Prepared under

INTERACT-Bio
Integrated action on biodiversity

LOCAL BIODIVERSITY STRATEGY AND ACTION PLAN FOR SRINAGAR MUNICIPAL CORPORATION

Funding Support

Supported by:

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

based on a decision of the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

Supported in India by

सत्यमेव जयते

Ministry of Environment, Forest and Climate Change
Government of India

Project Implemented in India by

ICLEI
Local Governments for Sustainability
SOUTH ASIA

Prepared Under the BMU Supported INTERACT-Bio Project
INTERACT-Bio is implemented by ICLEI – Local Governments for Sustainability and supported by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) through the International Climate Initiative (IKI).

Year of Publishing: 2023

Suggested Citation
ICLEI South Asia. (2023). Local Biodiversity Strategy and Action Plan for Srinagar Municipal Corporation. Prepared under the BMUV supported INTERACT-Bio project.

Prepared by: Rithika Fernandes, Alex C J, Vishakha Panwar and Monalisa Sen

Design: Sasi Madambi

Contact
ICLEI - Local Governments for Sustainability, South Asia
C-3 Lower Ground Floor, Green Park Extension, New Delhi - 110 016, India
Tel: +91-11-4974 7200; Email: iclei-southasia@iclei.org

Acknowledgement

The authors would like to express their gratitude to Mr. Junaid Azim Mattu, Hon'ble Mayor, Dr. Mohit Gera, PCCF and HoFF, J&K Forest Department and Chairman, J&K Biodiversity Council and Mr. Asaf M. Sagar, Member Secretary J&K Biodiversity Council for the support and guidance extended for this work.

We would also like to thank Mr. Athar Aamir Khan, IAS, Commissioner, Srinagar Municipal Corporation and Mr. T. Rabikumar, Addl. PCCF, Kashmir for their constant encouragement. We would also like to thank Mr. Lateef Ahmad Bhat, DFO Research Forest Division, Srinagar, Mr. Sanjay Gupta, ACF, J&K Biodiversity Council for their support.

The support extended by all the officials of the J&K Biodiversity Council is also acknowledged. 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.

Message - Mayor, Srinagar Municipal Corporation

Srinagar is the fastest growing city in Jammu and Kashmir, Located in the heart of Kashmir, it is well known for its beautiful gardens, forests, water bodies and green mountains. However, our city faces several serious threats caused by growing urbanization, shrinking wetlands, and threatened habitats and biodiversity. Handling such a multitude of problems requires a well-planned strategy and actions that will guide us towards a more sustainable form of development and lifestyle. It is high time that we rise to the occasion, keeping in view the growing climate change risks that the world is now focusing on, and which threaten Srinagar too. To this end, the city has taken a landmark step forward and developed its Local Biodiversity Strategy and action Plan (LBSAP), which will give its biodiversity conservation strategies a solid base to take off from and to make a lasting impact.

For this, I extend my thanks to J&K Biodiversity Council and ICLEI - Local Governments for Sustainability, South Asia for their efforts made to develop the LBSAP and congratulate all those who were involved in the project for bringing out this document.

I take this opportunity to thank the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), through the IKI as well. I am happy to present the LBSAP of Srinagar City.

Junaid Azim Mattu

Junaid Azim Mattu
Hon'ble Mayor, Srinagar

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

Srinagar Smart City characterized by network of gardens, lakes, wetlands and beautiful surroundings is the largest city in the Union Territory of Jammu & Kashmir. Located on the banks of river Jhelum and surrounded by the Himalayan Mountain Ranges, its picturesque landscape serves as a habitat to a variety of flora and fauna. The water bodies besides acting as a buffer against floods provide habitat for the aquatic flora and variety of migratory birds that throng these water bodies during the winter.

The Local Biodiversity Strategy & Action Plan (LBSAP) prepared for Srinagar Smart City aims at conservation of the rich natural heritage and better planning of the city in line with actions required for conservation of biodiversity. The LBSAP for Srinagar Smart City envisions a developmental path where conservation and sustainable use of biodiversity forms an integral part of urban planning. The goals and focus areas prioritized in LBSAP for Srinagar would certainly orient the management and governance towards preservation of critical habitats.

I am hopeful the City Administration and the implementation agencies responsible for the development of Srinagar Smart City will benefit from the recommendations suggested in LBSAP and provide them with a framework for preparing action programmers at the local level for conservation and sustainable use of the rich biodiversity.

I take this opportunity to compliment the J&K Biodiversity Council for pioneering effort in developing the LBSAP for Srinagar and thank ICLEI- Local Governments for sustainability, South Asia for the preparation of this important document 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

Biodiversity doesn't just exist in rural and forest landscapes but also in cities. Some cities have been developed in biodiversity rich areas and Srinagar is one of them. Hence, mainstreaming of biodiversity conservation is essential to maintain health of this world-famous city of lakes and gardens. In this backdrop, the preparation of Local Biodiversity Strategy & Action Plan (LBSAP) for Srinagar city assumes great significance.

LBSAP suggests actions and measures to address the local biodiversity concerns while planning of various developmental works within the smart city. The document articulates vision, goals, guiding principles and tools to implement LBSAP. These measures also aim to ensure that ecologically sensitive areas are well preserved for sustaining the benefits of biodiversity in the form of ecosystem services such as mitigation of air pollution and moderation of temperature.

I am hopeful that the document will act as a ready reckoner for the planners and city administrators and ensure conservation of biodiversity at the micro level and focus on key areas that need attention during planning and implementation of various development works.

I am confident that LBSAP of Srinagar Smart City will support conservation of biodiversity of this city of lakes and gardens and make is one of the most livable city in the world. I take this opportunity to thank the Hon'ble Mayor, Srinagar Municipal Corporation and Commissioner SMC for providing the support to J&K Biodiversity Council in formulation of LBSAP. I also thank other line departments/agencies for their support and ICLEI- Local Governments for sustainability, South Asia for developing the LBSAP for Srinagar through the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMUV) supported INTERACT-Bio project.

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
BMC	Biodiversity Management Committee
BMUV	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit
BSAP	Biodiversity Strategy and Action Plan
CBD	Convention on Biological Diversity
CBI	City Biodiversity Index
CCA	Community Conserved Area
COP	Conference of Parties
CRPF	Central Reserve Police Force
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
DEERS	Department of Environment, Ecology and Remote Sensing
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPA	Environment Protection Act, 1986
GAD	General Administration Department
GBF	Global Biodiversity Framework
GEF	Global Environment Facility
GIS	Geographic Information System
ICLEI	International Council for Local Environmental Initiatives
I&FC	Irrigation and Flood Control Department
IUCN	International Union for Conservation of Nature
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
J&K FRI	Jammu and Kashmir Forest Research Institute
KVK	Krishi Vigyan Kendra
LCMA	Lake Conservation and Management Authority
LBSAP	Local Biodiversity Strategy and Action Plan

LCMA	Jammu and Kashmir Lake Conservation Management Authority
MoEF	Ministry of Environment and Forests
MoEFCC	Ministry of Environment, Forests and Climate Change
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
PCCF	Principal Chief Conservator of Forests
PRI	Panchayati Raj Institution
PW (R&B)	Public Works (Road and Bridges) Department
RWA	Residents Welfare Association
SBSAP	State Biodiversity Strategy and Action Plan
SDA	Srinagar Development Authority
SFM	Sustainable Forest Management
SFRI	State Forest Research Institute
SG	Sacred Grove
SKUSAT	Sher-e-Kashmir University of Agriculture Sciences and Technology
SMC	Srinagar Municipal Corporation
SMR	Srinagar Metropolitan Region
SSCL	Srinagar Smart City Limited
STP	Sewage Treatment Plant
TEEB	The Economics of Ecosystems and Biodiversity
UEED	Urban Environmental Engineering Department
UT	Union Territory
VLC	Village Local Communities

Executive Summary

The Local Biodiversity Strategy and Action Plan (LBSAP) for the City of Srinagar 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 (Srinagar 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 Srinagar 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 Srinagar. The third chapter deals with biodiversity of Srinagar 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 Srinagar.

Srinagar is the largest city in the Union Territory of Jammu and Kashmir and is a popular tourist destination. 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 Srinagar 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 ' Srinagar city envisions a developmental path where conservation and sustainable use of historically, culturally and naturally rich biodiversity and ecosystems form an integral part of urban policy, planning and action for a prosperous, inclusive, equitable, resilient outcome'. 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. It is more specific in terms of actions and deadlines when compared with the 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 Srinagar.

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 major ecosystems (Focus Areas) within the city were identified and the current health status of those ecosystems was discussed and ranked as Very Good, Good, Moderate, Poor, and 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.

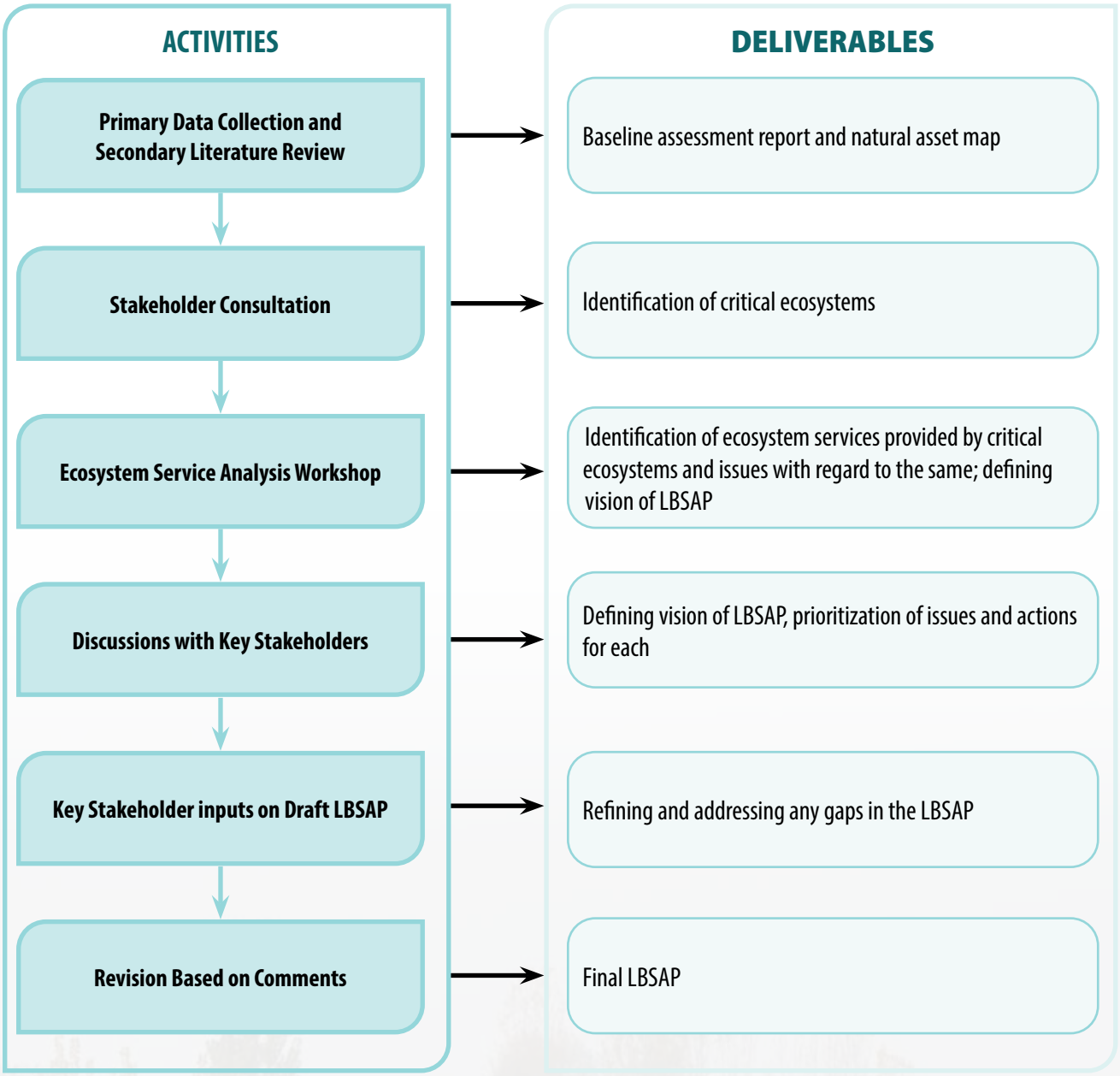

Figure 1: LBSAP development process

1.4. Format of LBSAP

The LBSAP of Srinagar is divided into six chapters. The introductory chapter provides a background to the LBSAP, scope and objectives, methodology used, and format of the LBSAP. The second chapter discusses the city profile of Srinagar. The third chapter deals with the biodiversity profile of the city of Srinagar. 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 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 Srinagar.

2. Srinagar City Profile

The city of Srinagar is the summer capital of the Indian-administered union territory (UT) of Jammu and Kashmir (Housing & Urban Development Department, 2017b). Srinagar is also the largest city in the UT, encompassing an area of 246 sq. km. The city lies in between latitudes 33°59'14" N and 34°12'37" N and longitudes 74°41'06" E and 74°57'27" E (Amin & Singh, 2012), located on the banks of River Jhelum, locally known as Vyath, which also serves as a tributary to River Indus. A number of water bodies in the form of lakes, wetland and swamps such as the Dal, Anchar, Nigeen, Khushal Sar, Gil Sar and Hokersar exist around the city region (Town Planning Organisation Kashmir, 2019). Given the presence of canals namely, the Mar Canal, Srinagar is termed as the 'Venice of the East', although this has changed due to the rapid urban development of the city.

2.1. Population

The total population of the city of Srinagar is 1,180,570 (Census of India, 2011). The number of males constituting the total city population is 618,790 while there are a total of 561,780 number of females. The average literacy rate of Srinagar city is 69.15% with the literacy rate amongst males being 75.87% and that of the females being 61.81%. The city of Srinagar forms a part of the Urban Agglomeration known as Srinagar Metropolitan Region (SMR) with an overall population of over one million. Given the high rate of urbanization, the total population in the city of Srinagar as well as Srinagar district is expected to witness an exponential growth in the coming decades (Town Planning Organisation Kashmir, 2019).

In terms of religion, Srinagar city comprises of a predominantly Muslim population (Census of India, 2011). 95.97% of the total population follows Islam, followed by Hinduism, which is practiced by approximately 2.75% of the total number of people.

Other ethnic minority groups include Sikhs (0.92%), Christians (0.21%), Buddhists (0.02%) and Jains (0.01%). In particular, Kashmiri Pandits largely constitute the Hindu population residing in the city of Srinagar.

Box 1: Srinagar Municipal Corporation Vital Statistics

Area

246 km^2

Population

1,180,570 people (Census 2011)

Climate

Humid continental climate is prevalent in the city of Srinagar. This type of climate is characterized by mild to hot summers and cold winters. Average summer temperature measured in Srinagar is 23.3 degree Celsius whereas average winter temperature is 3.2 degree Celsius. The city receives a mean annual precipitation of 721 mm.

Main land cover and land uses

As per a study (Amin & Fazal, 2012) the major land use/ land cover classes in Srinagar are built-up, parks/gardens and playgrounds, vacant, agriculture, plantation/orchards, forest, barren, marshy and water body. A maximum increase of 158 percent is observed in built-up area from 24.16 km2 in 1980 to 62.51 km^2 in 2010.

2.2. Environmental Context

Srinagar is the northernmost city of India. The city, nestled amidst the Kashmir valley is characterized by the prevalence of humid continental climate (Dfb), as per the Koppen climate classification (Ul & Liaqat Ali Khan, 2013). The city is situated at an altitude of 1,588 m above sea level and experiences warm summer and spring season to moderate autumn season and heavy snow during cold winters. Srinagar city records a varying range of temperature reaching 39.5°C in the month of July and dropping below the freezing point in the months of December to March (India Meteorological Department, 2016). Srinagar receives precipitation throughout the year with a mean annual rainfall of 721.8 mm.

Srinagar city is in the Kashmir valley which is surrounded by the Himalayan mountain range (Town Planning Organisation Kashmir, 2019). Over the course of millennia, the topography of the region including the city of Srinagar, was shaped by Glacial Flooding and the River Jhelum. This has further led to the formation of a complex network of natural ecosystems in the region including streams, lakes, rivers, wetlands and forests. The Jhelum, also considered as the backbone of the city's ecology, is connected to the Dal Lake. The Dal Lake outpours into Brari Numbal, Khushal Sar and Gil Sar. The outlet water from Khushal Sar and the Sindh Nallah goes into Lake Anchar. The Sindh Nallah, one of the important water bodies of the region, ultimately joins the river Jhelum. The city of Srinagar thus lies in an ecologically fragile region.

2.3. Socio-Economic and Cultural Context

Srinagar city is centrally positioned in the UT of Jammu and Kashmir (Census of India, 2011) and is the largest urban area of the region. Given the city is popular for its picturesque landscape and often referred to as the "paradise on the earth", it attracts a large number of tourists and hence, tourism industry forms the backbone of the city's economy (Srinagar Online, n.d.). Other allied businesses related to tourism such as hotels, restaurants, bakery, handloom and handicrafts significantly contribute to the local economy. Given the prevalence of old wood-carving tradition and other skill-based work associated with manufacturing and selling of goods and services including furniture, carpets, shawls and silk items in the Kashmir valley, the city of Srinagar is considered as the major commercial and transportation hub in the UT.

In addition to tourism, agriculture is the main economic activity of the local inhabitants of the city of Srinagar, also enclosing the area under Srinagar Metropolitan Region (Town Planning Organisation Kashmir, 2019). Major crops cultivated in the region comprise rice, vegetables, fruits, saffron, cereals and pulses. Agro-based industries like horticulture concerned with the production of dried fruits such as almonds and walnuts, apples, peaches and sericulture also assist in enhancing the overall economic potential of the city as well as the UT of Jammu and Kashmir. The presence of water bodies in Srinagar has also facilitated the fisheries sector, generating employment opportunities. However, the proportion of workforce in the city of Srinagar observed a minimal decadal growth of just 0.77%, depicting a stagnant economic trend (Census of India, 2011).

3. State of Srinagar's Biodiversity

Srinagar city and its adjoining areas house various kinds of green landscapes which serve as a habitat to a wide range of flora and fauna (Town Planning Organisation Kashmir, 2019). Also known as the city of gardens, Srinagar is well-admired for its Mughal Gardens namely, Nishat Bagh, Shalimar Gardens, Chashma Shahi and a botanical garden namely, Jawaharlal Nehru Memorial Botanical Garden. The ecological value of these gardens in Srinagar also contributes to the overall biodiversity in the city. In addition, abundance of water bodies in the city act as an ecological haven as well as buffers against floods, preserving the city's ecological heritage against potential damage. Wetlands, marshes and swamps in the city also provide habitat to a rich aquatic biological diversity as well as migratory birds.

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 Srinagar city. This map depicts various important bule green infrastructure within the city region. The natural assets mapped include river, marshes, forests, gardens, water bodies, plantation and cultivation area, golf courses and open green spaces (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 SMC boundary)

Land Class	Area (In ha)
Open ground	318.22
Park/ Garden	300.44
Golf course	106.79
Avenue tree cover	102.26
Paddy cultivation	4566.81
Terrace cultivation	475.68
Agricultural plantation (fruit tree)	2072.88
Agroforestry planation (Poplar dominant)	765.40
Orchard	267.06
Marshes with cultivation	262.07
Fallow	111.58
Vegetable cultivation	105.80
Marshes	630.76
Sparse vegetation	212.51
Lake	2041.88
Pond/Water body	68.65
River	584.89
Riverine vegetation / River bank	67.48
Flood Channel /Irrigation canal	111.49
Graveyard	40.04
Scrub forest	122.01
Forest / Natural vegetation	545.48
Total	**13880.19**

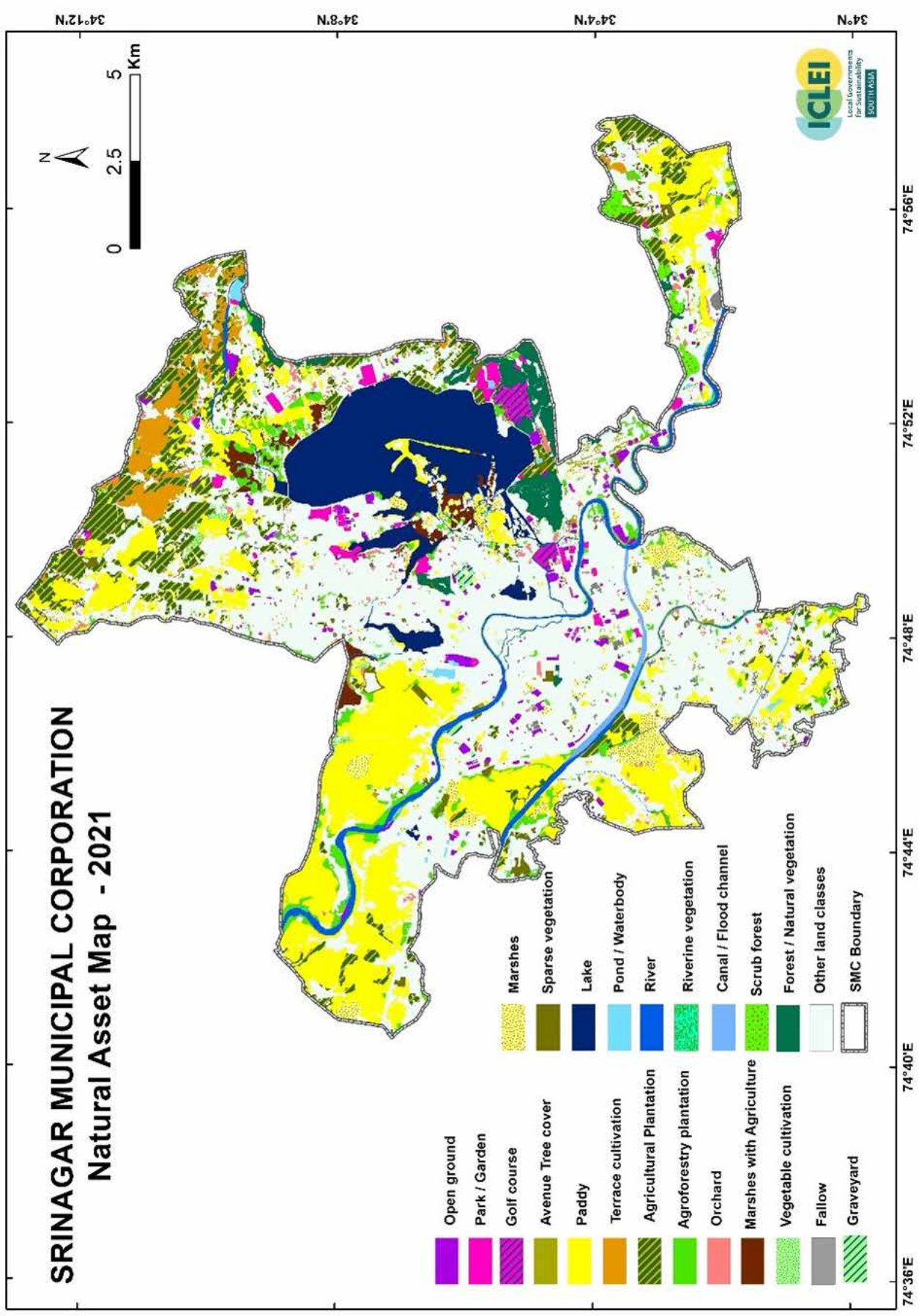

Figure 2: Natural asset map of Srinagar Municipal Corporation

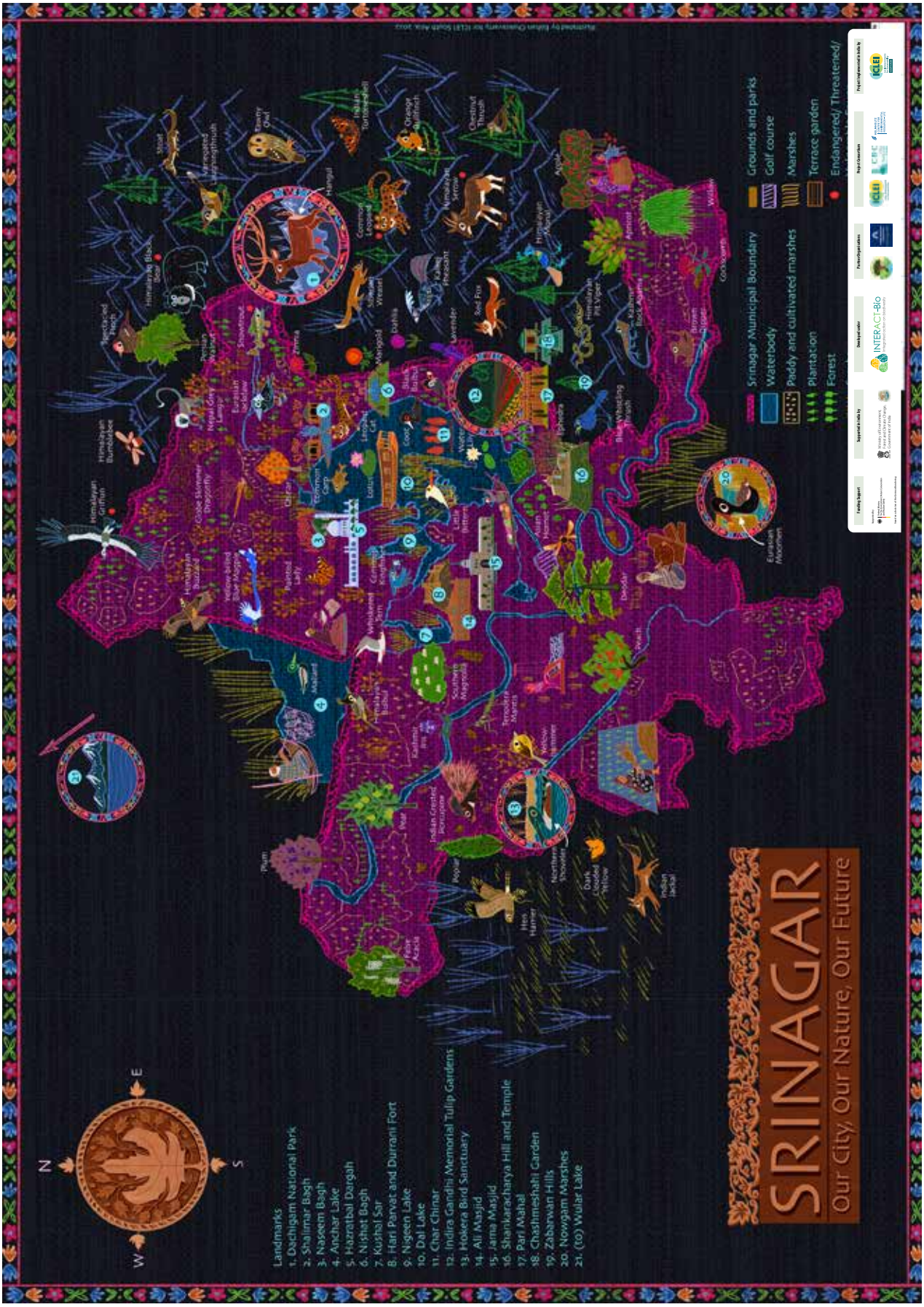

Figure 3: Illustrated Natural asset map of Srinagar Municipal Corporation

3.2. Flora

The city of Srinagar has a plethora of vegetation present as a part of its local geography at Shankaracharya and Hariparbat hills (Dutt *et al.,* 1963). Although due to uncontrolled grazing the hills have been mostly denuded, there are still a number of species of grass, herb and shrub constituted at their slopes and base. Herbaceous plants such as Iris sp., *Peganum harmala*, *Thymus serphyllum*, *Lotus corniculatus*, *Eryngium billardieri*, *Urtica dioica*, and *Herniaria hirsuta* are largely found on the Hariparbat hill whereas vegetation on the Shankaracharya hill is mainly shrubby. Shrubs including *Plectranthus rugosus*, *Rosa webbiana*, *Rubus fruticosus*, *Indigofera gerardiana* and medicinal shrub of *Zizyphus vulgaris* are commonly found in the zone. *Ailanthus altissima*, known as the tree of heaven also forms a part of the overall vegetation of the hill.

Aquatic vegetation in Dal and Nageen lakes forms a substantial proportion of flora existing in the city of Srinagar (Dutt *et al.,* 1963). Species of aquatic herbaceous plants such as *Nymphoides peltatum*, *Trapa natans* and *Sagittaria sagittifolia* dominate the floristic composition of the lakes. A number of species of water lilies have also been introduced in the lakes viz. rosy pink-coloured *Nelumbo nucifera* and *Nymphaea alba*. In addition, floating gardens and stabilized islands artificially made up of reeds are used for cultivating vegetables like sweet-corn, cucumbers, and radish.

Marshes, lagoons and swamps in and around the city limits of Srinagar including the Hokersar wetland, a Ramsar site, are covered with wet meadow herbs such as *Ranunculus aquatilis*, *Lythrum salicaria* and *Acorus calamus* (Dutt *et al.,* 1963).

Mehraj *et al.* (2018) investigated the plant specimen collections deposited in the KASH herbarium of the Centre for Biodiversity and Taxonomy, Department of Botany, University of Kashmir, Srinagar. Their investigation found that the flora of Srinagar city comprises 920 species, ten subspecies and seven varieties from 496 genera and 103 families. 669 species grow as wild, 237 species are cultivated, and 31 species grow wild as well as are cultivated in Srinagar. Overall, 98% of the species were angiosperms and 2% (19) were gymnosperms. *Asteraceae* is the largest family followed by *Poaceae* and *Fabaceae*.

Mehraj *et al.,* (2018) found that of the 325 introduced species they recorded in Srinagar, 157 species were under cultivation, while 168 species were growing in the wild (i.e., outside cultivation). The study demonstrated that alien flora of Srinagar comprises 10 invasive, 12 naturalised, 8 casual, 4 cultivated plant species. Muzafar *et al.,* (2018) recorded 108 introduced species growing along Srinagar roadsides of which 24 were invasive, 44 naturalized, 12 casual and 23 cultivated. Mehraj *et al.,* (2021) documented 342 plant species from the green spaces of Srinagar, predominantly represented by 245 introduced species of which 133 species are exclusively under cultivation (non-escapes) and 112 species grow in the wild (cultivation escapes and accidentally introduced species). Among these 112 species 51 were naturalised, 39 casual and 22 invasive. Through the Srinagar City Biodiversity Index (CBI), a total of 357 native vascular plants and 467 introduced alien species were recorded (ICLEI South Asia).

3.3. Fauna

Srinagar has vast reserves of natural wealth in the form of lakes, orchards and forests (Census of India, 2011). The dense forests in the region also host a wide variety of birds and animals such as in the Dachigam National Park. Although the National Park is situated outside the city limits of Srinagar, the biodiversity present there is assumed representative of Kashmir valley region including Srinagar city. The Park is an abode to over 150 species of birds and 20 species of mammals viz. Hangul (*Cervus elaphus hangul*), Himalayan brown bear (*Ursus arctos isabellinus*), Himalayan black bear (*Ursus thibetanus lanige*), Himalayan Grey Langur (*Semnopithecus ajax*), long-tailed marmot (*Marmota caudata*) and Leopard (*Panthera pardus*).

The city of Srinagar has rich avifaunal diversity (Rahul *et al.,* 2014). About 54 bird species are reported to have been found within the city's premises. Out of this, 25 species of birds were identified as residents and 29 species were found to be migrants. Some of the commonly found birds are, *Acredotheries tristis* (Common myna), *Columba livia* (Rock pigeon), *Curvus splendense* (House crow) and *Milvus migrans* (Black kite). The citizen science platform eBird, developed by the Cornell Lab of Ornithology,[2] records the presence of more than 222 birds from the city.

A number of protected areas in and around the city of Srinagar such as Dachigam National Park, Baltal (Thajwas) Wildlife Sanctuary, Khimber/ Dara/Sharazbal Conservation reserve, Brein Nishat Conservation Reserve constitute a myriad of faunal diversity (Department of Wildlife

2. https://ebird.org/home

Protection, n.d.). Other animals found in the area include *Unica unica* (snow leopard), *Felis bengalensis* (leopard cat), *Vulpes vulpes* (red fox), *Canis aureus* (golden jackal) and *Capra sibrica* (Asiatic ibex).

In a study (Ahmed *et al.,* 2017) conducted to mark the current status of fish fauna in Dal lake and Jhelum river, a total of 14 fish species were recorded. Some of the fish species abundantly found in river Jhelum are *Schizothorax esocinus* (Chhurru), *Schizothorax curvifrons* (Satter gad) and *Triplophysia kashmirensis* (AraGurun). Other species of fish found in the Dal Lake include *Carassius carassius* (Gang gad), *Botia birdi* (Rama gurun) and *Puntius Conchonius* (Rosy barb).

3.4. Agrodiversity

Local dwellers of Srinagar grow many temperate fruits and vegetables in shallow areas of surrounding lakes and wetlands in the city (Akhtar & Kirk, 2021). Different kinds of vegetables and crops are cultivated on constructed floating beds, popularly called 'floating gardens'. These floating gardens are primarily built alongside the lake shores, which are rich in soil organic content. Kohlrabi, collard greens (also known as Kashmir saag or haak), water chestnuts, lotus stems, tomatoes, carrot and cucumber are some of the vegetables grown on the floating gardens.

Owing to the temperate climatic conditions in and around the city of Srinagar, a vast expanse of fruit orchards and gardens comprising of favourable tree species is present (Dutt *et al.,* 1963). Some of them include *Platanus orientalis* (chinar), Populus alba (poplars), *Salix acmophylla* (willow), *Morus alba* (mulberry) and *Grevellia robusta* (silver oak). Other fruit trees grown in the region include *Malus sylvestris* (apple), *Pyrus communis* (pear), *Prunus avium* (cherry), *Prunus armenica* (apricot), *Prunus cerasifera* (alu-bukhara) and *Juglans regia* (walnut).

Silk farming as well as cultivation of saffron is widely practiced in Srinagar (Akhtar & Kirk, 2021). In addition, the fruit orchards in the city of Srinagar produce high quantity of apples, peaches, cherries, strawberry, pears, almonds and walnuts. A number of gardens in the city also contribute to a large production of flowers such as tulips and roses.

Owing to suitable geography and agro-climatic condition, livestock rearing and poultry farming is well-practiced in Jammu and Kashmir (Rather et al., 2020). Adding up to the agro-biodiversity of the Union Territory, farm animals found in and around the city of Srinagar include Gurezi and local Kashmiri cattle, Changthangi goat, Bakerwal and Gaddi sheep, buffalo and domestic waterfowl.

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 Srinagar. 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 (BMC) 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 was redrafted in 2018;[3] (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. Agricultural, 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 (Singh and Singh, 2016). 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: National and sub-national 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

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

Legislation / Policy / Strategy	Description
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
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	Promotes 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	Protection and improvement of 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

Legislation / Policy / Strategy	Description
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.
National Mission for Sustainable Agriculture	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 State of Jammu and Kashmir (Government of Jammu and Kashmir, n.d.-b).
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 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 State land. The Act also details out offences, penalties and procedure related to the mulberry tree. (Government of Jammu and Kashmir, 1949b).
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 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 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 State 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, 1949a).
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 State 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 State 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 State 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	
Building Regulations and Bye-Laws (Kashmir Division), 2010	The building bye-laws of Srinagar shall be subject to Environmental Impact Assessment (EIA) as well as detailed project report of the areas which are ecologically vulnerable such as forests, hilly areas, lakes, rivers, etc. (Srinagar Municipal Corporation, 2010)
Srinagar 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 Srinagar Municipal Corporation (SMC) (Shah, 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 of Srinagar Municipal Corporation (Government of Jammu and Kashmir, 2000a).
Srinagar Smart City Proposal, 2017	Aims to develop the city of Srinagar into a vibrant regional tourism destination through innovative and inclusive solutions on the basis of both cultural and natural resources (Housing & Urban Development Department, 2017a). Some of the projects intended to be implemented under area-based development include revival and rejuvenation of Jhelum waterfront and Brari Nambal Lake, waterways connection to Dal Lake through building of sustainable infrastructure. Others include green infrastructure development like public parks, permeable pavements, rainwater harvesting and street plantations. The document further enlists a number of strategic directions, planning interventions and identified projects meant to fulfil the objective of creating Srinagar as a 'Smart city'.

4.4. Institutional Environment in Srinagar

Srinagar Municipal Corporation (SMC): In general, the Municipal Corporations in India are assigned a diverse range of functions including urban forestry, sanitation, planning and development. However, given maximum civic functions are discharged by the Government of Jammu and Kashmir, the SMC is allocated limited duties of sewerage and drainage, water works, street lighting and revenue.

Srinagar Development Authority (SDA): The Authority is responsible for the preparation and implementation of Master Plan for robust physical and social infrastructure development in the SMR including the city of Srinagar. The Master Plan also takes into cognizance the conservation of local ecology and environment, natural features such as River Jhelum, Hokersar wetland, city forests and gardens.

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 Srinagar circle of Kashmir region, the department is responsible for the management of forests falling under the jurisdiction of city of Srinagar.

Floriculture, Gardens and Parks Department: This department which comes under the jurisdiction of the Government of Jammu and Kashmir is responsible for the management of parks and gardens in the city of Srinagar. Parks and gardens such as Tulip Garden, Shalimar Garden and Bagh-e-Bahu are maintained by the department.

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.

J&K Lake Conservation Management Authority (LCMA): Created as an autonomous body under the Development Act, 1970 AD vide Government order No.117 of HUD dated 11.04.1997 by the J&K Government, the Authority serves the main agency that manages and conserve the waterbodies and Waterways of the UT of J&K. In Srinagar specifically, the Authority is responsible for the Dal and Nigeen Lakes.

Srinagar Smart City Limited (SSCL): This city agency aims to transform the city of Srinagar into an environment-friendly, resilient and vibrant city through conservation of its natural and cultural heritage/tourism. Some of the green projects proposed by SSCL include green space development underneath flyovers, development of green spaces in Bemina region and River Jhelum waterfront development in the city of Srinagar.

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 & 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 Forest and Climate Change, 2014).

The NBAP Addendum primarily comprises of 12 National Biodiversity Targets (NBTs) 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. 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 state. An analysis of the factors causing degradation of biodiversity in the State 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, NGOs and the general public to support its proper implementation.

5. Vision and Guiding Principles for LBSAP of Srinagar

This section encompasses the overarching vision, as well as guiding principles and objectives to achieve the vision. The overarching strategy for a LBSAP consists of a 'Vision' and clearly defined 'Focus Areas'. The Vision is a short descriptive statement of the desired future state of biodiversity within the local municipal corporation. 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.

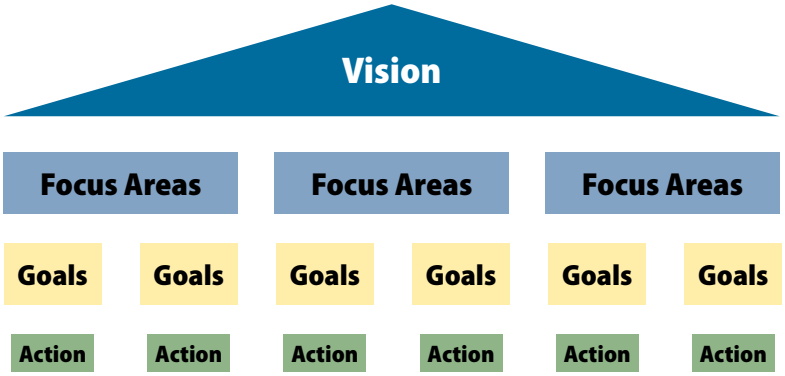

Figure 4: Key elements of a Strategy and Action Plan

5.1. Vision

The Vision of the LBSAP of Srinagar is provided below:

Vision of Srinagar City for LBSAP

"Srinagar city envisions a developmental path where conservation and sustainable use of historically, culturally and naturally rich biodiversity and ecosystems form an integral part of urban policy, planning and action for a prosperous, inclusive, equitable, resilient outcome."

5.2. Guiding Principles

The guiding principles for achieving the vision are:

1. The growth of the city will follow the path of sustainable development
2. Natural resources and ecosystems will be at the epicentre of this path given their significance historically and culturally
3. Legislation and planning will ensure this outcome through innovation, action and participation
4. The principles of equitability and inclusivity will guide the city along it's path of sustainable development ensuring all its citizens have access to prosperity and good quality of life

5.3. Focus Areas

LBSAP Focus Areas are intended to be planned, deliberated and focused efforts that are 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 to create a common sense of purpose. The eight Focus Areas for the LBSAP of Srinagar are outlined 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 is 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: Srinagar LBSAP Focus Areas

Sl. No.	Focus Areas
1	Wetlands (Dal, Anchar, Nigeen, Gilsar, Khushlasar, Hokersar, Shallabagh)
2	Forests (City Forests, Dara catchment, Shankaracharya hills, Hariparbat and Zabarwan)
3	Gardens and Parks (Mughal Gardens, Tulip Garden, Harwan, Iqbal park, Pratap park, Chinar bagh, Chashmashahi garden, Pari Mahal, Badam wari)
4	Horticulture (Orchards) and Agriculture
5	Roadside/Avenue Plantation (Block and Linear)
6	Open Grounds
7	Rivers/streams (Jhelum) and Irrigation Canals
8	Grassland/Pastureland

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 26 goals for the Srinagar LBSAP under 8 focus areas, along with guiding notes to provide further context for the selected goals, are outlined below:

Biodiversity Goals	
Focus Area 1: Wetlands	**Goal 1.1:** Protect City Wetlands **Guiding Notes:** This is aimed at: 1. Conferring local level protection mechanisms 2. Implementing the Wetland Rules of 2017 3. Action plan for individual water bodies
	Goal 1.2: Improve management of City Lakes and Preserve Ecological Services **Guiding Notes:** This is aimed at: 1. Conducting a threat analysis 2. Developing a detailed plan for the protection and conservation of the lake 3. Restoring the degraded and polluted areas of the lake 4. Connecting blue-green network 5. Improving governance mechanisms for effective management
	Goal 1.3: Improve community participation in wetland management **Guiding Notes:** This is aimed at: 1. Improving community participation and public consultation mechanisms 2. Instilling values of public ownership and an appreciation of ecosystem services of lake
Focus area 2: Forests	**Goal 2.1:** Improve Forest Cover **Guiding notes:** This goal aims at: 1. Land use change analysis 2. Identification of degraded patches of forest 3. Improving connectivity
	Goal 2.2: Reduce Wildlife-Human Conflict **Guiding notes:** This goal aims at: 1. Identifying drivers and problematic hotspots 2. Research 3. Implementing of Soft and Hard Interventions
	Goal 2.3: Strengthen Climate resilience planning for Forest Ecosystems **Guiding notes:** This goal aims at 1. Identifying Climate Risks and Vulnerability 2. Modelling 3. Development of a Climate Resilience Plan for Forests

Biodiversity Goals	
	Goal 2.4: Promote green pilgrimage practices within natural ecosystems **Guiding notes:** This goal aims at 1. Reducing human footprint within natural ecosystems 2. Increasing sensitivity towards nature 3. Improving inter-departmental coordination and developing innovative partnerships
Focus area 3: Gardens and Parks	**Goal 3.1:** Conserve ornamental genetic material **Guiding notes:** This goal aims at: 1. Preservation of the unique genetic repository of Mughal Gardens 2. Maintaining planting material and germplasm
	Goal 3.2: Improve maintenance of Parks **Guiding notes:** This goal aims at: 1. Managing tourist and local inflow 2. Improving awareness 3. Protecting and maintaining recreational services
	Goal 3.3: Increase ecological significance of Parks and Gardens **Guiding notes:** This goal aims at: 1. Exploring use of native species as ornamentals in City Parks and Gardens 2. Alternative and supporting niches/microhabitats for wildlife 3. Supporting the conservation and stewardship of land, water and natural resources
	Goal 3.4: Increase area of Parks and Gardens in line with URDPFI guidelines **Guiding notes:** This goal aims at: 1. Developing an action plan identifying suitable sites for recreational spaces 2. Innovative approaches to 'retrogreening' existing potential sites such as graveyards, institutional areas, educational areas
	Goal 3.5: Increase sustainability of Golf Courses **Guiding notes:** This goal aims at 1. Decreasing the negative impacts of Golf Courses on Biodiversity and natural ecosystems 2. Innovative greening and improving habitat mosaics

Biodiversity Goals	
Focus area 4: Orchards and Agriculture	**Goal 4.1:** Switch to a sustainable land-use pattern **Guiding notes:** This goal aims at: 1. Arresting land conversion for establishing new orchards 2. Sustainable livelihood alternatives 3. Reducing Wildlife Conflict
	Goal 4.2: Promote biodiversity-friendly practices in agricultural and horticultural areas **Guiding notes:** This goal aims at: 1. Improving biodiversity richness within agricultural areas 2. Supporting populations of pollinator and other agriculturally important organisms 3. Increasing public awareness on biodiversity-friendly practices
	Goal 4.3: Conserve land races and species of crops native to Kashmir **Guiding notes:** This goal aims at 1. Increasing area under local and endemic land races 2. Protecting endemic and local agrobiodiversity from extinction
	Goal 4.4: Promote Urban Farming **Guiding notes:** This goal aims at: 1. Increasing local food security 2. Generating awareness around urban farming and its benefits 3. Increasing local community participation
	Goal 4.5: Improve public awareness on wildlife conflict and its management **Guiding notes:** This goal aims at 1. Decreasing damage and loss of life from wildlife conflict 2. Improving public support for wildlife conservation activities 3. Improving local co-existence
Focus area 5: Roadside/Avenue Plantation	**Goal 5.1:** Increase Linear and Block Plantation **Guiding notes:** This goal aims at: 1. Greening avenues and roadsides 2. Enhancing tree plantations with relevant and native species 3. Improving green cover within private and public institutions
	Goal 5.2: Maintain and protect the existing avenue trees **Guiding notes:** This goal aims at: 1. Ensuring maintenance and proper management of the existing avenue trees

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	Goal 5.3: Developing Tree Corridors linking natural ecosystems **Guiding notes:** This goal aims at: 1. Improving connectivity between natural spaces via urban green spaces 2. Improving migration value
Focus area 6: Open Grounds	**Goal 6.1:** Augment ecological value of open grounds **Guiding notes:** This goal aims at: 1. Identifying the cultural and natural value of open spaces 2. Identifying public spaces for greening through public consultation and participation 3. Supplementing city's blue-green network
Focus area 7: Rivers/ streams (Jhelum) and Canals	**Goal 7.1:** Strengthen climate resilience through integrated water resource management **Guiding notes:** This goal aims at: 1. Identifying and mapping the catchment area 2. Identifying the threats within the catchment 3. Developing an integrated action plan for the catchment 4. Identifying convergence and partnerships for effective implementation
	Goal 7.2: Enhance the ecosystem services of River Jhelum **Guiding notes:** This goal aims at: 1. Arresting Pollution 2. Rejuvenation of the river 3. Soil conservation 4. Implementing scientifically-informed riverbank restoration actions
	Goal 7.3: Restore Srinagar 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 8: Grassland/ Pastureland	**Goal 8.1:** Protect grasslands **Guiding notes:** This goal aims at: 1. Mapping grasslands and their functions within the city 2. Identifying drivers of degradation 3. Developing local legislation for protection

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	Goal 8.2: Restore degraded grasslands **Guiding notes:** This goal aims at: 1. Analysing past land use to establish historical areas of grasslands 2. Interventions to restores patches within selected sites 3. Partnerships with local communities using grasslands to ensure sustainable use

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 Srinagar city

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Focus Area 1: Wetlands				
Goal 1.1 Protect City Wetlands	1. Development of city level policy and action plan for protection of wetlands, including legislative framework for local level protection	SMC, SSCL, SDA, LCMA, J&K Biodiversity Council, Local community, CSOs, NGOs, Kashmir Houseboat Owners Association and Academic Institutions	Two years	Medium-term
	2. Supporting J&K government in implementation of the Wetland Rules 2017	SMC, SSCL, SDA, LCMA, Department of Forest, Ecology and Environment	Continuous	Long-term
	3. Mapping all existing water bodies and identification of drivers of degradation for each individual water body	LCMA, SMC, SSCL, Local NGOs, Community members, Academic institutions, BMC, SMC, Kashmir Houseboat Owners Association	One year	Short-term
	4. Relocation of Achan dump yard away from wetland and bioremediation of the site	SMC, SSCL, SDA, NGOs, Academic Institutions, Subject Matter Experts	Five Years	Long-term
Goal 1.2 Improve management of City Lakes and Preserve Ecological Services	1. Prevention of sewage discharge in the canals through establishment of decentralised sewage treatment plants at various hotspots and exploration of other NbS such as floating wetlands	LCMA, SMC, NGOs, Local community, Academic institutions	Five years	Medium-term
	2. Development of eco-restoration package for lakes and implementation of the same	SMC, LCMA, UEED, NGOs, Academic institutions, Kashmir Houseboat Owners Association, J&K Biodiversity Council	Five years	Long term
	3. Coordinated departmental planning on Lake Management spearheaded by LCMA and SMC	SMC, SSCL, LCMA, UEED	Immediate	Short-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Goal 1.3 Improve community participation in wetland management	1. Launch citizens science app that monitors lake health through biodiversity assessments	SSCL, SMC, NGOs, J&K Biodiversity Council, BMC, LCMA	Two years	Medium-term
	2. Formation of Local Lake Protection Houseboat Association as citizen action bodies	SMC, Kashmir Houseboat Owners Association, NGOs, SDA, LCMA, LCMA, BMC	One year	Short-term
	3. IEC campaign targeting tourists on the significance of lakes	J&K Tourism Department, LCMA, NGOs, SMC, J&K Biodiversity Council, Schools	Continuous	Short-term
Focus Area 2: Forests				
Goal 2.1 Improve Forest Cover	1. Mapping degradation in the forests and identifying the hotspots of degradation	Academic Institutions, J&K Forest Department, J&K Biodiversity Council, NGOs, National Remote Sensing Centre (NRSC), Zoological Survey of India, Botanical Survey of India, Subject Matter Experts, NGOs, BMC, Local community	One year	Long-term
	2. Invasive plant species documentation and risk assessment	J&K Forest Department, J&K Biodiversity Council, J&K Forest Research Institute, Zoological Survey of India, Botanical Survey of India, Subject Matter Experts, Academic institutions, NGOs, Research Institutions	One year	Short-term
	3. Development of a restoration plan	J&K Forest Department, J&K FRI, Subject Matter Experts, Academic institutions, NGOs, BMC, SSCL	One- Two years	Medium-Long term
	4. Establishment of nurseries of local plant species	J&K Forest Department, J&K FRI, Local Universities	Five years	Medium-term
	5. Develop and maintain a database of annual taxa surveys in partnership with local universities and academic institutions	Research Institutions, NGOs, J&K FRI, J&K Biodiversity Council, SMC	Continuous	Medium-term
Goal 2.2 Reduce Wildlife-Human Conflict	1. Identify hotspots of wildlife conflict	J&K Wildlife Department, Research Institutions, Academic institutions, SMC, Local community, NGOs	Seasonal study	Short-term
	2. Warning systems in place through SMS/ whatsapp mechanisms	J&K Wildlife Department, Research Institutions, Academic Institutions, SMC, Local community, NGOs	Two Years	Short-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
	3. Mass awareness programs on proper food waste disposal, co-existing and sharing spaces with wildlife- Dos and Don'ts	Local community, Restaurant owners, Wedding halls, Caterers, J&K Widlife Department, Research Organisations, Academic institutions, SMC, NGOs	Continuous	Short-term
	4. Partnerships for waste management within wildlife conflict zones/hotspots and formulating alternative methods of waste disposal	Local community, Restaurant owners, Wedding halls, Caterers, J&K Widlife Department, Research Organisations, Academic institutions, SMC, NGOs, UEED	Continuous	Short-term
	5. Research on wildlife conflict in and around Srinagar	J&K Widlife Department, Research Institutions Academic Institutions, NGOs	Two-Three years	Medium-term
	6. Stray dog management especially around protected areas through appropriate strategies	Animal Husbandry Department, Veterinary Clinics, SMC, J&K Widlife Department, Local NGOs, Veterinary Colleges/Universities	One-three years	Short-term
Goal 2.3 Strengthen climate resilience planning for Forest Ecosystems	1. Research on the impacts of climate hazards on Srinagar's local natural ecosystems	SMC, NGOs, Academic Institutions, UEED, SSCL, LCMA	Three years	Medium-term
	2. Develop a Climate Action Plan for Srinagar City with major focus on its natural ecosystems	SMC, NGOs, Academic Organisations, UEED, DEERS, J&K Biodiversity Council, LCMA	One-Two years	Medium-Long term
	3. Identification of unique microhabitats and development of action plan for conservation of the same	DEERS, J&K Biodiversity Council, Academic Institutions, NGOs, J&K FRI	Three-Five years	Long-term
Goal 2.4 Promote green pilgrimage practices within natural ecosystems	1. Development of local guidelines for religious tourism within and around Srinagar	Religious Institutions, NGOs, Academic Institutions, Indian Armed Forces, Indian Para-Military Forces, J&K Tourism Department, LCMA, BMC, J&K Biodiversity Council, SMC, Local community (VLC), Religious (Awbaf communities)	Two years	Short-term
	2. Training programs for stakeholders and service providers	Indian Armed Forces, Indian Para-Military Forces, Hotels, Restaurants, Religious Institutions, Tourism Department, SMC, J&K Biodiversity Council, Local community (VLC), Religious (Awbaf communities)	Continuous	Short-term
	3. IEC material and appropriate signage developed around eco-sensitive areas	Religious Institutions, NGOs, Academic institutions, Indian Armed Forces, Indian Para-Military Forces, J &K Tourism Department, BMC, J&K Biodiversity Council, SMC	One-Two years	Medium-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Focus Area 3: Gardens and Parks				
Goal 3.1 Conserve ornamental genetic diversity	1. Setting up of seedbanks and germplasm collections within Mughal gardens	J&K Horticulture Department, Department of Floriculture, Gardens and Parks, SMC, J&K Agriculture Department, BMC	One-two years	Long-term
	2. Propagation of unique local varieties within parks and gardens of Srinagar	Horticulture Department, Department of Floriculture, Gardens and Parks, SMC	One-two years	Medium term
	3. Fairs and flower shows to boost awareness among tourists and locals	Horticulture Department, Department of Floriculture, Gardens and Parks	Continuous	Short-term
Goal 3.2 Improve maintenance of Parks	1. Composting of organic waste within parks through innovative partnerships	Academic institutions, SMC, NGOs, Department of Floriculture Gardens and Parks	Continuous	Short-term
	2. Plastic ban within parks and gardens enforced with fines	Department of Floriculture, Gardens and Parks, SMC, NGOs,	Continuous	Short-term
Goal 3.3 Increase ecological significance of Parks and Gardens	1. Promotion of local wild plants, wild pollinator biodiversity through the establishment of microhabitats/ combination of trees/herbs/shrubs	Department of Floriculture, Gardens and Parks, NGOs, Research Institutions, J&K FRI, J&K Biodiversity Council, J&K Forest Department	Continuous	Medium-term
	2. Creation of community food gardens within public parks and gardens	Department of Floriculture, Gardens and Parks, Horticulture Department, Agriculture Department, NGOs, Academic Institutions, Schools, J&KFRI, J&K Biodiversity Council, BMC, Local community, RWAs	1.5-3 years	Short-term
	3. Promote public participation through tie-ups with educational institutions	Department of Floriculture, Gardens and Parks, Education boards NGOs, Research Institutions, Schools, BMC	Continuous	Short-Medium term
	4. Develop interpretation centres to improve the educational value and visitor engagement	SMC, NGOs, Department of Floriculture, Gardens and Parks, J&K Forest Department, BMC	1.5 years	Short-term
	5. Develop parks as wildlife corridors between protected areas through appropriate planting strategies	Department of Floriculture, Gardens and Parks, J&K Forest Department, SMC, SDA, J&K Wildlife Protection Department, NGOs	Five years	Medium-term
Goal 3.4 Increase area of Parks and Gardens in line with URDPFI guidelines	1. Implement action points identified in Action plan on Augmentation of Green Spaces in Srinagar City	SMC, SDA, SSCL, J&K Forest Department, NGOs, Department of Floriculture, Gardens and Parks	Five years	Medium-term
	2. Innovative greening partnerships with institutions within the city	Local community, Department of Floriculture, Gardens and Parks, SMC, SDA, SSCL, Corporates	Five-ten years	Medium-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Goal 3.5 Increase sustainability of Golf Courses	1. Habitat improvement for birds and bats	NGOs, Academic Institutions, Golf Course Management, J&K Forest Department, BMC, J&K Wildlife Protection Department	One year	Medium-term
	2. Optimized and reduced use of pesticides and fertilizers such as application only when needed	NGOs, Research Institutions, Golf Course Management, J&K Forest Research Institute	Continuous	Medium-term
Focus Area 4: Orchards and Agriculture				
Goal 4.1 Address and arrest land use conversion (forestland being converted to agriculture or horticulture)	1. Integrate climate resilience into City Master Plan	NGOs, SMC, SDA, UEED, SSCL, Town and Country Planning Department, J&K Forest Department, Revenue Department	Two years	Long-term
	2. Identify land for orchard expansion and guide development of the same within these land parcels	NGOs, SMC, SDA, UEED, SSCL, Town and Country Planning Department, J&K Forest Department, Revenue Department. Local community	Five years	Medium-term
	3. Preserve agricultural areas within the city mandating no development within these areas	SMC, Revenue Department, Town and Country Planning Department, UEED, SDA, District Administration	Continuous	Medium-Long term
	4. Regulate conversion of agricultural and fallow land to built-up area in peripheral areas of SMC	SMC, Revenue Department, Town and Country Planning Department, UEED, SDA, District Administration	Continuous	Medium-Long term
Goal 4.2 Promote biodiversity-friendly practices in agricultural and horticultural areas	1. Conduct research on agroforestry practices within growing areas integrating traditional knowledge with latest scientific information	Agriculture University, J&K Biodiversity Council, Agriculture Department, Horticulture Department, Research institutes, NGOs	Continuous	Medium-Long term
	2. Identify potential biodiversity corridors within agricultural and horticultural areas and develop these to aid in biological connectivity	Forest Department, J&K Biodiversity Council, Agriculture Department, Horticulture Department, Research institutes, NGOs	Two-five years	Medium-Long term
	3. Improving conservation of pollinators through plantation of floral strips consisting of high plant species diversity with synchronous flowering and bee friendly plants like Aesculus indica, Crotalaria pallida, Ocimum basilicum	Forest department, Agriculture department, SMC, Transport and Highways Department, NGOs, SDA, SSCL, SFRI, J&K Biodiversity Council, Horticulture Department	One-three years	Short-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Goal 4.3 Conserve land races and species of crops native to Kashmir	1. Document and source local land races and native crops (including mushrooms) and develop a database of the same	J&K Agriculture Department, SKUAST, Department of Floriculture, Gardens and Parks, BMC, J&K Biodiversity Council, Academic institutions, J&KFRI, Farming community, NGOs	Five years	Medium-long term
	2. Provide seeds (foundation/breeder seeds) and initiate seed multiplication programmes for local cultivars and crops like musk bugdi/red rice etc.	Agriculture Department, SKUAST, Department of Floriculture, Gardens and Parks, BMC, J&K Biodiversity Council, Academic Institutions, Farmers, NGOs	Five years	Medium-long term
	3. Development of market chain and market linkages	J&K Agriculture Department, J&K Horticulture Department, SMC Academic institutions, NGOs, Krishi Vigyan Kendra	Two years	Medium-term
Goal 4.4 Promote Urban Farming	1. Integrate urban agriculture within Master Plan/land use plan through allotment of community and open spaces in neighbourhoods for agriculture	Agriculture department, SMC, SDA, Town and Country Planning, NGOs, CSOs, Community, RWAs	Five years	Medium-long term
	2. Create networks for ensuring the smooth supply of materials and equipment needed for farming.	Agriculture department, Universities, NGOs, Agricultural start-ups, Agriculture product suppliers, Krishi Vigyan Kendras (KVK)	Three-five years	Medium-long term
	3. Inclusion of kitchen gardening into school curriculum and distribution of seeds via educational institutions	Agriculture department, School Education Boards, Education institutes, NGOS, BMC, KVK	Continuous	Medium-long term
	4. Incentivise community/ kitchen gardens and backyard plantations through a reward and recognition system	Agriculture department, Community, NGOs, SMC, Srinagar BMC, KVk	Continuous	Medium-term
Goal 4.5 Improve public awareness on wildlife conflict and its management in agriculture	1. Development of an action plan to minimize wildlife conflict in agriculture and horticulture areas taking into account stakeholder concerns	Research Institutes, Universities, J&K Wildlife Protection Department, Local Community, NGOs, SMC, SDA, UEED	Two years	Long-term
	2. Behaviour modification and improving coexistence through well targeted IEC campaigns	Research Institutes, Universities, J&K Wildlife Protection Department, Local community, NGOs, SMC, SDA, UEED, BMC	Five years	Long-term
Focus Area 5: Roadside/Avenue Plantation				
Goal 5.1 Increase Linear and Block Plantation	1. Identify zones/wards with low green cover	Subject Matter Experts, Academic Institutes, PW(R&B) Department, SDA, SMC, Local community, NGOs, J&K Housing Board	Once every three years	Long-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
	2. Implement Action plan on Augmentation of Green Spaces in Srinagar City	Department of Floriculture, Gardens and Parks, SMC, SDA, J&K Housing Board, PW(R&B) Department; J&K Forest Department	Five years	Medium-long term
	3. Increase green cover around buildings, office complexes, institutional spaces and in natural areas listed as Heritage Buildings and	Department of Floriculture, Gardens and Parks, SMC, SDA, J&K Housing Board; PW(R&B) Department, Department of Archaeology, INTACH, J&K Biodiversity Council,	Five years	Medium-term
	4. Conservation Areas	Academic Institutions		
	5. Develop innovative models to support plantation and maintenance like crowd funding, CSR etc	J&K Forest Department, SMC, SDA, Department of Floriculture, Gardens and Parks, J&K FRI, Subject Matter Experts, NGOs, SSCL, J&K Department of Social Forestry	Yearly	Short-term
	6. Develop roadside verges with pollinator-friendly flowering plants	J&K Forest Department, Agriculture department, SMC, NGOs, SDA, SSCL, J&KFRI, J&K Biodiversity Council, PW(R&B) Department, J&K Department of Social Forestry	One-two years	Short-term
Goal 5.2 Maintain and protect the existing avenue trees	1. Development of a geo-referenced map of existing green spaces and geo-tagging of trees in the city	SMC, NGOs with GIS expertise, Academic Institutions, Subject Matter Experts, J&K Forest Department	Two years	Short-term
	2. Promoting Chinar Conservation Programme initiated by the J&K Forest Department	J&K Forest Department, PW(R&B) Department, J&K FRI, SMC, SDA, NGOs, Department of Floriculture, Department of Parks and Gardens	Continuous	Long-term
	3. Development and maintenance of tree health cards	J&K Forest Department, SFRI, SMC, SDA, NGOs, Academic Institutions	Continuous	Medium-term
	4. Development of a collaborative action plan to protect existing avenue plantations	J&K Forest Department, J&KFRI, SMC, SDA, NGOs, PW(R&B) Department, Academic Institutions, PW(R&B) Department, Indian Armed Forces, SSCL, J&K Department of Social Forestry	One-two years	Medium-long term
	5. Capacity building of relevant authorities on arboriculture	NGOs, Subject Matter Experts, SMC, SDA, Academic Institutions, J&K Forest Department, J&K Forest Research Institute	Continuous	Short-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Goal 5.3 Developing Green Corridors linking natural ecosystems	1. Identify areas that can act as green corridors on GIS platform	J&K Forest Department, J&K Biodiversity Council, SMC, NGOs, Academic Institutions, Local community LCMA, PW(R&B) Department, Indian Armed Forces	Two years	Long-term
	2. Development of multi-storey plantations which support a range of biodiversity	J&K Forest Department, J&K Biodiversity Council, SMC, NGOs, Academic Institutions, Citizens, Indian Armed Forces	Five years	Long-term
Focus Area 6: Open Grounds				
Goal 6.1 Augment ecological value of open grounds	1. Mapping of open spaces, ecosystem services provided and present usage	NGOs, SMC, SSCL, Research Institutions, Local community, SDA	One year	Short-term
	2. Identify areas within open spaces for enhancing biodiversity and undertake landscaping using native species of shrubs and herbs	NGOs, SMC, SSCL, Research Institutions, BMC, SDA	One year	Short-term
Focus Area 7: Rivers/streams (Jhelum) and Canals				
Goal 7.1 Strengthen climate resilience through integrated water resource management	1. Mapping of catchment areas, present status and degradation drivers	LCMA, SMC, Kashmir Irrigation and Flood Control Department (I&FC), Department of Soil and Water Conservation, NGOs, Research Institutions	One-two years	Medium-term
	2. Flood hazard assessment and mapping	LCMA, SMC, Kashmir Irrigation and Flood Control Department (I&FC), Department of Soil & Water Conservation, NGOs, Research institutions, J&K Disaster Management Authority	One-two years	Medium-term
	3. Vulnerability assessment through modelling approaches	LCMA, SMC, Kashmir Irrigation and Flood Control Department (I&FC), Department of Soil & Water Conservation, NGOs, Research institutions, J&K Disaster Management Authority	Two years	Medium-term
	4. Develop and implement integrated water resource management plan at the catchment level	LCMA, SMC, Kashmir Irrigation and Flood Control Department (I&FC), Department of Soil & Water Conservation, NGOs, Research Institutions	Two years	Medium-term
	5. Develop and implement zoning and development guidelines in vulnerable and flood prone areas	LCMA, SMC, Kashmir Irrigation and Flood Control Department (I&FC), Department of Soil & Water Conservation, NGOs, Research institutions, Revenue Department, J&K Disaster Management Authority, District Management, Town and Country Planning, SDA	One-three years	Long-term

Focus Area & Goals	Key actions	Stakeholders to be involved	Time frame	Impact (Short/ Medium/ Long-term)
Goal 7.2 Enhance the ecosystem services of River Jhelum	1. Undertake scientifically informed afforestation in catchment area	NGOs, Research Institutions, LCMA, SFRI, J&K Biodiversity Council, Department of Soil & Water Conservation	Continuous	Long-term
	2. Source water protection and watershed conservation	LCMA, I&FC Department, District Administration, NGOs, SMC	Continuous	Long-term
	3. Undertake eco-restoration of river	NGOs, Research Institutions, LCMA, UEED, SDA, SMC	Five-ten years	Long-term
	4. Undertake ecologically sound river front development	J&K Forest Department, NGOs, Research Institutes, LCMA, UEED, SDA, SSCL, SMC	Five years	Medium-term
Goal 7.3 Restore Canals of Srinagar	1. Clean, desilt and remove weeds regularly to improve and maintain flow	I&FC Department, LCMA, SMC, SSCL, NGOs, Local community	Continuous	Short-Medium term
	2. Prevent discharge of sewage in the canals through establishment of decentralized sewage treatment plants	SDA, SMC, SSCL, UEED, J&K Pollution Control Board, NGOs	Continuous	Short-Medium term
	3. Prevent disposal of solid waste in canals	SMC, SSCL, NGOs, J&K Pollution Control Board, CSR departments of Corporations	Continuous	Short-term
	4. Develop and implement canal management plan that guides the protection and maintenance of the same	SMC, I&FC Department, Research Institutions, NGOs, LCMA, Local community	One year	Long-term
Focus Area 8: Grassland/Pastureland				
Goal 8.1 Protect existing grasslands	1. Map and delineate extent of grasslands on GIS platform	SMC, NGOs, Subject Matter Experts, Academic Institutions	One year	Short-term
	2. Implement rotational grazing policy	NGOs, Local and nomadic pastoralists Academic Institutions, BMC, Animal, Sheep Husbandry and Fisheries Department	Two years	Long-term
	3. Awareness generation on the importance and ecosystem services provided by grasslands	NGOs, Local and nomadic pastoralists, BMC, J&K Biodiversity Council, KVK, Local Community	Two years	Long-term
Goal 8.2 Restore degraded grasslands	1. Identification of degraded areas in grasslands	SMC, NGOs, Subject Matter Experts, Academic Institutions, J&K FRI, SDA	Two years	Short-term
	2. Development and implementation of a restoration plan for selected sites	NGOs, Subject Matter Experts, Research Institutions, J&KFRI, Local and nomadic pastoralists, Local Community	Two years	Medium-long term

6. Tools to Support Implementation of LBSAP

This section provides links to various tools that can support the implementation of LBSAP of Srinagar Municipal Corporation. 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 Srinagar 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 Srinagar. The infrastructure mapped includes the river, water bodies, parks and gardens, various forests, cultivation and plantation areas (agricultural. horticultural and agroforestry), marshes, irrigation canals and urban green spaces. 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. 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 Srinagar

Bird Species

Family	Common Name	Scientific Name	Status	Urban
WaterFowl				
Anatidae	Northern Shoveler	*Spatula clypeata*	Migrant	
Anatidae	Mallard	*Anas platyrhynchos*	Migrant	
Anatidae	Tufted Duck	*Aythya fuligula*	Migrant	
Anatidae	Gadwall	*Mareca strepera*	Migrant	
Anatidae	Common Pochard	*Aythya ferina*	Migrant	
Anatidae	Ferruginous Duck	*Aythya nyroca*	Migrant	
Anatidae	Northern Pintail	*Anas acuta*	Migrant	
Anatidae	Garganey	*Spatula querquedula*	Migrant	
Anatidae	Green-winged Teal	*Anas crecca*	Migrant	
Anatidae	Red-crested Pochard	*Netta rufina*	Migrant	
Anatidae	Eurasian Wigeon	*Mareca penelope*	Migrant	
Grebes				
Podicipedidae	Little Grebe	*Tachybaptus ruficollis*	Migrant	
Pigeons and Doves				
Columbidae	Rock Pigeon	*Columba livia*	Resident	Yes
Columbidae	Oriental Turtle-Dove	*Streptopelia orientalis*	Migrant	No
Columbidae	Eurasian Collared-Dove	*Streptopelia decaocto*	Migrant	No
Columbidae	Spotted Dove	*Spilopelia chinensis*	Resident	Yes
Cuckoos				
Cuculidae	Asian Koel	*Eudynamys scolopaceus*	Migrant	
Cuculidae	Common Cuckoo	*Cuculus canorus*	Migrant	
Cuculidae	Himalayan Cuckoo	*Cuculus saturatus*	Migrant	
Cuculidae	Pied Cuckoo	*Clamator jacobinus*	Migrant	
Swifts				
Apodidae	Common Swift	*Apus apus*	Migrant	
Rails, Gallinules, and Allies				
Rallidae	Eurasian Moorhen	*Gallinula chloropus*	Resident	Yes
Rallidae	Eurasian Coot	*Fulica atra*	Resident	Yes
Rallidae	Gray-headed Swamphen	*Porphyrio poliocephalus*	Resident	Yes
Rallidae	Ruddy-breasted Crake	*Porzana fusca*	Resident	Yes
Rallidae	Water Rail	*Rallus aquaticus*	Migrant	
Shorebirds				
Charadriidae	Red-wattled Lapwing	*Vanellus indicus*	Resident	Yes
Jacanidae	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	Resident	No
Scolopacidae	Common Sandpiper	*Actitis hypoleucos*	Migrant	
Scolopacidae	Green Sandpiper	*Tringa ochropus*	Migrant	
Scolopacidae	Eurasian Curlew	*Numenius arquata*	Migrant	
Recurvirostridae	Black-winged Stilt	*Himantopus himantopus*	Migrant	
Gulls, Terns, and Skimmers				
Laridae	Black-headed Gull	*Chroicocephalus ridibundus*	Migrant	
Laridae	Brown-headed Gull	*Chroicocephalus brunnicephalus*	Migrant	
Laridae	Whiskered Tern	*Chlidonias hybrida*	Migrant	
Cormorants and Anhingas				
Phalacrocoracidae	Great Cormorant	*Phalacrocorax carbo*	Migrant	
Herons, Ibis, and Allies				

Family	Common Name	Scientific Name	Status	Urban
Ardeidae	Gray Heron	*Ardea cinerea*	Resident	No
Ardeidae	Little Egret	*Egretta garzetta*	Resident	Yes
Ardeidae	Indian Pond-Heron	*Ardeola grayii*	Resident	Yes
Ardeidae	Black-crowned Night-Heron	*Nycticorax nycticorax*	Resident	Yes
Ardeidae	Little Bittern	*Ixobrychus minutus*	Migrant	
Ardeidae	Great Egret	*Ardea alba*	Resident	Yes
Ardeidae	Cattle Egret	*Bubulcus ibis*	Resident	Yes
Threskiornithidae	Glossy Ibis	*Plegadis falcinellus*	Migrant	
Vultures, Hawks, and Allies				
Pandionidae	Osprey	*Pandion haliaetus*	Migrant	
Accipitridae	Hen Harrier	*Circus cyaneus*	Migrant	
Accipitridae	Black Kite	*Milvus migrans*	Resident	Yes
Accipitridae	Long-legged Buzzard	*Buteo rufinus*	Resident	Yes
Accipitridae	Pallas's Fish-Eagle	*Haliaeetus leucoryphus*	Resident	No
Accipitridae	Bonelli's Eagle	*Aquila fasciata*	Migrant	
Accipitridae	Shikra	*Accipiter badius*	Resident	Yes
Accipitridae	Eurasian Sparrowhawk	*Accipiter nisus*	Resident	Yes
Accipitridae	Himalayan Buzzard	*Buteo refectus*	Migrant	Yes
Accipitridae	Mountain Hawk-Eagle	*Nisaetus nipalensis*	Resident	No
Accipitridae	Eurasian Marsh-Harrier	*Circus aeruginosus*	Migrant	
Owls				
Strigidae	Collared Owlet	*Glaucidium brodiei*	Resident	No
Strigidae	Long-eared Owl	*Asio otus*	Migrant	
Strigidae	Tawny Owl	*Strix aluco*	Resident	Yes
Tytonidae	Barn Owl	*Tyto alba*	Resident	Yes
Hoopoes				
Upupidae	Eurasian Hoopoe	*Upupa epops*	Migrant	
Kingfishers				
Alcedinidae	White-throated Kingfisher	*Halcyon smyrnensis*	Resident	Yes
Alcedinidae	Pied Kingfisher	*Ceryle rudis*	Resident	No
Alcedinidae	Common Kingfisher	*Alcedo atthis*	Resident	Yes
Alcedinidae	Crested Kingfisher	*Megaceryle lugubris*	Resident	No
Bee-eaters, Rollers, and Allies				
Coraciidae	European Roller	*Coracias garrulus*	Migrant	
Meropidae	European Bee-eater	*Merops apiaster*	Migrant	
Barbets and Toucans				
Megalaimidae	Great Barbet	*Psilopogon virens*	Resident	Yes
Woodpeckers				
Picidae	Brown-fronted Woodpecker	*Dendrocoptes auriceps*	Resident	Yes
Picidae	Eurasian Wryneck	*Jynx torquilla*	Migrant	
Picidae	Himalayan Woodpecker	*Dendrocopos himalayensis*	Resident	No
Picidae	Scaly-bellied Woodpecker	*Picus squamatus*	Resident	No
Picidae	Speckled Piculet	*Picumnus innominatus*	Resident	No
Falcons and Caracaras				
Falconidae	Eurasian Kestrel	*Falco tinnunculus*	Resident	Yes
Falconidae	Eurasian Hobby	*Falco subbuteo*	Migrant	
Falconidae	Peregrine Falcon	*Falco peregrinus*	Resident	Yes

Family	Common Name	Scientific Name	Status	Urban
Parrots, Parakeets, and Allies				
Psittaculidae	Alexandrine Parakeet	*Psittacula eupatria*	Resident	Yes
Psittaculidae	Rose-ringed Parakeet	*Psittacula krameri*	Resident	Yes
Cuckooshrikes				
Campephagidae	Long-tailed Minivet	*Pericrocotus ethologus*	Migrant	
Old World Orioles				
Oriolidae	Indian Golden Oriole	*Oriolus kundoo*	Migrant	
Drongos				
Dicruridae	Ashy Drongo	*Dicrurus leucophaeus*	Migrant	
Shrikes				
Laniidae	Long-tailed Shrike	*Lanius schach*	Resident	Yes
Jays, Magpies, Crows, and Ravens				
Corvidae	Large-billed Crow	*Corvus macrorhynchos*	Resident	Yes
Corvidae	Eurasian Jackdaw	*Coloeus monedula*	Resident	Yes
Corvidae	Yellow-billed Blue-Magpie	*Urocissa flavirostris*	Resident	No
Corvidae	House Crow	*Corvus splendens*	Resident	Yes
Corvidae	Black-headed Jay	*Garrulus lanceolatus*	Resident	No
Tits, Chickadees, and Titmice				
Paridae	Fire-capped Tit	*Cephalopyrus flammiceps*	Migrant	
Paridae	Coal Tit	*Periparus ater*	Resident	Yes
Paridae	Rufous-naped Tit	*Periparus rufonuchalis*	Resident	No
Paridae	Green-backed Tit	*Parus monticolus*	Resident	Yes
Paridae	Cinereous Tit	*Parus cinereus*	Resident	Yes
Reedwarblers and Allies				
Acrocephalidae	Clamorous Reed Warbler	*Acrocephalus stentoreus*	Migrant	
Martins and Swallows				
Hirundinidae	Barn Swallow	*Hirundo rustica*	Migrant	
Bulbuls				
Pycnonotidae	Himalayan Bulbul	*Pycnonotus leucogenys*	Resident	Yes
Pycnonotidae	Black Bulbul	*Hypsipetes leucocephalus*	Resident	Yes
Leaf Warblers				
Phylloscopidae	Lemon-rumped Warbler	*Phylloscopus chloronotus*	Migrant	
Phylloscopidae	Tickell's Leaf Warbler	*Phylloscopus affinis*	Migrant	
Phylloscopidae	Common Chiffchaff	*Phylloscopus collybita*	Migrant	
Phylloscopidae	Western Crowned Warbler	*Phylloscopus occipitalis*	Migrant	
Phylloscopidae	Gray-hooded Warbler	*Phylloscopus xanthoschistos*	Resident	No
Phylloscopidae	Tytler's Leaf Warbler	*Phylloscopus tytleri*	Migrant	
Phylloscopidae	Sulphur-bellied Warbler	*Phylloscopus griseolus*	Migrant	
Phylloscopidae	Greenish Warbler	*Phylloscopus trochiloides*	Migrant	
Bush Warblers and Allies				
Cettiidae	Brownish-flanked Bush Warbler	*Horornis fortipes*	Migrant	
Long-tailed Tits and Bushtit				
Aegithalidae	White-throated Tit	*Aegithalos niveogularis*	Resident	No
Sylviid Warblers				
Sylviidae	Lesser Whitethroat	*Curruca curruca*	Migrant	
White-eyes, Yuhinas, and Allies				
Zosteropidae	Indian White-eye	*Zosterops palpebrosus*	Resident	Yes

Family	Common Name	Scientific Name	Status	Urban
Laughingthrushes and Allies				
Leiothrichidae	Streaked Laughingthrush	*Trochalopteron lineatum*	Resident	Yes
Leiothrichidae	Variegated Laughingthrush	*Trochalopteron variegatum*	Resident	No
Kinglets				
Regulidae	Goldcrest	*Regulus regulus*	Resident	No
Treecreepers				
Certhiidae	Bar-tailed Treecreeper	*Certhia himalayana*	Resident	No
Wrens				
Troglodytidae	Eurasian Wren	*Troglodytes troglodytes*	Resident	Yes
Dippers				
Cinclidae	Brown Dipper	*Cinclus pallasii*	Resident	No
Starlings and Mynas				
Sturnidae	Common Myna	*Acridotheres tristis*	Resident	Yes
Sturnidae	European Starling	*Sturnus vulgaris*	Migrant	
Sturnidae	Rosy Starling	*Pastor roseus*	Migrant	
Thrushes				
Turdidae	Scaly Thrush	*Zoothera dauma*	Resident	No
Turdidae	Gray-winged Blackbird	*Turdus boulboul*	Resident	Yes
Turdidae	Tickell's Thrush	*Turdus unicolor*	Migrant	
Turdidae	Chestnut Thrush	*Turdus rubrocanus*	Resident	No
Turdidae	Black-throated Thrush	*Turdus atrogularis*	Migrant	
Turdidae	Mistle Thrush	*Turdus viscivorus*	Resident	No
Old World Flycatchers				
Muscicapidae	Bluethroat	*Luscinia svecica*	Migrant	
Muscicapidae	Blue Whistling-Thrush	*Myophonus caeruleu*	Resident	Yes
Muscicapidae	Spotted Forktail	*Enicurus maculatus*	Resident	No
Muscicapidae	Slaty-blue Flycatcher	*Ficedula tricolor*	Migrant	
Muscicapidae	Ultramarine Flycatcher	*Ficedula superciliaris*	Migrant	
Muscicapidae	White-capped Redstart	*Chaimarrornis leucocephalus*	Resident	No
Muscicapidae	Blue-capped Redstart	*Phoenicurus caeruleocephala*	Resident	No
Muscicapidae	Blue Rock-Thrush	*Monticola solitarius*	Migrant	
Muscicapidae	Siberian Stonechat	*Saxicola maurus*	Migrant	
Muscicapidae	Gray Bushchat	*Saxicola ferreus*	Resident	No
Muscicapidae	Pied Bushchat	*Saxicola caprata*	Migrant	
Muscicapidae	Chestnut-bellied Rock-Thrush	*Monticola rufiventris*	Resident	Yes
Muscicapidae	Verditer Flycatcher	*Eumyias thalassinus*	Migrant	
Muscicapidae	Indian Blue Robin	*Larvivora brunnea*	Migrant	
Muscicapidae	Himalayan Rubythroat	*Calliope pectoralis*	Migrant	
Muscicapidae	Himalayan Bluetail	*Tarsiger rufilatus*	Resident	No
Muscicapidae	Rusty-tailed Flycatcher	*Ficedula ruficauda*	Migrant	
Muscicapidae	Kashmir Flycatcher	*Ficedula subrubra*	Migrant	
Muscicapidae	Blue-fronted Redstart	*Phoenicurus frontalis*	Migrant	
Muscicapidae	Plumbeous Redstart	*Rhyacornis fuliginosa*	Resident	Yes
Muscicapidae	Blue-capped Rock-Thrush	*Monticola cinclorhynchus*	Migrant	
Muscicipidae	Rufous-bellied Niltava	*Niltava sundara*	Migrant	
Accentors				
Prunellidae	Rufous-breasted Accentor	*Prunella strophiata*	Resident	No

Family	Common Name	Scientific Name	Status	Urban
Prunellidae	Black-throated Accentor	*Prunella atrogularis*	Migrant	
Old World Sparrows				
Passeridae	House Sparrow	*Passer domesticus*	Resident	Yes
Passeridae	Russet Sparrow	*Passer cinnamomeus*	Resident	Yes
Wagtails and Pipits				
Monarchidae	Indian Paradise-Flycatcher	*Terpsiphone paradisi*	Migrant	
Motacillidae	Gray Wagtail	*Motacilla cinerea*	Migrant	
Motacillidae	White Wagtail	*Motacilla alba*	Migrant	
Motacillidae	Tree Pipit	*Anthus trivialis*	Migrant	
Motacillidae	Citrine Wagtail	*Motacilla citreola*	Migrant	
Motacillidae	Rosy Pipit	*Anthus roseatus*	Migrant	
Motacillidae	Olive-backed Pipit	*Anthus hodgsoni*	Migrant	
Motacillidae	Water Pipit	*Anthus spinoletta*	Migrant	
Finches, Euphonias, and Allies				
Fringillidae	Black-and-yellow Grosbeak	*Mycerobas icterioides*	Resident	No
Fringillidae	Common Rosefinch	*Carpodacus erythrinus*	Migrant	
Fringillidae	Pink-browed Rosefinch	*Carpodacus rodochroa*	Migrant	
Fringillidae	Orange Bullfinch	*Pyrrhula aurantiaca*	Resident	No
Fringillidae	Yellow-breasted Greenfinch	*Chloris spinoides*	Migrant	
Fringillidae	European Goldfinch	*Carduelis carduelis*	Migrant	
Fringillidae	Brambling	*Fringilla montifringilla*	Migrant	
Old World Buntings				
Emberizida	Chestnut-eared Bunting	*Emberiza fucata*	Resident	Yes
Emberizidae	Rock Bunting	*Emberiza cia*	Resident	Yes
Emberizidae	White-capped Bunting	*Emberiza stewarti*	Migrant	
Emberizidae	Pine Bunting	*Emberiza leucocephalos*	Migrant	

Butterflies

Family	Scientific name	Common name
Hesperiidae	*Carcharodus alceae*	Plain Marbled Skipper
Hesperiidae	*Pelopidas mathias*	Small Branded Swift
Hesperiidae	*Parnara guttata*	Common Straight Swift
Pieridae	*Pieris brassicae*	Large Cabbage White
Pieridae	*Pieris canidia*	Asian Cabbage White
Pieridae	*Pontia daplidice*	Bath White
Pieridae	*Colias erate*	Pale Clouded Yellow
Pieridae	*Gonepteryx rhamni*	Common Brimstone
Pieridae	*Aporia saracto*	Himalayan Black Vein
Pieridae	*Colias fieldii*	Dark Clouded Yellow
Pieridae	*Pontia edusa*	Eastern Bath White
Lycaenidae	*Lycaena phlaeas*	Small Copper
Lycaenidae	*Lampides boeticus*	Pea Blue
Lycaenidae	*Tarucus indica*	Indian Pierrot
Lycaenidae	*Tarucus venosus*	Himalayan Pierrot
Lycaenidae	*Everes huegelii*	Dusky-blue Cupid
Lycaenidae	*Talicada nyseus*	Red Pierrot

Family	Scientific name	Common name
Lycaenidae	*Aricia agestis*	Orange-bordered Argus
Lycaenidae	*Heliophorus sena*	Sorrel Sapphire
Lycaenidae	*Rapala nissa*	Common Flash
Lycaenidae	*Celastrina argiolus*	Holly Blue
Lycaenidae	*Glaucopsyche alexis*	Green-underside Blue
Nymphalidae	*Danaus chrysippus*	Plain Tiger
Nymphalidae	*Libythea lepita*	Common Beak
Nymphalidae	*Argynnis jainadeva*	Himalayan Highbrown Silverspot
Nymphalidae	*Aglais caschmirensis*	Kashmir Tortoiseshell
Nymphalidae	*Argyreus hyperbius*	Indian Fritillary
Nymphalidae	*Argynnis childreni*	Large Silverstripe
Nymphalidae	*Cynthia cardui*	Painted Lady
Nymphalidae	*Hypolimnas misippus*	Danaid Eggfly
Nymphalidae	*Issoria gemmata*	Gem Silverspot
Nymphalidae	*Issoria lathonia*	Queen of Spain Fritillary
Nymphalidae	*Junonia orithya*	Blue Pansy
Nymphalidae	*Kaniska canace*	Blue Admirable
Nymphalidae	*Neptis hylas*	Common Sailor
Nymphalidae	*Phalanta phalanta*	Common Leopard
Nymphalidae	*Vanessa indica*	Indian Red Admirable
Nymphalidae	*Aulocera brahminus*	Great Satyr
Nymphalidae	*Aulocera padma*	Narrow Banded Satyr
Nymphalidae	*Paralasa mani*	Yelow Argus
Nymphalidae	*Callerebia nirmala*	Common Satyr
Nymphalidae	*Neptis saphho*	Pallas Sailor
Nymphalidae	*Pararge eversmanii*	Yellow Wall
Papilionidae	*Papilio machaon*	Common Yellow Swallowtail
Papilionidae	*Parnassius chaltronius*	Regal Apollo

Fish

Scientific Name	Common Name	Local Name
Schizothorax esocinus	Chirruh snowtrout	Churru
Schizothorax curvifrons	Sattar snowtrout	Sattar gaad
Schizothorax plagiostomus		Khont
Schizothorax labiatus	Kunar snowtrout	Chosh
Schizothorax niger	Common snowtrout	Alae gaad
*Cyprinus carpio var. Communis**	Scale carp	Common carp
*Cyprinus carpio var. specularis**	Mirror carp	Common carp
Triplophysa kashmirensis		Aara gurun
Triplophysa marmorata		Aara gurun
Crossocheilus diplocaulus		Tethur
Carassius carassius	Crucian carp	Gaang gaad
Puntius conchonius	Rosy barb	Safaid bacha
Gambusia holbrooki	Eastern mosquitofish	Mahi gaad
Botia birdi	Birdi loach	Rama gorun
Bangan dipostoma		Roput

Scientific Name	Common Name	Local Name
*Ctenopharyngodon idella**	Grass carp	Grass carp

**Found in captivity also*

Mammals

Family	Common name	Scientific Name
Felidae	Jungle Cat	*Felis chaus*
Canidae	Jackal	*Canis aureus*
Mustelidae	Eurasian otter	*Lutra lutra*
Sciuridae	Kashmir flying squirrel	*Eoglaucomys fimbriatus*
Ursidae	Asian black bear	*Ursus thibetanus*
Vespertilionidae	Indian pipistrelle	*Pipistrellus coromandra*
Canidae	Red fox	*Vulpes vulpes*
Muridae	House mouse	*Mus musculus*
Cercopithecidae	Rhesus macaque	*Macaca mulatta*
Hystricidae	Indian porcupine	*Hystrix indica*
Mustelidae	Yellow-throated marten	*Martes flavigula*
Soricidae	Asian house shrew	*Suncus murinus*
Mustelidae	Siberian weasel	*Mustela sibirica*

Plants

Family	Scientific Name	Status
Caprifoliaceae	*Abelia grandiflora*	Introduced
Pinaceae	*Abies pindrow*	Native
Malvaceae	*Abutilon theophrasti*	Introduced
Sapindaceae	*Acer caesium*	Native
Sapindaceae	*Acer palmatum*	Introduced
Sapindaceae	*Acer negundo*	Introduced
Asteraceae	*Achillea millefolium*	Native
Amaranthaceae	*Achyranthes aspera*	Native
Acoraceae	*Acorus calamus*	Native
Ranunculaceae	*Actaea spicata*	Native
Ranunculaceae	*Adonis aestivalis*	Native
Poaceae	*Aegilops tauschii*	Native
Fabaceae	*Aeschynomene indica*	Native
Sapindaceae	*Aesculus indica*	Native
Asteraceae	*Ageratum conyzoides*	Introduced
Rosaceae	*Agrimonia eupatoria*	Introduced
Rosaceae	*Agrimonia pilosa*	Native
Poaceae	*Agrostis stolonifera*	Native
Simaroubaceae	*Ailanthus altissima*	Invasive
Fabaceae	*Albizia julibrissin*	Native
Malvaceae	*Alcea lavateriflora*	Introduced
Malvaceae	*Alcea rosea*	Invasive
Amaryllidaceae	*Allium cepa*	Introduced

Family	Scientific Name	Status
Amaryllidaceae	*Allium sativum*	Introduced
Amaryllidaceae	*Allium rosenbachianum*	Introduced
Betulaceae	*Alnus nitida*	Native
Poaceae	*Alopecurus aequalis*	Invasive
Poaceae	*Alopecurus arundinaceus*	Invasive
Amaranthaceae	*Alternanthera caracasana*	Introduced
Amaranthaceae	*Alternanthera sessilis*	Invasive
Brassicaceae	*Alyssum desertorum*	Native
Amaranthaceae	*Amaranthus blitum*	Introduced
Amaranthaae	*Amaranthus caudatus*	Invasive
Amaranthaceae	*Amaranthus hypochondriacus*	Introduced
Amaranthaceae	*Amaranthus hybridus*	Invasive
Amaranthaceae	*Amaranthus viridis*	Introduced
Amaranthaceae	*Amaranthus spinosus*	Invasive
Amaranthaceae	*Amaranthus graecizans*	Native
Lythraceae	*Ammannia auriculata*	Invasive
Apiaceae	*Ammi majus*	Introduced
Fabaceae	*Amorpha fruticosa*	Introduced
Primulaceae	*Anagallis arvensis*	Native
Boraginaceae	*Anchusa azurea*	Native
Boraginaceae	*Anchusa arvensis*	Native
Ranunculaceae	*Anemone coronaria*	Introduced
Ranunculaceae	*Anemone obtusiloba*	Native

Family	Scientific Name	Status
Ranunculaceae	*Anemone falconeri*	Native
Ranunculaceae	*Anemone tschernjaewii*	Native
Apiaceae	*Angelica glauca*	Native
Asteraceae	*Anthemis cotula*	Invasive
Plantaginaceae	*Antirrhinum majus*	Introduced
Ranunculaceae	*Aquilegia fragrans*	Native
Ranunculaceae	*Aquilegia vulgaris*	Introduced
Brassicaceae	*Arabidopsis thaliana*	Native
Brassicaceae	*Arabis amplexicaulis*	Native
Brassicaceae	*Arabis nova*	Introduced
Brassicaceae	*Arabis pterosperma*	Native
Araliaceae	*Aralia cashemirica*	Native
Araliaceae	*Arctium lappa*	Native
Caryophyllaceae	*Arenaria neelgherrensis*	Native
Caryophyllaceae	*Arenaria serpyllifolia*	Native
Araceae	*Arisaema flavum*	Native
Araceae	*Arisaema jacquemontii*	Native
Boraginaceae	*Arnebia benthami*	Native
Asteraceae	*Artemisia absinthium*	Invasive
Asteraceae	*Artemisia dracunculus*	Native
Asteraceae	*Artemisia indica*	Native
Asteraceae	*Artemisia japonica*	Native
Asteraceae	*Artemisia parviflora*	Native
Asteraceae	*Artemisia scoparia*	Native
Asteraceae	*Artemisia tournefortiana*	Native
Asteraceae	*Artemisia vulgaris*	Native
Poaceae	*Arthraxon prionodes*	Native
Poaceae	*Arundo donax*	Native
Asparagaceae	*Asparagus filicinus*	Native
Asparagaceae	*Asparagus officinalis*	Introduced
Boraginaceae	*Asperugo procumbens*	Native
Rubiaceae	*Asperula cynanchica*	Introduced
Fabaceae	*Astragalus grahamianus*	Native
Campanulaceae	*Asyneuma thomsonii*	Native
Solanaceae	*Atropa acuminata*	Native
Garryaceae	*Aucuba japonica*	Introduced
Poaceae	*Avena fatua*	Native
Poaceae	*Avena sativa*	Introduced
Brassicaceae	*Barbarea intermedia*	Native
Brassicaceae	*Barbarea vulgaris*	Native
Amaranthaceae	*Bassia scoparia*	Introduced
Asteraceae	*Bellis perennis*	Introduced
Berberidaceae	*Berberis aquifolium*	Introduced
Berberidaceae	*Berberis lycium*	Native
Saxifragaceae	*Bergenia ciliata*	Native
Elatinaceae	*Bergia ammannioides*	Native
Apiaceae	*Berula erecta*	Native
Amaranthaceae	*Beta vulgaris*	Introduced

Family	Scientific Name	Status
Asteraceae	*Bidens bipinnata*	Introduced
Asteraceae	*Bidens biternata*	Native
Asteraceae	*Bidens cernua*	Native
Asteraceae	*Bidens tripartita*	Native
Poaceae	*Bothriochloa ischaemum*	Native
Poaceae	*Bothriochloa pertusa*	Native
Brassicaceae	*Brassica juncea*	Introduced
Brassicaceae	*Brassica napus*	Introduced
Brassicaceae	*Brassica nigra*	Native
Brassicaceae	*Brassica oleracea*	Introduced
Brassicaceae	*Brassica rapa*	Introduced
Poaceae	*Bromus arvensis*	Introduced
Poaceae	*Bromus catharticus*	Introduced
Poaceae	*Bromus inermis*	Native
Poaceae	*Bromus japonicus*	Native
Poaceae	*Bromus mollis*	Introduced
Scrophulariaceae	*Buddleja alternifolia*	Introduced
Scrophulariaceae	*Buddleja davidii*	Introduced
Scrophulariaceae	*Buddleja parviflora*	Introduced
Boraginaceae	*Buglossoides arvensis*	Native
Araliaceae	*Buxus sempervirens*	Introduced
Asteraceae	*Calendula officinalis*	Introduced
Plantaginaceae	*Callitriche palustris*	Native
Ranunculaceae	*Caltha palustris*	Native
Theaceae	*Camellia japonica*	Introduced
Campanulaceae	*Campanula medium*	Introduced
Bignoniaceae	*Campsis grandiflora*	Introduced
Bignoniaceae	*Campsis radicans*	Introduced
Fabaceae	*Campylotropis stenocarpa*	Native
Cannaceae	*Canna indica*	Introduced
Cannabaceae	*Cannabis sativa*	Introduced
Brassicaceae	*Capsella bursa-pastoris*	Native
Solanaceae	*Capsicum annuum*	Introduced
Brassicaceae	*Cardamine flexuosa*	Introduced
Brassicaceae	*Cardamine hirsuta*	Native
Brassicaceae	*Cardamine impatiens*	Native
Asteraceae	*Carduus edelbergii*	Native
Asteraceae	*Carduus onopordioides*	Introduced
Asteraceae	*Carduus nutans*	Introduced
Cyperaceae	*Carex alta*	Introduced
Cyperaceae	*Carex curaica*	Introduced
Cyperaceae	*Carex diluta*	Native
Cyperaceae	*Carex dimorpholepis*	Introduced
Cyperaceae	*Carex fedia*	Introduced
Cyperaceae	*Carex wallichiana*	Native
Asteraceae	*Carpesium abrotanoides*	Native
Asteraceae	*Carpesium cernuum*	Native
Asteraceae	*Carpesium nepalense*	Native

Family	Scientific Name	Status
Asteraceae	*Carthamus lanatus*	Invasive
Fagaceae	*Castanea sativa*	Introduced
Bignoniaceae	*Catalpa bignonioides*	Introduced
Bignoniaceae	*Catalpa speciosa*	Introduced
Poaceae	*Catapodium rigidum*	Introduced
Pinaceae	*Cedrus deodara*	Native
Amaranthaceae	*Celosia argentea*	Introduced
Cannabaceae	*Celtis australis*	Introduced
Asteraceae	*Centaurea iberica*	Native
Gentianaceae	*Centaurium pulchellum*	Native
Caryophyllaceae	*Cerastium arvense*	Introduced
Caryophyllaceae	*Cerastium tomentosum*	Introduced
Ceratophyllaceae	*Ceratophyllum demersum*	Introduced
Fabaceae	*Cercis siliquastrum*	Introduced
Rosaceae	*Chaenomeles speciosa*	Introduced
Rosaceae	*Chaenomeles japonica*	Introduced
Rosaceae	*Chaenomeles lagenaria*	Introduced
Fabaceae	*Chamaecrista mimosoides*	Native
Amaranthaceae	*Chenopodium album*	Invasive
Amaranthaceae	*Chenopodium glaucum*	Native
Amaranthaceae	*Chenopodium hybridum*	Introduced
Amaranthaceae	*Chenopodium murale*	Native
Calycanthaceae	*Chimonanthus praecox*	Introduced
Asteraceae	*Chondrilla graminea*	Native
Brassicaceae	*Chorispora tenella*	Native
Euphorbiaceae	*Chrozophora tinctoria*	Native
Asteraceae	*Chrysanthemum maximum*	Introduced
Asteraceae	*Chrysanthemum morifolium*	Introduced
Asteraceae	*Cichorium intybus*	Native
Asteraceae	*Cirsium arvense*	Native
Asteraceae	*Cirsium wallichii*	Native
Asteraceae	*Cirsium vulgare*	Native
Cucurbitaceae	*Citrullus lanatus*	Introduced
Onagraceae	*Clarkia amoena*	Introduced
Onagraceae	*Clarkia pulchella*	Introduced
Ranunculaceae	*Clematis gouriana*	Native
Ranunculaceae	*Clematis grata*	Native
Brassicaceae	*Clematis jackmanii*	Introduced
Cleomaceae	*Cleome spinosa*	Introduced
Lamiaceae	*Clinopodium vulgare*	Native
Lamiaceae	*Clinopodium umbrosum*	Native
Colchicaceae	*Colchicum luteum*	Native
Apiaceae	*Conium maculatum*	Invasive
Ranunculaceae	*Consolida ajacis*	Native
Orchidaceae	*Convallaria majalis*	Introduced
Convolvulaceae	*Convolvulus arvensis*	Native
Asteraceae	*Coreopsis grandiflora*	Introduced

Family	Scientific Name	Status
Apiaceae	*Coriandrum sativum*	Introduced
Coriariaceae	*Coriaria nepalensis*	Native
Brassicaceae	*Coronopus didymus*	Introduced
Papaveraceae	*Corydalis hookeri*	Introduced
Papaveraceae	*Corydalis diphylla*	Native
Asteraceae	*Cosmos bipinnatus*	Introduced
Asteraceae	*Cousinia microcarpa*	Native
Rosaceae	*Crataegus laevigata*	Introduced
Rosaceae	*Crataegus songarica*	Native
Asteraceae	*Crepis sancta*	Native
Iridaceae	*Crocosmia aurea*	Introduced
Iridaceae	*Crocus sativus*	Introduced
Iridaceae	*Crocus vernus*	Introduced
Cupressaceae	*Cryptomeria japonica*	Introduced
Cucurbitaceae	*Cucumis melo*	Introduced
Cupressaceae	*Cupressus cashmeriana*	Introduced
Cupressaceae	*Cupressus lusitanica*	Introduced
Cupressaceae	*Cupressus sempervirens*	Introduced
Cupressaceae	*Cupressus torulosa*	Native
Convolvulaceae	*Cuscuta europaea*	Native
Asteraceae	*Cyanus segetum*	Introduced
Rosaceae	*Cydonia oblonga*	Introduced
Plantaginaceae	*Cymbalaria muralis*	Introduced
Apocynaceae	*Cynanchum jacquemontianum*	Native
Asteraceae	*Cynara scolymus*	Introduced
Asteraceae	*Cynara cardunculus*	Introduced
Poaceae	*Cynodon dactylon*	Native
Boraginaceae	*Cynoglossum lanceolatum*	Native
Boraginaceae	*Cynoglossum wallichii*	Native
Cyperaceae	*Cyperus difformis*	Native
Cyperaceae	*Cyperus glomeratus*	Native
Cyperaceae	*Cyperus iria*	Native
Cyperaceae	*Cyperus rotundus*	Native
Fabaceae	*Cytisus scoparius*	Introduced
Poaceae	*Dactylis glomerata*	Native
Orchidaceae	*Dactylorhiza incarnata*	Introduced
Asteraceae	*Dahlia coccinea*	Introduced
Asteraceae	*Dahlia pinnata*	Introduced
Thymelaeaceae	*Daphne oleoides*	Introduced
Datiscaceae	*Datisca cannabina*	Native
Solanaceae	*Datura innoxia*	Introduced
Solanaceae	*Datura stramonium*	Invasive
Apiaceae	*Daucus carota*	Invasive
Ranunculaceae	*Delphinium roylei*	Native
Orchidaceae	*Dendrobium aphyllum*	Introduced
Orchidaceae	*Dendrobium falconeri*	Introduced
Brassicaceae	*Descurainia sophia*	Native

Family	Scientific Name	Status
Fabaceae	*Desmodium elegans*	Native
Hydrangeaceae	*Deutzia gracilis*	Introduced
Caryophyllaceae	*Dianthus barbatus*	Introduced
Caryophyllaceae	*Dianthus caryophyllus*	Introduced
Caryophyllaceae	*Dianthus chinensis*	Introduced
Caryophyllaceae	*Dianthus plumarius*	Introduced
Caryophyllaceae	*Dianthus deltoides*	Introduced
Plantaginaceae	*Digitalis grandiflora*	Introduced
Plantaginaceae	*Digitalis purpurea*	Introduced
Poaceae	*Digitaria ciliaris*	Native
Poaceae	*Digitaria cruciata*	Native
Poaceae	*Digitaria nodosa*	Introduced
Dioscoriaceae	*Dioscorea deltoidea*	Native
Ebenaceae	*Diospyros lotus*	Native
Polypodiaceae	*Dryopteris barbigera*	Native
Rosaceae	*Duchesnea indica*	Native
Amaranthaceae	*Dysphania botrys*	Native
Amaranthaceae	*Dysphania ambrosioides*	Invasive
Poaceae	*Echinochloa colona*	Native
Poaceae	*Echinochloa crusgalli*	Native
Elaeagnaceae	*Elaeagnus umbellata*	Native
Elatinaceae	*Elatine triandra*	Introduced
Cyperaceae	*Eleocharis palustris*	Introduced
Cyperaceae	*Eleocharis uniglumis*	Introduced
Poaceae	*Eleusine indica*	invasive
Poaceae	*Elymus semicostatus*	Native
Onagraceae	*Epilobium hirsutum*	Native
Onagraceae	*Epilobium laxum*	Native
Equisetaceae	*Equisetum arvense*	Native
Poaceae	*Eragrostis minor*	Native
Poaceae	*Eragrostis pilosa*	Native
Ranunculaceae	*Eranthis hyemalis*	Introduced
Asphodelaceae	*Eremurus himalaicus*	Native
Asteraceae	*Erigeron bonariensis*	Introduced
Asteraceae	*Erigeron canadensis*	Invasive
Asteraceae	*Erigeron poncinsii*	Native
Asteraceae	*Erigeron rufescens*	Introduced
Rosaceae	*Eriobotrya japonica*	Introduced
Geraniaceae	*Erodium cicutarium*	Native
Brassicaceae	*Erophila verna*	Native
Brassicaceae	*Eruca vesicaria*	Introduced
Apiaceae	*Eryngium billardieri*	Introduced
Apiaceae	*Eryngium caeruleum*	Native
Apiaceae	*Eryngium planum*	Introduced
Brassicaceae	*Erysimum hieraciifolium*	Introduced
Brassicaceae	*Erysimum perofskianum*	Introduced
Brassicaceae	*Erysimum altaicum*	Introduced

Family	Scientific Name	Status
Brassicaceae	*Erysimum cheiri*	Introduced
Papaveraceae	*Eschscholzia californica*	Introduced
Brassicaceae	*Euclidium syriacum*	Native
Celastraceae	*Euonymus hamiltonianus*	Native
Celastraceae	*Euonymus japonicus*	Introduced
Euphorbiaceae	*Euphorbia hispida*	Native
Euphorbiaceae	*Euphorbia falcata*	Native
Euphorbiaceae	*Euphorbia helioscopia*	Native
Euphorbiaceae	*Euphorbia lathyris*	Introduced
Euphorbiaceae	*Euphorbia hirta*	Introduced
Euphorbiaceae	*Euphorbia peplus*	Native
Euphorbiaceae	*Euphorbia prolifera*	Native
Convolvulaceae	*Evolvulus alsinoides*	Native
Moraceae	*Ficus carica*	Native
Moraceae	*Ficus palmata*	Native
Cyperaceae	*Fimbristylis dichotoma*	Native
Cyperaceae	*Fimbristylis quinquangularis*	Introduced
Cyperaceae	*Fimbristylis squarrosa*	Native
Apiaceae	*Foeniculum vulgare*	Native
Oleaceae	*Forsythia viridissima*	Introduced
Oleaceae	*Forsythia intermedia*	Introduced
Rosaceae	*Fragaria nubicola*	Native
Rosaceae	*Fragaria vesca*	Introduced
Oleaceae	*Fraxinus excelsior*	Introduced
Liliaceae	*Fritillaria imperialis*	Native
Papaveraceae	*Fumaria indica*	Native
Liliaceae	*Gagea dschungarica*	Introduced
Liliaceae	*Gagea gageoides*	Native
Liliaceae	*Gagea lutea*	Native
Asteraceae	*Gaillardia pulchella*	Introduced
Asteraceae	*Gaillardia grandiflora*	Introduced
Amaryllidaceae	*Galanthus nivalis*	Introduced
Asteraceae	*Galinsoga parviflora*	Invasive
Rubiaceae	*Galium aparine*	Native
Rubiaceae	*Galium ghilanicum*	Native
Asteraceae	*Gazania linearis*	Introduced
Asteraceae	*Gazania rigens*	Introduced
Gentianaceae	*Gentiana kurroo*	Native
Geraniaceae	*Geranium nepalense*	Native
Geraniaceae	*Geranium pusillum*	Native
Geraniaceae	*Geranium wallichianum*	Native
Rosaceae	*Geum urbanum*	Introduced
Ginkgoaceae	*Ginkgo biloba*	Introduced
Iridaceae	*Gladiolus hybridus*	Introduced
Fabaceae	*Gleditsia triacanthos*	Introduced
Fabaceae	*Glycine max*	Introduced
Amaranthaceae	*Gomphrena globosa*	Introduced

Family	Scientific Name	Status
Amaranthaceae	*Gomphrena haageana*	Introduced
Malvaceae	*Gossypium arboreum*	Introduced
Caryophyllaceae	*Gypsophila elegans*	Introduced
Plantaginaceae	*Hebe speciosa*	Introduced
Araliaceae	*Hedera canarensis*	Introduced
Araliaceae	*Hedera helix*	Introduced
Araliaceae	*Hedera nepalensis*	Native
Asteraceae	*Helianthus annuus*	Introduced
Asteraceae	*Helianthus tuberosus*	Introduced
Asteraceae	*Helichrysum bracteatum*	Introduced
Boraginaceae	*Heliotropium europaeum*	Introduced
Asphodelaceae	*Hemerocallis fulva*	Introduced
Caryophyllaceae	*Herniaria hirsuta*	Native
Caryophyllaceae	*Herniaria incana*	Introduced
Brassicaceae	*Hesperis matronalis*	Introduced
Malvaceae	*Hibiscus syriacus*	Introduced
Malvaceae	*Hibiscus trionum*	Native
Asteraceae	*Hieracium umbellatum*	Native
Asteraceae	*Himalaiella heteromalla*	Native
Poaceae	*Hordeum murinum*	Native
Asparagaceae	*Hosta sieboldii*	Introduced
Cannabaceae	*Humulus lupulus*	Introduced
Asparagaceae	*Hyacinthus orientalis*	Introduced
Hydrangeaceae	*Hydrangea heteromalla*	Introduced
Hydrangeaceae	*Hydrangea macrophylla*	Introduced
Hydrocharitaceae	*Hydrilla verticillata*	Native
Hydrocharitaceae	*Hydrocharis dubia*	Native
Hypericaceae	*Hypericum hookerianum*	Introduced
Hypericaceae	*Hypericum oblongifolium*	Native
Hypericaceae	*Hypericum perforatum*	Native
Asteraceae	*Hypochaeris radicata*	Introduced
Brassicaceae	*Iberis amara*	Introduced
Brassicaceae	*Iberis umbellata*	Introduced
Balsaminaceae	*Impatiens balsamina*	Introduced
Balsaminaceae	*Impatiens brachycentra*	Native
Balsaminaceae	*Impatiens glandulifera*	Native
Balsaminaceae	*Impatiens thomsonii*	Native
Balsaminaceae	*Impatiens edgeworthii*	Native
Poaceae	*Imperata cylindrica*	Introduced
Fabaceae	*Indigofera heterantha*	Native
Convolvulaceae	*Ipomoea eriocarpa*	Native
Convolvulaceae	*Ipomoea purpurea*	Introduced
Iridaceae	*Iris crocea*	Native
Iridaceae	*Iris ensata*	Introduced
Iridaceae	*Iris kashmiriana*	Native
Iridaceae	*Iris latifolia*	Introduced
Iridaceae	*Iris spuria*	Introduced
Iridaceae	*Iris variegata*	Introduced

Family	Scientific Name	Status
Iridaceae	*Iris versicolor*	Introduced
Iridaceae	*Iris germanica*	Introduced
Iridaceae	*Iris decora*	Native
Iridaceae	*Iris reticulata*	Introduced
Iridaceae	*Iris xiphium*	Introduced
Lamiaceae	*Isodon rugosus*	Native
Asteraceae	*Ixeris polycephala*	Native
Ixioliriaceae	*Ixiolirion tataricum*	Native
Oleaceae	*Jasminum humile*	Native
Oleaceae	*Jasminum mesnyi*	Introduced
Oleaceae	*Jasminum nudiflorum*	Introduced
Oleaceae	*Jasminum officinale*	Native
Juglandaceae	*Juglans regia*	Native
Juncaceae	*Juncus articulatus*	Native
Cupressaceae	*Juniperus horizontalis*	Introduced
Rosaceae	*Kerria japonica*	Introduced
Asphodelaceae	*Kniphofia uvaria*	Introduced
Cyperaceae	*Kobresia laxa*	Native
Poaceae	*Koeleria macrantha*	Native
Sapindaceae	*Koelreuteria paniculata*	Introduced
Fabaceae	*Laburnum anagyroides*	Introduced
Asteraceae	*Lactuca serriola*	Native
Asteraceae	*Lactuca dissecta*	Native
Lythraceae	*Lagerstroemia indica*	Introduced
Lamiaceae	*Lamium album*	Native
Lamiaceae	*Lamium amplexicaule*	Native
Aizoaceae	*Lampranthus multiradiatus*	Introduced
Boraginaceae	*Lappula echinophora*	Introduced
Asteraceae	*Lapsana communis*	Native
Fabaceae	*Lathyrus aphaca*	Native
Fabaceae	*Lathyrus odoratus*	Introduced
Lauraceae	*Laurus nobilis*	Introduced
Lamiaceae	*Lavandula angustifolia*	Introduced
Malvaceae	*Lavatera cashemiriana*	Native
Malvaceae	*Lavatera trimestris*	Introduced
Urticaceae	*Lecanthus peduncularis*	Native
Brassicaceae	*Lepidium didymum*	Introduced
Brassicaceae	*Lepidium latifolium*	Native
Brassicaceae	*Lepidium sativum*	Native
Brassicaceae	*Lepidium virginicum*	Introduced
Fabaceae	*Lespedeza elegans*	Native
Asteraceae	*Leucanthemum vulgare*	Introduced
Amaryllidaceae	*Leucojum aestivum*	Introduced
Oleaceae	*Ligustrum lucidum*	Introduced
Oleaceae	*Lingustrum japonicum*	Introduced
Oleaceae	*Ligustrum ovalifolium*	Introduced
Oleaceae	*Ligustrum sinense*	Introduced
Oleaceae	*Ligustrum vulgare*	Introduced

Family	Scientific Name	Status
Liliaceae	*Lilium regale*	Introduced
Liliaceae	*Lilium lancifolium*	Introduced
Plantaginaceae	*Linaria dalmatica*	Introduced
Plantaginaceae	*Linaria incarnata*	Introduced
Plantaginaceae	*Linaria vulgaris*	Introduced
Linderniaceae	*Lindernia dubia*	Introduced
Boraginaceae	*Lithospermum officinale*	Native
Brassicaceae	*Lobularia maritima*	Introduced
Poaceae	*Lolium perenne*	Native
Poaceae	*Lolium persicum*	Native
Poaceae	*Lolium temulentum*	Native
Caprifoliaceae	*Lonicera japonica*	Introduced
Caprifoliaceae	*Lonicera nitida*	Introduced
Caprifoliaceae	*Lonicera quinquelocularis*	Native
Fabaceae	*Lotus corniculatus*	Native
Brassicaceae	*Lunaria annua*	Introduced
Fabaceae	*Lupinus polyphyllus*	Introduced
Juncaceae	*Luzula pallescens*	Native
Lamiaceae	*Lycopus europaeus*	Native
Amaryllidaceae	*Lycoris radiata*	Introduced
Lythraceae	*Lythrum salicaria*	Native
Magnoliaceae	*Magnolia kobus*	Introduced
Magnoliaceae	*Magnolia grandiflora*	Introduced
Magnoliaceae	*Magnolia liliiflora*	Introduced
Magnoliaceae	*Magnolia stellata*	Introduced
Magnoliaceae	*Magnolia soulangeana*	Introduced
Berberidaceae	*Mahonia aquifolium*	Introduced
Berberidaceae	*Mahonia borealis*	Native
Berberidaceae	*Mahonia duclouxiana*	Native
Brassicaceae	*Malcolmia maritima*	Introduced
Brassicaceae	*Malcolmia africana*	Native
Rosaceae	*Malus baccata*	Native
Rosaceae	*Malus domestica*	Introduced
Rosaceae	*Malus sylvestris*	Introduced
Rosaceae	*Malus purpurea*	Introduced
Malvaceae	*Malva neglecta*	Native
Malvaceae	*Malva sylvestris*	Native
Malvaceae	*Malva verticillata*	Native
Lamiaceae	*Marrubium vulgare*	Native
Brassicaceae	*Matthiola incana*	Introduced
Asteraceae	*Matricaria matricarioides*	Introduced
Mazaceae	*Mazus pumilus*	Native
Fabaceae	*Medicago lupulina*	Native
Fabaceae	*Medicago minima*	Native
Fabaceae	*Medicago sativa*	Introduced
Fabaceae	*Medicago polymorpha*	Native
Meliaceae	*Melia azedarach*	Native
Poaceae	*Melica persica*	Native

Family	Scientific Name	Status
Fabaceae	*Melilotus albus*	Native
Fabaceae	*Melilotus indicus*	Native
Lamiaceae	*Mentha aquatica*	Native
Lamiaceae	*Mentha arvensis*	Native
Lamiaceae	*Mentha spicata*	Native
Lamiaceae	*Mentha × piperita*	Introduced
Lamiaceae	*Mentha longifolia*	Native
Nyctaginaceae	*Mirabilis jalapa*	Introduced
Moraceae	*Morus alba*	Introduced
Moraceae	*Morus nigra*	Introduced
Asparagaceae	*Muscari neglectum*	Introduced
Asparagaceae	*Muscari botryoides*	Introduced
Boraginaceae	*Mysotis scorpioides*	Native
Boraginaceae	*Myosotis arvensis*	Native
Boraginaceae	*Myosotis laxa*	Native
Asteraceae	*Myriactis nepalensis*	Native
Asteraceae	*Myriactis wallichii*	Native
Haloragaceae	*Myriophyllum aquaticum*	Invasive
Haloragaceae	*Myriophyllum spicatum*	Native
Myrtaceae	*Myrtus communis*	Introduced
Berberidaceae	*Nandina domestica*	Introduced
Amaryllidaceae	*Narcissus jonquilla*	Introduced
Amaryllidaceae	*Narcissus poeticus*	Introduced
Amaryllidaceae	*Narcissus pseudonarcissus*	Introduced
Amaryllidaceae	*Narcissus tazetta*	Introduced
Amaryllidaceae	*Narcissus incomparabilis*	Introduced
Amaryllidaceae	*Narcissus medioluteus*	Introduced
Amaryllidaceae	*Narcissus odorus*	Introduced
Brassicaceae	*Nasturtium officinale*	Native
Lamiaceae	*Nepeta cataria*	Native
Apocynaceae	*Nerium oleander*	Native
Brassicaceae	*Neslia paniculata*	Introduced
Solanaceae	*Nicotiana suaveolens*	Introduced
Ranunculaceae	*Nigella damascena*	Introduced
Onagraceae	*Oenothera rosea*	Introduced
Onagraceae	*Oenothera biennis*	Introduced
Onagraceae	*Oenothera glazioviana*	Introduced
Asteraceae	*Onopordum acanthium*	Native
Lamiaceae	*Origanum vulgare*	Native
Asparagaceae	*Ornithogalum umbellatum*	Introduced
Orobanchaceae	*Orobanche alba*	Introduced
Poaceae	*Oryza sativa*	Introduced
Oxalidaceae	*Oxalis corniculata*	Introduced
Oxalidaceae	*Oxalis debilis*	Introduced
Paeoniaceae	*Paeonia suffruticosa*	Introduced
Papaveraceae	*Papaver bracteatum*	Introduced
Papaveraceae	*Papaver dubium*	Native
Papaveraceae	*Papaver rhoeas*	Native

Family	Scientific Name	Status
Papaveraceae	*Papaver somniferum*	Introduced
Papaveraceae	*Papaver macrostomum*	Native
Hamamelidaceae	*Parrotiopsis jacquemontiana*	Native
Asteraceae	*Parthenium hysterophorus*	Introduced
Vitaceae	*Parthenocisus quinquefolia*	Introduced
Vitaceae	*Parthenocisus tricuspidata*	Introduced
Paulowniaceae	*Paulownia tomentosa*	Introduced
Passifloraceae	*Passiflora caerulea*	Introduced
Nitrariaceae	*Peganum harmala*	Native
Geraniaceae	*Pelargonium graveolens*	Introduced
Geraniaceae	*Pelargonium zonale*	Introduced
Poaceae	*Pennisetum flaccidum*	Native
Poaceae	*Pennisetum glaucum*	Introduced
Polygonaceae	*Persicaria hydropiper*	Native
Solanaceae	*Petunia hybrida*	Introduced
Poaceae	*Phalaris arundinacea*	Native
Poaceae	*Phalaris minor*	Native
Fabaceae	*Phaseolus vulgaris*	Introduced
Hydrangeaceae	*Philadelphus incanus*	Introduced
Poaceae	*Phleum pratense*	Native
Polemoniaceae	*Phlox drummondii*	Introduced
Polemoniaceae	*Phlox paniculata*	Introduced
Poaceae	*Phragmites australis*	Native
Solanaceae	*Physalis longifolia*	Introduced
Asteraceae	*Picris hieracioides*	Native
Pinaceae	*Pinus halepensis*	Introduced
Pinaceae	*Pinus wallichiana*	Native
Fabaceae	*Pisum sativum*	Introduced
Plantaginaceae	*Plantago lanceolata*	Native
Plantaginaceae	*Plantago major*	Native
Platanaceae	*Platanus orientalis*	Introduced
Cupressaceae	*Platycladus orientalis*	Introduced
Platanaceae	*Platanus occidentalis*	Introduced
Poaceae	*Poa angustifolia*	Native
Poaceae	*Poa annua*	Native
Poaceae	*Poa pratensis*	Native
Poaceae	*Poa bulbosa*	Native
Poaceae	*Poa palustris*	Introduced
Polygalaceae	*Polygala sibirica*	Native
Asparagaceae	*Polygonatum verticillatum*	Native
Polygonaceae	*Polygonum plebeium*	Native
Polygonaceae	*Polygonum aviculare*	Native
Rutaceae	*Poncirus trifoliata*	Introduced
Salicaceae	*Populus alba*	Native
Salicaceae	*Populus deltoides*	Introduced
Salicaceae	*Populus nigra*	Introduced
Portuculaceae	*Portulaca grandiflora*	Introduced
Portuculaceae	*Portulaca oleracea*	Introduced

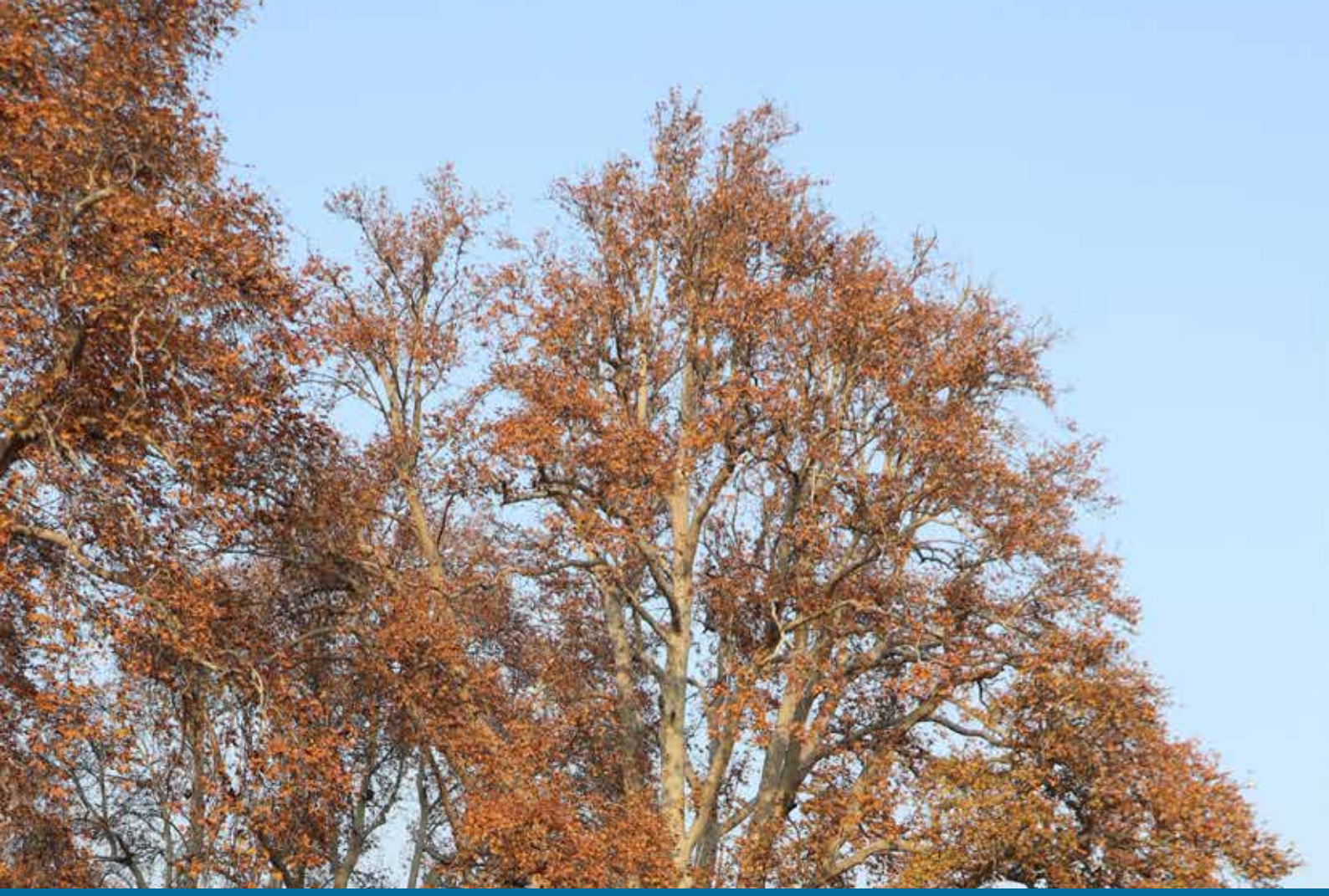
Family	Scientific Name	Status
Rosaceae	*Potentilla reptans*	Native
Rosaceae	*Potentilla sericea*	Introduced
Verbenaceae	*Priva grandiflora*	Introduced
Primulaceae	*Primula vulgaris*	Introduced
Lamiaceae	*Prunella vulgaris*	Native
Rosaceae	*Prunus armeniaca*	Introduced
Rosaceae	*Prunus avium*	Introduced
Rosaceae	*Prunus cerasifera*	Introduced
Rosaceae	*Prunus cerasus*	Introduced
Rosaceae	*Prunus domestica*	Introduced
Rosaceae	*Prunus dulcis*	Introduced
Rosaceae	*Prunus glandulosa*	Introduced
Rosaceae	*Prunus laurocerasus*	Introduced
Rosaceae	*Prunus persica*	Introduced
Rosaceae	*Prunus prostrata*	Introduced
Rosaceae	*Prunus tomentosa*	Introduced
Lythraceae	*Punica granatum*	Introduced
Rosaceae	*Pyrus malus*	Introduced
Rosaceae	*Pyrus communis*	Introduced
Fagaceae	*Quercus robur*	Introduced
Lamiaceae	*Rabdosia rugosa*	Native
Ranunculaceae	*Ranunculus laetus*	Introduced
Ranunculaceae	*Ranunculus aquatilis*	Introduced
Ranunculaceae	*Ranunculus arvensis*	Native
Ranunculaceae	*Ranunculus distans*	Native
Ranunculaceae	*Ranunculus lingua*	Native
Ranunculaceae	*Ranunculus muricatus*	Native
Ranunculaceae	*Ranunculus sceleratus*	Native
Brassicaceae	*Raphanus raphanistrum*	Introduced
Fabaceae	*Robinia pseudoacacia*	Introduced
Brassicaceae	*Rorippa indica*	Native
Brassicaceae	*Rorippa islandica*	Introduced
Brassicaceae	*Rorippa sylvestris*	Native
Rosaceae	*Rosa damascena*	Introduced
Rosaceae	*Rosa banksiae*	Introduced
Rosaceae	*Rosa brunonii*	Native
Rosaceae	*Rosa indica*	Introduced
Rosaceae	*Rosa multiflora*	Introduced
Rosaceae	*Rosa moschata*	Introduced
Rosaceae	*Rosa chinensis*	Introduced
Rosaceae	*Rosa corymbifera*	Introduced
Rosaceae	*Rosa foetida*	Introduced
Rosaceae	*Rosa laevigata*	Introduced
Rosaceae	*Rosa webbiana*	Native
Lamiaceae	*Rosmarinus officinalis*	Introduced
Poaceae	*Rostraria cristata*	Native
Lythraceae	*Rotala densiflora*	Native
Lythraceae	*Rotala indica*	Native

Family	Scientific Name	Status
Lythraceae	*Rotala mexicana*	Introduced
Rubiaceae	*Rubia cordifolia*	Native
Rosaceae	*Rubus niveus*	Native
Rosaceae	*Rubus ulmifolius*	Introduced
Asteraceae	*Rudbeckia fulgida*	Introduced
Asteraceae	*Rudbeckia hirta*	Introduced
Polygonaceae	*Rumex crispus*	Native
Polygonaceae	*Rumex dentatus*	Native
Polygonaceae	*Rumex hastatus*	Native
Polygonaceae	*Rumex patientia*	Native
Caryophyllaceae	*Sagina apetala*	Introduced
Caryophyllaceae	*Sagina procumbens*	Introduced
Caryophyllaceae	*Sagina saginoides*	Native
Salicaceae	*Salix aegyptiaca*	Introduced
Salicaceae	*Salix alba*	Introduced
Salicaceae	*Salix babylonica*	Introduced
Salicaceae	*Salix caprea*	Introduced
Salicaceae	*Salix matsudana*	Introduced
Salicaceae	*Salix disperma*	Native
Salicaceae	*Salix fragilis*	Introduced
Salicaceae	*Salix viminalis*	Introduced
Lamiaceae	*Salvia glutinosa*	Introduced
Lamiaceae	*Salvia splendens*	Introduced
Lamiaceae	*Salvia viridis*	Introduced
Lamiaceae	*Salvia moorcroftiana*	Native
Viburnaceae	*Sambucus nigra*	Introduced
Rosaceae	*Sanguisorba minor*	Native
Apiaceae	*Sanicula elata*	Native
Asteraceae	*Santolina chamaecyparissus*	Introduced
Caryophyllaceae	*Saponaria ocymoides*	Introduced
Caryophyllaceae	*Saponaria calabrica*	Introduced
Asteraceae	*Saussurea albescens*	Native
Apiaceae	*Scandix pecten-veneris*	Native
Scrophulariaceae	*Scrophularia decomposita*	Native
Scrophulariaceae	*Scrophularia lucida*	Introduced
Lamiaceae	*Scutellaria galericulata*	Native
Asteraceae	*Senecio nudicaulis*	Introduced
Asteraceae	*Senecio vulgaris*	Introduced
Poaceae	*Setaria viridis*	Native
Malvaceae	*Sidalcea malviflora*	Introduced
Asteraceae	*Sigesbeckia orientalis*	Native
Caryophyllaceae	*Silene armeria*	Introduced
Caryophyllaceae	*Silene coeli-rosa*	Introduced
Caryophyllaceae	*Silene conoidea*	Native
Caryophyllaceae	*Silene coronaria*	Native
Caryophyllaceae	*Silene vulgaris*	Native
Caryophyllaceae	*Silene schafta*	Introduced
Asteraceae	*Silybum marianum*	Native

Family	Scientific Name	Status
Berberidaceae	*Sinopodophyllym hexandrum*	Native
Brassicaceae	*Sisymbrium irio*	Native
Brassicaceae	*Sisymbrium officinale*	Invasive
Brassicaceae	*Sisymbrium loeselii*	Native
Apiaceae	*Sium latijugum*	Native
Solanaceae	*Solanum lycopersicum*	Introduced
Solanaceae	*Solanum melongena*	Introduced
Solanaceae	*Solanum tuberosum*	Introduced
Solanaceae	*Solanum americanum*	Introduced
Boraginaceae	*Solenanthus circinnatus*	Native
Asteraceae	*Solidago gigantea*	Introduced
Asteraceae	*Solidago virga-aurea*	Native
Asteraceae	*Sonchus arvensis*	Invasive
Asteraceae	*Sonchus asper*	Native
Asteraceae	*Sonchus oleraceus*	Invasive
Asteraceae	*Sonchus tenerrimus*	Introduced
Fabaceae	*Sophora japonica*	Introduced
Rosaceae	*Sorbaria tomentosa*	Native
Poaceae	*Sorghum halepense*	Native
Asteraceae	*Sphaeranthus indicus*	Introduced
Typhaceae	*Sparganium erectum*	Introduced
Fabaceae	*Spartium junceum*	Introduced
Caryophyllaceae	*Spergularia rubra*	Introduced
Rosaceae	*Spiraea bella*	Native
Rosaceae	*Spiraea canescens*	Native
Rosaceae	*Spiraea cantoniensis*	Introduced
Rosaceae	*Spiraea prunifolia*	Introduced
Rosaceae	*Spiraea japonica*	Introduced
Rosaceae	*Spiraea vanhouttei*	Introduced
Poaceae	*Sporobolus piliferus*	Introduced
Lamiaceae	*Stachys sericea*	Introduced
Caryophyllaceae	*Stellaria media*	Native
Caryophyllaceae	*Stellaria aquatica*	Native
Amaryllidaceae	*Sternbergia lutea*	Introduced
Amaryllidaceae	*Sternbergia vernalis*	Introduced
Acanthaceae	*Strobilanthes urticifolia*	Native
Fabaceae	*Styphnolobium japonicum*	Introduced
Boraginaceae	*Symphytum officinale*	Introduced
Oleaceae	*Syringa persica*	Native
Orchidaceae	*Syringa vulgaris*	Introduced
Asteraceae	*Tagetes erecta*	Introduced
Asteraceae	*Tagetes minuta*	Introduced
Asteraceae	*Tagetes tenuifolia*	Introduced
Tamaricaceae	*Tamarix parviflora*	Introduced
Asteraceae	*Taraxacum officinale*	Introduced
Ranunculaceae	*Thalictrum minus*	Native
Ranunculaceae	*Thalictrum pedunculatum*	Native
Poaceae	*Themeda anathera*	Native

Family	Scientific Name	Status
Brassicaceae	*Thlaspi arvense*	Native
Lamiaceae	*Thymus mongolicus*	Introduced
Lamiaceae	*Thymus linearis*	Native
Malvaceae	*Tilia rubra*	Introduced
Malvaceae	*Tilia platyphyllos*	Introduced
Apiaceae	*Torilis japonica*	Native
Apiaceae	*Torilis leptophylla*	Introduced
Anacardiaceae	*Toxicodendron grandiflorum*	Introduced
Arecaceae	*Trachycarpus fortunei*	Introduced
Commelinaceae	*Tradescantia bracteata*	Introduced
Commelinaceae	*Tradescantia virginiana*	Introduced
Asteraceae	*Tragopogon dubius*	Native
Asteraceae	*Tragopogon kashmirianus*	Native
Lythraceae	*Trapa natans*	Native
Zygophyllaceae	*Tribulus terrestris*	Native
Fabaceae	*Trifolium dubium*	Introduced
Fabaceae	*Trifolium fragiferum*	Native
Fabaceae	*Trifolium alexandrinum*	Introduced
Fabaceae	*Trifolium pratense*	Native
Fabaceae	*Trifolium repens*	Native
Poaceae	*Triticum aestivum*	Native
Tropaeolaceae	*Tropaeolum majus*	Introduced
Amaryllidaceae	*Tulbaghia violacea*	Introduced
Liliaceae	*Tulipa clusiana*	Native
Asteraceae	*Tussilago farfara*	Native
Ulmaceae	*Ulmus villosa*	Native
Ulmaceae	*Ulmus wallichiana*	Native
Urticaceae	*Urtica dioica*	Native
Lentibulariaceae	*Utricularia flexuosa*	Introduced
Caryophyllaceae	*Vaccaria hispanica*	Native
Caprifoliaceae	*Valeriana hardwickii*	Native
Caprifoliaceae	*Valeriana jatamansi*	Native
Caprifoliaceae	*Valerianella dentata*	Native
Scrophulariaceae	*Verbascum thapsus*	Native
Verbenaceae	*Verbena bonariensis*	Introduced
Verbenaceae	*Verbena officinalis*	Native
Verbenaceae	*Verbena hybrida*	Introduced

Family	Scientific Name	Status
Plantaginaceae	*Veronica anagallis-aquatica*	Native
Plantaginaceae	*Veronica arvensis*	Native
Plantaginaceae	*Veronica beccabunga*	Native
Plantaginaceae	*Veronica biloba*	Native
Plantaginaceae	*Veronica laxa*	Native
Plantaginaceae	*Veronica persica*	Introduced
Plantaginaceae	*Veronica polita*	Native
Plantaginaceae	*Veronica serpyllifolia*	Native
Plantaginaceae	*Veronica peregrina*	Introduced
Viburnaceae	*Viburnum grandiflorum*	Native
Viburnaceae	*Viburnum opulus*	Introduced
Fabaceae	*Vicia cracca*	Introduced
Fabaceae	*Vicia hirsuta*	Native
Fabaceae	*Vicia sativa*	Native
Fabaceae	*Vigna aconitifolia*	Native
Fabaceae	*Vigna mungo*	Native
Fabaceae	*Vigna radiata*	Native
Apocynaceae	*Vinca major*	Introduced
Santalaceae	*Viscum album*	Native
Violaceae	*Viola tricolor*	Introduced
Violaceae	*Viola odorata*	Introduced
Violaceae	*Viola x wittrockiana*	Native
Vitaceae	*Vitis vinifera*	Introduced
Caprifoliaceae	*Weigela florida*	Introduced
Fabaceae	*Wisteria sinensis*	Introduced
Solanaceae	*Withania somnifera*	Native
Asteraceae	*Xanthium strumarium*	Invasive
Asteraceae	*Xanthium spinosum*	Invasive
Asteraceae	*Xerochrysum bracteatum*	Introduced
Asteraceae	*Youngia japonica*	Native
Asparagaceae	*Yucca aloifolia*	Introduced
Araceae	*Zantedeschia aethiopica*	Introduced
Poaceae	*Zea mays*	Introduced
Amaryllidaceae	*Zephyranthes candida*	Introduced
Amaryllidaceae	*Zephyranthes rosea*	Introduced
Asteraceae	*Zinnia angustifolia*	Introduced
Asteraceae	*Zinnia elegans*	Introduced



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

Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhavan, Jor Bagh Road New Delhi - 110 003, INDIA
Phone: +91-11-24695135
Fax : +91-11-45660670
Email: hempande@nic.in, sujata@nic.in
Website: www.moef.nic.in

Edited by
Mr. Hem K. Pande
Dr. Sujata Arora

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

ACKNOWLEDGEMENTS

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

V.B. Mathur,
K. Sivakumar,
Malvika Onial,
C. Ramesh,
Vashaiwi Singh,
Biba Jasmine Kaur,
Anant Pande

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' (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.

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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.

ACTION POINTS OF NATIONAL BIODIVERSITY ACTION PLAN 2008

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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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.

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.

VI

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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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.

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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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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.

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


ACTION POINTS OF NATIONAL
BIODIVERSITY ACTION PLAN 20
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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.		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

34

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

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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
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

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

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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
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
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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
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												

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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
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

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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
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
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
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
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
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												

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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
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
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
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

52

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
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												

55

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.

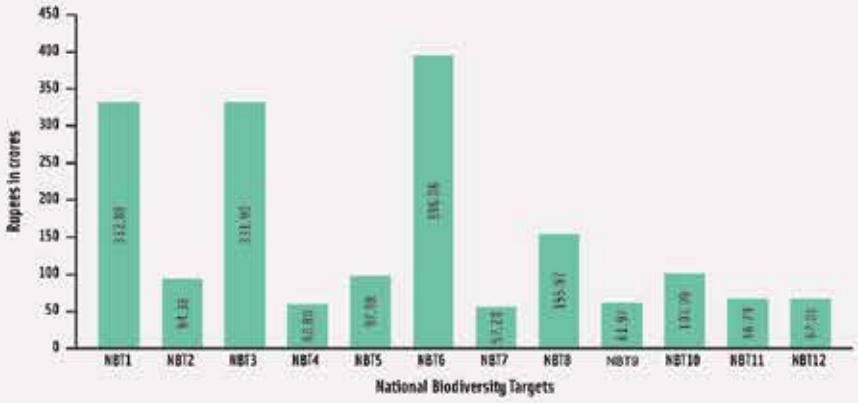

Figure 1. MoEF budget allocation (2013-2014) that contributes towards NBTs

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

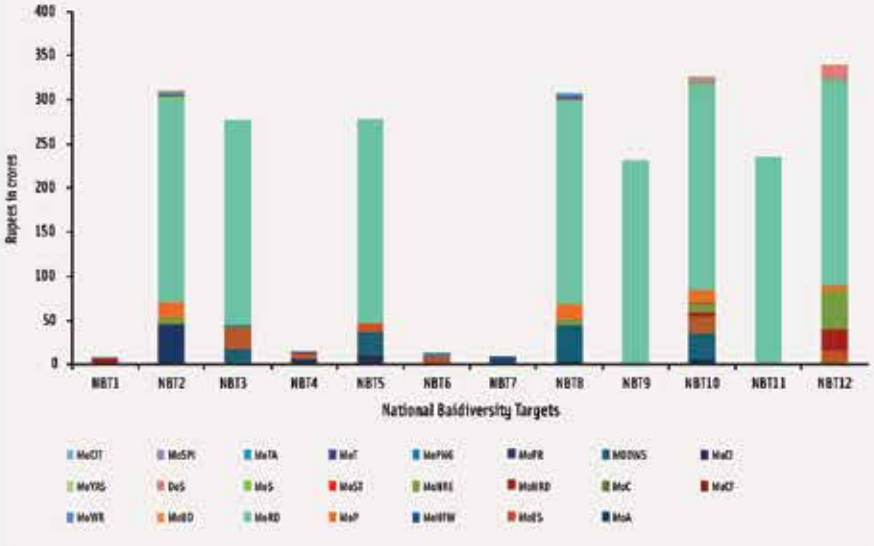

Figure 2. Budget allocations (2013-2014) of 21 Ministries of GoI (excluding MoRD and MoDWS) that contribute towards NBTs

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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).

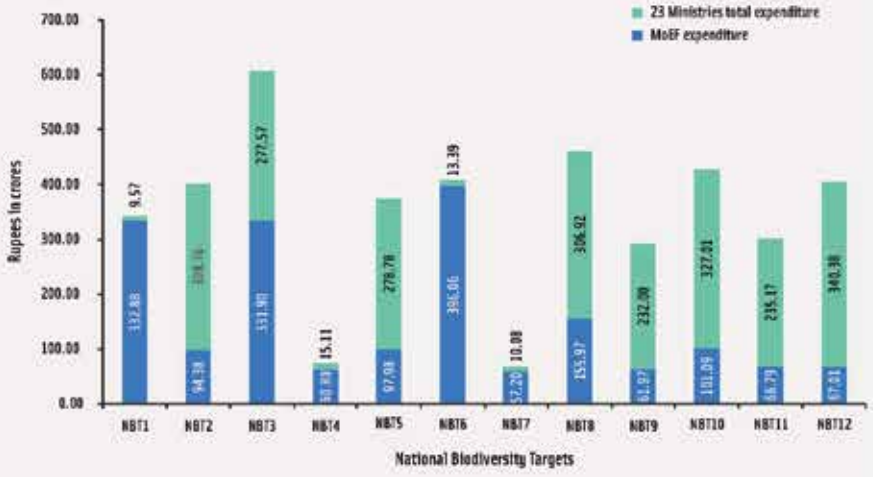

Figure 3. Combined allocation of funds (2013-2014) of MoEF and 23 Ministries/ Departments of GoI that contribute towards NBTs

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.

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

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

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.

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.

NATIONAL BIODIVERSITY ACTION PLAN (NBAP)

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.

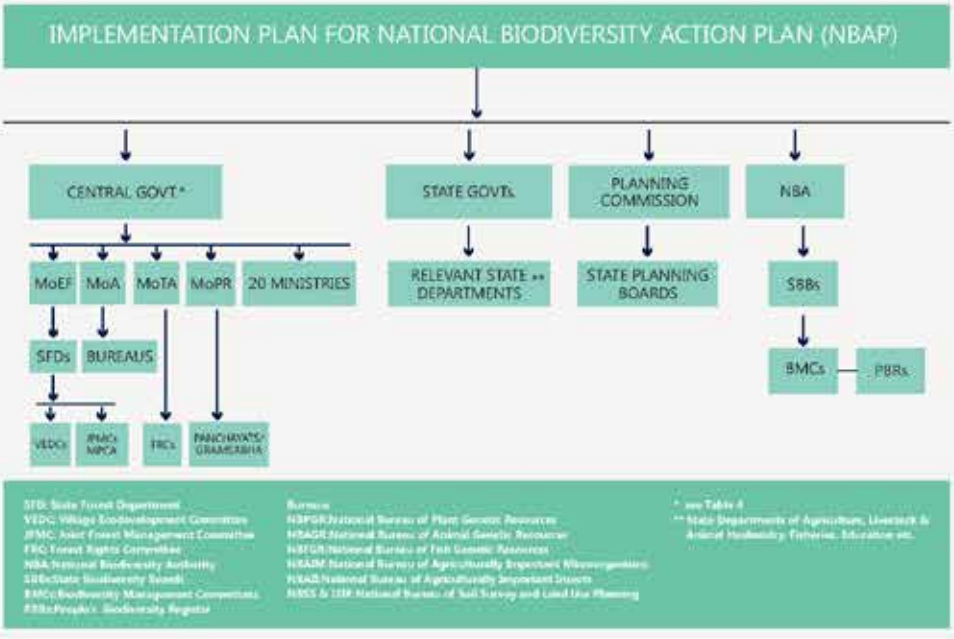

Figure 4. Implementation plan for NBAP

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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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

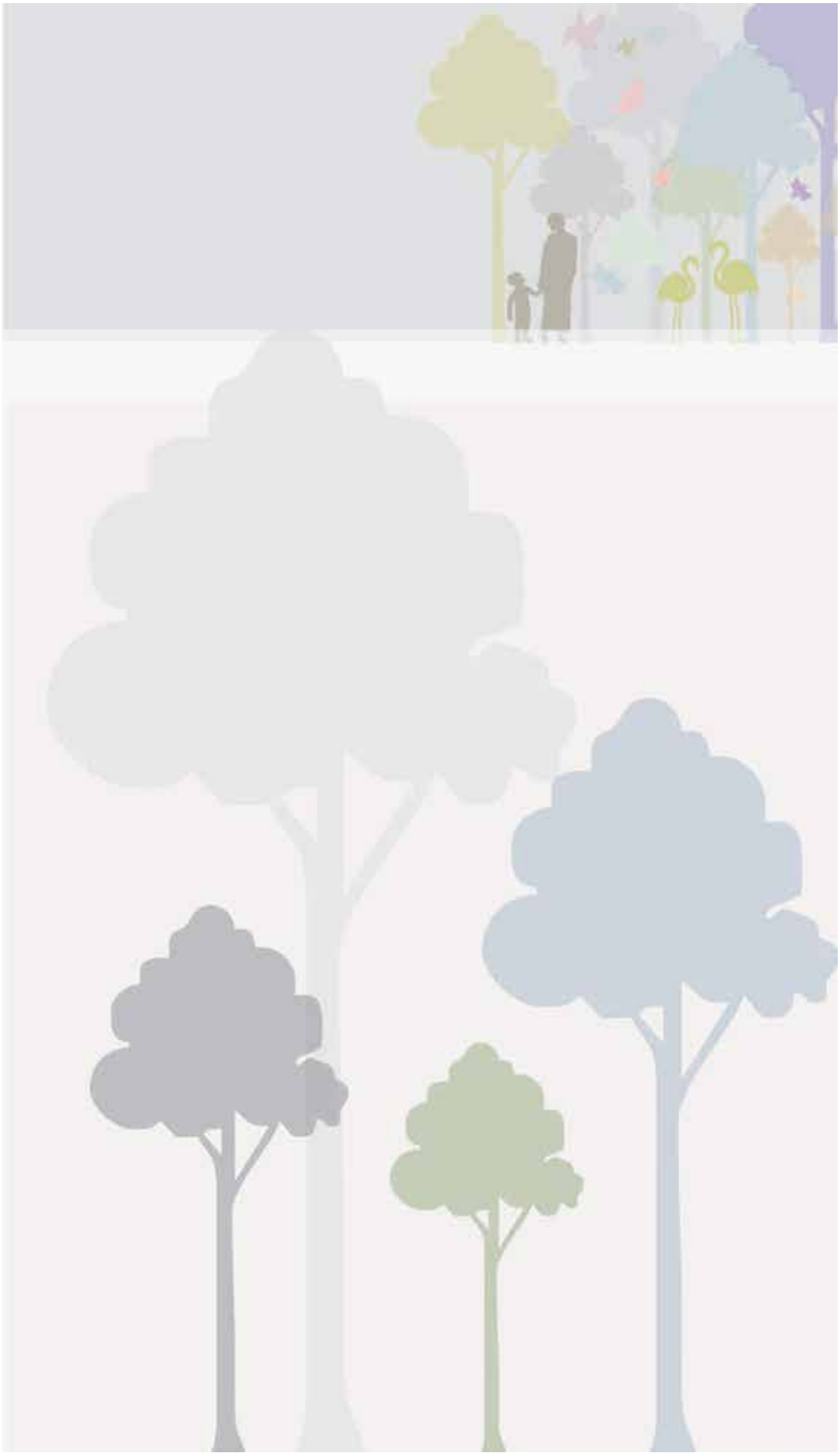
Objective IV: Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted

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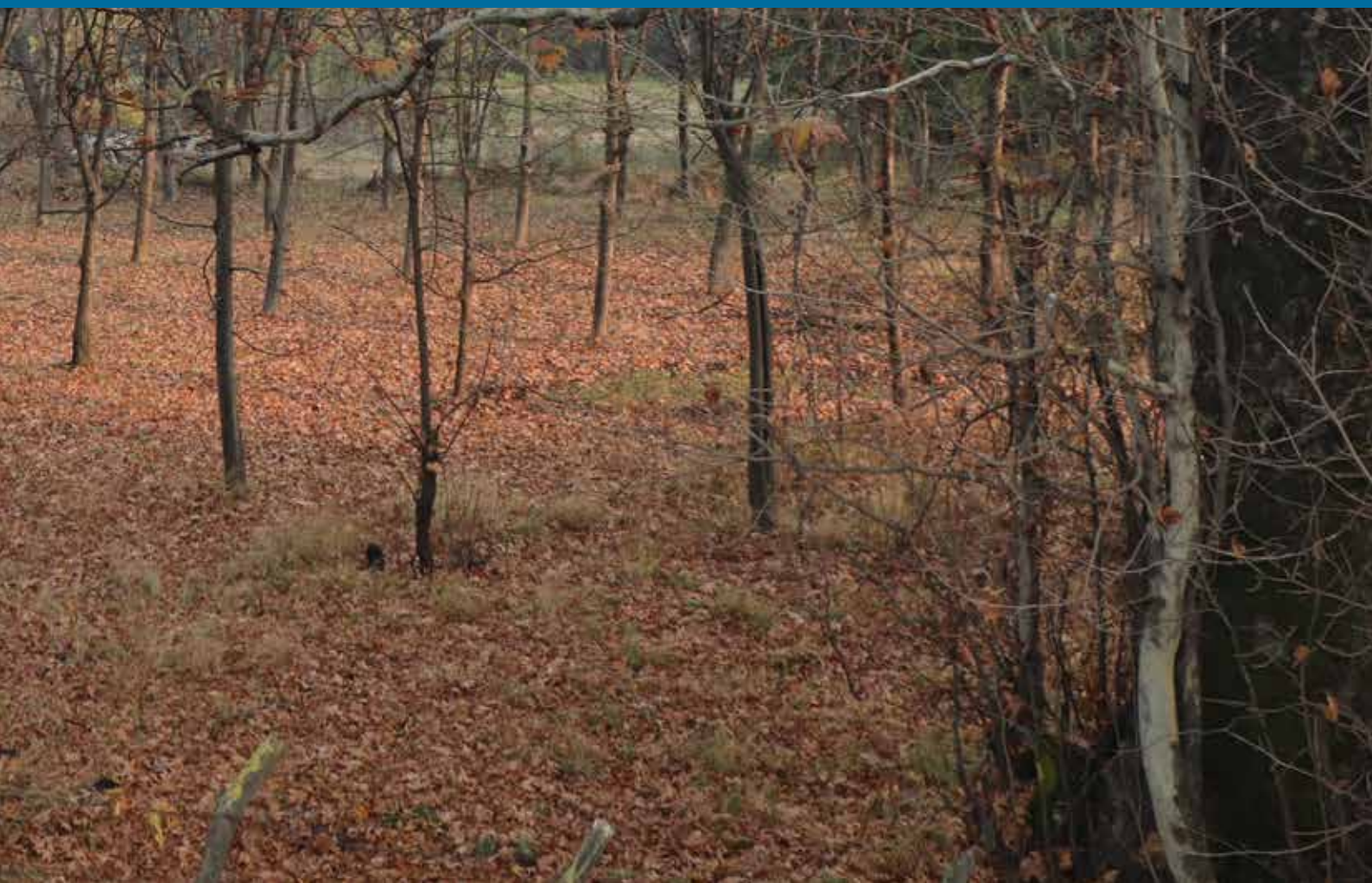
8.3. Proceedings of the Consultation Workshops for Developing Local Biodiversity Strategy and Action Plan (LBSAP) for Srinagar City



Prepared under

INTERACT-Bio
Integrated action on biodiversity

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

Banquet Hall, MA Road, Srinagar | 23 August 2021

Funding Support

Supported by:
Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
based on a decision of the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

Supported in India by

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 Srinagar 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 initiative, the city of Srinagar will align their planning with the National Biodiversity Strategy and Action Plans (NBSAPs), which is 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 Srinagar

The city of Srinagar is the summer capital of the Indian-administered union territory (UT) of Jammu and Kashmir (J&K). It is also the largest city in the UT and the northernmost city of India, situated at an altitude of 1588 m above mean sea level. A number of water bodies in the form of canals, lakes, wetlands and swamps exist around the city region of Srinagar.[1] The physiography of the city is unique[2] with steep hills in the east and north-east, agricultural fields in the flood plains of the Jhelum located in the south and west, the Karewas of Budgam in the extreme south and uplands with moderate slopes in the north. These geographic features have influenced urban sprawl in the direction of the plains rather than towards the mountains. Srinagar is very vulnerable to earthquakes being located in a severe intensity seismic zone. Given the city is popular for its picturesque landscape and often referred to as the "paradise on the earth", it attracts a large number of tourists and hence, the tourism industry forms the backbone of the city's economy.[3] Other allied businesses related to tourism such as hotels, restaurants, bakery, handloom and handicrafts significantly contribute to the local economy. Given the prevalence of old wood-carving tradition and other skill-based work associated with manufacturing and selling of goods and services including furniture, carpets, shawls and silk items in the Kashmir valley, the city of Srinagar is considered as the major commercial and transportation hub in the UT.

The city forms a part of the urban agglomeration known as Srinagar Metropolitan Region (SMR) with an overall population of over one million. In the last decade, the city has recorded a decadal growth rate of 23.13%.[2] Given the high rate of urbanization, the total population in the city as well as in Srinagar district is expected to witness an exponential growth in the coming decades.[1]

Rapid urbanisation in Srinagar has brought about significant degradation of the local ecosystems. The Dal Lake, in the heart of the city is encroached, eutrophied and has several invasive alien species. This is the case of all of the other lakes of the city. The Jhelum is constantly mined for sand and gravel, while the forested hills are slowly becoming fragmented and littered with solid waste. The city's agricultural fields, horticultural plantations and wetlands might soon fall prey to the real estate industry as the city's urban sprawl increases.

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.

1. Town Planning Organisation Kashmir. 2019. Srinagar Metropolitan Regional Plan - 2035.
2. Kuchay, N.A, M. Sultan Bhat M.S., and Kashmir J. 2014. 'Analysis and Simulation of urban expansion of Srinagar City.' Transactions of the Institute of Indian Geographers. 36 (1): 109-121.
3. Srinagar Online. 2021. 'Business and Economy of Srinagar.' https://www.srinagaronline.in/city-guide/business-and-economy-of-srinagar. Accessed on 31 August 2021.

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 Srinagar. 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 Srinagar, the Ecosystem Service Opportunities (ESO) framework, focusing on Steps 2 and 3 of the step-by-step guidelines[4,5] 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 the NBSAP.

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 Srinagar, Jammu and Kashmir (J&K) on the 23rd of August, 2021. 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:

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

Workshop Report

Inaugural Session

The inaugural session commenced with Mr. Asaf Mahmood Sagar, Member Secretary, J&K Biodiversity Council, welcoming the gathering. He spoke the importance of biodiversity in the city and how the health of the city can be measured by the health of its biodiversity. He also spoke about various indicators in conservation which benchmark sustainability and how the CBI and the LBSAP need to be mainstreamed into urban

4. Rode, J., and Wittmer, H. 2015. Acting on Ecosystem Service Opportunities – Guidelines for identifying, selecting and planning economic instruments to conserve ecosystems and enhance local livelihoods. Helmholtz Centre for Environmental Research GmbH – UFZ , Leipzig

5. Rode, J., Wittmer, H., Emerton, L., and Schröter-Schlaack,C. 2016. Ecosystem service opportunities: A practice-oriented framework for identifying economic instruments to enhance biodiversity and human livelihoods. Journal for Nature Conservation, 33: 35-47.

planning. He finally concluded by stating that the public needs to be involved in the process of developing these documents to bring about ownership and reduce any conflicts that could arise.

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 and it should not be used as a tool for comparison between cities. Rather, it is a tool for self-assessment. 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 help cities independently apply the index subsequently. The LBSAP and its significance was also introduced to the audience. She also stated that Srinagar being a smart city, could improve its score just be developing the CBI and LBSAP. She ended with what stakeholders could expect in the day's session.

Dr. Ruchi Pant, Chief- Climate Change, Resilience & Chemicals Management, UNDP, commended the J& K Biodiversity Council and the city government for reaching this stage of prioritising biodiversity. She mentioned how natural assets and biodiversity must be managed, valued and integrated into various aspects of city governance. As the world is now increasingly becoming urban, local bodies have an immense responsibility as biodiversity custodians in their areas. While several national plans and policies have been drawn up such as the National Biodiversity Strategy and Action Plan, the National Action Plan to Combat Desertification, the National Action Plan on Climate Change and so forth, there are huge gaps when it comes to localising these plans. Convergence along with a resource mobilisation plan for biodiversity must be looked at. She enumerated BIOFIN, a flagship programme that supports this. She spoke about how government ownership is necessary in the implementation and monitoring of the LBSAP. She ended with the collaborations the UNDP has had with Srinagar in the past, decisively stating that this collaboration to develop the LBSAP will help to localise the Sustainable Development Goals (SDGs).

Mr. Athar Aamir Khan, IAS, Commissioner, Srinagar Municipal Corporation (SMC) and CEO of Srinagar Smart City, congratulated the Forest Department on initiating this monumental step towards the stewardship of Srinagar's biodiversity. With so many animals facing extinction, biodiversity and ecological health is very important. He called for coming together to monitor, prevent and slowdown biodiversity and habitat loss. He also pointed out how habitat loss was the biggest threat faced by biodiversity. Bringing out local examples in Srinagar such as the Hokersar Lake which is affected by pollution, invasive species overtaking native ones in the Dal Lake, climate change in the Valley, he said the challenge going forward was bigger which meant that everyone needed to act now. He spoke about how the CBI and LBSAP could help in building back better. He ended by calling for various line departments, statal and parastatal bodies to come together so that the UT could take a position of leadership in the country with regard to biodiversity management and preservation.

A video on biodiversity and its links to health and food security was played for the participants.

Dr. Mohit Gera, the PCCF and HoFF of J&K Forest Department and Chairman, J&K Biodiversity Council, welcomed everyone and exclaimed that the city of Srinagar was one of love and peace. He expressed how impressed he was with the keen interest shown by the city's representatives. Biodiversity, he explained, connects ecosystems. He elaborated on the types of ecosystems, their resilience and how central humans were to them. He talked about tangible and intangible ecosystem services illustrating the same through forests in the UT. He stressed on protecting iconic city ecosystems such as the Chinars, catchment areas in the hills and agricultural area. He mentioned that J&K was blessed with biodiversity. Taking forward policy recommendations that 2/3rd of the area of the UT have forest cover in combination with the UN declaration that this be the decade of ecosystem restoration, the department has been planning to restore degraded lands. He also delved into a brief history of the J&K Biodiversity Council and the work that was done by the council till now. He outlined the People's Biodiversity Registers (PBR) being developed for the UT and how Biodiversity Management Committees (BMC) were being activated in a phased manner at the block level. He spoke about how the UT was preparing their Sub-national level Strategy and Action Plan and was hoping to bring out a more holistic approach. Srinagar is called the land of parks and gardens and with more partnerships, capacity building and a sustained awareness campaign, the city could be a front-runner model for others in the country in terms of biodiversity management. Finally, he outlined the agenda of the day and expressed his hope that the stakeholder consultation meeting would be a productive one.

Jenab Juanid Azim Mattu, Hon'ble Mayor, SMC, in his inaugural address spoke of the significance of the meeting. He declared that SMC commits itself to working on a comprehensive plan for the city in terms of the LBSAP. He gave participants a background on the CBD, the decision to include cities in the implantation of the convention and how cities and biodiversity are interwoven together. Urban biodiversity, he stated, can influence a city's form and quality of life. He called for collaborative and collective governance especially of biodiversity since its preservation

and conservation will be influenced by every stakeholder of the city. Through his personal reflections and experiences, he spoke of Srinagar's rich urban diversity and how urbanisation and neglect from policy makers had led to a negative impact on it. He underlined the need to have proactive and pre-emptive decisions and planning which the present masterplan completely lacked. Khushalsar Lake, he mentioned, was an example of a failure of urban governance where the lake was being eaten away by encroachments. A holistic masterplan should understand urban needs and plan for these factors while also accounting for biodiversity maintenance. He appealed to planners, government representatives and public servants, citizens to come together. As a concerned citizen, he could see the ecological disaster that faces the city, the UT and the country. He hoped that the CBI and LBSAP would be the first step on a journey that Srinagar would undertake to value, nurture and respect biodiversity. Finally, he pledged his unconditional support in this matter.

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 first introduced ICLEI- Local Governments for Sustainability, South Asia, and then explained the purpose of the stakeholder consultation. She also showed participants what the progress on data collection for Srinagar city was with regard to the index which is depicted below in Figure 1.

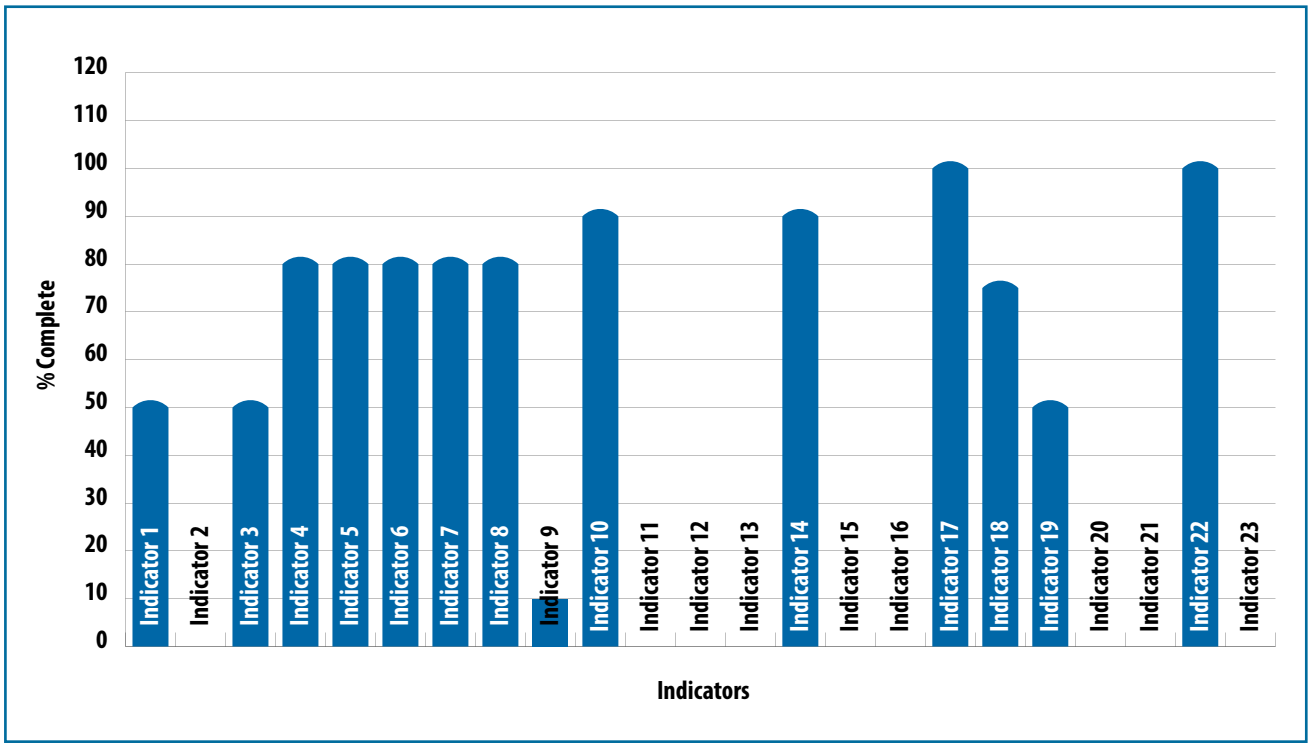

Figure 1: Progress made on individual indicators of the CBI of Srinagar

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. She then proceeded to explain the various concepts in 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 services assessments and valuations can help demonstrate the value of ecosystems. Finally, she touched upon the Cities Biodiversity Index and how it can act as a tool for green development planning.

With this, Dr. Sen split the participants into four 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 Srinagar?
- Which ecosystem services (ES) are important for Srinagar?
- 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 recognize 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 Srinagar based on the same. A draft of the Natural Asset Map which had been developed for Srinagar by ICLEI South Asia 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	Lakes and Rivers (Dal, Anchar, Nigeen, Gilsar/Khushalsar, Jhelum and its tributaries, Hokersar	Fish, drinking water, irrigation, navigation, flood buffer, fodder, recreation, livelihood, biomass, biodiversity hotspot, groundwater recharge, carbon sink	Citizens, fishermen, tourism service providers, tourists, government departments- PHE, I&FC, Tourism, Forest	Overexploitation of resources, siltation, pollution, climate change
	Forests (City forests, Zabarwan)	Livelihood, timber, firewood, fodder, medicinal and forest products, flood mitigation, soil and water conservation, recreation, aesthetics, biodiversity hotspot, carbon sink, pollination, climate regulation	Citizens, farmers, nomadic herders, government depts-forest, tourism, PHE, Wildlife, tourism service providers, industries	Deforestation, forest fires, overexploitation of resources, climate change
	Gardens/ Parks (Mughal gardens, city parks)	Recreation, aesthetics, health, tourism, livelihood, biodiversity repositories	Citizens, Tourism service providers, government dept- floriculture, tourism	Overuse, pollution
	Orchards	Food, livelihood, insect diversity, preservation of gene pool, firewood	Farmers, citizens, Horticulture dept.	Increase in population, urbanisation, climate change, monoculture, diseases
	Agricultural lands	Food, fodder	Farmers, citizens, Agriculture dept.	Change in land use, urbanisation, diseases, climate change, lack of irrigation
II	Forests (Zabarwan, Dachigam, Dara catchment, Shankaracharya hills, Hariparbat)	Carbon sequestration, Wildlife conservation, stabilisation of the environment, food chain, recreation, regulation of climate, prevents soil erosion, water purification, Medicinal and Forest Products	Local population, farmers, graziers, tribals, fringe dwellers, government- forest dept., revenue dept., tourism dept.	Overgrazing, man-animal conflict, exploitation of biological resources, deforestation, urbanisation, poaching, forest fires
	Wetlands (Shallabagh Harem, Narkar, Hokersar, Gilsar, Khushalsar, Anchalsar, Dal Lake)	Regulation and recharge of water, flood mitigation, aquifers, habitat	Fishermen, farmers, bird watchers, tourists, PHE dept.	Siltation, encroachment, drying of lakes, eutrophication, floods
	Parks and gardens (Tulip garden, shalimar garden, Nishat garden, Harwan, Iqbal park, Pratap park, Chinar Bagh, Chashmashahi garden, Parimahal, Badam wari)	Recreation, tourism, ecosystem balance, economic benefits, livelihood generation	Local population, tourists, tourism department.	Invasive species, encroachment
	Roadside/Avenue plantations	Pollutant sink, microclimate regulation	Urban citizens	Poor planning

Group	Ecosystem	Ecosystem Service	Who benefits	Threats
III	Dal Lake, other lakes and wetlands (Dal, Anchar, Nigeen, Hokersar, Jhelum, Gilsar)	Fishing, Plant diversity, Manure, Recreation, Livelihood, Irrigation, Floor reservoir, Habitat for wildlife, Tourism, water sports, wickerwork, ground water recharge, navigation	Local people, fishermen, houseboat dwellers, government departments- Wildlife, LCMA, PHE, Irrigation and Flood control, tourism; hoteliers, tourists	Landuse change, habitat destruction, biological invasions, waste dumping, pollution, deforestation in the catchment, siltation, encroachment, exploitation of resources, climate change, eutrophication
	Forest Ecosystems (Dachigam, Shankaracharya Hills, Hariparbat)	Habitat for wildlife, fuel, fodder, timber, ethnomedicinal, NTFP, livelihood for dependent communities, soil and water communities, carbon sinks, recreation, aesthetic value, drinking water supply, environmental pollution control	Local people, tourists, Grazers, farmers, livestock owners, local communities, industrialists, students	Deforestation, encroachments, overgrazing, forest fires, invasive species, poaching, smuggling
	Parks/ Gardens (Mughal gardens, Pratap garden etc.)	Recreation and aesthetic value, air pollution/noise pollution control, biodiversity conservation, tourism, habitat	Locals, tourists, floriculture dept., tourism dept., shopkeepers	Population growth, pollution, overexploitation, overcrowding, urbanisation
	Open grounds	Sporting activities, celebrations, pastures, recreational spaces, exercise/health impacts	Locals, sports persons, students	Population growth, road expansion, commercialisation, solid waste dumping, urbanisation
IV	Forest (Zabarwan, Dachigam National Park, City Forest, Shankaracharya Hill, Dhana Conservation Reserve, Brein Nishat)	Clean air, water, temperature regulation, prevention of soil erosion, timber, fuelwood, fodder, fruits, food, NTFPs, Recreation/ Aesthetic, Germplasm bank, biodiversity microrefuges, Carbon sink, pollination, water for irrigation and drinking, micro-climate regulation, tourism	Citizens; human population; Timber industry; Departments of Forestry, Horticulture, Floriculture, Wildlife, Irrigation and flood control, Tourism; Tourists; Education; Fisheries department; Fishermen; Power Department	Deforestation, Forest fires, land-use changes, invasive species, overharvesting, quarrying/stone mining, poaching- illegal wildlife trade
	Grassland/pastureland			
	Scrub (Hariparbat hill)			
	Lakes/Ponds	Habitat		Pollution, floods, Invasive species, waste dumping, effluent discharge, encroachment
	Rivers/Streams	Clean water for drinking and irrigation, fisheries, tourism, flood buffer, transportation, phyto remediation, micro climate regulation		

Group	Ecosystem	Ecosystem Service	Who benefits	Threats
	Marshes, Wetlands			
	Glaciers (Meena Nor)	Water source		
	Plantations (Block and linear)	Air and water purification, heat island effect, micro-climate regulation, carbon sink	Citizens, locals, forest and agriculture departments, wood-based industries, farmers, wickerwork, cricket bat industry, plywood industry	Land use change, commercial construction industry, encroachments
	Horticultural orchards	Food, pollination services, habitat		monocultures, land use conversion
	Agricultural lands	Food, livelihood, carbon capture		Pesticides, hazardous chemicals
	Floricultural gardens and parks	Aesthetics, recreation, sports, conservation		Construction industry
	Homestead, kitchen, floating gardens	Food, livelihood, reservoir of relatives of crops	Locals	
	Fish farms	food livelihood, germplasm, provisioning of water, water for drinking and irrigation		Non-regulation of construction; Land use changes
	Water reservoirs, water harvesting structures			
	Irrigation canals			

The main ecosystems highlighted across groups were:

- Water bodies (Rivers, Lakes, Springs, Canals)- Dal, Anchar, Nigeen, Jhelum and its tributaries, Narkara, Hokersar, Gilsar, Khushalsar
- Forests- Government managed. Forests, Dachigam National Park (outside city boundary), Dara Conservation area, Hariparbat, Shankaracharya Hills, Zabarwan, Brain Nishat Conservation area
- Urban Gardens, Parks, Open grounds, Roadside and revenue plantations- Mughal gardens and city parks (Pratap, Iqbal), golf course
- Orchards- Apple, Plum, Pear, Cherry- Mixed
- Agriculture- Rice, Wheat, Vegetable, Floating gardens, homestead gardens
- Scrubs and Grasslands (pasturelands)- Zabarwan south facing side

Other than the discussion captured in Table 1, the city's three golf courses were discussed as to whether they presented a threat to the ecosystems listed above or should be classified as an ecosystem themselves. The participants were divided as to what these should be classified as since around the golf courses were forested areas which present habitat mosaics to various species. Some participants mentioned that the grass used in these golf courses were imported from outside the country and the fertilizer load in them was so high that it was leaching into the Dal Lake.

Several native species which were used in the various Mughal Gardens of the city such as the famous Tulip gardens, were now being replaced with high yielding ornamental/introduced species. Group IV approached the ecosystem classification in a holistic manner, classifying them as natural and cultural and then further as terrestrial and aquatic. They mentioned that plantations were of two types, broad and linear and that native biodiversity was found in natural ecosystems while kitchen gardens acted as a repository of wild relatives of crops. Monocultures were a large threat to biodiversity which often was neglected in discussions.

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 four groups' responses.

Table 2: Summary of responses for Exercise 2

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
I	Waterbodies	• Planning and implementation of conservation priorities and management • Rejuvenation/ Revitalization of tributaries and channels • Prevention of urban sprawl • Segregation and solid waste management	• LCMA • SMC • Wildlife Dept • I&FC • Revenue Dept.	• Food and fodder • Drinking water • Irrigation • Revenue • Livelihood	• Citizens • Fishermen • Tourist Service providers • Govt Dept • Locals	• Siltation • Pollution • Irregulated tourism • Encroachment	• Citizens • Tourists • Government depts. •
	Forest	• Afforestation • Fire Control • Protection and Surveillance • Soil and water conservation	• Forest Dept (Soil conservation, wildlife, social forestry) •	• Increase in green cover • Availability of timber/firewood • Grazing • Pollution control • Air quality improvement	• Citizens • Farmers • Nomadic herders/ shepherds • Govt Dept •	• Deforestation (Foraging. Poaching) • Conversion of forest to non-forest (change in land use) •	• Citizens • Forest officials •
	Gardens/ parks	• Development and Maintenance • Tourism regulation	• Floriculture Dept • Tourism Department • SMC	• Recreation • Health benefits • Tourism • Livelihoods	• Citizen • Tourists • Tourism service providers • Govt Depts (revenue)	• Irregulated tourism • Dumping of solid waste	• Citizens • Tourists • Tourism Department
	Orchards/ Agriculture	• Farming operations • Marketing •	• Farmers/ orchardists • Fruit traders • Horticulture/ agriculture dept	• Food and Fodder • Livelihood • Firewood	• Farmers and orchardists • Marketing agents	• Chemical pesticides • Introduction of exotic and hybrid varieties	• Orchardists • Agro-chemical industries

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
II	Forest	• Maintaining forest • Afforestation • Soil conservation activities which include mechanical stream stabilization structures • Water harvesting structures to arrest run off • Augment water table stabilization • Social forestry • Agrostology- raising of grass in grazing areas in Dachigam	• Forest Dept which includes Territorial Forest division, JKFRI, Soil conservation, forest protection, Department of Ecology Environment & Remote Sensing (DEERS), wildlife, social forestry, Agrostology	• Livelihood generation • Ecotourism	• Labour • Tourist • General public associated with tourism	• Littering • Pollution increase • Climate Change • Disturbing wild habitats • Trespassing	• Tourists
	Wetlands	• Desiltation • De weeding • Eviction and inhibiting encroachment • maintaining aquatic habitats • Ecotourism in a regulated manner • Habitat improvement • Maintenance of aquatic ecosystem	• Lake Conservation and Management Authority (LCMA) • Wildlife Division • Fisheries Department	• Livelihood generation • Support vegetable and fish production • Flood mitigation • Regular water supply	• Tourists • Common people associated with tourism • Shikarawalas and boat men • •	• Littering • Overuse of resources • •	• Local people and stakeholders
	Gardens and parks	• Maintenance • Plantations • Germplasm conservation	• Floriculture • Parks and Gardens • SMC	• Recreation • Climate regulation	• Students • Children • All sects of society • Tourists	• Littering • Trampling of plants •	• Local people • Tourists •

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
	Roadside plantations	Landscape improvement Plantation of trees and ornamental plants Maintenance of aesthetics	Floriculture Urban Forestry Division SMC	Aesthetics Noise and air pollution abatement Acts as wind breaks	Common people (city dwellers)	Lack of maintenance	Local People Govt Departments
III	Forest	• Afforestation • Maintain tree cover • Soil and Water conservation	• Forest, wildlife, social forestry • Soil and water conservation dept • Ayush • Tribal and ethnic communities	• Clean Air • Protection of wild fauna • Recreation • Tourism • Food • Fodder • Fuel • Timber • Medicinal research • Gucchi foragers/ cultivators (morels)	• Local people • Tourists • Students • Trekkers	• Deforestation • Habitat fragmentation • Solid waste dumping • Forest Fires • Overgrazing • Trampling • Encroachments •	• Local communities • Smugglers • Govt agencies • Locals • Cattle rearers • Shepherds • •
	Aquatic ecosystem	• Removal of weed • Maintenance • Desiltation	• LCMA • Fisheries Dept • Srinagar Development Authority (SDA)	• Economic benefits • Food Security • Recreation • Vegetable cultivation • Fodder • Fisheries • Tourism	• Local people • City dwellers • Fishermen • Tourists • Hoteliers • Houseboat dwellers • Tourism Department	• Pollution • Landuse change • Solid waste dumping • Overpopulation Sewage disposal • Siltation • Encroachment • Eutrophication • Weed invasion	• Tourists • Hoteliers • Houseboat dwellers • Locals

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
	Parks and Gardens	• Maintenance • Plantation	• Floriculture • SMC • Urban forestry division • Forest Department	• Tourism • Habitat for flora and fauna • Better microclimate • mental well being • monetary gain • Movies and cinema	• Tourists • Locals • Hoteliers • Restaurant owners • Shopkeepers • Travel agencies • Film industry • Tourism dept	• Over population • Pollution • Over exploitation • Over crowding • Urbanisation • Land use change	• Locals • Tourists • Shopkeepers • Vehicle owners • Commercial units • Locals
IV	Plantations	• Maintenance • Plantation • Weeding • Research activities to improve conservation and protection	• Forest Dept • Line Depts (Agriculture, Soil and water conservation, floriculture) • Private owners • Village Forest Community • Universities/ Schools/ Institutes	• Fodder • Fuelwood • Regulating and supporting services like shade, clean air, soil formation etc.	• Locals • Forest Department • Other line depts • Farmers • Tourism based industries	• Urban Expansion • Encroachment • Water logging • Infrastructure projects Unplanned Drainage • Mining	• Tourists • Lack of coordination between departments
	Horticulture (Orchards)	• Maintenance • Weeding • Fertilizers and Pesticides • Technical inputs to improve yields	• Farmers • Horticulture Dept • Wildlife Dept • Revenue Dept • Institutes/ Universities • Religious groups	• Fruits • Pollination • Food processed products • Livestock grazing	• Locals • Horticulture and allied Depts • Industry	• Land use change • Unauthorised construction activity • Use of pesticides and chemicals	• Farmers • Government Departments • Horticulture Department

Group	Ecosystem	Stewardship		Benefitting		Degrading	
		Activity	Actor	Activity	Actor	Activity	Actor
	Agricultural lands	• Maintenance • Weeding • Fertilizers and Pesticides • Technical inputs to improve yields	• Farmers • Agriculture Dept • Institutes	• Food • Livelihood • Carbon capture	• Locals • Agriculture Department • Agro based industry	• Land use change • Unauthorised construction activity • Use of pesticides and chemicals	• Farmers • Government Departments
	Garden/parks	• Maintenance • Greening and further plantation • Weeding, fertilizers and pesticides • Nursery development • Distribution of planting material	• Locals • Floriculture Dept • Pvt Nurseries • Institutions • Govt Depts	• Livelihoods • Tourism • Recreation • Aesthetics • Sports	• Locals • Tourists • Depts	• Land use change • Construction • Invasive plants • Chemical run off	• Farmers • Tourists • Govt Dept •
	Aquatic- fish farms	• Breeding • Feeding • Maintenance of water quality	• Fisheries Dept • Locals • Farmers	• Food • Livelihood • Recreation • Hobby	• Locals • Fisheries Dept	• Landuse change • Diversion of water	• Govt Depts • Locals • Farmers
	Water reservoirs and irrigation canals	• Microshed activities • Maintenance of structures • Construction of dams, bunds etc.	• Public Health and Engineering-PHE (Jal Shakti) • Irrigation Department	• Water for drinking and irrigation	• Irrigation/PHE Dept • Flood control • Locals • Forest and allied depts	• Landuse change • Pollution from run off • Encroachment of canals • Flash floods	• Locals • Government Departments • Tourists

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 Srinagar. Some participants mention projects that were already taking place such as the medicinal plant policy which was submitted for the state, plans to develop an urban forest following the Miyawaki technique, Air Quality Index Dashboard, Sundays for Srinagar which is a cleanliness drive of targeted areas initiated by the SMC every Sunday. Several participants felt that housing and further housing expansion should be vertical i.e., in the form of apartments, rather than horizontal i.e., building more bungalows as this would not encroach into natural ecosystems. Some participants called for a sustainable city policy while others felt that the most pressing problem was the Achan Landfill site which needed to be managed scientifically. Some participants felt that traditional knowledge should be also added within the LBSAP would could then feed into green livelihood options.

Table 3: Summary of responses for the Brainstorming session

Group	Sl. No.	Idea	How to implement	Who will Implement	Time Frame
I	1	Conservation and management of water bodies (Formation of action plan)	• Research (Baseline data formation), involving experts, research organizations and other stakeholders conducting workshops and other outreach programmes	Government agencies, LWDA, Wildlife Department, SMC	5 years
	2	Increase green spaces (1.2 to 1.4/ha/person is ideal; presently the city is at 0.26)	• Identify land for the green spaces. • Formation and of development plan involving experts, research organization and other stakeholders and implementing agencies. • Identification of funding sources	Government agencies, Forest Department, SMC, SDA, Private companies, etc.	2 years
	3	Land use land cover planning and management (Drastic land use change in the last few decades)	• Baseline data collection • Framing of land use regulation • Land use zonation specifying type and extend of land use	Urban Planning Department, SDA, SMC, Housing and urban development agencies	5 years
II	1	Restriction of construction in wetlands inside waterbodies, agriculture lands. Vertical expansion rather than horizontal expansion should be focused on	• Stringent laws to be imposed to restrict construction • Encouraging people to Flat system and colonies • Clearing of congested areas of the cities and promotion of flats there to make adequate spaces for green zones. Promote vertical growth instead of horizontal growth.	Government administration	5 years
	2	Production of planting materials in bulk of fast growing and appropriate native species	• Set aside huge nursery areas with modern technology and scientific management system • creating nurseries and tissue cultural labs to improve availability of quality planting materials	Forest Department	5 years
	3	Data base development of threaten flora and fauna, desirable tree species, NTFP, MFP, Land use land cover area, etc.	• Survey and collection of data • Setting aside area of artificial regeneration of the species	Forest Department and allied departments	5 years
	4	Promotion of MFPs with high economical value and involvement of people in these activities	• Creation of nursery, tissue cultural labs, for germplasm production • Providing subsidies to the farmers to promote and adopt medicinal plant production	Medicinal Plant Board and Forest Department	5 years
	5	Ecotourism promotion – Natural habitat, Botanical Garden, herbarium, aquarium facilities	• Create green recreational spaces	Forest and Wildlife Department	5 years

Group	Sl. No.	Idea	How to implement	Who will Implement	Time Frame
III	1	Conservation of water bodies (Dal Lake)	• Detailed research about degradation causes • control and check over the sewage disposal in dal lake • Encroachment eviction • Mass education and awareness • Catchment improvement programme • Sewage treatment • legislation • Better policy and planning	Universities and institution, NGOs, LCMA, Law enforcement agencies All government and non-government agencies Forest, wildlife, soil conservation, social forestry dept. SMC, SDC	2 years
	2	Beatification and management of parks and gardens	• Regulation of visitors • Introduction of Indigenous local floral varieties • solid waste management • Landscape design • Natural interpretation centers • Introduction of attractive plant species	Floriculture Department, SDA, Tourism Department, Law enforcing agencies	2 years
	3	Biodiversity management across sacred groves	• Introduction of important indigenous species • Proper protection (fencing) • Restoration of heritage trees	Local communities (VLC) Religious (Awbaf communities)	2 years
IV	1	Development of baseline data on Srinagar's biodiversity	• GPS based digital platform	SMC in coordination with forest dept. and academic partners	2 years
	2	Restoration/ Rejuvenation of water bodies	• Historic mapping of natural courses of water bodies • Reconnecting water corridors • Addressing encroachments. • Desiltation/Dredging • Catchment Area Treatment	J&K Revenue Department, J&K Forest Department and other allied departments Universities and Institutions, LCMA	Till 2030
	3	Blanket ban on non-biodegradable materials	• Strong legislation • Awareness among people for generation of public support	Legislators, SMC, PCB, local people through government depts.	1 year

Valedictory Session

In the valedictory session, the dignitaries were appraised of the day's events and the deliberations that took place during the workshop by Dr. Sen and Dr Mohit Gera, PCCFand HoFF, J&K Forest Department and Chairman, J&K Biodiversity Council. Mr. Sanjeev Verma, IAS, Commissioner Secretary to the Department of Forest, Ecology and Environment reiterated how J&K was one of the few among other States and UTs to take up this initiative in benchmarking and prioritising biodiversity. He also mentioned that on the 28th of August, there would also be a workshop to finalise the draft report of the State Biodiversity Strategy Action Plan (SBSAP) which would give an indication of the type of issues the entire UT faces in terms of biodiversity which could support the development of the LBSAP.

Finally, Mr. Keshav Verma, IAS (Retired)addressed the gathering, praising the work ethic of the Forest Department and their dedication. He mentioned how Srinagar was unique and that the right decisions were being made at the right time. He spoke in detail of his experiences in other Indian cities which have become concrete jungles and the projects he was involved in which contributed to his knowledge and understanding of sustainable growth. He stated that planners were extremely important in creating sustainable cities but they were too few and those who are present are rarely consulted. He concluded the workshop saying that development must be infused with nature. This must be done by creating a strong masterplan and framework for land use planning which will incorporate recommendations and actions suggested in the LBSAP. There is a responsibility on the part of every citizen to preserve and protect biodiversity.

Annexure 1: Workshop Agenda

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

Workshop and Scoping: Nature's Benefits in Srinagar

Date: 23rd August 2021

Venue: Banquet Hall, MA Road, Srinagar

Program Schedule

Time	Item
Objectives: Introduce the City Biodiversity Index, ES concept and its applications, exercise to apply ES thinking to Srinagar's critical ecosystems, collect ideas on how to improve the situation, generate awareness, build capacity and ensure stakeholder buy-in for the project.	
10:00 – 10:30	**Registration**
10:30 – 11:30	**Inaugural Session** ● Welcome address by Member Secretary, J&K Biodiversity Council ● Introduction to CBI and LBSAP by Dr. Monalisa Sen, ICLEI South Asia ● Address by Dr. Ruchi Pant, UNDP ● Remarks of PCCF/HoFF and Chairman, J&K Biodiversity Council ● Address by Commissioner, Srinagar Municipal Corporation ● Inaugural address by Hon'ble Mayor, Srinagar Municipal Corporation ● Vote of thanks
11:30 – 11:45	**Tea/ Coffee Break**
11:45 – 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 Srinagar? 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 – 14:30	**Lunch break**
14:30 – 14:45	**Short input: Ecosystem service opportunities** – Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI South Asia

Time	Item
15:00 – 15:20	**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
15:20 – 15:30	**Reporting back from groups and synthesis**
15:30 – 16:15	**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)
16:15 – 17:00	**Valedictory Session** ● Welcome address by Member Secretary, J&K Biodiversity Council ● Brief Report on CBI and LBSAP of Srinagar 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 ● Valedictory Address by Mr Keshav Verma, IAS (Retired) ● Vote of thanks

Annexure 2: Participant list

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

Date: 23rd August 2021 | Srinagar

Registration Sheet

S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
	JENAB. JUNAID AZIM MATTU	MAYOR	SMC	7006160006	junaid.mattu@gmail.com	
	DR. MOHIT GERA	PCCF/HoFF	FOREST DEPT			
	ASAF MOHAMMED SAGAR	MEMBER SECRETARY	J&K BIODIVERSITY COUNCIL			
	ATHAR AMIR KHAN	COMISSIONER	SMC	7351003399	atharaamirkhan@gmail.com	
	DR. RAVI KUMAR	ADDL. PCCF	FOREST DEPT			
	DR. MONALISA SEN	PROG. COORDINATOR	ICLEI SA			

	NAME	DESIGNATION	ORGANIZATION	TELEPHONE	EMAIL	SIGNATURE
1.	S. Abid Nazir	D.F.O Urban	Forest deptt	9419060684	dfourban@gmail.com	
2.	Mudasir Mehmood	Project coordinator WUCMA	"	9858509302	mudasirmehmood@gmail.com	
3.	Irfan Ali Shah, IFS	Conservator of Forests Central circle	Forest Deptt	8494043939	irfanalisfs@gmail.com	23/8.
4.	Aaming Manzoor	JSP PBR	Forest Deptt	8491944560	aimumanzoor@gmail.com	
5.	Saima Farooq	JRF PBR's	Forest Deptt	9149453088	Saimafarooq623@gmail.com	
6.	Syed Javaid U. Hasan	D.F.O.	Demarcation Div. (Srinagar)	9419550772	javidhasan@gmail.com	
7.	M. Yaseen	DFO	Forest statistics Div.	7006259149		
8.	Dr. Akhlaq Amin Wani	Assoc. Professor	Faculty of Forestry SKUAST-K	9797011395	akhlaqwani@gmail.com	
9.	Manzoor Ahmad	DD PCCF	Rural Deptt.	7780910387	manzoorahmad1619@gmail.com	
10	Aaliya Afzal	Project Manager	Wildlife SOS	7006692300	aaliya@wildlifesos.org	

ICLEI Local Governments for Sustainability SOUTH ASIA

	NAME	DESIGNATION	ORGANIZATION	PHONE	EMAIL	SIGNATURE
11.	HUMA RASHEED	PROJECT ASSISTANT	JKFRI	9596530713	rasheedhuma07@gmail.com	Huma.
12	NAWAZ AHMAD TEELI	JRF PBR'	JKFRI	7006560145	[illegible]	[illegible]
13.	DR. SYED TARIQ	Jr. Sc. Asst.	JKFRI.	7006902735	drsyedtariq786@gmail.com	[illegible]
14.	[illegible]	DD, [illegible]	Forest Pro. Force	[illegible]	[illegible]	[illegible]
15.	Dr. T.S [illegible]	Director, SDUX	Soil Conserv.			[illegible]
16.	Shayiq Rasool	Deputy Director Flori	Floriculture	7006459796		[illegible]
17.	Mohammad Arif	AscoC(NK) SWCD	SWCD	9797836959	[illegible]	[illegible]
18.	Nazir Banoo Jr	N.G.O	National Society for Protection of Water Resources Wetlands	700651408		[illegible]
19.	Zubair Ahmad	CF, Sgr	Forest Deptt	9906812558	—	[illegible]
20.	Aijaz Hussain	WLW central	Wildlife	9419022274		[illegible]

ICLEI Local Governments for Sustainability SOUTH ASIA

	NAME	DESIGNATION	ORGANIZATION	PHONE	EMAIL	SIGNATURE
21	Hilal Malik	PHOTOGRAPHER	PCCF OFFICE	9419006555		[illegible]
22	Dr. Samina	W/W Research	Dept of wildlife Protection	9419046654		[illegible]
23	Rashid Naqash.	RWLW Kashmir	Deptt. of wildlife Protection	941900250		[illegible]
24	Intesar Suhail	WLW, Shopian	Deptt of wildlife Protection	9419049275		[illegible]
25	Anzar Khuroo	~~[illegible]~~ Professor	Univ. of Kashmir	7006124417		[illegible]
26	Iqbal	DFO Seed	J&K Forest deptt	9419046270		[illegible]
27	Dr Tasneem Kang	Scientist H	DEERS	9419400120		[illegible]
28	Zahoor Ahmed Shah	Floriculture officer	Srinagar Municipal corporation	9419011553		[illegible]
29	Afrozah Yaseen	J&K forest dep	J&K forest dep	6006132670		[illegible]
30	DR. ALEX CJ	SENIOR PROJ. OFFICER	ICLEI - SA			[illegible]

	NAME	DESIGNATION	ORGANIZATION	PHONE	EMAIL	SIGNATURE
30	Hilal Ahmad Handoo	Zonal Soil Cons. Officer.	Soil & water Cons. Deptt	9797839977	[illegible]@sc.com.	[illegible]
31	RITHIKA FERNANDES	ASST. MANAGER	ICLEI SA	8505819271		[illegible]

Prepared under

INTERACT-Bio
Integrated action on biodiversity

Stakeholder Consultation Meeting on the Development of Local Biodiversity Strategy and Action Plan for Srinagar City

Srinagar | 17 November 2022

Funding Support

Supported by:
Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
based on a decision of the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

Supported in India by

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 Project

The project will support Srinagar 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, Srinagar 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 four-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 Srinagar Context

The city of Srinagar is the summer capital of the Union Territory (UT) of Jammu and Kashmir (J&K). It is also the largest city in the UT and the northernmost city of India situated at an altitude of 1588 m above sea level. A number of water bodies in the form of canals, lakes, wetland and swamps exist around the city region of Srinagar.[1] The physiography of the city is unique[2] with steep hills in the east and north-east, agricultural fields in the flood plains of the Jhelum located in the south and west, the Karewas of Budgam in the extreme South and uplands with moderate slopes in the North. These geographic features have influenced urban sprawl in the direction of the plains rather than towards the mountains. Srinagar is very vulnerable to earthquakes being located in a severe intensity seismic zone. Given the city is popular for its picturesque landscape and often referred to as the "paradise on the earth", it attracts a large number of tourists and hence, the tourism industry forms the backbone of the city's economy.[3] Other allied businesses related to tourism such as hotels, restaurants, bakery, handloom and handicrafts significantly contribute to the local economy. Given the prevalence of old wood-carving tradition and other skill-based work associated with manufacturing and selling of goods and services including furniture, carpets, shawls and silk items in the Kashmir valley, the city of Srinagar is considered as the major commercial and transportation hub in the UT.

The city forms a part of the Urban Agglomeration known as Srinagar Metropolitan Region (SMR) with an overall population of over one million. In the last decade, the city has recorded a decadal growth rate of 23.13%.[4] Given the high rate of urbanization, the total population in the city as well as in Srinagar district is expected to witness an exponential growth in the coming decades1.

As is the case with Jammu, rapid urbanisation in Srinagar has brought about significant degradation of the local ecosystems. The Dal Lake, in the heart of the city is encroached, eutrophied and filled with invasive alien species. This is the case of all of the other lakes of the city. The Jhelum is constantly mined for sand and gravel, while the forested hills are slowly becoming fragmented and littered with solid waste. The city's agricultural fields, horticultural plantations and wetlands might soon fall prey to the real estate industry as the city's urban sprawl increases.

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

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2. N. A. Kuchay, M. Sultan Bhat, and J. Kashmir, "'Analysis and Simulation of urban expansion of Srinagar City.'
3. Srinagar Online, "Business and Economy of Srinagar." https://www.srinagaronline.in/city-guide/business-and-economy-of-srinagar Accessed on 31 August 2021
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Background to the Workshop

In 2021, the first stakeholder workshop was held where representatives from the public sector, NGO and CSO sector, academia and the private sector participated. The workshop identified the critical issues around biodiversity and ecosystems for the city of Srinagar 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 Srinagar. All of these outputs will feed 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 workshop was conducted in Srinagar, Jammu and Kashmir (J&K) on the 17th 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:

- 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 the relevance of biodiversity in the face of climate change, especially for the continued existence of humankind. He outlined the importance of documentation as it establishes a baseline and then helps to measure progress towards biodiversity conservation. Through the 4,290 Biodiversity Management Committees constituted in the state, they are documenting the biodiversity wealth, in the form of the People's Biodiversity Register. He outlined other activities by the council and partnerships they had undertaken with NGOs and Universities. He underlined that meaningful action could come from meaningful action plans and thus the contributions of the stakeholders in the day's workshop are integral to the same.

Dr. T. Rabikumar, Additional PCCF, J&K Forest Department explained to participants the context behind developing an LBSAP. He spoke about the Convention on Biodiversity and its legally binding obligations. He discussed national obligations for those countries who were party to the convention and how there is accompanying legislation to ensure that the obligations are met. He detailed state level activities that fall within this ambit and how the third tier, the local level- City Governments and Panchayats, has an important role to play as local strategies and actions can dovetail into sub-national and national ones. Biodiversity is cross-sectoral and does not just involve the forest department, but also the agriculture, horticulture, water departments. At the local level, Srinagar Municipal Corporation is an important player and therefore should look at integrating developmental activities with biodiversity conservation. He stated that when a city or any department planned projects and activities, they needed to keep in mind how to less their impact on biodiversity. He stressed that all government departments should be environmentally conscious and biodiversity sensitive. Urban areas are not lacking in biodiversity, which he illustrated through the example of sparrows and how old urban architecture facilitated their numbers. He requested that departments examine how they can fulfil their own sectoral policy objectives with the least impact on biodiversity. He finally ended by praising the natural beauty of the state and that it was among the top ten in the country to undertake the exercise in developing LBSAPs for two cities.

The inaugural ended with a vote of thanks.

Elements of an LBSAP

Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI-Local Governments for Sustainability, South Asia, 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).

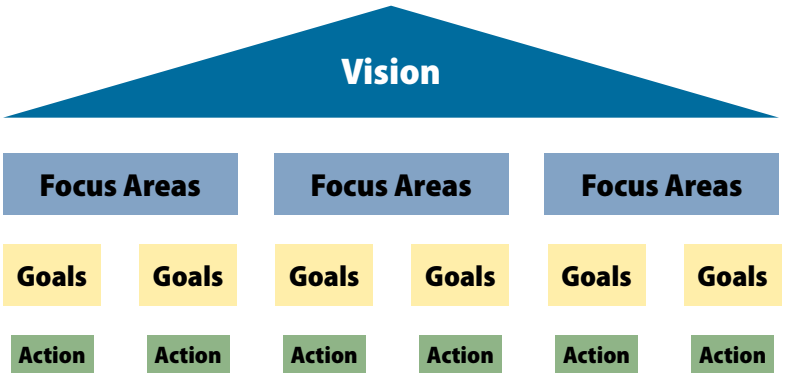

Figure 1: Elements of a local biodiversity strategy and action plan

Table 1: Focus areas identified in first stakeholder workshop

S. No.	Focus Areas
1	Wetlands (Dal, Anchar, Nigeen, Gilsar, Khushlasar, Hokersar, Shallabagh)
2	Forests (City Forests, Dara catchment, Shankaracharya hills, Hariparbat and Zabarwan)
3	Gardens and Parks (Mughal Gardens, Tulip Garden, Harwan, Iqbal park, Pratap park, Chinar bagh, Chashmashahi garden, Pari Mahal, Badam wari)
4	Orchards
5	Agriculture
6	Roadside/Avenue Plantation (Block and Linear)
7	Open Grounds
8	Rivers/streams (Jhelum)
9	Grassland/Pastureland
10	Irrigation canals

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

S. No.	Drivers
1	Land use change
2	Unregulated construction
3	Increase in invasive species

S. No.	Drivers
4	Climate Change
5	Overgrazing
6	Encroachment
7	Climate Change
8	Effluent discharge
9	Solid waste dumping
10	Pollution
11	Road expansion
12	Population growth
13	Unscientific planning
14	Use of chemical pesticides
15	Urbanisation

With this, Dr. Sen split the participants into four 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

"Srinagar city envisions a developmental path where conservation and sustainable use of historically, culturally and naturally rich biodiversity and ecosystems form an integral part of urban policy, planning and action for a prosperous, inclusive, equitable, resilient outcome."

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 and vagueness while too many were difficult to focus on.

The main objectives of the exercise were to:

- Discuss and finalize 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: Group exercise results on focus areas and assessment of their health

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status	Indicators	Group
1	Wetlands (Dal, Anchar, Nigeen, Gilsar, Khushlasar, Hokersar, Shallabagh)	Overexploitation of resources like overfishing	3	Increase in livelihood dependency of lake dwellers	I
		Pollution	2	Agriculture inputs (pesticides etc); Sewerage from adjacent areas; use of excessive polythenes	
		Siltation	2	Silt load is too heavy from the catchment areas due to rives and nallas directly opening into the lakes	
		Climate Change	3	There is marked change in the ratio of the migratory birds and other fauna in the water bodies	
		Landuse Change	2	Houses/structures have cropped into these bodies which has affected the landuse	
		Biological invasion	2	Heavy weed infestation, Eutrophication	
		Deforestation in catchment area	5	Negligible	
		Dumping of waste	1	Excessive dumping of waste	
		Encroachment	2	Filling of water bodies for construction (illegal) and bringing of some land under agriculture/horticulture use	
2	Forests (City Forests, Dara catchment, Shankaracharya hills, Hariparbat and Zabarwan)	Deforestation	4	Dhara area is little bit prone to illegal felling	
		Forest fires	2	Excessive forest fires on Zabarwan hills, manmade fires due to movement of Bakarwals	
		Overexploitation of resources	5	Resources are under used	
		Climate Change	4	Global warming	
		Overgrazing	3	Grazing is prevalent in Dhara area particularly	
		Urbanisation	4	No construction sone designated, except in Dhara	
		Poaching	4	Sporadic incidents of poaching happen (particularly of birds)	
		Encroachment	5	Encroachment has almost been restricted	
		Quarrying/stone mining	5	Banned	
3	Gardens and Parks (Mughal Gardens, Tulip Garden, Harwan, Iqbal park, Pratap park, Chinar bagh, Chashmashahi garden, Pari Mahal, Badam wari)	Tourism	4	Non biodegradable wastes	
		Pollution	4	Soil and water pollution; garbage accumulation	
		Increase in invasive species	5	Nil	
		Encroachment	5	Nil	
		Real estate industry	5	Nil	
4	Orchards	Increase in population	3	Over population leading to construction	
		Urbanisation	3	Colonisation; Construction	
		Climate change	3	Untimely hailstorm, Early onset of winters, disease pest outbreak	
		Monoculture	4	Monoculture of apple due to commercial gains	
		Diseases	3		

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status	Indicators	Group
5	Agriculture	Change in land use	2	Conversion from agriculture to horticulture and constructions	
		Climate change	3	Hailstorms, early onset of winters, dry spell leading to drought	
		Lack of irrigation water	3	Draughts and scarcity of water	
		Diseases	3	Impacts productivity	
		Urbanisation	3	Construction, colonisation	
		Use of chemical pesticides	3		
6	Roadside/Avenue Plantation (Block and Linear)	Unscientific planning	4		
		Land use change	5	Nil	
		Rampant Construction	4		
		Encroachment	4	Sporadic encroachment	
7	Open Grounds	Population growth	4	Encroachment	
		Road expansion	3		
		Commercialisation	3		
		Solid waste dumping	2	Heavy dumping of solid waste	
8	Rivers/streams (Jhelum)	Pollution	1	Dumping of solid and liquid waste into rivers	
		Climate Change	3	Erratic rainfall and snowfall, leading to flooding	
		Increase in invasive species	3	New invasive fish species like dike carp	
		Solid waste dumping	1	High dumping ins rivers	
		Effluent discharge	2	Is seen at various sites	
		Encroachment	4	Sporadic	
9	Glacier (Meena Nor)	Pollution	5	-	
		Climate Change	3	Impact on early melting of snow	
		Increase in invasive species	5		
10	Grassland/Pastureland	Overgrazing	3	Overgrazing by tribal population	
		Climate Change	3	Reduced growth due to climate change/ less rainfall	
		Increase in invasive species	3	Infestation of invasive weeds	
11	Irrigation canals	Land use change	4	Construction/ Silting / Lack of repair of canals	
		Unregulated construction	3		
1	Wetlands (Dal, Anchar, Nigeen, Gilsar, Khushlasar, Hokersar, Shallabagh)	Overexploitation of resources like overfishing	3	Less availability of local fish in markets	II
		Pollution	1	Water quality, change in aquatic vegetation, decline in aquatic fauna, eutrophication	
		Siltation	1	Declining water depth, water quality, habitat deterioration	
		Climate Change	1	Weather conditions, floods, cloud burst at higher frequency	
		Landuse Change	1		
		Biological invasion	2	Proliferation of invasive flora and fauna	
		Deforestation in catchment area	3	Siltation	
		Dumping of waste	2	Water quality deterioration; shrinking of wetland area	
		Encroachment	1	Agricultural practices in wetland areas leading to shrinking of wetlands	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status	Indicators	Group
2	Forests (City Forests, Dara catchment, Shankaracharya hills, Hariparbat and Zabarwan)	Deforestation	4	Increase in forest cover	
		Forest fires	3	Occasional	
		Overexploitation of resources	3	NTFP collection by locals	
		Climate Change	2	Phenological shift	
		Overgrazing	4	The areas only act as stop over sites for nomadic graziers	
		Urbanisation	2	Near forest fringes	
		Poaching	4	Not much reported	
		Encroachment	4	Not much reported	
		Quarrying/stone mining	3	Units of quarrying present at a few places	
3	Gardens and Parks (Mughal Gardens, Tulip Garden, Harwan, Iqbal park, Pratap park, Chinar bagh, Chashmashahi garden, Pari Mahal, Badam wari)	Tourism	4		
		Pollution	4	Clean Parks	
		Increase in invasive species	3	Occasional occurrence of invasive species	
		Encroachment	4		
		Real estate industry	5		
4	Orchards	Increase in population	2	Change in landuse	
		Urbanisation	2	Increase in human habitation	
		Climate change	3	Phenological changes	
		Monoculture	4	Not much reported	
		Diseases			
5	Agriculture	Change in land use	1	More urbanisation	
		Climate change	3	Weather Changes	
		Lack of irrigation water	2	Reduction in water availability	
		Diseases	3	Increase in pest outbreaks	
		Urbanisation	2	Residential expansion	
		Use of chemical pesticides	1	Increase in the frequency of spraying	
6	Roadside/Avenue Plantation (Block and Linear)	Unscientific planning	3	Monoculture	
		Land use change	2	Less space available	
		Rampant Construction	1	Need for more space	
		Encroachment	3	Street vendors on roadsides	
7	Open Grounds	Population growth	2	More human habitation	
		Road expansion	4	Not much reported	
		Commercialisation	2	Increase in commercial units in earlier open spaces	
		Solid waste dumping	1	Heaps of garbage in open grounds	
8	Rivers/streams (Jhelum)	Pollution	1	Water quality	
		Climate Change	3	Reduction in flow	
		Increase in invasive species	3	Eutrophication	
		Solid waste dumping	2	Siltation	
		Effluent discharge	1	Water quality	
		Encroachment	2	House boats/residential houses on river banks	
9	Glacier (Meena Nor)	Pollution	3		
		Climate Change	1	Receding of glacier	
		Increase in invasive species	4	Not much reported	
10	Grassland/Pastureland	Overgrazing	3	Use of grasslands by nomads	
		Climate Change	2	Change in vegetation structure	
		Increase in invasive species	2	Spread of invasive species	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status	Indicators	Group
11	Irrigation canals	Land use change	3	Reduction in size	
		Unregulated construction	3		
1	Wetlands (Dal, Anchar, Nigeen, Gilsar, Khushlasar, Hokersar, Shallabagh)	Overexploitation of resources like overfishing	4		III
		Pollution	3		
		Siltation	3		
		Climate Change	4		
		Landuse Change	2	Urbanisation and migration from rural areas	
		Biological invasion	4		
		Deforestation in catchment area	4		
		Dumping of waste	2	Solid waste dumped around waterbodies by locals	
		Encroachment	2	Locals encroach for more land	
2	Forests (City Forests, Dara catchment, Shankaracharya hills, Hariparbat and Zabarwan)	Deforestation	5		
		Forest fires	4		
		Overexploitation of resources	4		
		Climate Change	4		
		Overgrazing	4		
		Urbanisation	2	Encroachment by locals	
		Poaching	4		
		Encroachment	4		
		Quarrying/stone mining	4		
3	Gardens and Parks (Mughal Gardens, Tulip Garden, Harwan, Iqbal park, Pratap park, Chinar bagh, Chashmashahi garden, Pari Mahal, Badam wari)	Tourism	5		
		Pollution	4		
		Increase in invasive species	4		
		Encroachment	4		
		Real estate industry	4		
4	Orchards	Increase in population	4		
		Urbanisation	4		
		Climate change	4		
		Monoculture	5		
		Diseases	5		
5	Agriculture	Change in land use	2	Conversion of human habitations	
		Climate change	5		
		Lack of irrigation water	2	Lack of proper maintenance of natural drainage system, poor irrigation facilities	
		Diseases	4		
		Urbanisation	2	Converted to housing colonies	
		Use of chemical pesticides	4		
6	Roadside/Avenue Plantation (Block and Linear)	Unscientific planning	4		
		Land use change	4		
		Rampant Construction	4		
		Encroachment	4		

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status	Indicators	Group
7	Open Grounds	Population growth	3	Expansion of city into periurban areas, construction increase	
		Road expansion	1	Area expansion	
		Commercialisation	4		
		Solid waste dumping	1	Unregulated	
8	Rivers/streams (Jhelum)	Pollution	3	Waste is disposed into the river	
		Climate Change	4		
		Increase in invasive species	4		
		Solid waste dumping	1	Random and unregulated	
		Effluent discharge	1	High from hotels and domestic discharge	
		Encroachment	2	Bank width has decreased substantially	
9	Glacier (Meena Nor)	Pollution	5		
		Climate Change	4		
		Increase in invasive species	5		
10	Grassland/Pastureland	Overgrazing	3	Grazing lands are occupied by army, forcing cattle owners to overgraze on accessible areas	
		Climate Change	4		
		Increase in invasive species	4		
11	Irrigation canals	Land use change	1	Very rampant due to increased urbanisation	
		Unregulated construction	2	Population increase	
1	Wetlands (Dal, Anchar, Nigeen, Gilsar, Khushlasar, Hokersar, Shallabagh)	Overexploitation of resources like overfishing	1	Increased population, encroachment	**IV**
		Pollution	1	Chemical fertilizers, untreated waste and effluents from industries and households	
		Siltation	2	Unauthorised construction	
		Climate Change	3	Birds species richness reducing	
		Landuse Change	1	Overpopulation, construction	
		Biological invasion	2	Native species of birds and fish have gone extinct	
		Deforestation in catchment area	2	Areas are cleared for construction and urbanisation	
		Dumping of waste	1	No proper places for dumping waste	
		Encroachment	1	Population surge	
2	Forests (City Forests, Dara catchment, Shankaracharya hills, Hariparbat and Zabarwan)	Deforestation	3		
		Forest fires	3	Dry weather, poor fire management knowledge	
		Overexploitation of resources	3		
		Climate Change	2		
		Overgrazing	5		
		Urbanisation	2	Deforestation, reduction in forest area	
		Poaching	5		
		Encroachment	2	overpopulation	
		Quarrying/stone mining	2	Land is rendered barren, too much construction	

Sl. No.	Ecosystem	Drivers (impacting ecosystem health)	Health status	Indicators	Group
3	Gardens and Parks (Mughal Gardens, Tulip Garden, Harwan, Iqbal park, Pratap park, Chinar bagh, Chashmashahi garden, Pari Mahal, Badam wari)	Tourism	3	Improper disposal of non-biodegradable waste	
		Pollution	2	Increase in number of vehicles	
		Increase in invasive species	4		
		Encroachment	2	overpopulation	
		Real estate industry	3		
4	Orchards	Increase in population	2	Needs have increased, greed	
		Urbanisation	2	Overpopulation, urbanisation	
		Climate change	3	Phenological changes	
		Monoculture	2	Soil loses fertility	
		Diseases	1	Resistance affected with increase in use of chemical fertilisers	
5	Agriculture	Change in land use	2	Overpopulation	
		Climate change	4	Uncertain weather conditions	
		Lack of irrigation water	2	Plants dry up and productivity decreases	
		Diseases	2	Resistance affected with increase in use of chemical fertilizers	
		Urbanisation	2	Overpopulation and agricultural area has decreased abruptly	
		Use of chemical pesticides	1	Disease prevalence has increased, poor soil health	
6	Roadside/Avenue Plantation (Block and Linear)	Unscientific planning	3	Lack of proper research before plantation is done	
		Land use change	3	Industrialisation, urbanisation, overpopulation	
		Rampant Construction	2	Greedy nature of people	
		Encroachment	2		
7	Open Grounds	Population growth	2	Over construction	
		Road expansion	3	Trees are cut down	
		Commercialisation	2	Water bodies get choked and tree cover decreases	
		Solid waste dumping	1	Lack of proper dumping sites which has led to increasing dog menace	
8	Rivers/streams (Jhelum)	Pollution	1	Algal blooms, aquatic life is badly affected	
		Climate Change	2		
		Increase in invasive species	2	Native species outcompeted	
		Solid waste dumping	1	No check on garbage dumping	
		Effluent discharge	2	Aquatic life gets affected	
		Encroachment	2	Overpopulation, illegal construction	
9	Glacier (Meena Nor)	Pollution	2		
		Climate Change	5	Water level increases as glacier melts due to sudden rise in temperature	
		Increase in invasive species	3	Algal blooms, native species decrease	
10	Grassland/Pastureland	Overgrazing	1	Erosion increases and biodiversity decreases	
		Climate Change	3		
		Increase in invasive species	1	Biodiversity decreases	
11	Irrigation canals	Land use change	1	Water bodies get choked	
		Unregulated construction	1	No proper management plan, urbanisation, overpopulation	

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 and soul" of the strategy as they give content to the Vision and Focus Areas. These are well-defined targeted statements that give clarity and 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: Group exercise results on Goals and Key Actions

Group	Focus Area	Goals	Key actions	Responsibility	Time Frame
I	Gardens and Parks	Conservation of ornamental genetic material	Maintain planting material and germplasm	Floriculture, garden and parks Department	Continuous
		Keep parks litter/garbage free	Proper waste disposal and maintenance	Floriculture, gardens and parks Department, SMC	
		Fencing to control trespassing	Construction of boundary walls and C/L fencing	Floriculture, gardens and parks Department	
		Awareness generation	Installation of signage, hoardings, IEC material in conspicuous areas	Floriculture, gardens and parks Department	
	Wetlands	Removal of encroachment	Demarcation of wetland boundaries Constitution of anti-encroachment squads Anti-encroachment drives and retrival of land	Revenue dept, LCMA, Forest Dept., WCPD, District administration,	
		Removal of pollution	Identification of point and non-point sources of pollution Installation of STPs Scientific disposal of waste Regular cleanliness driver	SMC, LCMA, UEED	
		Deweeding and desilitation	Removal of invasive/alien species through manual/mechanical means Effective control of eutrophication Afforestation within catchment areas Regular desilitation/dredging Soil conservation/protection measures	LCMA, Soil Conservation Department, Forest Department	Continuous
	Agriculture	Conservation of pollinators	Plantation of bee friendly plants like Rubinis pseudoacacia; Aesculus indica, horse chestnut Increasing area under bee friendly cross-pollinated crops (oil-seeds, vegetable etc.) Increase bee fauna and conservation of local species	Forest Department, Agriculture Department	Continuous
		Conservation of land races and species of crops native to Kashmir	Increasing area under land races Provide seeds (foundation/breeder seeds) and seed multiplication programmes for local cultivars and crops like musk bugdi/red rice etc. Popularising Kashmir varieties of spices and aromatics	Agriculture Department, SKUAST, Floriculture Department	Continuous

Group	Focus Area	Goals	Key actions	Responsibility	Time Frame
		Promoting urban farming/ gardening	Kitchen gardening Aesthetic floriculture Nursery raising Protected cultivation of vegetables/ land races of vegetable crops Promoting local races of mushrooms in urban areas	Agriculture Department, parks and gardens Department, Floriculture Department	Continuous
		Purple revolution- Lavender farming promotion	Planting of lavender along degraded areas, river banks and vacant lots	Agriculture and Floriculture Departments	5 years
II	Forests	Increase in forest cover	Afforestation Protection Restoration	Forest Department, Forest Protection Force, Department of Wildlife, SMC, Revenue Department	5-10 years
		Conservation of Biodiversity	Protection of biodiversity rich areas Conservation of domesticated biodiversity Implementation of legal provisions	Forest Department., Dept of Wildlife, SMC, Agriculture Department, Horticulture, Fisheries, Animal Husbandry dept., Krishi Vigyan Unit, State Agriculture University	5-10 years
	Roadside/ Avenue plantation	Increase in Roadside plantation	Afforestation	Forest Department, SMC, Horticulture Department , Roads and Buildings Department	5-10 years
	Grassland/ Pastureland	Protection Increase productivity	Increase in watch and ward Rotational grazing Habitat restoration	Forest Department, Agriculture Department, SMC, SAU, KVK, Local communities	3-5 years
III	Orchards	Stop land conversion for establishing new orchards	Legal notices	Divisional administration, Horticulture Department	Every year through notices, public announcements in newspapers
		Sustainable land use pattern for upliftment of local communities	Intercropping between fruit bearing plants to improve productivity and restrict monocultures	Horticulture Department through SKUAST	5 years
		Shift reliance to biopesticides	Ban on chemical insecticides through legal interventions, circulars	Horticulture Department	
		Restrict monocultures to promote biodiversity			
		Improve soil conservation during establishment of new orchards	Craters/DRSM to protect banks, slopes	Soil and water conservation Department under convergence with allied Departments.	5 years

Group	Focus Area	Goals	Key actions	Responsibility	Time Frame
	Open Grounds	Plantation in open areas as per local needs	Plantation of local fuel species	Social forestry Division	5 years
		Containment of encroachments	Fencing	Social forestry Division	Land identification and fencing in first two years
		No garbage dumping sites	Ban on dumping of garbage in open areas Issue circular/order	PCB, SMC, local administration, divisional commissioner	
		Soil conservation interventions		Soil conservation Department	
		Establishment of biodiversity parks, arboretums	Planting of diversity of plants, including medicinal plants	SFRI, J&K Forest Department	5 years for establishment of species
	Rivers/ Streams	Desiltation and soil conservation works on banks	Desiltation of rivers	Irrigation and flood control Department (I&FC)	5 years
		Strip plantation for beautification and soil conservation	Strip plantation using soil binding species	Social Forestry Division and I&FC Department	5 years
		Introduction of aquatic native species	Introduction of native fish	Fisheries Department	3 years
		Arrest soil erosion around river/stream banks	Reduction of soil erosion through soil stabilization through DRSM, soil binding grasses, plantation activities	I&FC Department, Soil and water conservation Department	5 years
IV	Wetlands	Maintenance of water table	Prevention of loss of areas occupied by wetlands Curbing encroachment	LCMA. SMC, IF&C, Local residents	1 year
		Proper management of sewerage	Silt deposition to be check	LCMA. SMC, IF&C, Local residents	
		Management plan for each wetland and treatment of catchment areas	Removal of weeds, invasive species; contain dumping of waste	LCMA. SMC, IF&C, Local residents	
		Antipoaching activities to be conducted during bird migration seasons	Awareness programs		
	Irrigation Canals	Removal of encroachments		IF&C, local residents, other allied Departments	1 year
		Unauthorised extraction to be checked			

Valedictory Session

In the valedictory session, Dr. Mohit Gera, PCCF and HoFF of J&K Forest Department and the Chairman, J&K Biodiversity Council gave his closing remarks, thanking participants for their support. He also encouraged the Municipal Corporation to take ownership of the documents generated for the city especially the City Biodiversity Index and the LBSAP.

Annexure 1: Workshop Agenda

Development of the Local Biodiversity Strategy and Action Plan for Srinagar

Date: 17th November 2022

Venue: Meeting Hall, Office of CCF, Sheikh Bagh, Srinagar

Program Schedule

Time	Item
10:00 – 10:10	**Registration**
10:10 – 10:20	**Welcome Address** ● Mr. Asaf Mehmood Sagar, Member Secretary, J & K Biodiversity Council
10:20 – 10:30	**Introductory Remarks** ● Dr. T. Rabikumar, APCCF, J&K Forest Department
10:30 – 10:40	**Work done so far** ● **Dr. Monalisa Sen, Programme Coordinator (Biodiversity), ICLEI South Asia**
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 Srinagar**
12:00 – 13:30	**Exercise 2: Defining Goals and Key Actions for Srinagar's LBSAP**
13:30 – 14:00	**Lunch break**
14:00 – 14:45	**Exercise 3: Developing the Vision Statement for Srinagar'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**
16:00 – 16:10	**Concluding Remarks** ● Dr. Mohit Gera, PCCF and HoFF, J& K Forest Department and Chairman, J & K Biodiversity Council

Annexure 2: Participant List

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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 Srinagar

Date: 17th November 2022 | Meeting Hall, Office of CCF, Sheikh Bagh, Srinagar

Registration Sheet

S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
1	DR. MOHIT GERA	PCCF, HoF, Chairman	J&K Biodiversity Council J&K Forest Dept.			[illegible]
2	DR. ASAF MEHMOOD SAGAR	Addl PCCF, Member Secretary	J&K Biodiversity Council			[illegible]
3	T. RABI KUMAR (IFS)	Addl PCCF	J&K Forest Dept			[illegible]
4	Anzar A. Khuroo	Member, J&K Biodiversity Council	University of Kashmir	7006124417	anzarak@uok.edu.in	[illegible]
5.	Manzoor Ahmad	DPO Plg & Publicity	J&K Rural dept.	778891034		[illegible]

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S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
01	Sohail Ahmad Hajey	Assistant Curator of Game (Wild life)	Wildlife Protection Deptt.	7006588077	Sohail.wl1983@gmail.com	[illegible]
02	Syed Gulzar Ahmad Shah	District Agri Officer Srinagar	Dept. of Agri. & Farmers Welfare	9419941418	Syedgulzar0916@gmail.com	[illegible]
03	Dr. Samina Amin	Wildlife Warden Research	Dept. of Wildlife protection	9419046659	Samina.amin@gmail.com	[illegible]
04	Dr. Syed Tariq	Project Coordinator & Incharge JKUTBC	Jammu Kashmir Forest Research Institute	7006922735	astec786@gmail.com	[illegible]
05	Shamim Ahmad	I/c R.o SFRI	JSFRI	[illegible]	Shamimjourt99@	[illegible]
06	Nowsheena Zaffar	NBA-UNDP-BSTP Intern	JKUTBC	9906650437	nowshnzff@gmail.com	[illegible]
07.	Mr. Shaqiq Rasool Kar	Deputy Director Floriculture	Floriculture, Garden & Parks	7006959796	[illegible]	[illegible]
08	Abid Hussain	Additional Commissioner Kashmir	Divisional Commissioner Kashmir	9419910343	[illegible]	[illegible]
09	Sajad Ahmad	4L Computer opt	JKUTBC	9906105143	Sajad[illegible]@gmail.com	[illegible]
10	M. [illegible]	[illegible]	[illegible]	90794772[illegible]		[illegible]

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S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
1.	M. Latief Bhat	Dir. Research	J&K FRI, J&K UTBC	[illegible]	[illegible]	
2.	[illegible] Hussain	WLW Central	Wildlife	9419027??	[illegible] @gmail.com	
(3)	Farah Tanveer	DFO Social forestry Division [illegible]	Social forestry	9682171189	[illegible] @gmail.com	
4	Mehraj-ud-din Malik	Regional Director Social forestry [illegible]	Social forestry	969707129 2	[illegible] @gmail.com	
5	Syed [illegible]	Joint Commissioner	SMC	9906434343	[illegible] @gmail.com	
(6)	Tanveer Ahmad	Assistant Director (Em)	DULB(K)	[illegible]		
7	[illegible]	DFO [illegible]	Forest Deptt	9419550777	[illegible] @gmail.com	
8.	Dr Shazia Hayat	HDO Nurseries Kashmir Horticulture	Horticulture	9596889??	drshaziahayat @gmail.com	
9	Asrd [illegible]	DFO Urban Forestry	Forest deptt	9419006841	DFO urban [illegible] @gmail.com	
10	Nazir Benazir	Chairman N[illegible]		7006157408		

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INTERACT-Bio Integrated action on biodiversity

ICLEI Local Governments for Sustainability SOUTH ASIA

S. No.	Name	Designation	Organisation	Telephone number	Email Address	Signature
1.	Mohammad Yasin	DFO	J&K Forest Deptt.	[illegible]	[illegible]	
2.	Iqbal A. Lone	DFO	J&K Forest Deptt	7006936288	[illegible] @gmail.com	
3.	[illegible]	Forester	J&K Forest deptt	9419004463	[illegible]	
4.	Zahid Wani	JPO	J&K Forest Deptt	9419285557	[illegible] @gmail.com	
	DR. MONALISA SEN	PROGRAMME COORDINATOR	ICLEI SOUTH ASIA	9871747467		

NOTES

ICLEI - Local Governments for Sustainability, South Asia
C-3, Lower Ground Floor, Green Park Extension, New Delhi - 110016, India
Tel: +91 – 11 – 4974 7200; Fax: +91 - 11 - 4974 7201