal, Ministry of Commerce and Industry, Ministry of Communications and Information Technology, Ministry of Drinking Water and Sanitation, Ministry of Earth Sciences, Ministry of Health and Family Welfare, Ministry of Human Resource Development, Ministry of New and Renewable Energy, Ministry of Panchayati Raj, Ministry of Petroleum and Natural Gas, Ministry of Power, Ministry of Rural Development, Ministry of Science and Technology, Ministry of Shipping, Ministry of Statistics and Programme Implementation, Ministry of Tourism, Ministry of Tribal Affairs, Ministry of Urban Development, Ministry of Water Resources and Ministry of Youth Affairs and Sports, and Ministry of Environment, Forests & Climate Change for providing information relevant to biodiversity conservation and enabling us to compile data regarding investment being made in conservation of biodiversity in the country.

This exercise would have been incomplete if the funds allocated to States and Union Territories for biodiversity conservation was not looked into. We thank the Planning Commission for providing us detailed information regarding the funds allocated for the States and Union Territories for activities related to biodiversity conservation.

We are also grateful to all the State Biodiversity Boards who have participated with great enthusiasm in all the national stakeholder consultations and contributed by providing relevant information and suggestions.

The NBAP team

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Network
AYUSH	Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy
BHS	Biodiversity Heritage Site
BMCs	Biodiversity Management Committees
BNHS	Bombay Natural History Society
BSI	Botanical Survey of India
CAs	Chartered Accountants
CBD	Convention on Biological Diversity
CEE	Centre for Environment Education
CMFRI	Central Marine Fisheries Research Institute
CMLRE	Centre For Marine Living Resources & Ecology
CMS	Centre for Media Studies
CoP	Conference of Parties
CPCB	Central Pollution Control Board
CPREEC	C.P.R. Environmental Education Centre
CSIR	Council for Scientific and Industrial Research
DNA	Deoxyribonucleic Acid
DoS	Department of Space
EIA	Environment Impact Assessment
ESCAP	Economic and Social Commission for Asia and the Pacific
FRA	Forest Right Act
FRCs	Forest Right Committees
FRI	Forest Research Institute
FSI	Forest Survey of India / Fishery Survey of India
GEF	Global Environment Facility
GIM	Green India Mission
GoI	Government of India
GSPC	Global Strategy for Plant Protection
IBAs	Important Bird Areas
ICAR	Indian Council of Agriculture Research
ICFRE	Indian Council of Forest Research and Education
IEG	Institute for Economic Growth
IGIDR	Indira Gandhi Institute for Development Research
IIFM	Indian Institute of Forest Management
IUCN	International Union for Conservation of Nature
JFM	Joint Forest Management

JFMCs	Joint Forest Management Committees
LMOs	Living Modified Organism
MDF	Moderately Dense Forests
MDGs	Millennium Development Goals
MLAs	Member of Legislative Assembly
MoA	Ministry of Agriculture
MoC	Ministry of Coal
MoCF	Ministry of Chemical and Fertilizers
MoCI	Ministry of Commerce and Industry
MoCIT	Ministry of Communications and Information Technology
MoDWS	Ministry of Drinking Water and Sanitation
MoEF/ MoEFCC	Ministry of Environment and Forests/ Ministry of Environment, Forests & Climate Change
MoES	Ministry of Earth Science
MoHFW	Ministry of Health and Family Welfare
MoHRD	Ministry of Human Resources Department
MoNRE	Ministry of New and Renewable Energy
MoP	Ministry of Power
MoPNG	Ministry of Petroleum and Natural Gas
MoPR	Ministry of Panchayati Raj
MoRD	Ministry of Rural Development
MoS	Ministry of Shipping
MoSPI	Ministry of Statistics and Programme Implementation
MoST	Ministry of Science and Technology
MoT	Ministry of Tourism
MoTA	Ministry of Tribal Affairs
MoUD	Ministry of Urban Development
MoWR	Ministry of Water Resources
MoYAS	Ministry of Youth Affairs and Sports
MPs	Member of Parliament
NBA	National Biodiversity Authority
NBAGR	National Bureau of Animal Genetic Resources
NBAII	National Bureau of Agriculturally Important Insects
NBAIM	National Bureau of Agriculturally Important Microorganisms
NBAP	National Biodiversity Action Plan
NBFGR	National Bureau of Fish Genetic Resources
NBPGR	National Bureau of Plant Genetic Resources

NBSAP	National Biodiversity Strategic and Action Plan
NBSS&LUP	National Bureau of Soil Survey and Land Use Planning
NBTs	National Biodiversity Targets
NEP	National Environment Policy
NFDB	National Forest Development Board
NGO	Non-Government Organization
NMPB	National Medicinal Plant Board
NR5	Fifth National Report
NTFPs	Non Timber Forest Produce
OF	Open Forest
PA	Protected Area
PBR	People's Biodiversity Register
PoWPA	Programme of Work on Protected Areas
PRIs	Panchayati Raj Institutions
R&D	Research and Development
RFD	Result Framework Document
SAARC	South Asian Association for Regional Cooperation
SACON	Sálim Ali Centre for Ornithology and Natural History
SBAPs	State Biodiversity Action Plan
SBBs	State Biodiversity Boards
SFDs	State Forest Departments
SP	Strategic Plan for Biodiversity
SPCBs	State Pollution Control Boards
TK	Traditional Knowledge
TKDL	Traditional Knowledge Digital Library
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
UT	Union Territory
VDF	Very Dense Forest
VEDCs	Village Eco-development Committees
WII	Wildlife Institute of India
WWF	World- Wide Fund for Nature
ZSI	Zoological Survey of India
₹	Indian Rupee

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BACKGROUND

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

India, a megadiverse country with only 2.4% of the world's land area, accounts for 7-8% of all recorded species, including over 45,000 species of plants and 91,000 species of animals. India's biodiversity underpins ecosystem functions and services that are of great human value. For millions of Indians, biodiversity supports their very livelihoods and ways of life.

The Convention on Biological Diversity (CBD) mandates each Party to prepare a National Biodiversity Strategy and Action Alan (NBSAP) or an equivalent instrument, and to ensure that this strategy is mainstreamed into relevant sectoral or cross-sectoral plans, programmes and policies. NBSAPs are the principal instruments for implementing the Convention at the national level. Accordingly, the Government of India developed a National Policy and Macrolevel Action Strategy on Biodiversity in 1999 (MoEF 1999) within five years of ratifying the CBD. This document, prepared through an extensive consultative process involving various stakeholders, is a macro-level statement of policies and strategies needed for conservation and sustainable use of biological diversity. Subsequently, the Ministry of Environment and Forests[1] (MoEF) implemented an externally-aided project, the NBSAP, from 2000 to 2004. Following India's adoption of the National Environment Policy (NEP) in 2006, a National Biodiversity Action Plan (NBAP) was prepared by updating the 1999 document (MoEF 1999), and by using the final technical report of the NBSAP project, in order to achieve consonance between the NBAP and the NEP 2006. India's NBAP, formulated through a comprehensive interministerial process, was approved by Government of India (GoI) in 2008 (MoEF 2008, http://nbaindia.org/uploaded/Biodiversityindia/NBAP.pdf). The NBAP draws from the principle in the NEP that human beings are at the centre of concerns for sustainable development and they are entitled to a healthy and productive life in harmony with nature. The NBAP 2008 identifies threats and constraints in biodiversity conservation taking into cognizance the existing legislations, implementation mechanisms, strategies, plans and programmes, based on which action points have been designed.

[1] The Ministry of Environment & Forests (MoEF) has been renamed as Ministry of Environment, Forests & Climate Change (MoEFCC) in June, 2014. The terms have been used interchangeably in the document.

1.1

ADDENDUM 2014 TO NBAP 2008

Even though the NBAP 2008 was prepared prior to the adoption of the Strategic Plan for Biodiversity (SP) 2011-2020 and its 20 Aichi Biodiversity Targets by the Conference of Parties (CoP) to the CBD in 2010 at Nagoya, Japan (Appendix 1), the NBAP is broadly aligned with the five Strategic Goals and the 20 Aichi Biodiversity Targets of SP. The CoP-10 to the CBD has urged Parties to develop national and regional targets, using SP and its targets as a flexible framework, in accordance with national priorities and capacities. Parties are also required to review, and as appropriate update and revise, their NBSAPs or equivalent instruments with the SP, by integrating their National Biodiversity Targets (NBTs) into their NBSAPs, and report thereon to CoP-12. Since India has prepared her second generation of NBAP in 2008, it was decided that the NBAP need not be completely overhauled or revised, but an exercise be undertaken of updating the NBAP by developing NBTs (Table 1), keeping in view the Aichi Biodiversity Targets as a framework. Accordingly, in pursuance to the decision of CoP-10, India has prepared 12 NBTs using the SP for Biodiversity 2011-2020 as the broad framework. These National Biodiversity Targets prepared through an extensive consultative process with all stakeholders, have also been included in India's Fifth National Report (NR5) to the CBD (MoEF 2014, http://www.cbd.int/doc/world/in/in-nr-05-en.pdf).

These 12 NBTs along with indicators and monitoring framework developed for these targets, are presented in this document, which is an Addendum to NBAP 2008. In addition, an exercise has been undertaken to highlight the synergies between NBAP 2008, 12 NBTs, Programme of Work on Protected Areas (PoWPA), and Global Strategy for Plant Conservation (GSPC). With a view to provide ready reference and continuity with NBAP 2008, the action points of India's NBAP 2008 along with action points of India's PoWPA have been reproduced in Sections 1.3 and 1.4, respectively.

PROCESS OF UPDATING NATIONAL BIODIVERSITY ACTION PLAN 2008

1.2

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

Considering the aforementioned need for updating the NBAP, 12 NBTs and associated indicators and monitoring framework (Table 1) that provide a road map for achieving the Aichi Biodiversity Targets have been developed. These NBTs are based on consultations with a range of stakeholders and a review of the programmes and activities being undertaken by Ministries/Departments in the GoI and by State Biodiversity Boards (SBBs). Icons for the NBTs have also been developed with a view to enhance their recall value and outreach (Table 1).

The process of preparing NBTs was initiated through a high level meeting with concerned Ministries/Departments in November 2011. This was followed by a series of inter-ministerial meetings and stakeholders consultations organized in April 2012 and July 2012. Thereafter, under the Global Environmental Facility (GEF) Direct Access project on 'Strengthening the Enabling Environment for Biodiversity Conservation and Management in India', consultations with stakeholders for preparation of NR5 and updating of NBAP were continued. A National Stakeholder Consultation for discussing the contents of NR5 and the proposed NBTs was held on 30 July 2013. Following further discussions, the revised draft was reviewed by a Technical Review Committee set up by MoEF for this purpose. The NBTs were identified based on an extensive review of Result Framework Documents (RFDs) of the 52 Ministries/Departments of the GoI, information available in annual reports/websites of Ministries/Departments and institutions, as well as discussions and written submissions provided by officials, scientists and other stakeholders at the individual level and a range of organizations in the country.

The NBTs were also discussed and communicated through an outreach and communication programme as part of the seventh CMS Vatavaran International Environment and Wildlife Film Festival and Forum, held between 30 January 2014 and 3 February 2014 at New Delhi, supported by the MoEF. Twelve sessions were conducted for each target over the period, wherein panel discussions and public outreach programmes were conducted to create awareness, deliberate upon and communicate to the public about the development of India's NBTs in harmony with the CBD's SP 2011-2020 and Aichi Biodiversity Targets.

While the 12 NBTs have been conceptualized now, the country has a long history of working for conservation of its unique biodiversity with multi-stakeholder participation. The fact that India harbours 7-8% of the world's known biological diversity in about 2.4% of the land area while supporting 18% of the human and 18% of the cattle population, is an eloquent testimony to her conservation ethos and commitment to conserving biodiversity and to realizing the vision of living in harmony with nature.

03

PROCESS OF UPDATING NATIONAL BIODIVERSITY ACTION PLAN 2008

ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

1.3

ADDENDUM 2014 TO NBAP 2008

Strengthening and integration of *in situ*, on-farm and *ex situ* conservation

In situ conservation

1. Expand the Protected Area (PA) network of the country including Conservation and Community Reserves, to give fair representation to all biogeographic zones of the country. In doing so, develop norms for delineation of PAs in terms of the objectives and principles of the National Environment Policy, in particular, participation of local communities, concerned public agencies, and other stakeholders, who have direct and tangible stake in protection and conservation of wildlife, to harmonize ecological and physical features with needs of socio-economic development.
2. Establish self-sustaining monitoring system for overseeing the activities and effectiveness of the PA network.
3. Ensure that human activities on the fringe areas of PAs do not degrade the habitat or otherwise significantly disturb wildlife.
4. Mitigate man-animal conflicts.
5. Promote site-specific eco-development programmes in fringe areas of PAs, to restore livelihoods and access to forest produce by local communities, owing to access restrictions in PAs.
6. Promote voluntary relocation of villagers from critical habitats of PAs.
7. Devise effective management and conservation techniques for the forest preservation plots to ensure conservation of representative areas of different forest types.
8. Strengthen research work on PAs, biosphere reserves and fragile ecosystems by involving local research institutions and universities, so as to develop baseline data on biological and managerial parameters, and functional properties of ecosystems.
9. Strengthen the protection of areas of high endemism of genetic resources (biodiversity hotspots), while providing alternative livelihoods and access to resources to local communities who may be affected thereby.
10. Continue to promote inter-sectoral consultations and partnerships in strengthening biodiversity conservation activities.
11. Strengthen capacities and implement measures for captive breeding and release into the wild of identified endangered species.
12. Reintroduction and establishment of viable populations of threatened plant species.
13. Control poaching and illegal trade in wild animals and plant species.

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

14. Periodically revisit the norms, criteria and needs of data for placing particular species in different schedules of the Wildlife (Protection) Act.
15. Promote ecological and socially sensitive tourism and pilgrimage activities with emphasis on regulated and low impact tourism on a sustainable basis through adoption of best practice norms.
16. Formulate and implement partnerships for enhancement of wildlife habitat in Conservation Reserves and Community Reserves, on the lines of multi-stakeholder partnerships for afforestation, to derive both environmental and eco-tourism benefits.
17. Promote conservation of biodiversity outside the PA network, on private property, on common lands, water bodies and urban areas.
18. Formulate and implement programmes for conservation of endangered species outside PAs.
19. Ensure conservation of ecologically sensitive areas, which are prone to high risk of loss of biodiversity due to natural or anthropogenic factors.
20. Ensure that survey and bioprospecting of native economically important biological resources is undertaken on a priority basis.
21. Integrate conservation and wise use of wetlands and river basins involving all stakeholders, in particular local communities, to ensure maintenance of hydrological regimes and conservation of biodiversity.
22. Consider particular unique wetlands as entities of incomparable values, in developing strategies for their protection and formulate conservation and prudent use strategies for the identified wetlands with participation of local communities and other stakeholders.

On-farm conservation

23. Identify hotspots of agro-biodiversity under different agro-ecozones and cropping systems and promote on-farm conservation.
24. Provide economically feasible and socially acceptable incentives such as value addition and direct market access in the face of replacement by other economically remunerative cultivars.
25. Develop appropriate models for on-farm conservation of livestock herds maintained by different institutions and local communities.
26. Develop mutually supportive linkages between *in situ*, on-farm and *ex situ* conservation programmes.

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ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

Ex situ conservation

27. Promote *ex situ* conservation of rare, endangered, endemic and insufficiently known floristic and faunal components of natural habitats, through appropriate institutionalization and human resource capacity building. For example, pay immediate attention to conservation and multiplication of rare, endangered and endemic tree species through institutions such as Institute of Forest Genetics and Tree Breeding.
28. Focus on conservation of genetic diversity (*in situ, ex situ, in vitro*) of cultivated plants, domesticated animals and their wild relatives to support breeding programmes.
29. Strengthen national *ex situ* conservation system for crop and livestock diversity, including poultry, linking national gene banks, clonal repositories and field collections maintained by different research centres and universities.
30. Develop cost effective and situation specific technologies for medium and long term storage of seed samples collected by different institutions and organizations.
31. Undertake DNA profiling for assessment of genetic diversity in rare, endangered and endemic species to assist in developing their conservation programmes.
32. Develop a unified national database covering all *ex situ* conservation sites.
33. Consolidate, augment and strengthen the network of zoos, aquaria, etc., for *ex situ* conservation.
34. Develop networking of botanic gardens and consider establishing a 'Central Authority for Botanic Gardens' to secure their better management on the lines of Central Zoo Authority.
35. Provide for training of personnel and mobilize financial resources to strengthen captive breeding projects for endangered species of wild animals.
36. Strengthen basic research on reproduction biology of rare, endangered and endemic species to support reintroduction programmes.
37. Encourage cultivation of plants of economic value presently gathered from their natural populations to prevent their decline.
38. Promote inter-sectoral linkages and synergies to develop and realize full economic potential of *ex situ* conserved materials in crop and livestock improvement programmes.

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

II

Augmentation of natural resource base and its sustainable utilization: Ensuring inter-and intra-generational equity

39. Secure integration of biodiversity concerns into inter-sectoral policies and programmes to identify elements having adverse impact on biodiversity and design policy guidelines to address such issues. Make valuation of biodiversity an integral part of pre-appraisal of projects and programmes to minimize adverse impacts on biodiversity.
40. Promote decentralized management of biological resources with emphasis on community participation.
41. Promote sustainable use of biodiversity in sectors such as agriculture, animal husbandry, dairy development, fisheries, apiculture, sericulture, forestry and industry.
42. Promote conservation, management and sustainable utilization of bamboos and canes, and establish bambusetum and canetum for maintaining species diversity and elite germplasm lines.
43. Promote best practices based on traditional sustainable uses of biodiversity and devise mechanisms for providing benefits to local communities.
44. Build and regularly update a database on NTFPs, monitor and rationalize use of NTFPs ensuring their sustainable availability to local communities.
45. Promote sustainable use of biological resources by supporting studies on traditional utilization of natural resources in selected areas to identify incentives and disincentives, and promote best practices.
46. Encourage cultivation of medicinal plants and culture of marine organisms exploited for drugs to prevent their unsustainable extraction from the wild.
47. Promote capacity building at grassroot level for participatory decision-making to ensure ecofriendly and sustainable use of natural resources.
48. Develop *sui generis* system for protection of traditional knowledge and related rights including intellectual property rights.
49. Encourage adoption of science-based, and traditional sustainable land use practices, through research and development, extension of knowledge, pilot scale demonstrations, and large scale dissemination including farmer's training, and where necessary, access to institutional finance.
50. Promote reclamation of wasteland and degraded forest land through formulation and adoption of multi-stakeholder partnerships involving the land owning agency, local communities, and investors.
51. Promote sustainable alternatives to shifting cultivation where it is no longer ecologically viable, ensuring that the culture and social fabric of the local people are not disrupted.
52. Encourage agro-forestry, organic farming, environmentally sustainable cropping patterns, and

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ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

adoption of efficient irrigation techniques.

53. Incorporate a special component in afforestation programmes for afforestation on the banks and catchments of rivers and reservoirs to prevent soil erosion and improve green cover.

54. Integrate wetland conservation, including conservation of village ponds and tanks, into sectoral development plans for poverty alleviation and livelihood improvement, and link efforts for conservation and sustainable use of wetlands with the ongoing rural infrastructure development and employment generation programmes.

55. Promote traditional techniques and practices for conserving village ponds.

56. Mainstream the sustainable management of mangroves into the forestry sector regulatory regime so as to ensure the protection of coastal belts and conservation of flora and fauna in those areas.

57. Disseminate available techniques for regeneration of coral reefs and support activities based on application of such techniques.

58. Adopt a comprehensive approach to integrated coastal management by addressing linkages between coastal areas, wetlands, and river systems, in relevant policies, regulations and programmes.

Regulation of introduction of invasive alien species and their management

59. Develop a unified national system for regulation of all introductions and carrying out rigorous quarantine checks.

60. Strengthen domestic quarantine measures to contain the spread of invasive species to neighbouring areas.

61. Promote intersectoral linkages to check unintended introductions and contain and manage the spread of invasive alien species.

62. Develop a national database on invasive alien species reported in India.

63. Develop appropriate early warning and awareness system in response to new sightings of invasive alien species.

64. Provide priority funding to basic research on managing invasive species.

65. Support capacity building for managing invasive alien species at different levels with priority on local area activities.

66. Promote restorative measures of degraded ecosystems using preferably locally adapted native species for this purpose.

ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

67. Promote regional cooperation in adoption of uniform quarantine measures and containment of invasive exotics.

IV

Assessment of vulnerability and adaptation to climate change, and desertification

68. Identify the key sectors of the country vulnerable to climate change, in particular impacts on water resources, agriculture, health, coastal areas and forests.
69. Promote research to develop methodologies for tracking changes and assessing impacts of climate change on glaciers, river flows and biodiversity.
70. Assess the need for adaptation to future impacts of climate change at national and local levels, and the scope for incorporating the outputs of such assessments in relevant programmes, including watershed management, coastal zone planning and regulation, agricultural technologies and practices, forestry management, and health programmes.
71. Explicitly consider vulnerability of coastal areas and their biodiversity to climate change and sealevel rise in coastal management plans, as well as infrastructure planning and construction norms.
72. Participate in voluntary partnerships with other countries both developed and developing, to address the challenges of sustainable development and climate change, consistent with the provisions of the UNFCCC.
73. Identify the most important gaps in knowledge that limit the national ability to develop and implement climate change adaptation strategies for species, and ecological processes and functions.
74. Enhance the capacity of climate modeling in the country substantially to get clear idea on the impacts of climate change on biodiversity at national and local levels.
75. Develop ecological criteria for identifying the species and ecosystems that are at great risk from climate change and identify their priority habitats.
76. Identify information requirements and priorities, through expert consultative processes, for long term monitoring of climate change impacts on biodiversity.
77. Establish a climate change and biodiversity website for decision makers concerned with national resource management to facilitate information exchange about the actual and potential impacts of climate change and relevant policies, strategies and programmes.
78. In view of the multidisciplinary nature of the subject, undertake an 'All India Coordinated Research Project on Impacts of Climate Change' on various facets of wild and agricultural biodiversity.
79. Integrate biodiversity concerns into measures for energy conservation and adoption of renewable

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ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

energy technologies with a focus on local biomass resources and dissemination of improved fuelwood stoves, and solar cookers.

80. Strengthen efforts for partial substitution of fossil fuels by bio-fuels, through promotion of biofuel plantations, promoting relevant research and development, and streamlining regulatory certification of new technologies.

81. Strengthen and augment the existing programmes and activities of the Central and State Governments relating to drylands.

82. Prepare and implement thematic action plans incorporating watershed management strategies, for arresting and reversing desertification and expanding green cover.

83. Promote reclamation of wastelands by energy plantations for rural energy through multistakeholder partnerships involving the landowning agencies, local communities, and investors.

Integration of biodiversity concerns in economic and social development

84. Develop strong research base on impact assessment and conduct rigorous impact assessment of development projects, with a focus on biodiversity and habitats.

85. Integrate biodiversity concerns across development sectors (such as industry, infrastructure, power, mining, etc.) and promote use of clean technologies.

86. Accord priority to the potential impacts of development projects on biodiversity resources and natural heritage while undertaking EIA. In particular, ancient sacred groves and biodiversity hotspots should be treated as possessing incomparable values.

87. Take steps to adopt and institutionalize techniques for environmental assessment of sectoral policies and programmes to address any potential adverse impacts, and enhance potential favourable impacts.

88. Develop and integrate pre-project plans for reallocation and rehabilitation of local people likely to be displaced by development projects keeping in view their socio-cultural and livelihood needs.

89. Ensure that in all cases of diversion of forest land, the essential minimum needed land for the project or activity is permitted. Restrict the diversion of dense natural forests, particularly areas of high endemism of genetic resources, to non-forest purposes, only to site-specific cases of vital national interest.

90. Give priority to impact assessment of development projects on .wetlands; in particular, ensuring that environmental services of wetlands are explicitly factored into cost-benefit analysis.

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

91. Promote integrated approaches to management of river basins considering upstream and downstream inflows and withdrawals by season, pollution loads and natural regeneration capacities, in particular, for maintenance of in-stream ecological values.

92. Consider and mitigate the impacts on river and estuarine flora and fauna, and the resulting change in the resource base for livelihoods, of multipurpose river valley projects, power plants and industries.

93. Adopt best practice norms for infrastructure construction to avoid or minimize damage to sensitive ecosystems and despoiling of landscapes.

94. Support practices of rain water harvesting and revival of traditional methods for enhancing groundwater recharge.

95. Give due consideration to the quality and productivity of lands which are proposed to be converted for development activities, as part of the environmental clearance process.

96. Ensure provision for environmental restoration during commissioning and after decommissioning of industries. For example, in all approvals of mining plans, institutionalize a system of postmonitoring of projects to ensure safe disposal of tailings and ecosystem rehabilitation following the principles of ecological succession.

97. Promote, through incentives, removal of barriers and regulation, the beneficial utilization of wastes such as fly ash, bottom ash, red mud, and slag, minimizing thereby their adverse impacts on terrestrial and aquatic ecosystems.

98. Promote sustainable tourism through adoption of best practice norms for tourism facilities and conservation of natural resources while encouraging multistakeholder partnerships favouring local communities.

99. Develop and implement viable models of public-private partnerships for setting up and operating secure landfills, incinerators, and other appropriate techniques for the treatment and disposal of toxic and hazardous wastes, both industrial and biomedical, on payment by users, taking the concerns of local communities into account. The concerned local communities and State Governments must have clear entitlements to specified benefits from hosting such sites, if access is given to non-local users. Develop and implement strategies for clean-up of toxic and hazardous waste dump legacies, in particular in industrial areas, and abandoned mines, and reclamation of such lands for future, sustainable use.

100. Survey and develop a national inventory of toxic and hazardous waste dumps, and an online monitoring system for movement of hazardous wastes. Strengthen capacity of institutions responsible for monitoring and enforcement in respect of toxic and hazardous wastes.

101. Strengthen the legal arrangements and response measures for addressing emergencies arising out of transportation, handling and disposal of hazardous wastes as part of the chemical accidents regime.

102. Promote organic farming of traditional crop varieties through research in and dissemination of techniques for reclamation of land with prior exposure to agricultural chemicals, facilitating

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ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

marketing of organic produce in India and abroad, including by development of transparent, voluntary and science-based labeling schemes.

103. Develop and enforce regulations and guidelines for management of e-waste as part of the hazardous waste regime.

104. Promote, through incentives, removal of barriers, and regulations, the beneficial utilization of generally non-hazardous waste streams such as fly ash, bottom ash, red mud, and slag, including in cement and brick-making, and building railway and highway embankments.

Pollution impacts

VI

105. Minimise and eliminate activities leading to loss of biodiversity due to point and non-point sources of pollution and promote development of clean technologies.

106. Strengthen the monitoring and enforcement of emission standards for both point and non-point sources.

107. Develop location-specific work plans focusing on biodiversity conservation while managing pollution problems.

108. Treat and manage industrial effluents so as to minimize adverse impacts on terrestrial and aquatic biological resources.

109. Promote biodegradable and recyclable substitutes for non-biodegradable materials, and develop and implement strategies for their recycle, reuse, and final environmentally benign disposal, including through promotion of relevant technologies, and use of incentive based instruments.

110. Avoid excessive use of fertilizers, pesticides and insecticides while encouraging integrated pest management practices, and use of organic manures and biofertilisers.

111. Promote organic farming of locally adapted and traditional crop varieties through appropriate incentives, and direct access to markets duly supported by credible certification systems.

112. Develop a strategy for strengthening regulation, and addressing impacts, of ship-breaking activities on human health, coastal and near marine bioresources.

113. Accord priority to potential impacts on designated natural heritage sites in view of their incomparable values that merit stricter standards than in otherwise comparable situations.

114. Promote R&D on impacts of air, water and soil pollution on biodiversity and use of biological methods for pollution amelioration.

ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

VII

Development and integration of biodiversity databases

115. Develop an integrated national biodiversity information system with distributive linkages for easy storage, retrieval and dissemination including through augmentation of extant efforts of spatial mapping of natural resources and development of interactive databases at national level.

116. Intensify survey, identification and inventorization activities, involving local institutions and giving priority to hitherto unexplored areas.

117. Conduct regular surveys to monitor changes in populations of target species (wild and domesticated), using remote sensing and other updated tools and techniques.

118. Update list of endangered species of flora and fauna on priority, based on internationally accepted criteria.

119. Extend listing of keystone, umbrella and endemic species for conserving them on priority basis, and develop models/packages for their conservation.

120. Update database on sacred groves and sacred ponds documenting bio-resources and associated knowledge conserved at these sites.

121. Promote DNA fingerprinting, other molecular analytical techniques and studies on genetic diversity of critically endangered species to develop appropriate conservation strategies.

122. Expand area specific surveys of land races, traditional cultivars of crops, wild relatives of crop plants and breeds of domesticated animals inter alia through application of appropriate statistical techniques.

123. Use modern taxonomic methods for documentation/identification of species.

124. Strengthen and build capacity for taxonomy and biosystematics, particularly for groups of plants, animals and microorganisms which are as yet inadequately understood.

VIII

Strengthening implementation of policy, legislative and administrative measures for biodiversity conservation and management

125. Accelerate effective actions at the central, state and local levels to implement provisions under the Biological Diversity Act.

126. Review enabling policies to prevent transfer of prime agricultural land to non-agricultural purposes, and promote sustainability of agricultural lands.

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ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

127. Formulate suggestive policies for strengthening and supporting conservation and management of grasslands, pastoral lands, sacred groves and other areas significant for biodiversity conservation.

128. Support preparation of PBRs with technical help by the scientific institutions.

129. Strengthen systems for documentation, application and protection of biodiversity associated traditional knowledge, providing adequate protection to these knowledge systems while encouraging benefits to communities.

130. Revive and revitalize sustainable traditional practices and other folk uses of components of biodiversity and associated benefits to local communities with a view to promoting and strengthening traditional knowledge and practices.

131. Create public education and awareness about the need to conserve, protect and gainfully use traditional knowledge systems.

132. Identify emerging areas for new legislation, based on better scientific understanding, economic and social development, and development of multilateral environmental regimes, in line with the NEP.

133. Review the body of existing legislations relevant to biodiversity conservation to develop synergies among relevant statutes and regulations, eliminate obsolescence, and amalgamate provisions with similar objectives, in line with the NEP. Further, encourage and facilitate review of legislations at the level of state and local governments with a view to ensuring their consistency with this policy.

134. Review the regulatory processes for LMOs so that all relevant scientific knowledge is taken into account, and ecological, health, and economic concerns are adequately addressed.

135. Periodically review and update the national biosafety guidelines to ensure that these are based on current scientific knowledge.

136. Ensure conservation of biodiversity and human health while dealing with LMOs in transboundary movement in a manner consistent with the multilateral biosafety protocol.

137. Develop appropriate liability and redress mechanisms to internalize environment costs and address economic concerns in case of any damage to biodiversity.

138. Harmonise provisions concerning disclosure of source of biological material and associated knowledge used in the inventions under the Patents Act, Protection of Plant Varieties and Farmers' Rights Act, and Biological Diversity Act, to ensure sharing of benefits by the communities holding traditional knowledge, from such use.

139. Develop supportive regulatory regime for protection of identified wetlands and biosphere reserves.

140. Develop appropriate system and modalities for operationalizing provisions for prior informed consent and benefit sharing under the Biological Diversity Act, working towards greater congruence between these provisions and trade related aspects of intellectual property rights.

ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

IX

Building of national capacities for biodiversity conservation and appropriate use of new technologies

141. Develop consortium of lead institutions engaged in conservation providing linkages and networking across public and private sectors.
142. Outsource research and promote joint ventures on key conservation issues.
143. Promote application of biotechnology tools for conserving endangered species.
144. Encourage DNA profiling for assessment of genetic diversity in endangered species to assist conservation.
145. Develop DNA-probe based technology for tracking of LMOs.
146. Develop specific pilot gene banks for LMOs approved for undertaking research and commercial use.
147. Develop capacity for risk assessment, management and communication on LMOs.
148. Support pilot studies on use of biotechnology tools for conservation where appropriate.
149. Develop specific complimentary capacity building measures based on national needs and priorities for the formulation and implementation of national rules and procedures on liability and redress to strengthen the establishment of baseline information and monitoring of changes.
150. Develop protocols for monitoring products based on genetic use restriction technologies.
151. Strengthen participatory appraisal techniques and encourage formation of local institutional structures for planning and management of natural resources for ensuring participation of women.
152. Preserve and strengthen traditional, religious, ritualistic, ethical and cultural methods of conservation.
153. Promote livelihood diversification opportunities for making value added bioresource based products and building upon traditional as well as emerging environmental technologies customized at local/field level.
154. Strengthen manpower, infrastructure and other pertinent capacities including upgradation of skills of officials of the MoEF to enable it to address new and emerging requirements in the field of biodiversity conservation and management.
155. Strengthen capabilities of BSI and ZSI and promote their technical cooperation with SBBs and BMCs.
156. Augment human resource development and personnel management in forestry and wildlife sector.
157. Strengthen multidisciplinary R&D efforts on key areas pertaining to conservation and management of biological diversity.
158. Strengthen and support departments of biology, botany, zoology, sociology, anthropology and other

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ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

relevant disciplines in central, state and deemed universities/ colleges, with a view to raising the standard of research and producing faculty who could guide the process of environmental education in schools.

159. Promote both formal and non-formal means for environment education and biodiversity conservation.

160. Design and implement awareness programmes, particularly for rural women, and also benefit from their wisdom. Women's organizations such as women's councils and mahila mandals could be used for this purpose.

161. Incorporate modules on conservation and sustainable utilization of biodiversity in foundational and professional training courses for the officers of various services.

162. Promote and/or strengthen education, training, awareness and extension programmes on biodiversity issues for various stakeholders including all levels of students, professionals (such as engineers, doctors, lawyers, CAs, etc.), elected representatives (such as representatives of PRIs, MLAs, MPs, Mayors, etc.), judiciary, NGOs, public and private sectors (e.g. corporate representatives, industrial associations etc.), defence and para military forces, customs, police, media, cultural, spiritual and religious institutions/ individuals.

163. Enhance public education and awareness for biodiversity conservation through audio, visual and print media.

164. Promote activities relating to animal welfare.

Valuation of goods and services provided by biodiversity, and use of economic instruments in decision making processes

X

165. Develop a system of natural resource accounting reflecting the ecological as well as economic values of biodiversity, with special attention to techniques of green accounting in national accounts and estimation of positive and negative externalities for use of various types of natural resources in the production processes as well as in household and government consumption.

166. Develop suitable valuation models for adoption at national, state and local levels.

167. Support projects and pilot studies aimed at validating methods of valuation of bioresources.

168. Identify key factors and indicators to assess effectiveness of valuation methods and models, taking into consideration the UN guidelines on monitoring and evaluation of socio-economic projects.

169. Assess the utility of traditional and innovative fiscal instruments for promoting conservation and sustainable utilization of biodiversity.

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

170. Develop systems for partial ploughing back of the revenues generated in protected areas, zoological parks, botanical gardens, aquaria, etc., for improving their management.

171. Mobilize additional resources based on project formulation for biodiversity conservation.

XI

International cooperation

172. Further consolidate and strengthen global cooperation, especially with UN agencies and other international bodies on issues related to biodiversity.

173. Promote regional cooperation for effective implementation of suitable strategies for conservation of biodiversity, especially with neighbouring countries through flora such as SAARC, ASEAN and ESCAP.

174. Develop projects for accessing funds for conservation and sustainable use of biodiversity from external sources, earmarked for conservation through bilateral, regional and other multilateral channels.

175. Promote technology transfer and scientific cooperation towards conservation of biological resources, their sustainable use and equitable sharing of benefits arising out of their use, taking also into account extant regulations including those relating to taxation.

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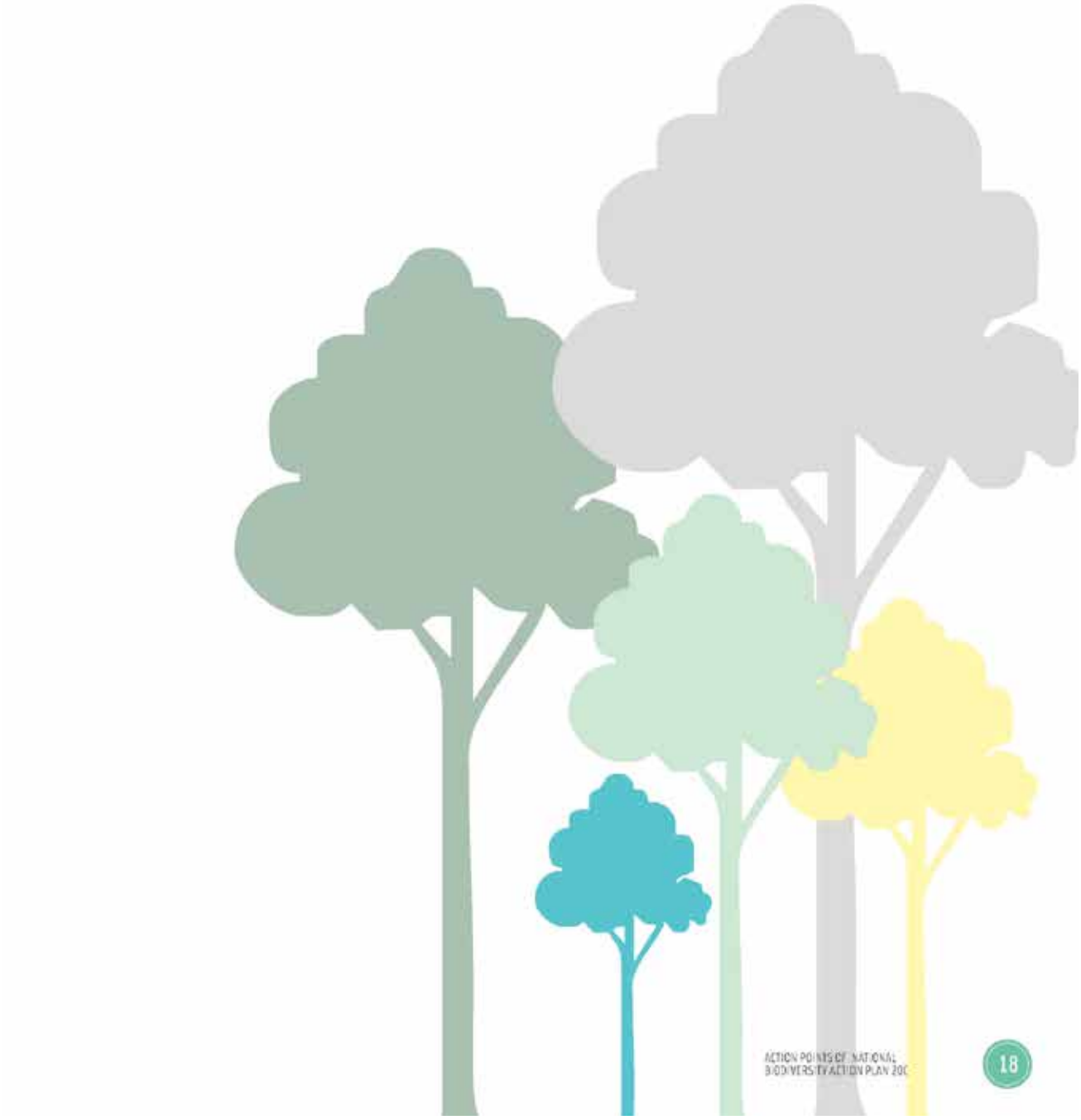
ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008


ADDENDUM 2014
TO NBAP 2008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ACTION POINTS OF PROGRAMME OF WORK ON PROTECTED AREAS 2012

1.4

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

In order to implement CBD's PoWPA, India prepared an Action Plan in 2012 (MoEF 2012 a) which comprises the following key steps to be pursued under each action:

Action 1

Development of Site Specific Management Plans

- Inventory and Assessment
- Capacity Building
- Equipments
- Preparation of Site Specific Management Plan

Action 2

Integration of PAs (Securing Identified Corridors and Connectivity Areas)

- Public awareness and support
- Demonstration of mainstreaming corridors and connectivity for 50 sites
- Action Plan for corridors and connectivity areas of identified sites

Action 3

Diversifying the Governance Types

- Participatory Wildlife Monitoring for strengthening management

Action 4

Protected Area Valuation Assessment

- Targeted studies on PA valuation assessment in select PAs

Action 5

Climate Change Resilience and Adaptation Assessment

- Targeted studies on Climate Change Resilience and Adaptation Assessment in select PAs

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ACTION POINTS OF PROGRAMME OF WORK ON PROTECTED AREAS 2012

NATIONAL BIODIVERSITY TARGETS

1.5

ADDENDUM 2014
TO NBAP 2008

The 12 NBTs along with the indicators and monitoring framework are given in Table 1, with a view to facilitate monitoring of trends and recording progress in their implementation through a consultative process. The agencies that have been identified on the basis of their mandate, domain expertise and geographical coverage for monitoring the progress in achieving the NBTs are also depicted in Table 1. While the frequency of monitoring of the 12 NBTs ranges from three to five years, data may be recorded yearly or more frequently by different agencies. Once the data are first reported for three years, these will be reviewed for any mid-course correction that may be required, and any changes will be incorporated appropriately.

Table 1. National Biodiversity Targets: Indicators and Monitoring Framework

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
By 2020, a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.		Trends in incorporating awareness and attitudes towards environmental conservation through communication and mainstream education	• Number of students opting for higher-level elective subject and specialization in environmental education (EE)	ISC/ICSE and CBSE boards	2 years
			• Numbers of schools enrolled in the National Environment Awareness Campaign, National Green Corps-Eco Clubs Programme, Paryavaran Mitra (Friends of the Environment) Programme, Global Learning and Observations, Gyan Vigyan Vidyalaya, birdwatching clubs, DNA clubs (DBT's Natural Resource Awareness Clubs), etc.	MoEF, Youth for Coastal Marine Conservation, South Asia Youth Environment Network (SAYEN), Ministry of Human Resource Development (MoHRD)- Department of Education Centre for Environment Education (CEE), C.P.R. Environmental Education Centre (CPREEC), Centre for Media Studies (CMS), Department of Biotechnology (DBT)	2 years
			• Trends in coverage of environment-related programmes and projects with enhanced involvement of youth	Ministry of Sports and Youth Affairs (MoSYA)	2 years
			• Trends in visits to protected areas (PAs), natural history museums and exhibitions and zoological/botanical gardens	State forest departments (Wildlife Wing), Central Zoo Authority (CZA), CEE	2 years
		Trends in promoting awareness at local levels	• Trends in number of Biodiversity Management Committees (BMCs) constituted/operationalized • Trends in number of people's biodiversity registers (PBRs) prepared	National Biodiversity Authority (NBA)/State Biodiversity Boards (SBBs)	2 years
			• Trends in number of Joint Forest Management Committees (JFMCs) constituted/operationalized • Trends in number of civil society organizations/NGOs, Panchayati Raj Institutions, Community Forest Rights (CFR) committees (under Forest Right Act (FRA), 2006) engaged in creating environmental awareness	State forest departments, MoEF CEE MoPR Ministry of Tribal Affairs (MoTA)	2 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation strategies.		Trends in incorporating natural resource/biodiversity/ecosystem service values in national and state planning processes and development programmes	• Trends in biodiversity and ecosystem services valuation studies • Trends in number and coverage of studies -TEEB, NPV relating to biodiversity • Trends in number and effectiveness of measures developed in the Mahatma Gandhi National Rural Employment Guarantee Act programme (MGNREGA) and Integrated Watershed Management Programme (IWMP) for protection and enhancement of ecosystem services and biodiversity • Trends in biodiversity-inclusive climate change adaptation and mitigation measures formulated/implemented • Trends in area covered by catchment area treatment under irrigation projects	Institute of Economic Growth (IEG), Indira Gandhi Institute for Development Research (IGIDR), Indian Institute of Forest Management (IIFM), MoEF Ministry of Rural Development (MoRD), MoTA, state forest departments State climate change cells	3 years
		Trends in integration of biodiversity and ecosystem service values into sectoral and development policies and programmes	• Trends in studies on economic and non-economic valuation of selected ecosystem services • Trends in reflection of biodiversity and ecosystem services in policy decisions, planning and reporting processes	IIFM, IGIDR, IEG, MoEF, NBA	3 years
		Trends in policies considering biodiversity and ecosystem services in environmental impact assessment and strategic environmental assessment	• Trends in number of studies on biodiversity-inclusive environment impact assessment, cumulative environment impact assessment (CEIA) and strategic environment assessment (SEA)	MoEF, Planning Commission	3 years
			• Trends in identification, assessment, establishment and strengthening of incentives that reward positive contributions to biodiversity and ecosystem services	Ministry of Corporate Affairs (MoCA)	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.	5, 15	Trends in forest cover	• Change in proportion of forest cover in different forest categories (VDF, MDF, OF and Scrub)	Forest Survey of India (FSI)	3 years
		Trends in aquatic ecosystems	• Changes in area under riverine ecosystems and wetlands (terrestrial and coastal) • Number of wetlands under integrated management plans	Department of Space (DoS), Wetlands International-South Asia, SACON	3 years
		Trends in mangrove cover and coastal area management	• Change in mangrove cover over the years • Trends in area covered under integrated coastal area management	FSI; Integrated Coastal and Marine Area Management (ICMAM), Ministry of Earth Sciences; Integrated Coastal Zone Management (ICZM) Project Unit of Society of Integrated Coastal Management (SICOM); National Centre for Sustainable Coastal Management (NCSCM), MoEF; DoS	2 years
		Trends in river water quality	• Changes in water quality (by interception, diversion and treatment of domestic sewage and preventing agricultural runoff, toxic wastes, industrial effluents, chemical wastes and unburnt bodies from entering water bodies)	National Ganga Authority, National River Conservation Directorate (NRCD) (Ganga Action Plan, Yamuna Action Plan and other action plans for polluted water bodies), SPCBs, CPCB	2 years
		Trends in afforestation and restoration	• Monitoring canopy cover, grasslands and traditional grazing lands • Monitoring carbon stock • Assisted natural regeneration • Rehabilitation of mined out areas	Green India Mission, NRSC, DoS, ICFRE, forest departments, FSI Central Mine Planning and Design Institute (CMPDI)	3 years
		Combating desertification	• Trends in land degradation • Status and trends in area under desert, levels of water in wells/groundwater table	National Bureau of Soil Survey and Land Use Planning (NBSSLUP), Department of Agriculture & Cooperation, Disaster Management Support Programme, DoS, Department of Land Resources, Ministry of Rural Development, Ministry of Water Resources	2 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
		Species restoration after forest and water body restoration	• Status of selected indicator species	Green India Mission, state forest departments	3 years
		Trends in maintenance of fertility in agricultural lands using natural methods and means	• Soil health records • Organic carbon and humus buildup • Trends in keeping the health of near-pristine soils, being awarded titles under FRA in forest areas	Ministry of Agriculture, state forest departments	3 years
			• Number and coverage of management plans developed for prioritized invasive species and integration with PA management plans and wetland management plans • Change in area affected by invasive species	Forest departments, DoS, Wetlands International-South Asia, SACON, ICFRE (Forest Invasive Species Cell), WII, CMLRE, National Institute of Oceanography (NIO), Annamalai University Faculty of Marine Sciences, CABI South Asia	
By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed		Trends in invasive alien species management	• Number and coverage of management plans developed for prioritized invasive species and integration with PA management plans and wetland management plans • Change in area affected by invasive species	Forest departments, DoS, Wetlands International-South Asia, SACON, ICFRE (Forest Invasive Species Cell), WII, CMLRE, National Institute of Oceanography (NIO), Annamalai University Faculty of Marine Sciences, CABI South Asia	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.		Trends in sustainable agriculture	• Trends in area under organic farming, integrated pest management • Trends in organic farming certification • Trends in the production/usage of agrochemical fertilizers • Trends in the use of bio-fertilizers/biofuels, organic manure and vermicompost • Trends in soil quality and land use • Trends in energy consumption (by types/source) in farms • Trends in groundwater table • Trends in increased acreage under organic production on farms of agricultural research institutions and universities • Trends in enhanced use of landraces • Trends in proliferation of local crops and varieties that are more adapted to the environment, requiring less external inputs and therefore more integrated in the ecosystem, at the same time enhance prospects of greater household food security. • Trends in analysis of agricultural policies and programmes that adversely affect ecosystem services such as pollination	Department of Agriculture, ICAR Department of Fertilizers, APEDA NBSS&LUP ICAR ICAR Ministry of Agriculture, Ministry of Rural Development, Ministry of Consumer Affairs, Food and Public Distribution, district administration Ministry of Agriculture	3 years
		Monitoring agricultural extension	• Trends in awareness levels of farmers • Trends in awareness levels of extension service staff, scientists and agricultural research system with relation to agro-biodiversity and associated knowledge	Department of Agriculture ICAR	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
		Trends in sustainable forestry	• Trends in area of degraded forests • Trends in area of restored forests. • Trends in proportion of products derived from sustainable sources	Green India Mission, IIFM FSI, ICFRE, FRI	3 years
		Trends in stock sizes of target and bycatch fish species (freshwater and marine)	• Trends in catch per unit effort (cpue)	Fishery Survey of India, Central Marine Fisheries Research Institute (CMFRI), National Fisheries Development Board (NFDB), CMLRE (for deeper water marine fishes), NBFGR	3 years
		Trends in intensity of destructive fishing practices	• Trends in sale of large-scale or destructive fishing gear (e.g. purse-seine, bottom trawlers) • Trends in area covered by trawlers • Trends in frequency of trawling	Department of Animal Husbandry, Dairying & Fisheries NFDB, Central Institute of Fisheries Technology (CIFT), Fishery Survey of India	3 years
			• Trends in certification of fish produce	Marine Products Export Development Authority	Annual
		Trends in sustainable fishing practices Trends in number of fishing boats/fishing capacity	• Trends in number of licences issued to fishing boats in coastal states • Trends in fishing effort capacity	NFDB, Department of Fisheries of each coastal state	3 years
Ecologically representative areas under terrestrial and inland water, and also coastal and marine zones, especially those of particular		Trends in PA coverage under four legal categories (National Park, Wildlife Sanctuary, Community Reserve and Conservation Reserve)	• Change in number/area/percentage of PAs over time	Wildlife Institute of India (WII)	3 years
		Trends in other area-based conservation measures	• Area/number of initiatives	Indigenous Peoples' and Community Conserved Territories and Areas (ICCA) consortium, UNDP India, WWF	3 years
		Trends in coverage under Biodiversity Heritage Sites (BHS) under the Biological Diversity Act 2002	• Change in number/area/percentage of BHSs over time	National Biodiversity Authority, SBBs	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, based on protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20% of the geographic area of the country, by 2020.		Trends in wetlands brought under integrated management	• Changes in area and ecological status of wetlands through implementation of integrated management plans • Changes in abundance and diversity of waterbird species in wetlands over time • Trends in coverage of sites of international importance for migratory species under CMS convention	SACON, Wetlands International-South Asia, DoS Wetlands International-South Asia, BNHS, SACON Wetlands International-South Asia, BNHS, SACON	3 years
		Trends in Important Bird Areas (IBAs)	• Change in number/area of Important Bird Areas (IBAs) over time	Bombay Natural History Society (BNHS)	3 years
		Status and population trends of 16 IDWH terrestrial species and 7 marine species	• Population trends of selected species (16 terrestrial and 7 marine species)	For terrestrial species: Zoological Survey of India (ZSI), WII, SACON, BNHS, NCF, WTI, WWF, IISc For marine species: CMLRE, ZSI, Fishery Survey of India, National Centre for Antarctic & Oceanic Research (NCAOR), CMFRI	5 years
		Trends in forest cover in four designated categories	• Change in proportion of forest cover in different forest categories (VDF, MDF, OF, Scrub)	FSI	2 years
		Trends in status of Indian plant and animal species included in IUCN Red Data Book	• Conservation status of species, subspecies and varieties and even selected subpopulations at a national scale in order to highlight taxa threatened with extinction and therefore promote their conservation	IUCN-India, ZSI, BSI, WII	4 years
		Trends in air and water quality and in noise pollution	• Status and trends of ambient air quality; monitoring water quality for physico-chemical and bacteriological parameters, trace metals, pesticides at selected sites; trends in noise levels	CPCB, SPCBs	Yearly
		Status of ecosystem services of selected ecosystems	• Status of ecological services of selected ecosystems including agricultural landscapes	IIFM, IEG	5 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
		Trends in areas of exceptional agricultural biodiversity and their threat status	• Assessing the conservation status of landraces and varieties to highlight threatened status and therefore promote conservation	Ministry of Agriculture, State Biodiversity Boards	5 years
By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	13	Animal genetic diversity	• Trends in number of indigenous/domesticated breeds (*in situ*) • Trends in populations of domestic breeds (*in situ*) • Effectiveness of initiatives/measures taken to conserve indigenous animal varieties • Trends in germplasm accessions in *ex situ* collections	National Bureau of Animal Genetic Resources (NBAGR) Department of Agriculture Agriculture universities	3 years
		Plant genetic diversity	• Trends in numbers of indigenous varieties (*in situ*) • Trends in area under cultivation, production/yield (*in situ*) • Effectiveness of initiatives/measures taken to conserve indigenous crop varieties and their wild relatives • Trends in germplasm accessions in *ex situ* collections	National Bureau of Plant Genetic Resources (NBPGR) Department of Agriculture Agriculture universities National Bureau of Forest Genetic Resources	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
By 2020, ecosystem services, especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified, taking into account the needs of women and local communities, particularly the poor and vulnerable sections.	14	Human development index-standard of living in India	• Trends in number of people with access to primary/secondary education/health services/safe drinking water/electricity/road connectivity • Trends in number of women with access to primary/secondary education/health services/safe drinking water/electricity/road connectivity	MoHRD Ministry of Health and Family Welfare	2 years
		Level of toxic contaminants in wetlands/rivers/aquatic fauna	• Trends in pollution status of wetlands of international (Ramsar sites) and national (identified by state governments) importance • Level of toxic contaminants in rivers that provide freshwater for human use • Levels of toxic contaminants in aquatic/terrestrial fauna	Central Pollution Control Board (CPCB) Indian Institute of Toxicology Research	2 years
		Extent of restored forest cover in India	• Trends in area of forests under restoration • Trends in area under plantations in rural/urban areas • Trends in very dense forest/moderately dense forest in protected areas	FSI, REDD+ Green India Mission JFM programme ICFRE/FRI	2 years
		Extent of groundwater pollution and groundwater levels	• Trends in groundwater levels • Trends in proportion of groundwater available for use	Central Ground Water Board	2 years
		Trends in use of chemicals and fertilizers in agriculture/organic products	• Agricultural area under chemicals/ fertilizers/ pesticides use • Agricultural area under organic farming in agro-ecosystems • Level of nitrogen/phosphorus/essential nutrients in soil	Department of Agriculture Indian Agriculture Research Institute NBSS&LUP	2 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
		Trends in wetlands significant for delivering freshwater being brought under integrated management	• Area of wetlands such as lakes and ponds under integrated management	SACON, Wetlands International - South Asia, BNHS, DoS	3 years
		Trends in proportion of people using improved water services	• Trends in number of people with access to potable water • Trends in number of households with tap water connections	Ministry of Drinking Water and Sanitation	2 years
		Trends in availability of urban greenspaces	• Area under greenspaces in urban centres (as a proxy to conservation of urban biodiversity)	Ministry of Urban Development, School of Planning and Architecture (SPA)	3 years
By 2015, Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislations.	16	Trends in access to genetic resources and equitable sharing of benefits	• Trends in number of proposals for intellectual property rights • Trends in number of cases seeking third party transfer for accession of biological resources and associated traditional knowledge • Trends in number of cases for seeking prior approval of NBA for transferring the results of research to foreign nations, companies, NRIs for commercial purposes • Trends in number of cases seeking approval to bio-resources and associated traditional knowledge for commercial utilization	NBA, SBBs Departments of Agriculture, Animal Husbandry and Fisheries, ICAR, Controller General of Patents, Designs & Trademarks	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
By 2020, an effective, participatory and updated national biodiversity action plan is made operational at different levels of governance		Progress in implementing National Biodiversity Action Plan (NBAP)	• Trends in preparation of State Biodiversity Action Plans (SBAPs) • Trends in implementing the activities envisaged under SBAPs	SBBs and state planning boards, NBA, MoEF, Departments of Forests, Agriculture, Animal Husbandry and Fisheries	3 years
By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.		Trends in documentation/data abstraction and management	• Number of traditional herbal formulations documented from codified systems of Indian medicine • Number of transcriptions • Number of folk uses of medicinal plants documented from PBRs prepared by BMCs	TKDL- AYUSH-CSIR Unit NBA	3 years 3 years
		Trends in access agreements related to traditional knowledge (TK)	• Number of potential 'bio-piracy'/wrong patent cases prevented • Number of patents and ABS based on TK derived from folk knowledge	TKDL-AYUSH-CSIR unit Controller General of Patents, Designs & Trademarks, NBA	3 years 3 years
		Trends in grassroots innovations and traditional practices	• Number of innovations and traditional practices documented	National Innovation Foundation (NIF), NBA	3 years
		Trends in capacity building related to TK and PBRs	• Training/capacity building at local and community levels • Numbers of BMCs and PRI institutions trained	NBA, SBBs and Foundation for Revitalisation of Local Health Traditions (FRLHT), BSI, state forest academies and training centres, ICFRE	3 years

National Biodiversity Target	Corresponding Aichi Biodiversity Target	Composite Indicator	Description of Indicator	Responsible agencies (Indicative list)	Frequency of monitoring/ report
		Trends in conservation and sustainable use of medicinal plants used by India's medical heritage	• Number of medicinal plant conservation areas (MPCAs) established in the country • Trends in collection of plants providing raw drugs used in Indian systems of medicine	MoEF, National Medicinal Plant Board (NMPB), FRLHT NMPB	3 years
		Trends in documentation and awareness of the conservation traditions in TK	• Documentation and awareness meetings/capacity building workshops/seminars/conferences for various target groups (NGOs, CBOs, Mahila Mandals, academicians) • Trends in number of PBRs prepared	CPREEC MoHRD NBA	3 years
By 2020, opportunities to increase the availability of financial, human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.		Trends in availability of financial, human and technical resources for achieving 20 Aichi Biodiversity Targets and 12 National Biodiversity Targets	• Trends in financial resources made available for implementing Aichi and National Biodiversity Targets • Trends in human resources made available for implementing Aichi and National Biodiversity Targets • Trends in technical resources made available for implementing Aichi and National Biodiversity Targets	Planning Commission, MOEF NBA SBBs State forest departments, MoHRD DoS, MoST, Indian Meteorological Department (IMD)/MoES	3 years

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

1.6

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The actionable points under India's NBAP 2008 bear close harmonization with the 12 NBTs developed in 2014, as can be seen in Table 2. The 12 NBTs capture the essence of NBAP 2008 and its actions points that call for strengthening of *in situ*, on farm, and *ex situ* conservation; augmentation of natural resource base and its sustainable utilization; regulation of introduction of invasive species and their management; vulnerability assessment regarding climate change and desertification; integration of biodiversity concerns in socio-economic development; impacts of pollution; development of biodiversity databases; strengthening implementation of policy, legislative and administrative measures for biodiversity conservation and management, national capacity building and appropriate use of new technologies; biodiversity valuation and use of economic instruments in decision-making; and global cooperation on issues related to biodiversity. The four-colour scheme in Table 2 depicts whether the linkage between actionable points of NBAP 2008 and the 12 NBTs is direct, indirect, is at a tertiary level, or has a peripheral connect.

ADDENDUM 2014
TO NBAP 2008

Table 2. Linkages between Actionable Points of NBAP 2008 and National Biodiversity Targets

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
Strengthening and integration of *in situ*, on-farm and *ex situ* conservation												
***In Situ* Conservation**												
1 Expand the Protected Area (PA) network of the country including Conservation and Community Reserves, to give fair representation to all biogeographic zones of the country. In doing so, develop norms for delineation of PAs in terms of the objectives and principles of the National Environment Policy, in particular, participation of local communities, concerned public agencies, and other stakeholders, who have direct and tangible stake in protection and conservation of wildlife, to harmonize ecological and physical features with needs of socio-economic development												
2 Establish self-sustaining monitoring system for overseeing the activities and effectiveness of the PA network												
3 Ensure that human activities on the fringe areas of PAs do not degrade the habitat or otherwise significantly disturb wildlife												
4 Mitigate man-animal conflicts												
5 Promote site-specific eco-development programmes in fringe areas of PAs, to restore livelihoods and access to forest produce by local communities, owing to access restrictions in PAs												
6 Promote voluntary relocation of villagers from critical habitats of PAs												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008
AND THE 12 NATIONAL BIODIVERSITY TARGETS

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
7 Devise effective management and conservation techniques for the forest preservation plots to ensure conservation of representative areas of different forest type												
8 Strengthen research work on PAs, biosphere reserves and fragile ecosystems by involving local research institutions and universities, so as to develop baseline data on biological and managerial parameters, and functional properties of ecosystems												
9 Strengthen the protection of areas of high endemism of genetic resources (biodiversity hotspots), while providing alternative livelihoods and access to resources to local communities who may be affected thereby												
10 Continue to promote inter-sectoral consultations and partnerships in strengthening biodiversity conservation activities												
11 Strengthen capacities and implement measures for captive breeding and release into the wild of identified endangered species												
12 Reintroduction and establishment of viable populations of threatened plant species												
13 Control poaching and illegal trade in wild animals and plant species												
14 Periodically revisit the norms, criteria and needs of data for placing particular species in different schedules of the Wildlife (Protection) Act												
15 Promote ecological and socially sensitive tourism and pilgrimage activities with emphasis on regulated and low impact tourism on a sustainable basis through adoption of best practice norms												
16 Formulate and implement partnerships for enhancement of wildlife habitat in												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
Conservation Reserves and Community Reserves, on the lines of multi-stakeholder partnerships for afforestation, to derive both environmental and eco-tourism benefits												
17 Promote conservation of biodiversity outside the PA network, on private property, on common lands, water bodies and urban areas												
18 Formulate and implement programmes for conservation of endangered species outside PAs												
19 Ensure conservation of ecologically sensitive areas, which are prone to high risk of loss of biodiversity due to natural or anthropogenic factors												
20 Ensure that survey and bioprospecting of native economically important biological resources is undertaken on a priority basis												
21 Integrate conservation and wise use of wetlands and river basins involving all stakeholders, in particular local communities, to ensure maintenance of hydrological regimes and conservation of biodiversity												
22 Consider particular unique wetlands as entities of incomparable values, in developing strategies for their protection and formulate conservation and prudent use strategies for the identified wetlands with participation of local communities and other stakeholders												
On-farm conservation												
23 Identify hotspots of agro-biodiversity under different agro-ecozones and cropping systems and promote on-farm conservation												
24 Provide economically feasible and socially acceptable incentives such as value addition and direct market access in the face of												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
replacement by other economically remunerative cultivars												
25 Develop appropriate models for on-farm conservation of livestock herds maintained by different institutions and local communities												
26 Develop mutually supportive linkages between *in situ*, on-farm and *ex situ* conservation programmes												
***Ex situ* conservation**												
27 Promote ex situ conservation of rare, endangered, endemic and insufficiently known floristic and faunal components of natural habitats, through appropriate institutionalization and human resource capacity building. For example, pay immediate attention to conservation and multiplication of rare, endangered and endemic tree species through institutions such as Institute of Forest Genetics and Tree Breeding												
28 Focus on conservation of genetic diversity (*in situ, ex situ, in vitro*) of cultivated plants, domesticated animals and their wild relatives to support breeding programmes												
29 Strengthen national ex situ conservation system for crop and livestock diversity, including poultry, linking national gene banks, clonal repositories and field collections maintained by different research centres and universities												
30 Develop cost effective and situation specific technologies for medium and long term storage of seed samples collected by different institutions and organizations												
31 Undertake DNA profiling for assessment of genetic diversity in rare, endangered and												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets 1	2	3	4	5	6	7	8	9	10	11	12
endemic species to assist in developing their conservation programmes												
32 Develop a unified national database covering all ex situ conservation sites												
33 Consolidate, augment and strengthen the network of zoos, aquaria, etc., for ex situ conservation												
34 Develop networking of botanic gardens and consider establishing a 'Central Authority for Botanic Gardens' to secure their better management on the lines of Central Zoo Authority												
35 Provide for training of personnel and mobilize financial resources to strengthen captive breeding projects for endangered species of wild animals												
36 Strengthen basic research on reproduction biology of rare, endangered and endemic species to support reintroduction programmes												
37 Encourage cultivation of plants of economic value presently gathered from their natural populations to prevent their decline												
38 Promote inter-sectoral linkages and synergies to develop and realize full economic potential of ex situ conserved materials in crop and livestock improvement programmes												
Augmentation of natural resource base and its sustainable utilization: Ensuring inter and intra-generational equity												
39 Secure integration of biodiversity concerns into inter-sectoral policies and programmes to identify elements having adverse impact on biodiversity and design policy guidelines to address such issues. Make valuation of biodiversity an integral part of pre-appraisal of projects and programmes to minimize adverse impacts on biodiversity												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008		National Biodiversity Targets											
		1	2	3	4	5	6	7	8	9	10	11	12
40	Promote decentralized management of biological resources with emphasis on community participation												
41	Promote sustainable use of biodiversity in sectors such as agriculture, animal husbandry, dairy development, fisheries, apiculture, sericulture, forestry and industry												
42	Promote conservation, management and sustainable utilization of bamboos and canes, and establish bambusetum and canetum for maintaining species diversity and elite germplasm lines												
43	Promote best practices based on traditional sustainable uses of biodiversity and devise mechanisms for providing benefits to local communities												
44	Build and regularly update a database on NTFPs, monitor and rationalize use of NTFPs ensuring their sustainable availability to local communities												
45	Promote sustainable use of biological resources by supporting studies on traditional utilization of natural resources in selected areas to identify incentives and disincentives, and promote best practices												
46	Encourage cultivation of medicinal plants and culture of marine organisms exploited for drugs to prevent their unsustainable extraction from the wild												
47	Promote capacity building at grassroot level for participatory decision-making to ensure eco-friendly and sustainable use of natural resources												
48	Develop *sui generis* system for protection of traditional knowledge and related rights including intellectual property rights												
49	Encourage adoption of science-based, and traditional sustainable land use practices,												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008		National Biodiversity Targets											
		1	2	3	4	5	6	7	8	9	10	11	12
	through research and development, extension of knowledge, pilot scale demonstrations, and large scale dissemination including farmer's training, and where necessary, access to institutional finance												
50	Promote reclamation of wasteland and degraded forest land through formulation and adoption of multi-stakeholder partnerships involving the land owning agency, local communities, and investors												
51	Promote sustainable alternatives to shifting cultivation where it is no longer ecologically viable, ensuring that the culture and social fabric of the local people are not disrupted												
52	Encourage agro-forestry, organic farming, environmentally sustainable cropping patterns, and adoption of efficient irrigation techniques												
53	Incorporate a special component in afforestation programmes for afforestation on the banks and catchments of rivers and reservoirs to prevent soil erosion and improve green cover												
54	Integrate wetland conservation, including conservation of village ponds and tanks, into sectoral development plans for poverty alleviation and livelihood improvement, and link efforts for conservation and sustainable use of wetlands with the ongoing rural infrastructure development and employment generation programmes												
55	Promote traditional techniques and practices for conserving village ponds												
56	Mainstream the sustainable management of mangroves into the forestry sector regulatory regime so as to ensure the protection of coastal belts and conservation of flora and fauna in those areas												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008		National Biodiversity Targets											
		1	2	3	4	5	6	7	8	9	10	11	12
57	Disseminate available techniques for regeneration of coral reefs and support activities based on application of such techniques												
58	Adopt a comprehensive approach to integrated coastal management by addressing linkages between coastal areas, wetlands, and river systems, in relevant policies, regulations and programmes												
Regulation of introduction of invasive alien species and their management													
59	Develop a unified national system for regulation of all introductions and carrying out rigorous quarantine checks												
60	Strengthen domestic quarantine measures to contain the spread of invasive species to neighbouring areas												
61	Promote intersectoral linkages to check unintended introductions and contain and manage the spread of invasive alien species												
62	Develop a national database on invasive alien species reported in India												
63	Develop appropriate early warning and awareness system in response to new sightings of invasive alien species												
64	Provide priority funding to basic research on managing invasive species												
65	Support capacity building for managing invasive alien species at different levels with priority on local area activities												
66	Promote restorative measures of degraded ecosystems using preferably locally adapted native species for this purpose												
67	Promote regional cooperation in adoption of uniform quarantine measures and containment of invasive exotics												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
Assessment of vulnerability and adaptation to climate change, and desertification												
68 Identify the key sectors of the country vulnerable to climate change, in particular impacts on water resources, agriculture, health, coastal areas and forests												
69 Promote research to develop methodologies for tracking changes and assessing impacts of climate change on glaciers, river flows and biodiversity												
70 Assess the need for adaptation to future impacts of climate change at national and local levels, and the scope for incorporating the outputs of such assessments in relevant programmes, including watershed management, coastal zone planning and regulation, agricultural technologies and practices, forestry management, and health programmes												
71 Explicitly consider vulnerability of coastal areas and their biodiversity to climate change and sealevel rise in coastal management plans, as well as infrastructure planning and construction norms												
72 Participate in voluntary partnerships with other countries both developed and developing, to address the challenges of sustainable development and climate change, consistent with the provisions of the UNFCCC												
73 Identify the most important gaps in knowledge that limit the national ability to develop and implement climate change adaptation strategies for species, and ecological processes and functions												
74 Enhance the capacity of climate modeling in the country substantially to get clear idea on the impacts of climate change on biodiversity at national and local levels												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008		National Biodiversity Targets											
		1	2	3	4	5	6	7	8	9	10	11	12
75	Develop ecological criteria for identifying the species and ecosystems that are at great risk from climate change and identify their priority habitats												
76	Identify information requirements and priorities, through expert consultative processes, for long-term monitoring of climate change impacts on biodiversity												
77	Establish a climate change and biodiversity website for decision makers concerned with national resource management to facilitate information exchange about the actual and potential impacts of climate change and relevant policies, strategies and programmes												
78	In view of the multidisciplinary nature of the subject, undertake an 'All India Coordinated Research Project on Impacts of Climate Change' on various facets of wild and agricultural biodiversity												
79	Integrate biodiversity concerns into measures for energy conservation and adoption of renewable energy technologies with a focus on local biomass resources and dissemination of improved fuelwood stoves, and solar cookers												
80	Strengthen efforts for partial substitution of fossil fuels by bio-fuels, through promotion of biofuel plantations, promoting relevant research and development, and streamlining regulatory certification of new technologies												
81	Strengthen and augment the existing programmes and activities of the Central and State Governments relating to drylands												
82	Prepare and implement thematic action plans incorporating watershed management strategies, for arresting and reversing desertification and expanding green cover												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
83 Promote reclamation of wastelands by energy plantations for rural energy through multistakeholder partnerships involving the landowning agencies, local communities, and investors												
Integration of biodiversity concerns in economic and social development												
84 Develop strong research base on impact assessment and conduct rigorous impact assessment of development projects, with a focus on biodiversity and habitats												
85 Integrate biodiversity concerns across development sectors (such as industry, infrastructure, power, mining, etc.) and promote use of clean technologies												
86 Accord priority to the potential impacts of development projects on biodiversity resources and natural heritage while undertaking EIA. In particular, ancient sacred groves and biodiversity hotspots should be treated as possessing incomparable values												
87 Take steps to adopt and institutionalize techniques for environmental assessment of sectoral policies and programmes to address any potential adverse impacts, and enhance potential favourable impacts												
88 Develop and integrate pre-project plans for reallocation and rehabilitation of local people likely to be displaced by development projects keeping in view their socio-cultural and livelihood needs												
89 Ensure that in all cases of diversion of forest land, the essential minimum needed land for the project or activity is permitted. Restrict the diversion of dense natural forests, particularly areas of high endemism of genetic resources, to non-forest purposes, only to site-specific cases of vital national interest												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008		National Biodiversity Targets											
		1	2	3	4	5	6	7	8	9	10	11	12
90	Give priority to impact assessment of development projects on .wetlands; in particular, ensuring that environmental services of wetlands are explicitly factored into cost-benefit analysis												
91	Promote integrated approaches to management of river basins considering upstream and downstream inflows and withdrawals by season, pollution loads and natural regeneration capacities, in particular, for maintenance of in-stream ecological values												
92	Consider and mitigate the impacts on river and estuarine flora and fauna, and the resulting change in the resource base for livelihoods, of multipurpose river valley projects, power plants and industries												
93	Adopt best practice norms for infrastructure construction to avoid or minimize damage to sensitive ecosystems and despoiling of landscapes												
94	Support practices of rain water harvesting and revival of traditional methods for enhancing groundwater recharge												
95	Give due consideration to the quality and productivity of lands which are proposed to be converted for development activities, as part of the environmental clearance process												
96	Ensure provision for environmental restoration during commissioning and after decommissioning of industries. For example, in all approvals of mining plans, institutionalize a system of postmonitoring of projects to ensure safe disposal of tailings and ecosystem rehabilitation following the principles of ecological succession												
97	Promote, through incentives, removal of barriers and regulation, the beneficial utilization of wastes such as fly ash, bottom												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
ash, red mud, and slag, minimizing thereby their adverse impacts on terrestrial and aquatic ecosystems												
98 Promote sustainable tourism through adoption of best practice norms for tourism facilities and conservation of natural resources while encouraging multistakeholder partnerships favouring local communities												
99 Develop and implement viable models of public-private partnerships for setting up and operating secure landfills, incinerators, and other appropriate techniques for the treatment and disposal of toxic and hazardous wastes, both industrial and biomedical, on payment by users, taking the concerns of local communities into account. The concerned local communities and State Governments must have clear entitlements to specified benefits from hosting such sites, if access is given to non-local users. Develop and implement strategies for clean-up of toxic and hazardous waste dump legacies, in particular in industrial areas, and abandoned mines, and reclamation of such lands for future, sustainable use												
100 Survey and develop a national inventory of toxic and hazardous waste dumps, and an online monitoring system for movement of hazardous wastes. Strengthen capacity of institutions responsible for monitoring and enforcement in respect of toxic and hazardous wastes												
101 Strengthen the legal arrangements and response measures for addressing emergencies arising out of transportation, handling and disposal of hazardous wastes as part of the chemical accidents regime												
102 Promote organic farming of traditional crop varieties through research in and												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
dissemination of techniques for reclamation of land with prior exposure to agricultural chemicals, facilitating marketing of organic produce in India and abroad, including by development of transparent, voluntary and science-based labeling schemes												
103 Develop and enforce regulations and guidelines for management of e-waste as part of the hazardous waste regime												
104 Promote, through incentives, removal of barriers, and regulations, the beneficial utilization of generally non-hazardous waste streams such as fly ash, bottom ash, red mud, and slag, including in cement and brick-making, and building railway and highway embankments												
Pollution impacts												
105 Minimise and eliminate activities leading to loss of biodiversity due to point and non-point sources of pollution and promote development of clean technologies												
106 Strengthen the monitoring and enforcement of emission standards for both point and non-point sources												
107 Develop location-specific work plans focusing on biodiversity conservation while managing pollution problems												
108 Treat and manage industrial effluents so as to minimize adverse impacts on terrestrial and aquatic biological resources												
109 Promote biodegradable and recyclable substitutes for non-biodegradable materials, and develop and implement strategies for their recycle, reuse, and final environmentally benign disposal, including through promotion of relevant technologies, and use of incentive based instruments												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
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There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets 1	2	3	4	5	6	7	8	9	10	11	12
110 Avoid excessive use of fertilizers, pesticides and insecticides while encouraging integrated pest management practices, and use of organic manures and biofertilisers												
111 Promote organic farming of locally adapted and traditional crop varieties through appropriate incentives, and direct access to markets duly supported by credible certification systems												
112 Develop a strategy for strengthening regulation, and addressing impacts, of ship-breaking activities on human health, coastal and near marine bioresources												
113 Accord priority to potential impacts on designated natural heritage sites in view of their incomparable values that merit stricter standards than in otherwise comparable situations												
114 Promote R&D on impacts of air, water and soil pollution on biodiversity and use of biological methods for pollution amelioration												
Development and integration of biodiversity databases												
115 Develop an integrated national biodiversity information system with distributive linkages for easy storage, retrieval and dissemination including through augmentation of extant efforts of spatial mapping of natural resources and development of interactive databases at national level												
116 Intensify survey, identification and inventorization activities, involving local institutions and giving priority to hitherto unexplored areas												
117 Conduct regular surveys to monitor changes in populations of target species (wild and												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
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The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
domesticated), using remote sensing and other updated tools and techniques												
118 Update list of endangered species of flora and fauna on priority, based on internationally accepted criteria												
119 Extend listing of keystone, umbrella and endemic species for conserving them on priority basis, and develop models/packages for their conservation												
120 Update database on sacred groves and sacred ponds documenting bio-resources and associated knowledge conserved at these sites												
121 Promote DNA fingerprinting, other molecular analytical techniques and studies on genetic diversity of critically endangered species to develop appropriate conservation strategies												
122 Expand area specific surveys of land races, traditional cultivars of crops, wild relatives of crop plants and breeds of domesticated animals inter alia through application of appropriate statistical techniques												
123 Use modern taxonomic methods for documentation/identification of species												
124 Strengthen and build capacity for taxonomy and biosystematics, particularly for groups of plants, animals and microorganisms which are as yet inadequately understood												
Strengthening implementation of policy, legislative and administrative measures for biodiversity conservation and management												
125 Accelerate effective actions at the central, state and local levels to implement provisions under the Biological Diversity Act												
126 Review enabling policies to prevent transfer of prime agricultural land to non-agricultural purposes, and promote sustainability of agricultural lands												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
127 Formulate suggestive policies for strengthening and supporting conservation and management of grasslands, pastoral lands, sacred groves and other areas significant for biodiversity conservation												
128 Support preparation of PBRs with technical help by the scientific institutions												
129 Strengthen systems for documentation, application and protection of biodiversity-associated traditional knowledge, providing adequate protection to these knowledge systems while encouraging benefits to communities												
130 Revive and revitalize sustainable traditional practices and other folk uses of components of biodiversity and associated benefits to local communities with a view to promoting and strengthening traditional knowledge and practices												
131 Create public education and awareness about the need to conserve, protect and gainfully use traditional knowledge systems												
132 Identify emerging areas for new legislation, based on better scientific understanding, economic and social development, and development of multilateral environmental regimes, in line with the NE												
133 Review the body of existing legislations relevant to biodiversity conservation to develop synergies among relevant statutes and regulations, eliminate obsolescence, and amalgamate provisions with similar objectives, in line with the NEP. Further, encourage and facilitate review of legislations at the level of state and local governments with a view to ensuring their consistency with this policy												
134 Review the regulatory processes for LMOs so that all relevant scientific knowledge is												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

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NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
taken into account, and ecological, health, and economic concerns are adequately addressed												
135 Periodically review and update the national biosafety guidelines to ensure that these are based on current scientific knowledge												
136 Ensure conservation of biodiversity and human health while dealing with LMOs in transboundary movement in a manner consistent with the multilateral biosafety protocol												
137 Develop appropriate liability and redress mechanisms to internalize environment costs and address economic concerns in case of any damage to biodiversity												
138 Harmonise provisions concerning disclosure of source of biological material and associated knowledge used in the inventions under the Patents Act, Protection of Plant Varieties and Farmers' Rights Act, and Biological Diversity Act, to ensure sharing of benefits by the communities holding traditional knowledge, from such use												
139 Develop supportive regulatory regime for protection of identified wetlands and biosphere reserves												
140 Develop appropriate system and modalities for operationalizing provisions for prior informed consent and benefit sharing under the Biological Diversity Act, working towards greater congruence between these provisions and trade related aspects of intellectual property rights												
Building of national capacities for biodiversity conservation and appropriate use of new technologies												
141 Develop consortium of lead institutions engaged in conservation providing linkages and networking across public and private sectors												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
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The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
142 Outsource research and promote joint ventures on key conservation issues												
143 Promote application of biotechnology tools for conserving endangered species												
144 Encourage DNA profiling for assessment of genetic diversity in endangered species to assist conservation												
145 Develop DNA-probe based technology for tracking of LMOs												
146 Develop specific pilot gene banks for LMOs approved for undertaking research and commercial use												
147 Develop capacity for risk assessment, management and communication on LMOs												
148 Support pilot studies on use of biotechnology tools for conservation where appropriate												
149 Develop specific complimentary capacity building measures based on national needs and priorities for the formulation and implementation of national rules and procedures on liability and redress to strengthen the establishment of baseline information and monitoring of changes												
150 Develop protocols for monitoring products based on genetic use restriction technologies												
151 Strengthen participatory appraisal techniques and encourage formation of local institutional structures for planning and management of natural resources for ensuring participation of women												
152 Preserve and strengthen traditional, religious, ritualistic, ethical and cultural methods of conservation												
153 Promote livelihood diversification opportunities for making value added												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

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The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
bioresource based products and building upon traditional as well as emerging environmental technologies customized at local/field level												
154 Strengthen manpower, infrastructure and other pertinent capacities including upgradation of skills of officials of the MoEF to enable it to address new and emerging requirements in the field of biodiversity conservation and management												
155 Strengthen capabilities of BSI and ZSI and promote their technical cooperation with SBBs and BMCs												
156 Augment human resource development and personnel management in forestry and wildlife sector												
157 Strengthen multidisciplinary R&D efforts on key areas pertaining to conservation and management of biological diversity												
158 Strengthen and support departments of biology, botany, zoology, sociology, anthropology and other relevant disciplines in central, state and deemed universities/ colleges, with a view to raising the standard of research and producing faculty who could guide the process of environmental education in schools												
159 Promote both formal and non-formal means for environment education and biodiversity conservation												
160 Design and implement awareness programmes, particularly for rural women, and also benefit from their wisdom. Women's organizations such as women's councils and mahila mandals could be used for this purpose												
161 Incorporate modules on conservation and sustainable utilization of biodiversity in												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
foundational and professional training courses for the officers of various services												
162 Promote and/or strengthen education, training, awareness and extension programmes on biodiversity issues for various stakeholders including all levels of students, professionals (such as engineers, doctors, lawyers, CAs, etc.), elected representatives (such as representatives of PRIs, MLAs, MPs, Mayors, etc.), judiciary, NGOs, public and private sectors (e.g. corporate representatives, industrial associations etc.), defence and para military forces, customs, police, media, cultural, spiritual and religious institutions/ individuals												
163 Enhance public education and awareness for biodiversity conservation through audio, visual and print media												
164 Promote activities relating to animal welfare												
Valuation of goods and services provided by biodiversity, and use of economic instruments in decision making processes												
165 Develop a system of natural resource accounting reflecting the ecological as well as economic values of biodiversity, with special attention to techniques of green accounting in national accounts and estimation of positive and negative externalities for use of various types of natural resources in the production processes as well as in household and government consumption												
166 Develop suitable valuation models for adoption at national, state and local levels												
167 Support projects and pilot studies aimed at validating methods of valuation of bioresources												
168 Identify key factors and indicators to assess effectiveness of valuation methods and												

LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The linkage is primary/ direct
The linkage is secondary/ indirect
The linkage is at a tertiary level
There is no primary, secondary or tertiary linkage, except a peripheral connect

Actionable points of NBAP 2008	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
models, taking into consideration the UN guidelines on monitoring and evaluation of socio-economic projects												
169 Assess the utility of traditional and innovative fiscal instruments for promoting conservation and sustainable utilization of biodiversity												
170 Develop systems for partial ploughing back of the revenues generated in protected areas, zoological parks, botanical gardens, aquaria, etc., for improving their management												
171 Mobilize additional resources based on project formulation for biodiversity conservation												
International cooperation												
172 Further consolidate and strengthen global cooperation, especially with UN agencies and other international bodies on issues related to biodiversity												
173 Promote regional cooperation for effective implementation of suitable strategies for conservation of biodiversity, especially with neighbouring countries through fora such as SAARC, ASEAN and ESCAP												
174 Develop projects for accessing funds for conservation and sustainable use of biodiversity from external sources, earmarked for conservation through bilateral, regional and other multilateral channels												
175 Promote technology transfer and scientific cooperation towards conservation of biological resources, their sustainable use and equitable sharing of benefits arising out of their use, taking also into account extant regulations including those relating to taxation												

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LINKAGES BETWEEN ACTIONABLE POINTS OF NBAP 2008 AND THE 12 NATIONAL BIODIVERSITY TARGETS

FUNDING FOR BIODIVERSITY CONSERVATION AND ALLOCATIONS CONTRIBUTING TOWARDS ACHIEVEMENT OF NATIONAL BIODIVERSITY TARGETS

1.7

ADDENDUM 2014 TO NBAP 2008

Resource flows to the biodiversity sector include direct core funding and non-core funding (that originates from the budgetary resources of the MoEF); indirect peripheral funding, which comprises development budgetary resources that are allocated by other scientific and development Ministries/Departments of the GoI towards programmes that have a bearing on biodiversity conservation; and funding by the State Governments on biodiversity and environment. The MoEF undertook an assessment of funding for biodiversity conservation for the year 2010-2011 in which funding for core (direct and immediate biodiversity impact of MoEF programmes/schemes), net non-core (indirect), and net peripheral funding flows (from biodiversity relevant 29 schemes of seven Ministries/Departments other than MoEF), along with core funding by the State Governments was assessed (MoEF 2012 b). Building on this study and using similar methodology, an assessment was conducted for 2013-2014 that included expanded datasets based on peripheral funding related to 77 schemes of 23 Ministries/Departments of the GoI (MoEF 2014).

In the context of Strategic Goal E and Aichi Biodiversity Target 20 relating to resource mobilization, and keeping into consideration the call to Parties for providing data on resource mobilization according to the indicators adopted in CoP decision X/3, activities have been classified into those that are directly related to biodiversity and others that are indirectly related to biodiversity for assessing funding for biodiversity conservation. Funding for activities directly related to biodiversity include activities taken up for *in situ/ex situ* conservation, for protected areas, for maintaining genetic diversity and for addressing threats to specific ecosystems and/or species. Funding considered under this category is generally provided by environmental agencies that directly and purposely consider biodiversity within their mandates. Activities that have benefits for biodiversity but for which biodiversity conservation and sustainable use are not the main focus are considered to bear an indirect relation with regard to funding for biodiversity conservation. The total estimated funding for biodiversity conservation during 2013-2014 (including core, non-core and peripheral funding for biodiversity conservation) is provided in Table 3. As explained in the foregoing, peripheral funding pertains to funding related to biodiversity conservation under 77 schemes and programmes of 23 Ministries/ Departments of the GoI other than the MoEF.

Table 3. Core, non-core and peripheral funding for biodiversity conservation in 2013-2014

Nature of funding	Amount (₹ in crores)
Core	1564.34
Non-core	259.8
Core + non-core	1824.14
States	5025.57
Peripheral	₹ 2354.74 (23 Ministries, 77 schemes)
Total	₹ 9204.45 crores or USD 1482.68 million (at 1USD = ₹ 62.08 in February 2014)

The allocations of funding for biodiversity conservation for activities that are contributing towards achieving the 12 NBTs have been explored below (Figures 1, 2, 3) with regard to core, non-core funding of MoEF and peripheral funding related to 23 Ministries.

CORE AND NON-CORE FUNDING FOR BIODIVERSITY CONSERVATION: MOEF BUDGET ALLOCATION VIS-À-VIS NATIONAL BIODIVERSITY TARGETS

1.7.1

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

MoEF in 2013-14 had allocated a sum of ₹ 1824.14 crores towards biodiversity conservation of which 1564.34 crores and 259.8 crores formed core and non-core funding, respectively. In early 2014, MoEF formulated 12 NBTs (MoEF 2014). An effort has been made to work out the relative allocation of the overall MoEF funding for biodiversity conservation contributing towards each of the 12 NBTs (Figure 1).

The highest allocation works out to be for NBT 6, followed by NBT 1, and NBT 3, while the lowest allocation is for NBT 7 followed by that for NBT 4. The highest allocation for NBT 6 results due to the fact that within the overall budget of the MoEF, a substantial part of the budgetary allocation is under "Forestry and Wildlife" wherein the funds contribute strongly towards activities envisaged under NBT 6. The next highest allocation contributing towards achieving NBT 1 is due to the fact that a large number of MoEF insitutions and Centres of Excellence are creating information and are helping in generating awareness on environment and biodiversity conservation. The high allocation for NBT 3 is owing to the allocation for programmes and activities that prevent habitat loss and fragmentation and support afforestation and ecological restoration. Although MoEF allocation for NBT 4 works out to be low, there are other Ministries in GoI, particularly Ministry of Agriculture and Ministry of Earth Sciences, which have programmes/ schemes for dealing with invasive species. Similarly, MoEF allocations for NBT 7 have emerged to be low since activities under NBT 7 fall within the purview of the Ministry of Agriculture, specifically the five national bureaus, namely, National Bureau of Plant Genetic Resources (NBPGR), National Bureau of Animal Genetic Resources (NBAGR), National Bureau of Agriculturally Important Microorganisms (NBAIM), National Bureau of Agriculturally Important Insects (NBAII), and National Bureau of Fish Genetic Resources (NBFGR), which are carrying out activities that contribute to achieving NBT 7.

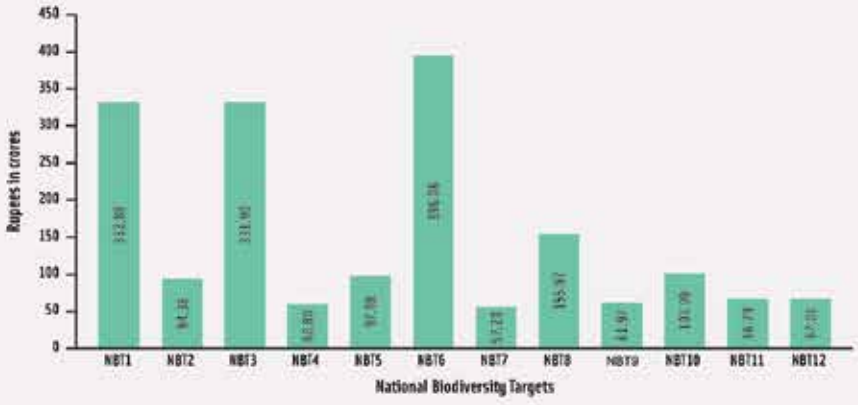

Figure 1. MoEF budget allocation (2013-2014) that contributes towards NBTs

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PERIPHERAL FUNDING FOR BIODIVERSITY CONSERVATION: 23 MINISTRIES VIS-À-VIS NATIONAL BIODIVERSITY TARGETS

1.7.2

ADDENDUM 2014 TO NBAP 2008

Of the 23 Ministries that have been identified as contributing towards peripheral funding for biodiversity conservation, the allocations of MoRD and MoDWS constitute the highest proportion of funding (as MoRD and MoDWS allocations are several times higher than the rest of the 21 Ministries, these have not been depicted graphically in Figure 2). This is due to the overall high allocations of the schemes of MoRD and MoDWS that contribute to biodiversity conservation in peripheral or indirect ways. The allocations of MoRD particularly contribute towards NBT 2. The allocation of the MoDWS schemes contribute towards activities envisaged under NBT 5.

Of the remaining 21 Ministries (Table 4), the allocations are highest towards NBT 12, followed by NBT 10 and NBT 2 while the lowest three allocations are for NBT 1 followed by NBT 7 and NBT 6 (Figure 2).

Table 4. Indicative list of Ministries/Departments and National Biodiversity Targets for Implementation of the National Biodiversity Action Plan

Ministries/Departments of Government of India and Planning Commission	National Biodiversity Targets											
Ministry of Agriculture (MoA)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of Chemicals and Fertilizers (MoCF)	3	4	5	6	7	8	9	10	11	12		
Ministry of Coal (MoC)	3	4	5	6	7	8	9	10	11	12		
Ministry of Commerce and Industry (MoCI)	2	3	5	7	8	9	10	12				
Ministry of Drinking Water and Sanitation (MoDWS)	3	4	5	6	9	10	11	12				
Ministry of Earth Sciences (MoES)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of Environment and Forests (MoEF)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of Health and Family Welfare (MoHFW)	1	3	4	5	6	9	10	11	12			
Ministry of Human Resource Development (MoHRD)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of New and Renewable Energy (MoNRE)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of Panchayati Raj (MoPR)	1	3	4	5	6	7	8	9	10	11	12	
Ministry of Petroleum and Natural Gas (MoPNG)	3	4	5	6	7	8	9	10	12			
Ministry of Power (MoP)	2	3	4	5	6	7	8	9	10	12		
Ministry of Rural Development (MoRD)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of Science and Technology (MoST)	1	2	3	4	5	6	7	8	9	10	11	12
Ministry of Shipping (MoS)	3	4	6	7	8	9	10	12				
Ministry of Tourism (MoT)	3	4	5	6	7	8	9	10	11	12		
Ministry of Tribal Affairs (MoTA)	1	2	3	4	5	6	7	8	9	10	11	12

Ministries/Departments of Government of India and Planning Commission	National Biodiversity Targets											
Ministry of Urban Development (MoUD)	1	3	4	5	6	7	8	9	10	11	12	
Ministry of Water Resources (MoWR)	1	2	3	4	5	6	7	8	9	10	11	12
Department of Space (DoS)	3	4	5	6	7	8	9	10	11	12		
Ministry of Youth Affairs and Sports (MoYAS)	1	2	3	9	10	11	12					
Ministry of Statistics and Programme Implementation (MoSPI)	1	2	3	5	7	8	9	10	11	12		
Ministry of Communications and Information Technology Technology (MoCIT)	9	10	12									
Planning Commission of India	1	2	3	4	5	6	7	8	9	10	11	12

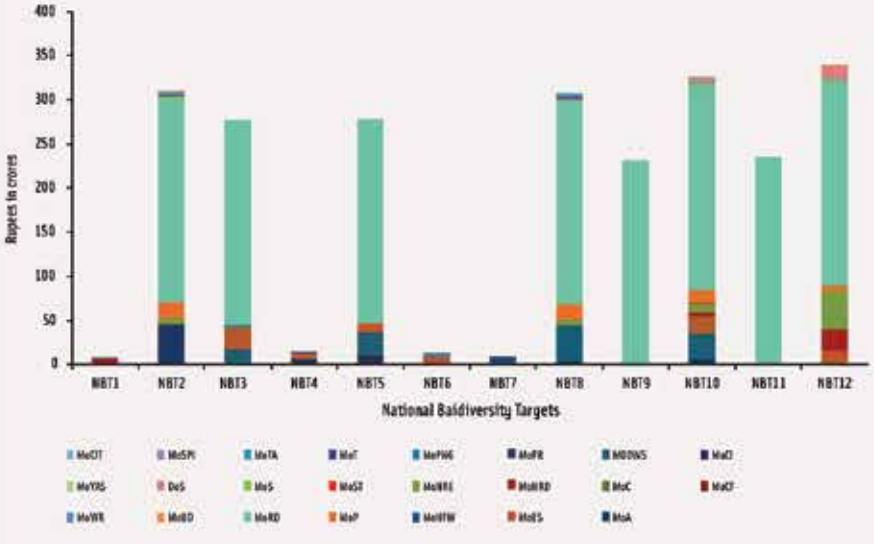

Figure 2. Budget allocations (2013-2014) of 21 Ministries of GoI (excluding MoRD and MoDWS) that contribute towards NBTs

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PERIPHERAL FUNDING FOR BIODIVERSITY CONSERVATION: 23 MINISTRIES VIS-A-VIS NATIONAL BIODIVERSITY TARGETS

COMBINED ALLOCATIONS FOR BIODIVERSITY CONSERVATION: MOEF AND 23 MINISTRIES VIS-À-VIS NATIONAL BIODIVERSITY TARGETS

1.7.3

ADDENDUM 2014
TO NBAP 2008

Of the combined allocations of all 24 Ministries including MoEF for biodiversity conservation, maximum funds allocated contribute towards NBT 3 followed by NBT 8 and NBT 10, while the lowest allocations are towards NBT 7 followed by NBT 4 (Figure 3).

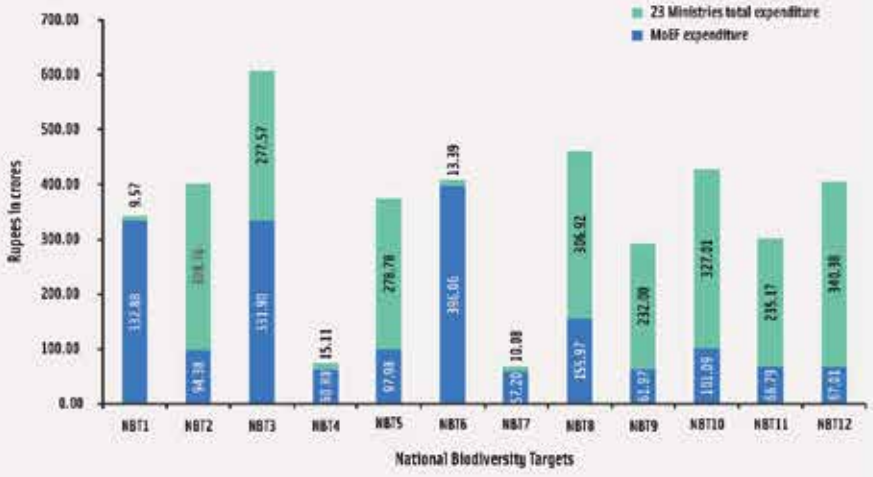

Figure 3. Combined allocation of funds (2013-2014) of MoEF and 23 Ministries/ Departments of GoI that contribute towards NBTs

PROGRAMME OF WORK ON PROTECTED AREAS: LINKAGES WITH NATIONAL BIODIVERSITY ACTION PLAN AND NATIONAL BIODIVERSITY TARGETS

1.8

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The CBD vide CoP-7 Decision VII/28 established PoWPA with the overall purpose to support the establishment and maintenance by 2010 for terrestrial and by 2012 for marine areas of comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas that collectively, inter alia, through a global network contribute to achieving the three objectives of the Convention and the 2010 target to significantly reduce the current rate of biodiversity loss at the global, regional, national and sub-national levels and contribute to poverty reduction and the pursuit of sustainable development, thereby supporting the objectives of the Strategic Plan of the Convention, the World Summit on Sustainable Development Plan of Implementation and the Millennium Development Goals.

The PoWPA was developed bearing in mind the need to avoid unnecessary duplication with existing thematic work programmes and other ongoing initiatives of the CBD, and to promote synergy and coordination with relevant programmes of various international organizations. It consists of the following four interlinked elements intended to be mutually reinforcing and cross-cutting in their implementation:

1) Direct actions for planning, selecting, establishing, strengthening, and managing, protected area systems and sites.
2) Governance, participation, equity and benefit sharing.
3) Enabling activities.
4) Standards, assessment, and monitoring.

In pursuance to CoP-10 decision X/31 requesting Parties to submit action plans for the implementation of the PoWPA, India prepared and submitted PoWPA action plan (www.cbd.int/database/attachment/?id=1551).

In line with paragraph 1(c) of decision X/31, the CoP urged Parties to integrate national PoWPAs into updated NBSAPs, which, in accordance with paragraphs 3 (c) and (d) of decision X/2, should be adopted as policy instruments and used as a primary framework for implementation and as the basis for securing the necessary financial support, including from national budgets and from bilateral, multilateral and other sources.

The linkages between India's action plan for PoWPA implementation and the action points under India's NBAP 2008 accordingly are shown in Table 5.

Table 5. Linkages between India's action points for PoWPA implementation and action points of NBAP 2008

Action Points under PoWPA Implementation Plan (India)	NBAP 2008 Action Points										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Development of site specific management plan											
Integration of Protected Areas (PA) (securing identified corridors and connectivity areas)											
Diversifying the governance types											
PA valuation assessment											
Climate change resilience and adaptation assessment											

The linkage is primary/ direct — The linkage is secondary/ indirect

As can be seen from Table 5, the action points under India's plan for PoWPA implementation demonstrate convergence with all NBAP 2008 action points. However, linkages of PoWPA implementation action points under "Diversifying the governance types" and "PA valuation assessments" with NBAP 2008 action points are currently indirect and need to be strengthened.

The linkages between India's action plan for PoWPA implementation and the 12 NBTs is shown in Table 6.

Table 6. Linkages between India's action points for PoWPA implementation and 12 NBTs

Action Points under PoWPA Implementation Plan (India)	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
Development of site specific management plan												
Integration of Protected Areas (PA) (securing identified corridors and connectivity areas)												
Diversifying the governance types												
PA valuation assessment												
Climate change resilience and adaptation assessment												

The linkage is primary/ direct — The linkage is secondary/ indirect

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

Since PoWPA is directly related to Aichi Biodiversity Target 11 and NBT 6, there is strong convergence between India's PoWPA implementation plan and NBT 6, as indicated in Table 6. The first action point under India's PoWPA implementation plan on "Development of site-specific management plans" incorporates aspects related to both Aichi Biodiversity Target 9 and NBT 4 on invasive species management. However, there is a need to strengthen convergence between this first action point for PoWPA implementation and NBT 4. There is also a need for building stronger linkages of the NBTs with action points under PoWPA implementation for "PA valuation assessment" and "Climate change resilience and adaptation assessment". The funding support for programmes and activities that show strong linkages between PoWPA implementation will have to be continued and where the linkages are as yet indirect, more funding resources will have to be allocated.

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PROGRAMME OF WORK ON PROTECTED AREAS: LINKAGES WITH NATIONAL BIODIVERSITY ACTION PLAN AND NATIONAL BIODIVERSITY TARGETS

1.9 LINKAGES BETWEEN NATIONAL BIODIVERSITY ACTION PLAN, NATIONAL BIODIVERSITY TARGETS AND GLOBAL STRATEGY FOR PLANT CONSERVATION

ADDENDUM 2014 TO NBAP 2008

Recognizing the critical role of plants in supporting ecosystem resilience, provision of ecosystem services, adapting to and mitigating environmental challenges, and for supporting human well being, CoP-10 adopted the consolidated update of Global Strategy for Plant Conservation (GSPC) in 2010, including the 16 outcome-oriented global targets, the implementation of which is to be pursued as a part of the broader framework of the SP (see Appendix II). These targets range from protecting threatened species to ensuring that plant products are taken from sources which are sustainably managed. Implementing the GSPC will contribute to meeting the goal to reduce significantly the rate of biodiversity loss. The linkages between GSPC Targets and the action points under India's NBAP 2008 are shown in Table 7.

Table 7. Linkages between GSPC Targets and NBAP 2008 Action Points

Global Strategy for Plant Conservation Targets	NBAP 2008 Action Points										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

The linkage is primary/ direct The linkage is secondary/ indirect

As indicated in Table 7, the action points under NBAP 2008 demonstrate convergence with all the targets of GSPC. In particular, Action Point I of NBAP 2008, namely "Strengthening and integration of *in situ*, on farm and *ex situ* conservation", is strongly linked with the GSPC targets.

The linkages between GSPC Targets and the 12 NBTs are shown in Table 8.

Table 8. Linkages between GSPC Targets and 12 National Biodiversity Targets.

Global Strategy for Plant Conservation Targets	National Biodiversity Targets											
	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												

The linkage is primary/ direct

The linkage is secondary/ indirect

India's NBTs and the GSPC targets have linkages which are strong in relation to several aspects (as indicated in Table 8) particularly in case of GSPC target 4 ("At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration"), target 5 ("At least 75 per cent of the most important areas for plant diversity of each ecological region protected, with effective management in place for conserving plants and their genetic diversity"), and target 7 ("At least 75 per cent of known threatened plant species conserved *in situ*"), which bear strong convergence with NBTs. NBT 6, which pertains to species conservation and area-based measures and their effective and equitable management, and NBT 11, pertaining to protection and promotion of traditional knowledge, bear important direct linkages with the GPSC targets. Opportunities for building stronger convergence need to be explored and supported where the inter-linkages are indirect.

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LINKAGES BETWEEN NATIONAL BIODIVERSITY ACTION PLAN, NATIONAL BIODIVERSITY TARGETS AND GLOBAL STRATEGY FOR PLANT CONSERVATION

IMPLEMENTATION OF NATIONAL BIODIVERSITY ACTION PLAN

1.10

ADDENDUM 2014
TO NBAP 2008

The road map for implementation of the NBAP and for achieving the NBTs involves the MoEF and 23 Ministries/Departments of the GoI that have been identified (Table 4), the National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), Biodiversity Management Committees (BMCs), State Forest Departments (SFDs), State Planning Boards and the relevant Departments of State Governments such as Fisheries, Forests, Agriculture, Livestock and Animal Husbandry, Mining and Education. Local-level institutions, including BMCs, Forest Rights Committees (FRCs), Village Ecodevelopment Committees (VEDCs), Joint Forest Management Committees (JFMCs) and Gram Sabhas (village assemblies) are crucial for implementation of the NBAP. A multi-tier mechanism for implementation as depicted in Figure 4 will be used.

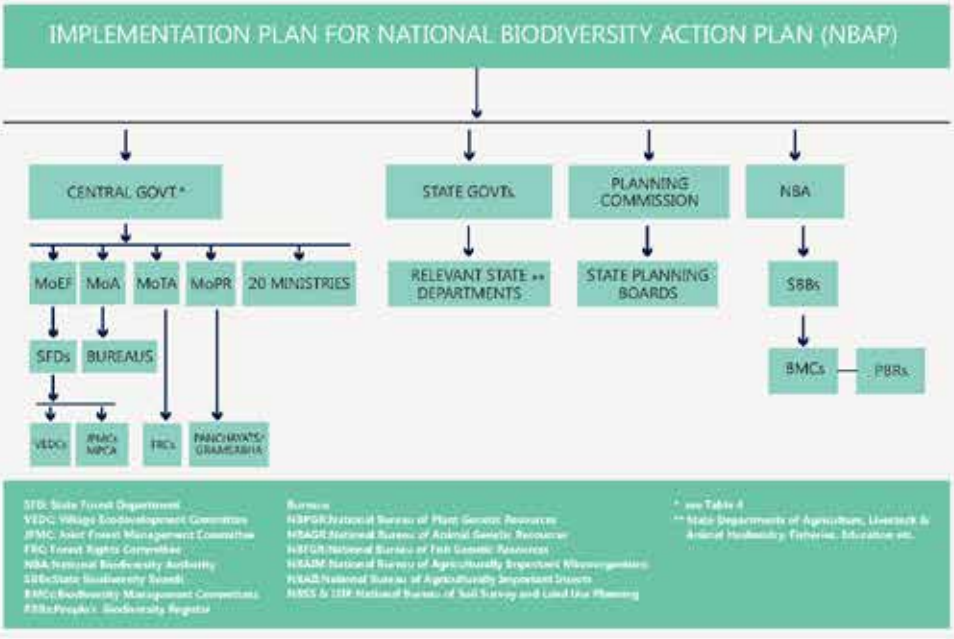

Figure 4. Implementation plan for NBAP

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The activities listed in the NBAP are ongoing, and are being undertaken under the ambit of existing schemes and programmes by the Central and State Governments, public and private sector as well as civil society organisations, securing full utilisation of available infrastructure and funds, with augmentation and further inputs, wherever required. In addition, sources of bilateral and multilateral funding are explored and availed of for implementing some of these activities, in accordance with the extant policies and regulations. Thus, the action points in the NBAP are to be the basis for seeking funds from domestic and external sources. In order to sharpen the inter-linkages between the Aichi Biodiversity Targets and India's NBAP, the plan schemes and programmes of the MoEF and those of other Ministries/Departments of the GoI have to be further aligned for their outcomes in terms of indicators provided by the Aichi Biodiversity Targets/NBTs in the coming years. Further, possibilities of leveraging substantial financial resources at the national level to implement India's NBAP in the light of SP 2011-2020 and the Aichi Biodiversity Targets also needs to be explored. Towards this, an indicative list of Ministries/Departments has been prepared with respect to each NBTs (Table 4).

Moreover, fulfilling the overall aim of the NBAP and progress towards achieving NBTs requires widespread public engagement and participation wherein opportunities are made available at the individual level that enable citizens to make long-term choices that support biodiversity and its conservation. This is because conservation of biodiversity has to be everyone's responsibility. While Governments have to play a crucial facilitative role, all citizens must work together and contribute to meet the challenge of halting the continuing decline in biodiversity.

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IMPLEMENTATION OF NATIONAL BIODIVERSITY ACTION PLAN

REFERENCES

ADDENDUM 2014
TO NBAP 2008

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APPENDIX I.
STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND THE AICHI TARGETS "LIVING IN HARMONY WITH NATURE"

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

The Vision

"By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

The Mission

"Take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented and decision-making is based on sound science and the precautionary approach."

Strategic Goal A:
Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B:
Reduce the direct pressures on biodiversity and promote sustainable use

Target 5

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C:
To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 11

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

APPENDIX I. STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND THE AICHI TARGETS "LIVING IN HARMONY WITH NATURE"

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Target 12

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D:
Enhance the benefits to all from biodiversity and ecosystem services

Target 14

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E:
Enhance implementation through participatory planning, knowledge management and capacity building

Target 17

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their

customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011–2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

APPENDIX II
GLOBAL STRATEGY FOR PLANT CONSERVATION (GSPC): OBJECTIVES AND TARGETS

Objective I: Plant diversity is well understood, documented and recognized

Target 1: An online Flora of all known plants

Target 2: An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action

Target 3: Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared

Objective II: Plant diversity is urgently and effectively conserved

Target 4: At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration

Target 5: At least 75 per cent of the most important areas for plant diversity of each ecological region protected, with effective management in place for conserving plants and their genetic diversity

Target 6: At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity

Target 7: At least 75 per cent of known threatened plant species conserved in situ

Target 8: At least 75 per cent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes

Target 9: 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge

Target 10: Effective management plans in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded

Objective III: Plant diversity is used in a sustainable and equitable manner

Target 11: No species of wild flora endangered by international trade

Target 12: All wild-harvested plant-based products sourced sustainably

Target 13: Indigenous and local knowledge, innovations and practices associated with plant resources, maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care

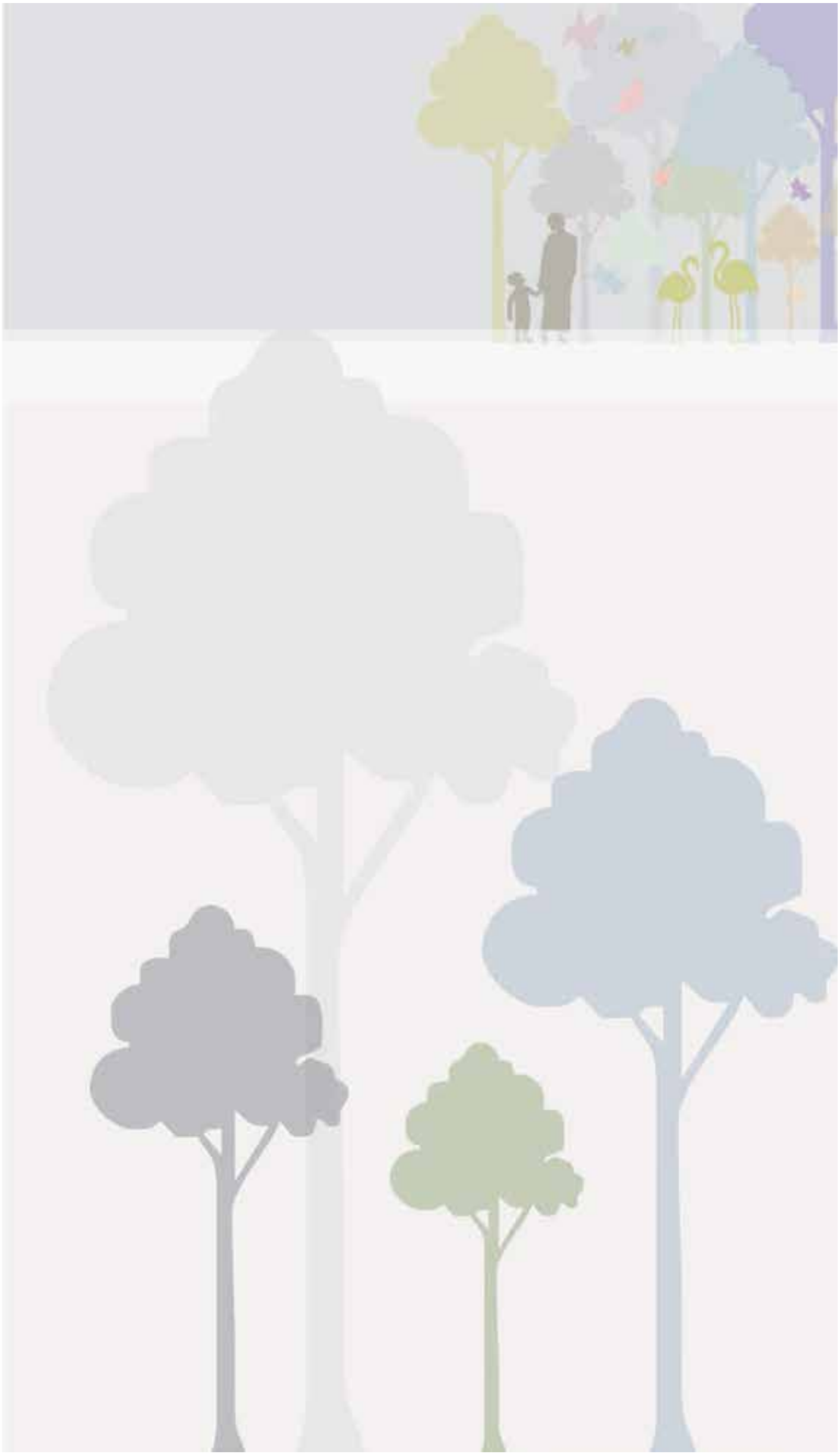
Objective IV: Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted

Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes

Objective V: The capacities and public engagement necessary to implement the Strategy have been developed

Target 15: The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy

Target 16: Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy



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Government of India

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8.3. Proceedings of the Consultation Workshops for Developing Local Biodiversity Strategy and Action Plan (LBSAP) for Jammu City

Prepared under

INTERACT-Bio
Integrated action on biodiversity

Proceedings of the Stakeholder Consultation Meeting on the Development of the City Biodiversity Index and Local Biodiversity Strategy and Action Plan for Jammu City

Udyog Bhawan, Jammu | 18 August 2021

Funding Support

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IKI INTERNATIONAL CLIMATE INITIATIVE

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सत्यमेव जयते

Ministry of Environment, Forest and Climate Change
Government of India

Project Implemented in India by

ICLEI
Local Governments for Sustainability
SOUTH ASIA

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Description of the Initiative

The initiative will support the city of Jammu to understand and unlock, within its specific local context, the potential of nature to provide essential services and new or enhanced economic opportunities, while simultaneously protecting and enhancing the biodiversity and ecosystems on which these services and opportunities depend. Through the project, Jammu will align their planning with the National Biodiversity Strategy and Action Plans (NBSAPs), as required by the Convention on Biological Diversity (CBD) through the development of Local Biodiversity Strategy and Action Plans (LBSAP), which will be one of the few to be developed in India. This is being funded under the INTERACT- Bio project which is supported by the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) through the International Climate Initiative (IKI). INTERACT-Bio is a four-year project designed to support sustainable utilization and management of natural resources within fast-growing cities and the regions surrounding them.

Additionally, the city will also apply the City Biodiversity Index (CBI) to benchmark and monitor the progress of their biodiversity conservation efforts against their own individual baselines. This is being supported by the UNDP through the GOI- UNDP-SECURE Himalaya Project.

The Initiative in the Context of Jammu

Jammu city is the winter capital of the Union Territory (UT) of Jammu and Kashmir. Jammu city is the main economic hub of the administrative division of Jammu. The city is popularly referred to as the 'city of temples' and reflects a vast cultural heritage with the existence of old historical buildings. Owing to the presence of major holy shrines such as Shri Mata Vaishno Devi and Amarnath in the adjoining region, tourism is the most important industry in the city. As the city of Jammu is well-regarded for its regional connectivity, leading up the way to the Kashmir valley and Ladakh, it is widely acclaimed as a transit city in the local area.

Rapid urbanization and infrastructure development in the city has led to a notable increase in the size and population of the city of Jammu. This in turn has had its impact on the city's natural resources- forested hill slopes, River Tawi and orchards and agricultural farms, which are becoming fragmented, polluted and degraded.

There is an urgent need for the assessment and appreciation of the ecosystem services provided by biodiversity within and around city-regions and to formulate and implement sustainable strategies, which offset investments in conventional infrastructure that has high carbon lock-in and leverage ecosystem services in a sustainable and inclusive manner to make Indian cities safe and resilient. Decisions and actions that affect biodiversity are often taken at the local level, and hence corresponding strategies and action plans need to be developed and implemented at the relevant sub-national level.

The development of the City Biodiversity Index and Local Biodiversity Strategy and Action Plan follows the process of engaging relevant local stakeholders including municipal and sub-national governmental staff, local communities, community-based organization (CBOs), local businesses and NGOs that are affected by or hold interest in the selected city-region's ecosystem services.

Background to the Workshop

The ValuES (Integrating Ecosystem Services into Policy, Planning and Practice programme) is a developed concept of ecosystems services, which demonstrates nature's value, and will feed into the ecosystem assessment in Jammu. The ValuES is funded by IKI/BMUB and implemented by GIZ in close collaboration with the UFZ and the Conservation Strategy Fund (CSF). Within this context as part of the scoping process in Jammu, the Ecosystem Service Opportunities (ESO) framework, focusing on Steps 2 and 3 of the step-by-step guidelines (Rode and Wittmer 2015, see also Rode et al. 2016) was used. The structure and materials used reflect a modified version of the framework, which was adapted based on recent application experiences in several countries (Mexico, South Pacific, etc.).

An LBSAP is a guiding strategy with specific actions suggested for the local governments to achieve "optimal and realistic governance and management of biodiversity and ecosystem services" (Avlonitis et al., n.d.). An LBSAP, in essence, is the local equivalent of National and State Biodiversity Strategy and Action Plan.

The City Biodiversity Index (CBI) or the Singapore Index consolidates the available biodiversity-related indicators locally, which can help cities evaluate and benchmark their biodiversity conservation efforts. CBI scoring is quantitative in nature. A total of 23 indicators makes up the index, measuring a city's native biodiversity, the ecosystem services provided and biodiversity governance. Scores range between zero to four points for each indicator, with a maximum overall score of 92. The first year is considered the baseline against which cities can then chart their subsequent evolution.

The stakeholder consultation was conducted in Jammu, Jammu and Kashmir (J&K) on the 18th of August, 2021. Representatives from the public sector, NGO and CSO sector, and academicians participated in the consultation. It was organised by ICLEI- Local Governments for Sustainability, South Asia, in conjunction with the Jammu and Kashmir Biodiversity Council. The workshop aimed to discuss the following aspects with the participants:

- The critical issues around biodiversity and ecosystems for the city of Jammu and identify the ecosystem services that are critical for the city
- The actors and activities which influence the provision of ecosystem services
- Management measures or policy instruments to improve ecosystem services within Jammu
- The application of the CBI for the city of Jammu

Workshop Report

Inaugural Session

The inaugural session commenced with Mr. Asaf Mahmood Sagar, Member Secretary, J&K Biodiversity Council, welcoming the gathering. He spoke about the sheer diversity of plants and animals found within the UT. He also spoke about how much progress the city was making in initiating the development of both the CBI and the LBSAP.

Dr. Monalisa Sen, ICLEI South Asia, congratulated the policy makers and government officials present on taking such a momentous decision to mainstream biodiversity into their planning and development. The CBI is the only globally accepted urban tool that measures a city's biodiversity. She mentioned how ICLEI- Local Governments for Sustainability and the Singapore National Parks, who were the original developers of the index, were partnering to convert the present CBI into an online tool that would be much simpler to use. The LBSAP and its significance was also introduced to the audience. She ended with what stakeholders could expect in the day's session.

Dr. Mohit Gera, PCCF and HoFF of J&K Forest Department and Chairman, J&K Biodiversity Council, welcomed everyone and delved into a brief history of the J&K Biodiversity Council and the work that was done by the Council in the last year. He outlined the People's Biodiversity Registers

being developed for the UT and how Biodiversity Management Committees were being activated in a phased manner at the block level. He outlined his vision for involving these committees in sustainable management of minor forest produce as stipulated in the Biological Diversity Act, 2002. He talked about tangible and intangible ecosystem services illustrating the same through forests in the UT. Finally, he outlined the agenda of the day and expressed his hope that the stakeholder consultation would be a productive one.

Shri Sanjeev Verma, IAS, Commissioner Secretary of the Department of Forests, Ecology and Environment highlighted programmes being taken up by the Forest Department in J&K. He spoke about management plans being developed for wetlands, eco-restoration programs for forests that would commence in partnership with IIT Jammu over the next five years and how the UT intends to align their agenda with that of global and national commitments such as the UN Decade for Restoration. He spoke positively of the event and looked forward to see the impact of the CBI and LBSAP within Jammu city and its management.

With this, a set of two brochures on Urban Greening and Birds were released by the Chief Secretary, the Commissioner Secretary, the PCCF/HoFF and the Member Secretary.

Shri Arun Kumar Mehta, IAS, Chief Secretary, Jammu and Kashmir, in his inaugural address talked about the importance of data in measuring the performance of any activity or scheme. He underlined that in doing so, one is able to chart one's growth which then drives performance. In saying this, he commended the J&K Biodiversity Council and the city for initiating the same for biodiversity, because biodiversity represents the diversity of lifeforms and measuring it would indicate the liveability of a city. He insisted there be public ownership of the index in order to ensure success of programmes introduced along the way as well as to measure its adaptability, uptake and sustainability. Biodiversity conservation needs collective effort and should not just be a prerogative of the Forest Department. There should be cooperation and convergence across associated departments and organisations in Jammu. Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) was an important national level scheme which could be used to enhance plantation and achieve convergence. He also proposed that indices measuring the Air Quality and Water Quality be done so, hand in hand with the CBI, with care and with precision. Information, Education and Communication would go hand in hand with technical implementation as people need to be made aware on what forests do for people and what people can do for forests. He felt this should be integral to strategies brought out in the LBSAP while also addressing degradation of ecosystems. He mentioned how institutions like ecoclubs and youth clubs would be ideal starting points for this. He also spoke of some initiatives that were being spearheaded such as biofencing of wetlands and riverfront development. Finally, he mentioned that the Forest department was the most underutilized of departments in the UT and that there was a need to capitalise on its potential.

The inaugural ended with a vote of thanks

Developing the City Biodiversity Index

Dr. Monalisa Sen commenced the workshop with a detailed description of the CBI and took participants through every indicator, illustrating each with what was done in other cities where the CBI was applied. She also showed participants what the progress on data collection for Jammu city was with regard to the index which is depicted below in Figure 1.

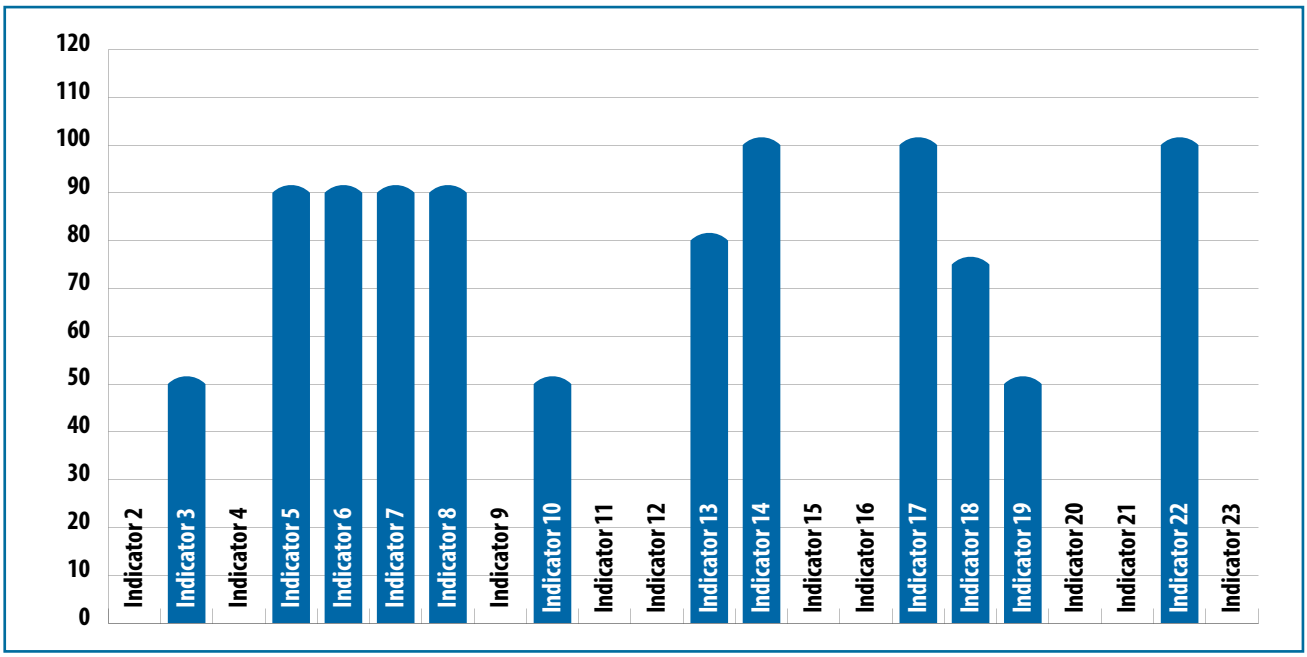

Figure 1: Progress made on individual indicators of the CBI of Jammu

What are ecosystem services and why should cities care about them?

Dr. Monalisa Sen in this session provided participants with an overview of ecosystems and the various services provided by the different types of ecosystems. She first introduced ICLEI- Local Governments for Sustainability, South Asia, explaining the purpose of the stakeholder consultation. She then proceeded to explain the various concepts and principals for measuring ecosystem services, touching upon the Payment for Ecosystem Services (PES concept), the Millennium Ecosystem Assessment (2005) Synthesis Report and the Economics for Ecosystems and Biodiversity (TEEB) methodology. To illustrate why cities should care about ecosystem services, she discussed a few examples from range of case studies on how ecosystem service assessments and valuations can help demonstrate the value of ecosystems. Finally, she touched upon the City Biodiversity Index and how it can act as a tool for green development planning.

With this, Dr. Sen split the participants into five different groups for the group exercise sessions that followed.

Exercise 1: Scoping biodiversity issues and ecosystem services

The main objectives of the exercise were to identify

- What are the most critical issues around biodiversity and ecosystems for Jammu?
- Which ecosystem services (ES) are important for Jammu?
- Where are these ES generated? What is their current status and trend? Where do trade-offs between ES occur and how?

The outcome expected for the session was to understand the relevance of ES for urban sustainability and recognise that measures are needed to maintain and enhance ES provision.

The groups were also given the TEEB classification of ecosystem services and were asked to categorise ecosystems in Jammu based on the same. The landuse map which had been developed for Jammu in the Master Plan 2032 was also distributed amongst groups to enable a better identification of ecosystem services. All of the groups classified ecosystems and their services rendered. The following are the outcomes from the groups (Table 1).

Table 1: Summary of responses for Exercise 1

Group	Ecosystem	Ecosystem Service	Who benefits	Threats
I	Forest Grasslands and Sacred Groves	Climate Moderation; Timber, Fuel and Fodder	Citizens; Wildlife; Cattle rearers and owners	Diversion of forestland; Forest Fires; Habitat Fragmentation; Encroachment; Degradation; Overgrazing
	River (Tawi)	Habitat for Fauna; Potable Water; Irrigation; Silt arresting; Groundwater recharge; Mineral source; Recreational; Socio-cultural and religious value	Fauna; Citizens; Farmers	Industrial Waste Discharge; Domestic and Biomedical Waste Discharge; Mining for sand and gravel (Bajri); Unsustainable extraction of minerals; Pollution; Encroachment
	Canals (Ranbir Canal)	Habitat for Fauna; Potable Water; Irrigation; Silt arresting; Groundwater recharge; Mineral source; Recreational; Socio-cultural and religious value	Fauna; Citizens; Farmers	Industrial Waste Discharge; Domestic and Biomedical Waste Discharge; Mining; Unsustainable extraction of minerals; Pollution; Encroachment
	Ponds	Groundwater recharge; Pisciculture; Water for Cattle; Aesthetic value; Micro-climate Moderation; Breeding place for Migratory Birds	Local Community	Effluent discharge; Siltation; Encroachment; Breeding grounds for harmful insects
	Agricultural and Horticultural lands (Irrigated and Dry Land)	Food; Fodder; Fuel wood; Aesthetics; Medicinal; Beekeeping; Agro-based industry	Local inhabitants; Livestock rearers; Bee keepers; Farmers	Decrease in land size due to real estate demand; Indiscriminate use of chemicals, fertilizers and pesticides; population growth; land conversion; depletion of ground water; monkey menace
II	Forest	Timber; Wildlife conservation; Water conservation; Medicinal plants; Sericulture	Urban population; Village communities	Unorganised settlements and influx of migrants; unplanned growth; urbanisation; absence of town planning; forest encroachement; Disasters like landslides, forest fires and floods; Settlement of forest communities under the forest rights act
	River	Irrigation; Habitat; Socio-cultural importance	Urban population; Village communities	Degradation of catchment areas; discharge of garbage and effluents
	Pond	Recharge of water table; Habitat; Cultural significance	Urban population; Village communities	Draining and encroachment; discharge of effluents and solid waste; loss of awareness around cultural value of ponds
	Canal	Power Generation; Irrigation; Recreation; Amelioration of city micro-climate	Urban population; Village communities	
	Sacred Groves	Cultural importance; Traditional knowledge; Medicinal Plants; Learning centres; Genetic repository; Environmental education and awareness	Urban population; Village communities	
	Green belts/Parks/ Plantations	Floriculture; Aesthetic beauty; Habitat; Carbon sequestration; Recreation; Health; Oxygen banks	Urban population; Village communities	
	Agriculture	Food security; Fodder; Pollination	Urban population; Village communities; Farmers	Reduction in area due to urbanisation and infrastructure; use of chemical fertilizers and pesticides

Group	Ecosystem	Ecosystem Service	Who benefits	Threats
III	Freshwater bodies (dams, canals, ponds, river)	Food, employment, habitat	Citizens; Fishermen;	Overexploitation; water pollution; extraction of bed material; disposal of solid waste
	Sacred Groves	Tourism; Employment generation; Heritage value	Citizens	Indiscriminate littering and polluting activities; Absence of inclusion in education curriculum leading to loss of connection with this heritage
	Hills	Pastures for grazing communities; Habitat Aesthetics; Tourism	Grazing communities; tourists; local communities;	Roads and other developmental activities; landslides exacerbated by climate change; tree felling; over-extraction of timber; Mining of gravel
IV	Forests	Timber; fodder, fuelwood; NTFPs; air and water purification; recreation; tourism; aesthetics; religious value; soil and moisture conservation; habitat; Nutrient recycling; ground water recharge; carbon sequestration; reduction in GHG	Upstream and downstream communities	Deforestation, urbanisation, invasive species, encroachment; unplanned development; fragmentation; pollution; unchecked diversion of forests; poaching and smuggling
	Ponds (Chapris and Talabs)	Water recharge, habitat, cooling- impacts microclimate	Local Community	Eutrophication; waste dumping; effluent discharge; encroachment
	Parks and Gardens	aesthetic beauty; air purification	Urban community	Plastic use and improper disposal; waste dumping and littering
	Wetlands	Water recharge, habitat, cooling; impacts microclimate; tourism	Tourists; Local community	encroachment; landfilling; lack of awareness
	Canals and River	Irrigation; cooling of surrounding area; aesthetic beauty; groundwater recharge; livelihood generation	Local Community, farmers	waste dumping; anthropogenic activities
	Khandi belts	livestock support (rearing); timber; firewood	Marginal farmers	diversion of land resources
	Sacred groves	Habitat; religious significance; traditional knowledge	Local Community	population growth; lack of awareness; extinction of tree species
	Paddy fields	Livelihood generation; groundwater recharge; food security	Farmers	weeds; pests of crops; real estate and conversion of land use
	Scrubs and Khads	construction material; habitat; grazing areas	Local Community	Uncontrolled mining
	Plantations (Urban, horticulture, floriculture)	Aesthetic beauty; air purification; carbon sequestration; shade; employment generation; support apiculture; sericulture; minor timber and fuel wood	Urban community	urbanisation; pests
	Protected areas	tourism; recreation; protection of threatened fauna; improves ecology of area; pastures for grazing	Villagers; Livestock rearers; Tourists; Local communities	lack of funds; invasive species; urbanization; encroachment; low priority for government; Issues related to settlement of Forest Rights Act for Tribals; fragmentation leading to human wildlife conflict

Group	Ecosystem	Ecosystem Service	Who benefits	Threats
V	Tawi river	Fisheries	Local Community; Fishermen	Encroachment, non-functional STPs; Overextraction of water, water pollution-eutrophication, sand mining
	Wildlife Sanctuary	Tourism, Livelihood generation; cultural significance; grazing areas; habitat	J&K Tourism dept; Local communities	Hunting and poaching, illegal smuggling, ecological degradation; irresponsible tourism
	Botanical Garden	Education; Medicinal herbs; revenue generation; ambient air quality maintenance; habitat; educational value	Pharmaceutical industry; Schools and students; Citizens	Climate change- less rainfall; apathy and negligence; insufficient maintenance; lack of trained human resources
	Wetlands	Tourism, habitat, livelihoods, educational services, aesthetics	Local community	anthropogenic activity, land encroachment
	Ponds and Lakes	Habitat; Tourism, ground water recharge, habitat; employment generation	Local community	illegal encroachment; waste disposal; degrading activities such as pollution
	Forests	Habitat; several commercial products	Local community, Forest Dept.	encroachment, deforestation, forest fires, decrease in total rainfall

The main ecosystems identified by the groups were:

- Hills and Forests
- Tawi River and Canals
- Wetlands and Ponds
- Agricultural land and Plantations
- Sacred groves
- Khads and Scrub forests

Other than the discussion captured in Table 1, some of the participants shared the folklore surrounding Jammu city which encapsulated coexistence with biodiversity. It was said that during the reign of Raja Jamboo Lochan, whose capital was at Bahu, on a hunting expedition, he observed a lion and a goat drinking from the same pond. He decided to establish a city there named after him, Jamboo, which over the course of time came to be known as Jammu.

Participants also shared that Bahu Conservation reserve and Ramnagar Wildlife Sanctuary formed the lungs of the city while River Tawi was its lifeline. Important canals in the city like Ranbir Canal help with its drainage and micro-climate regulation as the city faces extremes of temperature in the cold and hot seasons. The canals are also extremely important for the agricultural ecosystems of the city as they are the main irrigation sources.

The clan or the Baradari system is very strong in Jammu and is associated with its sacred grove and pond ecosystems since millennia. The local Dogra population make up these clans. These ecosystems were collectively owned and maintained by each clan in the district. Passing down of traditional environmental knowledge was also done from one generation to the next through these institutions in the past. Ponds represent important local water recharge structures in the city. Within the sacred groves, the Barna tree or *Crateva religiosa* is slowly disappearing.

Two types of areas were demarcated in the city. The *kandi* or the dry area above the canals and the agricultural area/belt below the canals, near the river. Jammu is famous for Basmati rice and is known as the Basmati belt.

Some of the immediate threats being faced included land use conversion especially of agricultural areas and *khads*.[1] The basmati growing area has now come under the bypass and has therefore reduced, having implications on local food security and livelihoods. Ranbir canal is also

1. Topographical features which are seasonal in nature and represent ravines and gullies that run through the city

threated by a flyover which is being constructed to ease traffic. Mining of sand and gravel along the river is rampant. Sacred groves are losing their importance as many youths are not aware about them. There is also an increase in human wildlife conflict because of fragmentation of forests. The hills are the most neglected of all the ecosystems and because of developmental activities such as cutting of hills and development of road infrastructure, landslides are on the rise. In addition to all of this, improper solid waste management especially plastic waste is threatening many ecosystems. Of the three Sewage Treatment Plants in Bhagwati Nagar, only one is functional.

Exercise 2: Understanding activities and actors

Dr. Sen introduced the framework for identifying ecosystem service opportunities before opening the session up for the second exercise. In the second exercise, the activities which influence the provision of relevant ES were explored. Participants were encouraged to identify which actors are involved and to classify the actors and activities as benefitting, stewards and degrading to a particular ES.

The outcome of the session was for a joint understanding of how activities and actors relate to ecosystem service provision. Below is a summary of the five groups' responses.

Table 2: Summary of responses for Exercise 2

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
I	Forest and Hills	Forest Conservation and Afforestation	Depts: Forest; Social Forestry; SFRI; IWDP/PWMP; FPF; Horticulture; Sericulture; Agriculture; Animal Husbandry; NGOs	Establishing Water sources- Ponds		Deforestation; Forest fire	Local Community
		Awareness and Educational programs	Volunteers, NGOs, Govern ment Depts.	Eco tourism		Overgrazing	Nomads
		Insitu: Closure establishment; Seeding	Departments; NGOs, Community, SAU			Earth extraction	R&B/PWD other construction dept
		Ex Situ: Nursery Raising- includes Plantation (Van Mahotsav); Fencing	Departments; NGOs, Community, SAU			Road and building construction if without proper survey	R&B/PWD other construction dept
						Unscrupulous activities	Mafia
		Adoption of sustainable micro-watershed approach	Line Depts; NGOs	Adoption of landuse as per capability		Soil erosion	Local community
		Water conservation by gully plugging, check dams	SAU	Livelihood support	Animal husbandry; floriculture dept	land use conversion and real estate expansion	Land mafia
		Plantation of forest	Forest Dept.	Fodder, fuel, fruit trees, medicinal plants plantation	Farmers		
				Contour cultivation	Local Community		
II	River and Canals	River and Canal management and Conservation	Flood and irrigation dept.	Farming	Farmers	Mining	Mining, Industrial Units, Stone crushers, Building material providers
		Soil and Water conservation	Relevant dept.	Irrigation	Urban population	Road building, encroachment, forest fires, land use changes, urbanisation	JMC, JDA, PWD, Revenue department

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
		Awareness generation	NGOs	Grazing	Grazing community	Grazing	Grazing community
				Mining	Mining, Industrial Units, Stone crushers, Building material providers		
				Flood prevention	Citizens		
	Forests	Habitat protection	Forest Dept.	firewood extraction	Timber traders. Brick kiln owners	Over Grazing, Illicit tree felling, mining	Nomads. PMGSY, Stone crusher owners, extraction of sand and stones
		Reafforestation	Forest Dept.	Grazing	Livestock owners; Nomads		
	Ponds and wetlands	Catchment area treatment	Respective Dept.	Fisheries and Aquaculture	Fishermen, Fisheries Dept.	Encroachment, reclamation of ponds, use of plastics, siltation	Land mafia, property dealers, local population, municipal corporation
		Solid waste management, pollution control activity	Municipality, JDA, Housing Board, Smart City Corporation; Pollution control Dept	Housing, Infrastructure, Urban Planning	PWD	Garbage dumping, over use of plastics, introduction of exotics, use of agrochemicals	Fisheries dept, Agriculture, horticulture
				Birding; Fishing; religious activities, Tourism	tourists and locals	Use of non-biodegradable material during functions	Caterers, hoteliers, service providers, civic society
						Pollution, sewage dumping	Tourism, Irrigation, Infrastructure Development
III	Wetlands and Ponds	Conservation of wetlands	Pollution control board	Tourism	Locals, Tourists	Silting	
		Preservation of gene pools of flora and fauna	Students	Fisheries	Locals, Fishermen	Sewage pollution	Citizens, industries
		Awareness generation	NGOs	Employment Generation	Unemployed youth	Encroachment	Government agencies

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
		Control of pollution	Forest Dept; Fisheries Dept; Lakes and Wetlands Development Board	Cultural hub	Related industries	Exploitation of fauna	Hunters
		Preservation of heritage	NGOs	Bird watching; Photography; Water sports; Local art promotion	Tourists, Locals, Service providers	Discharge of effluents leading to pollution	Industries
IV	Khads	Catchment area treatment	PRIs, Govt departments, civil society,	Fuelwood/ fodder	Locals/ nomads	Overgrazing	Locals/nomads
		Mining areas management plan to support local stakeholders (benefit sharing)	Law making authorities	construction material	Contractors, private firms govt organisations, locals for bonafide use	construction material overextraction	Contractors, private firms govt organisations, locals for bonafide use
				mining leases	PRIs, Local administration, courts, polce, JDA, Municipal Corporation, Housing Board, revenue dept	Encroachment	Land mafia, contractors, govt organisations, locals
	Scrub Forest	Conserving Gene pool for nurseries and botanical and zoological gardens	Forest dept.	Medicinal plants; ornamental; bamboo	Forest Dept., Ayurveda	Lopping	Locals/nomads
		Soil and water conservation work through DRSM, Gabion structures, gully plugging	Irrigation and Flood control (Jal Shakti) Dept; PRIs. VPC. Forest dept	Development of village woodlots in the scrub forests/ areas to support supply of local/ minor timber	Forest dept; district admin; PRIs; Village plantation committee (VPCs)	unplanned developmental activities	PWD, Industries, Land mafia etc.
		Strengthening the various stakeholders like FDAs, JFMC, BMCs, to check the use of khads and scrub forests	Seminars by various departments, education and awareness by IT Dept, Local print and electronic media,				
		grazing plan implementation; implementation of FRA	forest dept				

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
V	Sacred Groves	Maintenance	Temple staff; Tribal people; Religious trust; Local Village population	Aesthetics; Worshipping	Local Community; Tribal people	Encroachment	Urban citizens, real estate industry
						Deforestation	Government
						Forest fires	
	Agriculture and Horticulture		Agriculture dept; Horticulture dept; Floriculture dept; PHE	Food production	Agri Dept; Farmers	Overuse of chemical fertilizers	Farmers
		Soil fertility improvement	Agriculture dept; Horticulture dept; Floriculture dept;	Revenue Generation and Livelihood improvement	Agriculture dept; Horticulture dept; Floriculture dept;	Overextraction of water for irrigation	Flood and irrigation dept; PHE; Industries

Exercise 3: Brainstorming session

This session focused on collecting ideas on how to improve the situation (which activities, management measures or policy instruments could help). Each group was asked to come up with at least three ideas on how to improve the situation of ES for Jammu.

Table 3: Summary of responses for the Brainstorming session

Group	Sl. No.	Idea	How to implement	Who will Implement	Time Frame
I	1	Base line study: Study the baseline status of all organisms and preserve it	• Involve experts to study the diversity of plants, animals, microorganism, ecosystems and document it in public domain	• State forest department, • NGOS, • Universities, and research scholars	20 % time of Project Duration 1 year and 5 year project
	2	Enrichment of biodiversity by active involvement of government departments and the local community in a joint manner	• Involvement of concerned government department and local communities by building up BMCs • Awareness and capacity building by regular training and govt. and non govt. functions and experience sharing • Monitoring and evaluation • Protection of agriculture land • Prevention of encroachments and habitat • Conservation and strict implementation of env. laws. (Stick to master plans)	• Forest Department • Agri /horticulture department • JDA, JMC, ULB, FRI, PWD, IT, Pollution control committee, Local BMCs, • Local Panchayat, • Universities	80 % of time of Project Duration

Group	Sl. No.	Idea	How to implement	Who will Implement	Time Frame
	3	Sustainable Management Plan for future	• Preparation of management plan by involving experts and local communities • Seamless execution by the stakeholders	• All stakeholders through nodal agencies	Continuous process
II	1	Maintenance of ground water recharge through restoration of waste lands and protection of wild habitat	• Reforestation of Shivalik hills • Protection of Bahu conservation reserve and Ramnagar wildlife sanctuaries	• Agriculture, Horticulture, Floriculture, Forest Departments • Wildlife protection department	5 – 10 Years
	2	Maintenance of soil health and productivity by phasing out the use of plastics and agrochemicals	• Municipal corporation to adopt scientific solid waste management practices. • Reduce the use of insecticides, pesticides and fertilizers adopt organic farming	• Urban Development Department, JMC and /stakeholders, Agencies, NGOs	5 – 10 Years
	3	Proper and scientific town planning through efficient drainage system and use of ecofriendly materials	• PWD, JMC, JDA, Town planning departments need to develop ecofriendly practices like green spaces and parks	• Urban forestry, Urban Energy resources department, (Solar, wind energy) • Urban and housing dept. • JAKEDA	10 -20 years
III	1	General awareness (IEC campaigns)	• Pamphlets • Books / Essay • Short movies • Folk songs • Painting Competitions	• Through educational institutions • Media / Ngo / Govt. Departments	Continuous process
	2	Inter – departmental coordinating committees involving local communities to implement various departmental agendas	• Seminars / conferences • Public meetings • Design objectives and identifying problems with respect to biodiversity	• JMC / JDA • Pollution control board • Forest and Wildlife departments • Local public	Continuous Process
	3	Improvement of Community participation in the city	• Consider the public as the major stakeholders • Consultation on public endeavors and education on the benefits of projects	• JMC • Urban development agencies • Local public	Continuous process
IV	1	Involve local stakeholders in every aspect of protection, development, implementation and management of ecosystem	• Involve the PRIs, VFCs, JFMs, Urban NGOs, Media groups, social activists etc. aimed at conservation and sustainable use of ecological resources	• All govt departments / NGO • Policy makers and legislatives authorities	1 – 2 Years
	2	Stringent and clear legislation and its implementation	• Create awareness among political representatives • support them with data • involve NGOs and Civil society	• All govt departments / NGOs • Policy makers and legislatives authorities	1 – 2 years

Group	Sl. No.	Idea	How to implement	Who will Implement	Time Frame
	3	3Rs – Reduce, Reuse and Recycle	• Education and awareness among all stakeholders especially the school. It should be entered in their course curriculum etc. • Ban on single use plastic, promotion of biodegradable disposables. • Developing a state of the art solid and liquid waste management plants. • Reduction in creation of household waste by imposing strict parameters	• PCBs, Forest Dept., • Dept. of police etc. • Civil societies, Legislatives etc.	1 – 2 Years
V	1	Decentralised Waste water treatment system (DEWATS)	• Community wise DEWATS installation. Eg; 1 DEWATS system for 500 households	• Urban environmental engineering department	3 years
	2	Solid Liquid waste separation (Chocking is currently existing SLW mixing	• Capacity building and awareness of stakeholders • Cover open drains	• JMC and Urban environmental engineering department	3 years
	3	Waste Processing plant Installation either at processing site or at bulk generator site	• Installation of waste to energy plant and Bio-methanisation plant for waste	• JSCL • JMC • ULBs	3 years

Valedictory Session

In the valedictory session, the Shri Chander Mohan Gupta, Hon'ble Mayor and Adv. Purnima Sharma, Hon'bleDeputy Mayor were appraised of the day's events and the deliberations that took place during the workshop. The workshop concluded with a valedictory address by the Mayor who looked forward to outcomes of the workshop in the form of the LBSAP and CBI and assured the participants of the city's full support for implementation of the same.

Annexure 1: Workshop Agenda

Development of City Biodiversity Index and Local Biodiversity Strategy and Action Plan for Jammu

Workshop and Scoping: Nature's Benefits in Jammu

Date: 18th August 2021

Venue: Udhyog Bhawan, Jammu

Program Schedule

Time	Item
Objectives: Introduce the City Biodiversity Index, ES concept and its applications, exercise to apply ES thinking to Jammu's critical ecosystems, collect ideas on how to improve the situation, generate awareness, build capacity and ensure stakeholder buy-in for the project	
10:30 – 11:00	**Registration**
11:00 – 11:45	**Inaugural Session** ● Welcome address by Member Secretary, J&K Biodiversity Council ● Introduction to CBI and LBSAP by Dr. Monalisa Sen, ICLEI South Asia ● Remarks of PCCF/HoFF and Chairman, J&K Biodiversity Council ● Address by Commissioner Secretary, Department of Forest, Ecology and Environment ● Release of Pamphlets on awareness about importance of biodiversity ● Inaugural address by Chief Secretary, J&K Government ● Vote of thanks
11:45 – 12:00	**Tea/ Coffee Break**
12:00 – 12:30	**Developing the City Biodiversity Index** – Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI South Asia
12:30 – 13:30	**'What are ecosystem services, and why should urban administrators/policy makers take them into account?'** **Exercise 1: Scoping ecosystem services** ● Which ecosystem services (ES) do the identified ecosystems provide for Jammu? Where are they generated? How important are they? For whom? What is their current status and trend? **Desired outcome** ● Recognition that healthy ecosystems are crucial for a urban sustainability and that measures are needed to maintain and enhance ES provision Systematic (qualitative) scoping of relevant ES (on map and in template)
13:30 – 13:45	**Reporting back from groups and synthesis**
13:45 – 14:45	**Lunch break**
14:45 – 15:00	**Short input: Ecosystem service opportunities** – Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI South Asia

Time	Item
15:00 – 15:45	**Exercise 2: Understanding activities and actors** ● Which activities influence the provision of relevant ES? Which actors are involved and how? ● Where do trade-offs between ES occur and how? **Desired outcome** ● Joint understanding of how activities and actors relate to ecosystem service provision by the identified ecosystems ● Systematic scoping of actors (also in template) as entry points for initiating a change process
15:45 – 16:00	**Brainstorming session: how to improve the situation** ● Collect ideas how to improve the situation (i.e. which measures or instruments could help – thinking broad, not only what the project will be able to do)
16:00 – 16:15	Reporting back from groups and synthesis
16:15 – 16:30	**Tea/ Coffee Break**
16:30 – 17:15	**Valedictory Session** ● Welcome address by Member Secretary, J&K Biodiversity Council ● Brief Report on CBI and LBSAP of Jammu City by Dr. Monalisa Sen, ICLEI ● Remarks of PCCF/HoFF and Chairman, J&K Biodiversity Council ● Observations of Commissioner Secretary, Department of Forest, Ecology and Environment ● Address by Hon'ble Deputy Mayor, JMC ● Valedictory Address by Hon'ble Mayor, JMC ● Vote of thanks

Annexure 2: Participant list

Development of City Biodiversity Index and Local Biodiversity Strategy and Action Plan for Jammu

Date: 18th August 2021 | Jammu

Registration Sheet

S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
	DR. ANIL KUMAR MEHTA	CHIEF SECY	~~FOREST~~			
	MR. SANJEEV VERMA	COMM / SECY FORESTS				
	DR. MOHIT GERA	PCCF HOFF	FOREST DEPT			
	Roshan Jaggi	PCCF / Director Social Forestry	Department.			18.8.
	Asaf - M	MEMBER SECRETARY	JAMMU & KASHMIR BIODIVERSITY COUNCIL			

	NAME	DESIGNATION	ORGANIZATION	EMAIL	PHONE	SIGN
1.	Dr. C.M. Sein.	Member of Pondicherry council.	Forest.	drcmsein@rediffmail.com	9419011804	
2.	Sat Paul IFS	Conservator of Forest Chenab circle	Forest dept.	Yehmsb@gmail.com.	9419962563	
3.	Kuldeep Singh	Corporator	J.M.C		9858013378	
4.	Shams Uddin	Corporator W. No -31	JMC Jammu		94191-26119	
5.	Sibat Ali	Corporator W. No -74.	JMC. Jamm.		94191-27378	

	NAME	DESIGNATION	ORGANIZATION	PHONE	EMAIL	SIGN
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INTERACT-Bio
Integrated action on biodiversity

Proceedings of the Stakeholder Consultation Meeting on the Development of the City Biodiversity Index and Local Biodiversity Strategy and Action Plan for Jammu City

Udyog Bhawan, Jammu | 15 November 2021

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Description of the Project

The project will support Jammu to understand and unlock, within its specific local context, the potential of nature to provide essential services and new or enhanced economic opportunities, while simultaneously protecting and enhancing the biodiversity and ecosystems on which these services and opportunities depend. Through the project, Jammu will align their planning with the National Biodiversity Strategy and Action Plans (NBSAPs), which are required by the Convention on Biological Diversity (CBD) through the development of Local Biodiversity Strategy and Action Plans (LBSAP), which will be one of the few to be developed in India. This is being funded under the INTERACT- Bio project which is supported by the German Federal Ministry for the Environment, Nature Conservation Nuclear Safety and Consumer Protection (BMUV) through the International Climate Initiative (IKI). INTERACT-Bio is a six-year project designed to support sustainable utilization and management of natural resources within fast-growing cities and the regions surrounding them.

The Project in the Jammu Context

Jammu city is the winter capital of the Union Territory (UT) of Jammu and Kashmir. Jammu city is the main economic hub of the administrative division of Jammu. The city is popularly referred to as the 'city of temples' and reflects a vast cultural heritage with the existence of old historical buildings. Owing to the presence of major holy shrines such as Shri Mata Vaishno Devi and Amarnath in the adjoining region, Tourism is the most important industry in the city. As the city of Jammu is well-regarded for its regional connectivity, leading up the way to Kashmir valley and Ladakh, it is widely acclaimed as a transit city in the local area.

Rapid urbanization and infrastructure development in the city has led to a notable increase in the size and population of the city of Jammu. This in turn has its impact on the city's natural resources- forested hill slopes, River Tawi and orchards and agricultural farms which are becoming fragmented, polluted and degraded.

There is an urgent need for the assessment and appreciation of the ecosystem services provided by biodiversity within and around city-regions and to formulate and implement sustainable strategies, which offset investments in conventional infrastructure that has high carbon lock-in and leverage ecosystem services in a sustainable and inclusive manner to make Indian cities safe and resilient. Decisions and actions that affect biodiversity are often taken at the local level, and hence corresponding strategies and action plans need to be developed and implemented at the relevant sub-national level.

The project is engaging relevant local stakeholders including municipal and sub-national governmental staff, local communities, community-based organization (CBOs), local businesses and NGOs that are affected by or hold interest in the selected city-region's ecosystem services.

The project will serve as a platform to ensure that the voice of sub-national governments is heard and enhance the conditions for subnational biodiversity action.

Background to the Workshop

In 2021, the first stakeholder consultation was held where representatives from the public sector, NGO and CSO sector, academia and the private sector participated in the consultation. The workshop identified the critical issues around biodiversity and ecosystems for the city of Jammu and the ecosystem services that are critical for the city, the actors and activities which influence the provision of ecosystem services, and management measures or policy instruments to improve ecosystem services within Jammu. All of these outputs fed into the development of the city's LBSAP.

An LBSAP is a guiding strategy with specific actions suggested for the local governments to achieve "optimal and realistic governance and management of biodiversity and ecosystem services" (Avlonitis et al., n.d.). An LBSAP, in essence, is the local equivalent of National and State Biodiversity Strategy and Action Plan.

The second instalment of the workshop was conducted in Jammu, Jammu and Kashmir (J&K) on the 15th of November, 2022. Representatives

from the public sector, NGO and CSO sector and the private sector participated in the workshop. It was organised by ICLEI Local Governments for Sustainability, South Asia in conjunction with the J&K Biodiversity Council. The workshop aimed to discuss the following aspects with the participants:

- Develop the vision statement
- Discuss and finalize the focus areas
- Identification of health of focus areas
- Develop goals and key action plans

Workshop Report

Inaugural Session

The inaugural session commenced with the Member Secretary, J&K Biodiversity Council, Mr. Asaf Mehmood Sagar, welcoming the gathering. He spoke about how the planet's health was dependent on biodiversity and that despite this reliance, most of the populace is poorly aware on the benefits of keeping biodiversity safe and healthy. In this regard J&K Biodiversity Council is working towards biodiversity conservation by initiating the LBSAPs beyond the UT level plan for J&K's largest cities, Jammu and Srinagar. He mentioned that this was the second instalment of the stakeholder consultation and encouraged active participation.

Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI South Asia, congratulated the policy makers and government officials present on taking such a momentous decision to mainstream biodiversity into their planning and development. She reacquainted participants with outcomes from the first stakeholder meeting which was held in August 2021. The ecosystems and their services that were identified in the last meeting would be finalised along with constructing a vision, identifying focus areas and goals. She discussed what outcomes were expected and the plan for the day.

Dr. Mohit Gera, the PCCF and HoFF of J&K Forest Department, welcomed everyone and delved into a brief history of the J&K Biodiversity Council and the work that was done by the council in the last two years. He outlined the People's Biodiversity Registers being developed for the UT and how Biodiversity Management Committees were being activated in a phased manner at the block level. He mentioned that cities were facing tremendous pressure on account of population growth and in-migration. However, cities were also avenues for solutions and so, in the context of the meeting today, developing the LBSAP would provide part of the solution to the crisis faced by the world. He spoke of the City Biodiversity Index which had been done for both cities and how the cities of Jammu and Srinagar would be the 6th and 7th in the country to develop and LBSAP. He cautioned how vulnerable the UT was to climate change and how the LBSAP could support decisionmakers in future climate proofing of cities. He finally encouraged participants to contribute wholeheartedly and share their varied expertise.

Mr. Sanjeev Verma, IAS, Commissioner Secretary of the Department of Forests, Ecology and Environment, Jammu and Kashmir, painted a grim picture of the present situation. He mentioned that adhering to preventing the 1.5^{0}C rise in temperature may no longer be possible. He stated how J&K was a hotspot of biodiversity. He said he hoped that the LBSAP would bring out microlevel planning, providing decision makers with a much-needed bottom-up approach that would maintain the health of natural ecosystems of the UT. He requested that the strategy that was going to be an outcome of the program today, be a good one, which could be translatable into local action. Capacity, institutional power, the will of the people would feed into the plan which caters to local needs. He mentioned how local solutions to food security such as kitchen gardens would also support local biodiversity. He called for a rich, actionable and workable action plan which moved beyond cosmetic solutions. He encouraged participants to extract their collective knowledge and add value to the document. He stated that Jammu needed creative solutions to enhance greenery in a city where open and green spaces were limited and constrained by topography. Finally, he dubbed the meeting, a practitioner's meeting and said he looked forward to the outcome.

The inaugural ended with a vote of thanks.

Elements of an LBSAP

Dr. Monalisa Sen session provided participants with an overview of the elements that make up an LBSAP. She first introduced ICLEI- Local Governments for Sustainability, South Asia, the INTERACT- Bio project, explaining the purpose of the workshop. She then proceeded to explain India's international commitment as a party to the Convention on Biodiversity, the National Biodiversity Strategy and Action Plan, followed by the Aichi targets and how LBSAPs dovetail into these. She explained by LBSAPs were important, what they were, who develops them, and why Strategies and Action Plans have relevance in an action plan. She explained the various elements that make up LBSAPs, detailing each level and how they align with each other (Figure 1). She also referred to the outcomes of the previous stakeholder workshop where 10 focus areas were identified (Table 1) along with positive and negative drivers that affect them (Table 2).

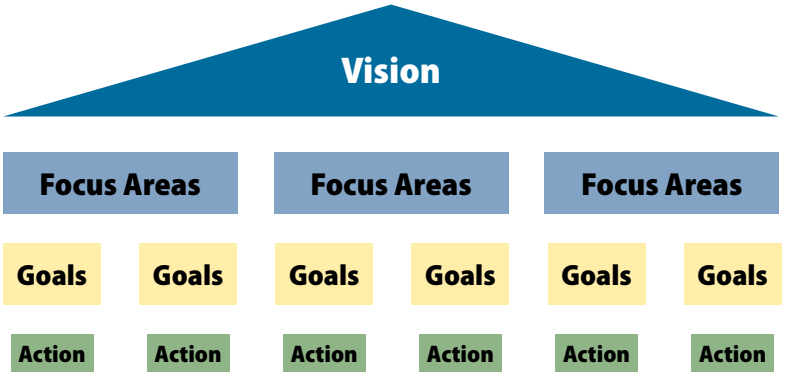

Figure 1: Elements of a local biodiversity strategy and action plan

Table 1: Focus areas identified in first stakeholder workshop

S. No.	Focus Areas
1	Forests
2	River (Tawi)
3	Canals (Ranbir Canal)
4	Ponds
5	Agriculture
6	Sacred groves
7	Hills
8	Parks and Gardens (Botanical Garden)
9	Kandi belts
10	Khads

Table 2: Some of the drivers identified from previous stakeholder consultation

S. No.	Drivers
1	Diversion of Forestland
2	Forest Fires
3	Habitat Fragmentation
4	Encroachment
5	Influx of migrants
6	Urbanisation
7	Climate Change
8	Deforestation
9	Increase in invasive species
10	Pollution
11	Issues related to Forest Rights Act for Tribals
12	Irresponsible tourism
13	Industrial Waste Discharge
14	Domestic and Biomedical Waste Discharge
15	Mining for sand and gravel

With this, Dr. Sen split the participants into five different groups for the group exercise sessions that followed.

Exercise 1: Constructing the Vision Statement for the LBSAP

For this exercise Dr. Sen explained that a collective short descriptive statement of a desired future state – "mental picture" of where are we headed & want to achieve was necessary. The vision statement gives direction – anchor that prevents you getting lost, is inspirational, ambitious but realistic and succinct, clear & easy for all to understand & visualise.

This was done as a collective exercise and the following is the vision statement agreed upon by the participants

"Jammu City envisions a future that balances economic priorities with ecological security of the city through conservation of its cultural and natural heritage, ecological practices, a focus on enhancing and conserving the city's natural resources, including waterbodies, and climate-smart infrastructure, with participation of resident communities."

Exercise 2: Finalisation of Focus Areas and Assessment of their Health

Dr. Sen explained to participants how planned, deliberate and focused efforts were needed to achieve the Vision which would reflect priorities, help to create a common sense of purpose. She warned that too few would show a lack of clear focus & vagueness while too many were difficult to focus on.

The main objectives of the exercise were to identify

- Discuss and finalise the focus areas identified in the previous stakeholder workshop
- Score the health of each of these focus areas

Each group was given a sheet with the focus area and its identified drivers and asked to score the impact of the driver on the health of the ecosystem with a score of 1 corresponding to an impact of poor health and a score of 5 corresponding to an impact of good health. Against each driver, participants were also asked to identify what they thought could be indicators for that particular driver. The summary of responses is given below in Table 3.

Table 3: Exercise assessing health of the focus areas

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
1	Forests	Diversion of Forestland	3	Growing urbanisation, Infrastructural development projects	I
		Forest Fires	2	It is a great thereat to ecosystem and measures need to be taken. Due to migratory herds	
		Habitat Fragmentation	3	Rapid colonisation due to influx of migrants from rural to urban	
		Encroachment	1	New settlements, mining, stone crushers	
		Influx of migrants	1	(Rohingias and migrant populations) 1947, 1965, 1989 (Kashmir migrants) Local migration from hilly districts	
		Urbanisation	1	JDA limits increased from 200 sq km to 500 sq km- fast colonisation	
		Climate Change	3	Impact on agriculture/ horticulture. Changing weather patterns. Global warming	
		Deforestation	3	Its is a threat. Encroachment for urbanisation. Illicit felling for brick kilns and other industrial uses.	
		Increase in invasive species	1	Lantana and other invasive species like Parthenium	
		Pollution	3	Traffic dust, dust due to construction, earth work, unhygienic colonies, visual pollution	
		Issues related to Forest Rights Act for Tribals	3	Regularisation of encroachments	
		Irresponsible tourism	3	Awareness is needed. Ecotourism	
2	River (Tawi)	Industrial Waste Discharge	1	Excess of pollution, no scientific system in place. No treatment of industrial effluent within industrial area	
		Domestic and Biomedical Waste Discharge	1	More awareness is needed	
		Mining for sand and gravel	2	Uncontrolled extraction of mining material	
		Pollution	1	Water quality index is poor	
		Encroachment	2	River banks are being encroached and river width is reducing	
		Degradation of catchment areas	2	Encroachment, urbanisation, settlements and nomadic grazing	
		Non functional STPs	2	Only one unit is functional at Bhagwati nagar. More are needed	
		Over extraction of water	3	It has to be done scientifically	
3	Canals (Ranbir Canal)	Industrial Waste Discharge	1	All effluents flow into the canal	
		Domestic and Biomedical Waste Discharge	1	All effluents flow into the canal	
		Mining	3	Limited	
		Pollution	1	Solid waste discharge of all the colonies. Municipal dumping sites along the canal.	
		Encroachment	1		

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
4	Ponds	Effluent discharge	1	City waste is dispersed in these ponds	
		Siltation	1	Because of poor management	
		Encroachment	1	Many ponds have been encroached	
		Landfilling	1	Due to the city disposal of C&D and municipal waste	
		Lack of awareness on cultural values of ponds	1	More awareness is needed	
		Solid waste discharge	1		
5	Agriculture	Demand for land by real estate	1	Colonies and infrastructure, new roads	
		Indiscriminate use of chemicals	3		
		Population growth	1	At peak	
		Land use change	1	Government act itself has indicated for land use change	
		Depletion of ground water	3		
		Monkey menace	2	Due to reduction in the forest areas and change in feeding habits	
		Increase in pests	2	Due to climate change	
6	Sacred groves	Dumping of waste	1		
		Lack of awareness on cultural and heritage values	2	Revival of cultural heritage is not a priority	
		Extinction of tree species	1	Due to cutting of trees	
		Population growth	2		
7	Hills	Road construction	2	Projects like PMGSY are in full swing	
		Landslides	1	Lots of landslides due to heavy rain and many infrastructure projects	
		Tree Felling	1	Due to construction	
		Gravel mining	1	Due to construction	
8	Parks and Gardens (Botanical Garden)	Dumping of waste	3		
		Decline in rainfall	-	No impact	
		Lack of trained human resources for management	1	Less resources	
9	Kandi belts	Landuse change	1	In full swing	
		Overgrazing	1	Full swing	
10	Khads	Uncontrolled mining	1	Illegal extraction of building material from khads	
		Overgrazing	4	Nil	
1	Forests	Diversion of Forestland	2	Urbanisation, Infrastructure increase, industrialisation	II
		Forest Fires	3	Encroachment, Increase in biomass of grass, trespassing-arson, accidental	
		Habitat Fragmentation	2	Urbanisation, road construction	
		Encroachment	1	Increasing population, urbanisation, industrialisation, seasonal migration	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
		Influx of migrants	2	Nomads settling down in city to improve their standard of living	
		Urbanisation	1	Employment opportunities, Education and health facilities, improved standard of living	
		Climate Change	1	Increasing population density, industrialisation, pollution	
		Deforestation	3	Encroachment, infrastructure development, urbanisation	
		Increase in invasive species	3	Deforestation, improper land use planning and management, planting of exotic species	
		Pollution	1	Industrialisation, population growth	
		Issues related to Forest Rights Act for Tribals	2	Nomad settlement	
		Irresponsible tourism	2	Littering of garbage	
2	River (Tawi)	Industrial Waste Discharge	1	Unplanned industrialisation	
		Domestic and Biomedical Waste Discharge	1	Poor sewage management	
		Mining for sand and gravel	2	Excessive construction work	
		Pollution	1	Human interference	
		Encroachment	1	Greed for land, settlements on river tawi banks	
		Degradation of catchment areas	2	Human pressure	
		Non-functional STPs	1	Unplanned sewage management	
		Overextraction of water	2	Urbanisation	
3	Canals (Ranbir Canal)	Industrial Waste Discharge	1	Unplanned industrialisation	
		Domestic and Biomedical Waste Discharge	1	Unplanned sewage management and network, poor development of basic infrastructure in colonies	
		Mining	5		
		Pollution	2	Urbanisation	
		Encroachment	3	Overpopulation	
4	Ponds	Effluent discharge	1	Human activities	
		Siltation	2	Encroachment	
		Encroachment	2	Overpopulation	
		Landfilling	3	Unplanned urbanisation and encroachment	
		Lack of awareness on cultural values of ponds	4	Superstitions	
		Solid waste discharge	3	Urbanisation	
5	Agriculture	Demand for land by real estate	1	Urbanisation	
		Indiscriminate use of chemicals	1	Higher productivity, yields	
		Population growth	1	Urbanisation	
		Land use change	1	Construction	
		Depletion of ground water	2	Overexploitation, unplanned sewage discharge into ground	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
		Monkey menace	3	Urbanisation, encroachment of forest land	
		Increase in pests	3	Decrease in production	
6	Sacred groves	Dumping of waste	4	Urbanisation, annual mela	
		Lack of awareness on cultural and heritage values	2	Human interference	
		Extinction of tree species	4	Human interference	
		Population growth	3	Urbanisation	
7	Hills	Road construction	2	Urbanisation	
		Landslides	3	Unplanned urbanisation, road networks	
		Tree Felling	2	Diversion of forest land	
		Gravel mining	4	Urbanisation	
8	Parks and Gardens (Botanical Garden)	Dumping of waste	1	Human interference	
		Decline in rainfall	3	Climate change	
		Lack of trained human resources for management	3	No maintenance of parks	
9	Khandi belts	Landuse change	3	Urbanisation	
		Overgrazing	3	Non availability of grazing areas, increase in invasive species	
10	Khads	Uncontrolled mining	1	Urbanisation	
		Overgrazing	3	Non availability of grazing areas	
1	Forests	Diversion of Forestland	3	Construction of roads, electricity towers and institutional acquisition for use by other departments	III
		Forest Fires	4	Very rarely seen in the municipal limits	
		Habitat Fragmentation	3	Construction of roads	
		Encroachment	3	Establishment of unauthorised colonies/scattered habitation	
		Influx of migrants	2	Migration is a continuous process for want of employment/ education	
		Urbanisation	2	Due to increase in population and infrastructure development	
		Climate Change	2	Poor AQI, increase in average temperature, delay in rains/ scanty rainfall/ emission by industries and transport	
		Deforestation	3	Consequence of rapid urbanisation and above mentioned parameters	
		Increase in invasive species	2	Manifestation of Lantana, Congress Grass	
		Pollution	3	Industrial and vehicular pollution deteriorating AQI	
		Issues related to Forest Rights Act for Tribals	0	FAR is still to be implemented fully	
		Irresponsible tourism	5		

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
2	River (Tawi)	Industrial Waste Discharge	2	Lack of treatment of industrial effluents	
		Domestic and Biomedical Waste Discharge	3	Polythene and city waste	
		Mining for sand and gravel	4		
		Pollution	3		
		Encroachment	4		
		Degradation of catchment areas	4		
		Non functional STPs	2	Very less functional	
		Overextraction of water	3		
3	Canals (Ranbir Canal)	Industrial Waste Discharge	4	Every factory discharges somewhere	
		Domestic and Biomedical Waste Discharge	2	From nursing homes/hospitals and domestic waste	
		Mining	5	Not prevalent	
		Pollution	2	Polythene menace	
		Encroachment	4	Very rarely seen	
4	Ponds	Effluent discharge	2		
		Siltation	2		
		Encroachment	2		
		Landfilling	2		
		Lack of awareness on cultural values of ponds	2		
		Solid waste discharge	2		
5	Agriculture	Demand for land by real estate	3	Flats coming up	
		Indiscriminate use of chemicals	3	For higher yields and pesticides use to meet increase in demand	
		Population growth	2	Increased demand for food	
		Land use change	3	Construction	
		Depletion of ground water	1	Water table receding	
		Monkey menace	1	Big problem in and around Jammu city	
		Increase in pests	3	More chemicals and pesticides being used	
6	Sacred groves	Dumping of waste	5	Religious beliefs are attached and people worship	
		Lack of awareness on cultural and heritage values	5		
		Extinction of tree species	4	Number is decreasing due to construction of roads etc	
		Population growth	3	Evident from urbanisation	
7	Hills	Road construction	0	Jammu is a plain area	
		Landslides	0	Jammu is a plain area	
		Tree Felling	0	Jammu is a plain area	
		Gravel mining	0	Jammu is a plain area	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
8	Parks and Gardens (Botanical Garden)	Dumping of waste	4	Noticeable somewhere like polythenes etc	
		Decline in rainfall	3	Noticeable everywhere	
		Lack of trained human resources for management	2	Very few trained manpower is seen	
9	Kandi belts	Landuse change	3	Construction etc	
		Overgrazing	2	Graziers from nearby villages comes	
10	Khads	Uncontrolled mining	2	Unauthorised extraction of Bajri etc	
		Overgrazing	2	Graziers of nearby places come with cattle	
1	Forests	Diversion of Forestland	4	Encroachment, erosion, development	**IV**
		Forest Fires	5	Hardly there is any fires incident	
		Habitat Fragmentation	4	It is rare. Takes place only due to construction of roads	
		Encroachment	3	Encroachments must be checked.	
		Influx of migrants	3	Not a serious problem	
		Urbanisation	3	Taking place due to job opportunities; respite from cold weather	
		Climate Change	4	Due to increase in population	
		Deforestation	3		
		Increase in invasive species	2	Increase in species like Lantana, Parthenium etc	
		Pollution	2	Increase in number of vehicles, air conditioners and other gadgets that emit carbon-di-oxide and heat	
		Issues related to Forest Rights Act for Tribals	4	FRS has not been implemented much.	
		Irresponsible tourism	4	No such degradation taking place	
2	River (Tawi)	Industrial Waste Discharge	4	No such industry which pollutes the River Tawi	
		Domestic and Biomedical Waste Discharge	3	This is a serious problem. All effluents and drains flow into the river	
		Mining for sand and gravel	4	Due to Hon'ble High Court stay, sand and gravel extraction not taking place now. Otherwise also they pick the accumulated material and are not allowed to dig deep	
		Pollution	2	Pollution is there	
		Encroachment	2	It is there in the peripheral area	
		Degradation of catchment areas	4	No such serious problem due to controlled extraction	
		Non functional STPs	3	They are few in numbers	
		Overextraction of water	2	Problem is there	
3	Canals (Ranbir Canal)	Industrial Waste Discharge	2		
		Domestic and Biomedical Waste Discharge	4		
		Mining	3		
		Pollution	3		
		Encroachment	3		

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
4	Ponds	Effluent discharge	2		
		Siltation	2		
		Encroachment	1		
		Landfilling	1		
		Lack of awareness on cultural values of ponds	1		
		Solid waste discharge	1		
5	Agriculture	Demand for land by real estate	1		
		Indiscriminate use of chemicals	2		
		Population growth	2		
		Land use change	1		
		Depletion of ground water	1		
		Monkey menace	2		
		Increase in pests	1		
6	Sacred groves	Dumping of waste	5		
		Lack of awareness on cultural and heritage values	1		
		Extinction of tree species	4		
		Population growth	3		
7	Hills	Road construction	3	Though it takes place, it is done after the approval of the Forest Department	
		Landslides	3		
		Tree Felling	4		
		Gravel mining	3	Controlled activity	
8	Parks and Gardens (Botanical Garden)	Dumping of waste	5		
		Decline in rainfall	4		
		Lack of trained human resources for management	2		
9	Kandi belts	Landuse change	2		
		Overgrazing	3		
10	Khads	Uncontrolled mining	3		
		Overgrazing	4	Not existing	
1	Forests	Diversion of Forestland	3	Urbanisation, Infrastructure increase	V
		Forest Fires	3	Dry spell, encroachment, biomass build-up	
		Habitat Fragmentation	2	Urbanisation, linear infrastructure	
		Encroachment	3	Urbanisation, migration, increase in population and land value	
		Influx of migrants	3	Urbanisation, military disturbances, climatic extreme events	
		Urbanisation	2	military disturbances, climatic extreme events	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
		Climate Change	3	Urbanisation, GHGs, industrialisation, pollution	
		Deforestation	3	Diversion	
		Increase in invasive species	2	Invasion of unwanted weeds	
		Pollution	2	Industrialisation, population growth, urbanisation, population, transport	
		Issues related to Forest Rights Act for Tribals	3	Rights not settled	
		Irresponsible tourism	3	Plastic waste, noise pollution	
2	River (Tawi)	Industrial Waste Discharge	3	Indirect disposal into smaller nullahs	
		Domestic and Biomedical Waste Discharge	3	Indirect disposal	
		Mining for sand and gravel	2	Unregulated mining	
		Pollution	3	Household waste discharged into streets	
		Encroachment	3		
		Degradation of catchment areas	3	Developmental activities, erosion, encroachment on water bodies	
		Non functional STPs	3		
		Overextraction of water	3		
3	Canals (Ranbir Canal)	Industrial Waste Discharge	4		
		Domestic and Biomedical Waste Discharge	3	Disposal of household waste, puja waste	
		Mining	4		
		Pollution	2	Household waste, leakage from sewage	
		Encroachment	3	Land mafia, locals	
4	Ponds	Effluent discharge	3	Uncheck household discharge	
		Siltation	3	Discharge from local drains	
		Encroachment	2	Land mafia locals	
		Landfilling	2	Rising land rates, land mafia	
		Lack of awareness on cultural values of ponds	2	Lower dependence on ponds in urban areas	
		Solid waste discharge	2	Lack of civic planning in areas around ponds	
5	Agriculture	Demand for land by real estate	2	Rising price of land, overpopulation, migration from rural to urban areas	
		Indiscriminate use of chemicals	2		
		Population growth	2	Dense cluster formation in urban areas	
		Land use change	2	Residential colonies increasing, infrastructure development	
		Depletion of ground water	2	Drying up of wells and aquifers	
		Monkey menace	3	Changes in crop choices and patterns	
		Increase in pests	3		

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status*	Indicators	Group
6	Sacred groves	Dumping of waste	3		
		Lack of awareness on cultural and heritage values	3	New generation needs to be educated on their cultural heritage, losing touch	
		Extinction of tree species	3	Deforestation	
		Population growth	2	Urbanisation	
7	Hills	Road construction	2	Construction of NH, approach roads to all house	
		Landslides	3	Deforestation	
		Tree Felling	3	Infrastructure development	
		Gravel mining	3	Construction and infrastructure development	
8	Parks and Gardens (Botanical Garden)	Dumping of waste	4		
		Decline in rainfall		Deforestation	
		Lack of trained human resources for management	3	No maintenance of no budget to train HR	
9	Kandi belts	Landuse change	3	Increasing population, infrastructure	
		Overgrazing	3	nomads	
10	Khads	Uncontrolled mining	2	Uncontrolled mining, construction, industry demands, overpopulation	
		Overgrazing	2	Nomads	

Exercise 3: Goals and Key Actions

Dr. Sen finally explained to participants that for this exercise, the goals needed to align with the identified focus areas. They are the "heart & soul" of the strategy as they give content to the Vision & Focus Areas. These are well-defined targeted statements that give clarity & direction being S.M.A.R.T (Specific, Measurable, Achievable, Realistic and Time-bound). They encompass a clearly defined outcome & deadline and form the basis for measuring progress & performance. She asked participants to develop between 2 – 4 goals per Focus Area along with actions that could achieve the goal. Each group was given two focus areas and asked to come up with goals and actions for these areas as detailed in Table 4.

Table 4: Summary of responses for Exercise 3

Group	Focus Area	Goals	Key actions	Responsibility	Time Frame
I	Forests	Improvement of tree density in forests	Plantations Nurseries	Forest Department	>5 years
		Conservation of land	Blanket ban on encroachments No permission for diversion of forest land	Revenue Department	>5 years
		Maintain biodiversity	Encourage plantation of indigenous species	JMC	>5 years
	River Tawi	Improving health of catchment	Recharging of river by protection of catchment areas Revival of springs	Forest Department	Long term
			Ban on river bed mineral extraction	Mining Department	5 years
		Improvement of water quality	Control of affluents from city sources Treatment of affluents at source	UEED; SMART City Development Cooperation	3 years

Group	Focus Area	Goals	Key actions	Responsibility	Time Frame
II	Canals	Restoration of Canals	Removal of encroachments Ban on industrial development around canal Greening of embankments	JMC, Irrigation Department, DFO, PCB, Urban Forestry Division	3 years
		Pollution free canals	Prevention of industrial and domestic waste disposal into canal Laying of sewage network along canals Treatment of sewerage Capacity building of staff	JMC, Pollution Control Committee, Irrigation Department, NGOs	1.5- 3 years Continuous
	Ponds	Rejuvenation of ponds	Removal of encroachments Desilting Protection of catchment area	JMC, Forest Department JMC Soil and water conservation Department, JMC, Revenue Department, Forest Department	1-3 years
		Maintenance of ponds	Fencing and plantation around ponds Regular sanitation drives Prevention of domestic and industrial waste disposal	JMC, Forest Department JMC education, institutions, NGOs, Pollution Control C	2-3 years Continuous
III	Agriculture	Establishment of a kitchen, herbal, terrace, vertical garden	Creation of awareness and imparting trainings Establishment of nurseries Space to be reserved for respective gardens as per feasibility while passing of home plans, conditions to be kept in the bye laws Managing monkey menace	JMC, Agriculture and Horticulture Department, Floriculture Department , IIIM Agriculture and Horticulture Dept, Floriculture Dept., IIIM, Private sector JMC Wildlife Department., JMC	Continuous
		Promoting organic farming	Conversion of kitchen waste into organic manure through composting techniques Use of cattle dung as organic manure	Agriculture and Horticulture Department, Floriculture Department , JMC Animal husbandry Dept./ Agriculture Dept, JMC	Continuous
		Promotion of herbal, medicinal, aromatic gardens in educational institutions, industries etc.	Holding awareness camps and trainings Establishment of nurseries	Education Dept., Forest Dept., IIM, Agriculture, Horticulture and Floriculture Dept., JMC	Continuous
		Establishment of new high-tech vegetable mandis and upgradation of existing mandis	Online marketing and sale through web portal Proper sanitary practices around mandis Organic waste composting on site	JMC, Horticulture Department, IT Department, MBA colleges/ NGOs	Continuous

Group	Focus Area	Goals	Key actions	Responsibility	Time Frame
	Sacred groves	Protection of existing sacred groves	Awareness and publicity Prevention of encroachment in areas around sacred groves	JMC, IT Department., Ayush, NGOs, JMC	Continuous
		Establishment of new sacred groves in shrines and religious places, around traditional ponds, especially Amrit sarovars	Establishment of nurseries Distribution of plants Plantation drives	NGOs, Ayush, Forest Department., IIIM, Social Forestry Division, Urban Forestry Division, NGOs	Continuous
IV	Hills	Watershed Management	Catchment area treatment Gully Plugging- DRSM, Gabions, check dam Landslide treatment- engineering structures, soil stabilization, slope moderation, soil binding measures	Forest Department, Soil conservation Department	10 years
		Increase in green cover	Afforestation and wildlife management Awareness, identification of key target areas, selection of suitable species and sites for plantation, habitat enrichment	Forest Department, J&K Biodiversity Council	10 years
	Parks and Gardens	Waste management in existing parks and gardens	Segregation of waste Composting of organic waste Setting up of waste treatment plants Reduce, Reuse, Recycle campaigns Landfill remediation	Gardens, parks and floriculture Departments , JMC, Smart City Development Corporation	10 years
		Theme-based parks	Identification of themes- butterfly, bird, vertical gardens, botanical gardens Identification of new sites for parks and greening activities Involving of household		
V	Kandi Belt	Providing perennial source of water	Channel water towards kandi areas by creation of kuls	Irrigation and flood control Department	5 years
		Protection of forest and vegetation cover	Awareness programmes targeting locals	Forest Department., RDPR, BMC	2 years
		Protecting landscapes from encroachment	Demarcation of boundaries after mapping the same Removal of encroachments	Forest Department., Revenue Department	5 years
		Improving agricultural production	Providing adequate and continuous source of irrigation Supply improved varieties of agricultural crops Awareness programmes	Agriculture Department	5 years
	Khad	Protection from encroachments	Demarcation and erection of boundary pillars	Forest Department, Revenue Department Panchayti Raj Department	5 years
		Control of soil erosion	Construction of check dams	Soil and water conservation Department	5 years
		Protection of flora and fauna	Greening	Forest Department	Continuous

Some further discussions not recorded in the exercise sheets including developing niches for both macro and micro fauna in the city such as through butterfly or pollinator gardens. The illustrated natural asset map was also discussed and participants wanted the large hoardings of the map to be put up in high footfall areas like train stations, markets, etc. Promoting terrace gardening, kitchen gardens, recruiting locals to map important ecosystems as a means to manage and update information, encouraging commercial institutions to improve their greenery were also suggested.

Valedictory Session

In the valedictory session, the Member Secretary, J&K Biodiversity Council gave his closing remarks, thanking participants for their support.

Annexure 1: Workshop Agenda

Development of City Biodiversity Index and
Local Biodiversity Strategy and Action Plan for Jammu

Date: 15th November 2022

Venue: Udhyog Bhawan, Jammu

Program Schedule

Time	Item
09:30 – 10:00	**Registration**
10:00 – 10:05	**Welcome** Mr. Asaf Mehmood Sagar, Member Secretary, J & K Biodiversity Council
10:05 – 10:10	**Introductory Remarks** Dr. Mohit Gera, PCCF and HoFF, J& K Forest Department and Chairman, J & K Biodiversity Council
10:10 – 10:15	**Work done so far** Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI South Asia
10:15 – 10:30	**Special Address** Mr. Sanjeev Verma, IAS, Commissioner Secretary of the Department of Forests, Ecology and Environment, Government of Union Territory of Jammu and Kashmir
10:30 – 11:00	**Coffee Break**
11:00 – 12:00	**Exercise 1: Focus Areas and Drivers impacting the health status of the various ecosystems in Jammu**
12:00 – 13:30	**Exercise 2: Defining Goals and Key Actions for Jammu's LBSAP**
13:30 – 14:00	**Lunch break**
14:00 – 14:45	**Exercise 3: Developing the Vision Statement for Jammu's LBSAP**
14:45 – 15:15	**Reporting back from groups and synthesis**
15:15 – 15:45	**Coffee Break**
15:45 – 16:00	**Discussion on results, synthesis and way forward**

Annexure 2: Participant List

INTERNATIONAL CLIMATE INITIATIVE

INTERACT-Bio Integrated action on biodiversity

INTERACT-Bio: Integrated sub-national action for Biodiversity- Supporting Implementation of National Biodiversity Strategy and Action Plan (NBSAP)

Development of Local Biodiversity Strategy and Action Plan for Jammu

Date: 15th November 2022 | Meeting Hall, Udyog Bhawan, Jammu

Registration Sheet

S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
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