



CITY BIODIVERSITY INDEX – GANGTOK



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Contents

Background	6
Summary of the Scores	7
Location	8
Climate	8
PART 1 – Gangtok City Profile	8
Demography	9
Economy	9
Biodiversity Features	9
Administration of Biodiversity	12
Native Biodiversity	14
Indicator 1: Proportion of Natural Areas in the City	14
PART II: Indicators of the Index on Cities’ Biodiversity	14
Indicator 2: Connectivity Measures or Ecological Networks to Counter Fragmentation	16
Indicator 3: Native Biodiversity in Built Up Areas (Bird Species)	18
Indicator 4 - 8: Change in Number of Native Species	19
Indicator 9: Proportion of Protected Natural Areas	20
Indicator 10: Proportion of Invasive Alien Species	21
Indicator 11: Regulation of Quantity of Water	23
Indicator 12: Climate Regulation: Carbon Storage and Cooling Effect of Vegetation	25
Indicator 13: Recreational Services	26
Indicator 14: Educational Services	27
Indicator 15: Budget Allocated to Biodiversity	28
Indicator 16: Number of Biodiversity Projects Implemented by the City Annually	29
Indicator 17: Policies, Rules and Regulations – Existence of Local Biodiversity Strategy and Action Plan	30
Indicator 18 : Institutional Capacity - Essential Biodiversity Related Functions	31
Indicator 19 : Institutional Capacity - Inter-Agency Co-Operation	32
Indicators 20 : Participation and Partnership - Formal or Informal Public Consultation	33
Indicators 21 : Participation and Partnership - Institutional Partnership	34
Indicators 22: Education and Awareness - Is Biodiversity or Nature Awareness included in the School Curriculum	35
Indicators 23: Education and Awareness - Number of Outreach or Public Awareness Events	36

Annexure 1 – References	38
Annexure 2 – List of Species	40
Annexure 3 – Connectivity Measures - Value of A_1 to A_n	64

List of Tables

Table 1: Gangtok City Profile.....	9
Table 2: Changes in Land Use Pattern in Gangtok City, 2001-2011 (Paul <i>et al.</i> , 2016).-----	9
Table 3: Class wise distribution of natural assets (inside GMC boundary)-----	11
Table 4: Biodiversity of Gangtok, compiled from primary and secondary sources-----	11
Table 5: Biodiversity Management Committee of Gangtok city -----	13
Table 6: Area wise distribution of natural assets (inside KMC boundary)-----	14
Table 7: List of Invasive Species-----	21
Table 8: Land class used to calculate Permeable Area -----	23
Table 9: Summary of the Points-----	37
Table 10: List of Birds used for calculation of Indicator 3 and 5 -----	40
Table 11: List of Vascular Plant Species used for calculation of Indicators 4 and 10 -----	44
Table 12: List of Butterfly Species for Indicator 6-----	60
Table 13: List of Reptiles for Indicator 7 -----	61
Table 14: List of Freshwater Fish for Indicator 8 -----	61
Table 15: List of Mammals -----	63

List of Figures

Figure 1: Gangtok City Biodiversity Index 2020 at a Glance-----	7
Figure 2: Location Map of Gangtok showing the municipal boundary and the wards of the city-----	8
Figure 3: Natural Asset Map-----	10
Figure 4: Patches of natural areas within the boundary of GMC -----	17

Acronyms

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BMC	Biodiversity Management Committee
BMU	Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety
CBD	Convention on Biological Diversity
CBI	City Biodiversity Index
CBSE	Central Board of Secondary Education
CoP	Conference of Parties
CDP	City Development Plan
GMC	Gangtok Municipal Corporation
GSCDL	Gangtok Smart City Development Limited
Ha	Hectare
ICLEI SA	ICLEI – Local Governments for Sustainability, South Asia
ICSE	Indian Certificate of Secondary Education
IKI	International Klimate Initiative
INR	Indian Rupee
INTERACT-Bio	Integrated subnational action for biodiversity: Supporting implementation of National Biodiversity Strategy and Action Plans through the mainstreaming of biodiversity objectives across city-regions
km.	Kilometre
LBSAP	Local Biodiversity Strategy and Action Plan
PBR	People's Biodiversity Register
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organisation
sq.km.	Square Kilometre
SCBD	Secretariat for the Convention on Biological Diversity
WWF	World Wide Fund for Nature

Background

The City Biodiversity Index (CBI), also known as the Singapore Index was developed after the ninth meeting of the Conference of Parties (CoP) in 2008, when it was acknowledged that cities and local bodies have a role to play in the implementation of a country's National Biodiversity Strategy and Action Plan (NBSAP). The purpose of the index is to consolidate the available biodiversity-related indicators at the local level, which could then help cities to evaluate and benchmark their biodiversity conservation efforts.

CBI scoring is quantitative in nature. A total of 23 indicators make 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 index is meant to allow the city to visualise their progress in conserving biodiversity with every application of the index. The first year is considered the baseline against which cities can then chart their subsequent evolution.

According to the Secretariat for the Convention on Biological Diversity (SCBD, 2014), some of the benefits that cities derived from the application of the index include "a) the process facilitated capacity-building in biodiversity conservation, b) the indicators also function as biodiversity conservation guidelines and c) assistance in setting priorities for conservation actions and budget allocation through quantitative scoring".

The City Biodiversity Index of Gangtok was developed under the Integrated sub-national action for biodiversity: Supporting implementation of National Biodiversity Strategy and Action Plans through the mainstreaming of biodiversity objectives across city-regions or INTERACT-Bio project. Funded by The German Federal Minister for the Environment, Nature Conservation, and Nuclear Safety, (BMU) through the International Climate Initiative (IKI), the four-year project is being implemented in India by ICLEI-Local Governments for Sustainability, South Asia, in partnership with Gangtok Municipal Corporation and Sikkim State Biodiversity Board.



Summary of the Scores

The City Biodiversity Index of Gangtok, 2020 has been prepared based on the Secretariat of the Convention on Biological Diversity endorsed user manual for CBI updated in 2014 (Secretariat of the Convention on Biological Diversity, 2014). There are 23 indicators to calculate the CBI. These 23 indicators are grouped into three main components viz. Native Biodiversity, Ecosystem Services provided by biodiversity and Governance and Management of biodiversity.

The city scored a total 34 out of 72 for the 18 indicators. Since this was the baseline year the indicators 4-8 were not considered for the analysis.

- The first section on “Native Biodiversity in the City”, contributed to a score of 13 out of 20 as only 5 indicators were taken into consideration. This is a robust score and contributes significantly to the overall score. Gangtok city still retains a large proportion of its original natural area i.e. 45% which includes dense forest, mixed sparse vegetation and river. This has contributed significantly to this score.
- Indicators 11-14 which relate to “Ecosystem Services Provided by Biodiversity in the City” scored 6 out of 16 points. Despite having 45% of natural area, the city did not score well in the second component, which focusses on ecosystem services. It seems that flourishing urbanisation is impacting the ecosystem services of the city.
- Indicators 15-23 which correspond to “Governance and Management of Biodiversity in the City” contributed to a score of 15 out of 36 points. The score of this section shows that Gangtok city needs to strengthen its governance mechanisms that will lead to the conservation and management of its biodiversity. Though the Gangtok Municipal Corporation (GMC) works in close association with NGOs and intergovernmental agencies, stronger and a greater number of partnerships will improve the score further.

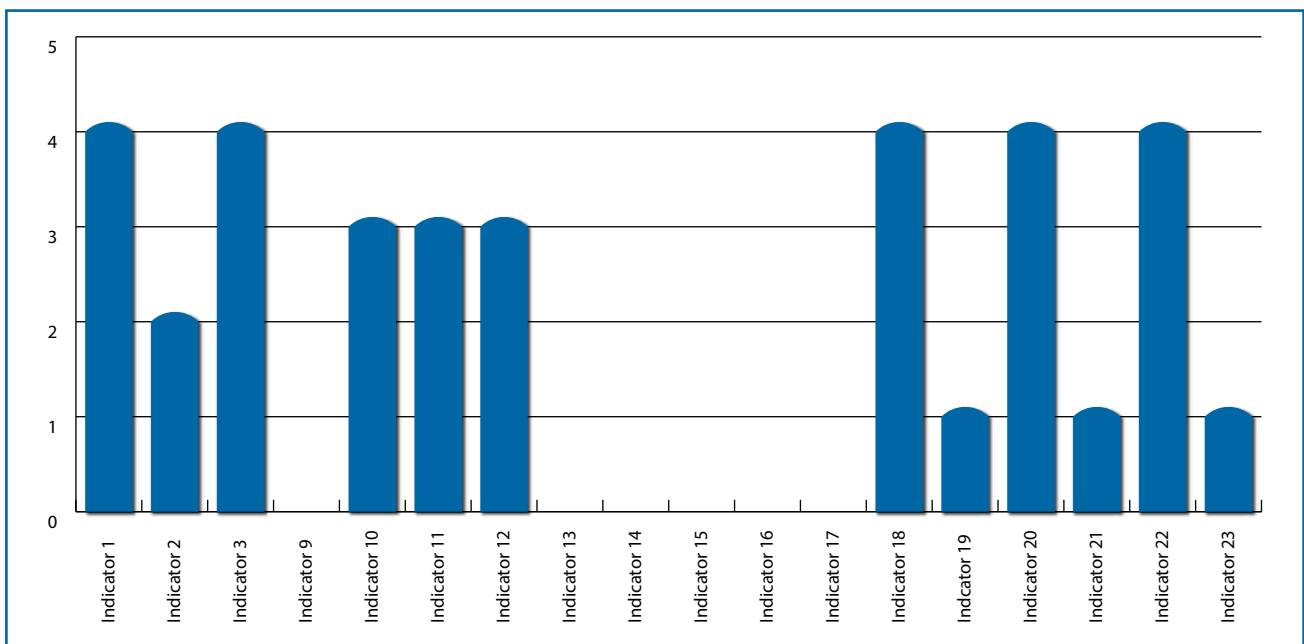


Figure 1: Gangtok City Biodiversity Index 2020 at a Glance

PART 1 – Gangtok City Profile

Location

The capital city of Sikkim, Gangtok, also the largest city of the state, is located in the Eastern Himalayan range at an altitude of 1,650m. The city lies between 27°17'20"N to 27°21'47" N latitude and 88°35'12"E to 88°39'40" E longitude (Figure 2), flanked by two rivers, namely Rorochu and Ranikhola in the east and west, respectively.

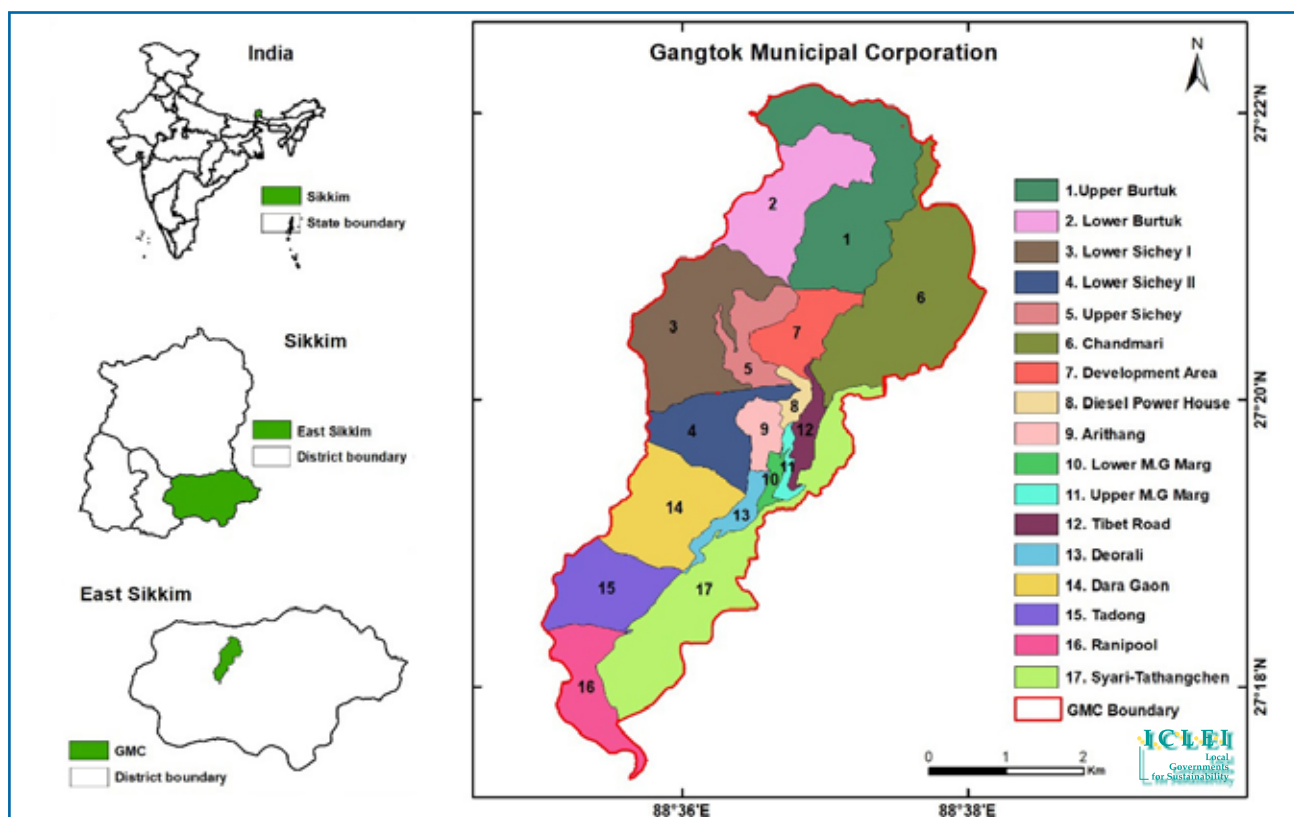


Figure 2: Location Map of Gangtok showing the municipal boundary and the wards of the city

Climate

Gangtok lies at an elevation of 1,650 m above mean sea level. Altitude is an important factor controlling the climate and weather conditions of the city. Because of its elevation and sheltered environment, the city enjoys a mild, temperate climate throughout the year. Like most Himalayan towns, Gangtok enjoys five seasons- summer, monsoons, autumn, winter, and spring. Temperature ranges from an average maximum of 22°C in summer to an average minimum of 4°C in winter. Summers (lasting from late April to June) are mild, with maximum temperature rarely crossing 25°C. In winter, temperature averages between 3°C and 7°C. Annual temperatures range from a high of 25°C in summer to a low of about 3°C in winter. Snowfall is rare, although the city has received snow in 2004, 2005, 2009 and 2020. The monsoon season from June to September is characterized by intense torrential rains, often causing landslides. Annual rainfall varies from about 1,300 mm to 5,000 mm.

Demography

With a population of 100,286 in 2011, Gangtok city accounts for more than 65% of the total urban population of the state of Sikkim (State Annual Action Plan, AMRUT, 2016). The percentage of male population is about 53% while female population is about 47%. The average literacy rate is 82.17%, which is higher than India's literacy rate (Ministry of Home Affairs, 2011). The total upsurge of urban population in Sikkim for the span 2001-2011 is 98,658 out of which a population increase of 69,299 was observed in the city. In other words, Gangtok city accounted for around 76% of the total growth during 2001-2011. The city has seen the most phenomenal growth rate of 241.65% in the last decade (Paul, 2016).

Table 1: Gangtok City Profile

S. No.	Particulars	Status
1	Population (2011 census)	100,286
2	Number of Households (2011 census)	23,773
3	Area (sq km)	19.20
4	Number of Municipal Wards	17
5	Population Density (2011 census)	5,223.23 per sq. km
6	Total Households (2011 census)	23,773
7	Average Household size (2011 census)	4
8	Number of Slum Households (2011 census)	6,086 (25.6% of total households)
9	Slum Population	23,577 persons (23.51% of total population)
10	Literacy (2011 census)	82.17%
11	Sex ratio (2011 census)	912

Economy

The hospitality industry is the major source of income for the locals. Summer and spring are the most popular tourist seasons. Ecotourism has emerged as an important economic activity in the region, which includes trekking, mountaineering, river rafting and other nature-oriented activities. The city does not have any large industry. However, cottage industries such as watchmaking and handicraft are very prominent industries in the city. The government provides the largest employment in the city, both directly and through contracts. The main market in Gangtok provides many of the state's rural residents a place to offer their produce during the harvest season. As per the Central Income Tax Act, 1961, residents of Sikkim are exempted from income tax.

Biodiversity Features

Gangtok is a mesmerizing hill station, situated in the lap of the Eastern Himalayas, a global biodiversity hotspot. Adding to the city's natural beauty are several surrounding wildlife sanctuaries. These include Fambong La Wildlife Sanctuary (2 km away from Gangtok), Kyongnosla Alpine Sanctuary (8 km away from Gangtok), Varsy Rhododendron Sanctuary (48 km away from Gangtok), Maenam Wildlife Sanctuary (14 km away from Gangtok), and Deorali Orchid Sanctuary (inside the city boundary). The city has rapidly urbanised and expanded in the last decade (2001-2011), resulting in a drastic change in land use. Over a duration from 2001-2011, there has been an increase in the built-up area and a decrease in the overall forest cover and agricultural land (refer Table 2).

Table 2: Changes in Land Use Pattern in Gangtok City, 2001-2011 (Paul et al., 2016).

Land Use Category	Area (Hectares)	
	2001	2011
Agricultural cropland (Kharif Crops)	109.48	79.79
Mixed Build up area (Urban)	231.74	274.42

Land Use Category	Area (Hectares)	
	2001	2011
Build up area (Residential)	551.77	702.57
Forest Semi-evergreen (Dense/closed)	393.62	348.84
Forest Semi-evergreen (Open)	449.09	349.13
Tree Plant Area (Open)	96.38	79.23
Tree Plant area (Dense)	14.75	13.04
Water bodies (Perennial)	1.17	0.98
Total	1,848	1,848

The Natural Asset Map (Figure 3) prepared by ICLEI South Asia shows that Gangtok city has a high proportion of natural areas (45%).

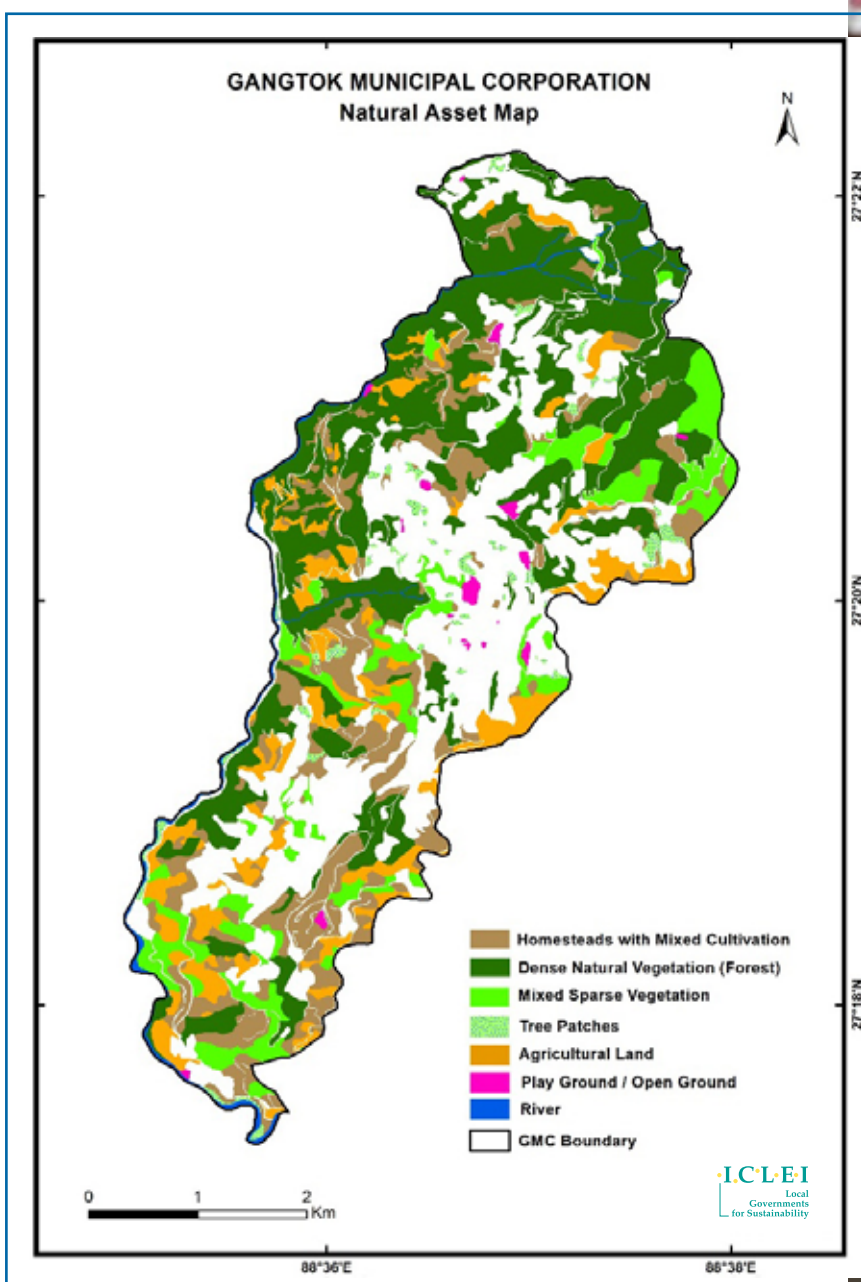


Figure 3: Natural Asset Map

Table 3: Class wise distribution of natural assets (inside GMC boundary)

S. No.	Land Class	Area in ha.	Area in sq. km.
1	River	35.52	0.36
2	Dense Natural Vegetation (Forest)	647.57	6.48
3	Mixed sparse vegetation	185.83	1.86
4	Open grounds/Playground	12.54	0.13
5	Tree Patches	33.86	0.34
6	Agriculture land	195.39	1.95
7	Homesteads with Mixed Cultivation	292.19	2.92

The city of Gangtok is bestowed with natural resources and is rich in biodiversity. Gangtok city is surrounded with dense forest consisting of temperate, deciduous forests of poplar, birch, oak, and elm, as well as evergreen, coniferous trees of the wet alpine zone. Densely forested regions of these evergreens lie just around the city. Orchids are common and bamboo grows in abundance along the slopes of Gangtok. In the lower reaches of the city, the vegetation graduates from alpine to subtropical and temperate deciduous.

For the purpose of the CBI, the following biodiversity studies were referred to

- Biodiversity of Raj Bhavan (Ganguli-Lachungpa, 2010).
- Draft People's Biodiversity Register of Gangtok (ICLEI, unpubl.)
- Invasive Alien Plants of the Indian Himalayan Region- Diversity and Implication (Sekar, 2012).
- Vegetation of Gangtok with Special Reference to Exotic Plant (Hajra and Das, 1982).
- Butterflies of Sikkim with known sites of distribution (Sikkim Forest, Environment and Wildlife Management Department).
- Mammals of Sikkim (Avasthe and Jha, 1999)

Table 4: Biodiversity of Gangtok, compiled from primary and secondary sources

Taxa	Number of species
Mammals	30
Birds	184
Reptiles	12
Freshwater Fishes	48
Plants	658
Butterflies	52

Flora: The flora of Gangtok comprises various plant species which include native, exotic, naturalized, invasive plant species. Of these, some significant species which are endemic to the region include Rhododendrons and Orchids. Deorali Orchid Sanctuary, which is found within the city boundary, is famous for its rare and extensive collection of orchids. The sanctuary has around 225 orchid species, among which are native orchid species such as "chilaune" (*Schima wallichii*), "Katus" (*Ouercus spicata*), "Utis" (*Alnus nepalensis*) and Malata" (*Macaranga denticulata*) (Raju, Krishna and Lachungpa, 1984). The city of Gangtok also hosts many home gardens. Spinach (*Spinacia oleracea*), Potato (*Solanum tuberosum*), Sweet Pepper (*Capsicum annuum*) and Corn (*Zea mays*) are some of the home garden crops grown in the city.

Fauna: 30 species of the mammals including Himalayan Mole (*Talpa micrura*), Asian house shrew (*Suncus murinus*) and Leschenault's rousette (*Rousettus leschanaulti*) and 12 different species of reptiles have also been documented within the city. A list of 48 species of butterflies has been compiled from secondary

data (Ganguli-Lachungpa, 2010) and the State Forest, Environment and Wildlife department. Gangtok city is also home to 184 species of birds including Indian Cuckoo (*Cuculus micropterus*), Indian Scops Owl (*Otus bakkamoena*) and Himalayan Black Bulbul (*Hypsipetes leucocephalus*).

Annexure 2 provides details of the various species documented from the city.

Administration of Biodiversity

Krishnan *et al.* (2012) have detailed 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. 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.

Three biodiversity governance models are present in Gangtok i.e. protected area, territorial forest, and decentralized governance institutions. The city has a protected area named Deorali Orchid Sanctuary within its boundary. This is under the jurisdiction of the Forest, Environment and Wildlife Department, Government of Sikkim.

In accordance with the Biological Diversity Act 2002, Gangtok Municipal Corporation has constituted a Biodiversity Management Committee for conservation, sustainable use, and documentation of the biological diversity of the city.

In Gangtok, the following institutions at the state and the city levels are responsible for biodiversity

Gangtok Municipal Corporation: Gangtok Municipal Corporation is the civic governing body of the city. It provides basic services like waste management and water supply to the 17 wards (increased from 15 wards after the 2011 census) of the city. It is also authorized to build roads within Municipal Corporation limits and impose taxes on properties coming under its jurisdiction. The elected body of the Corporation is headed by the Mayor and consists of 17 councillors, representing each ward. The Municipal Commissioner is the head of administration and is responsible for the functioning of the council including tax collection, estate maintenance, projects, among other things. When it comes to biodiversity-related activities, GMC generally supports the State Biodiversity Board and the Forest, Environment and Wildlife department in the implementation of these activities. The biodiversity and ecosystem resilience projects of Gangtok Municipal Corporation mainly focus on the promotion of organic farming, maintaining of public open green spaces like parks public ground, tree planting and awareness through various programme such as flower show and 10 minutes for earth. For more information, please visit <http://www.gmcsikkim.in/>

Biodiversity Management Committee (BMC): In accordance with the Biological Diversity Act, 2002, every local body is mandated to constitute a BMC to promote conservation, sustainable use and documentation of biological diversity. An important function of the BMC is the preparation of a People's Biodiversity Register (PBR) that contains comprehensive information on availability and use of local biological resources, and any other traditional knowledge associated with them. The BMC is supposed to serve as the guardian of all biological resources and traditional knowledge. Gangtok Municipal Corporation (GMC) with support from the State Biodiversity Board has formed a BMC in December 2019. The committee is involved in the preparation of the People's Biodiversity Register with support from ICLEI South Asia. Table 4 provides details of the members of the BMC of Gangtok city. For more information, please visit <http://sbbsikkim.nic.in/about.html>.

Table 5: Biodiversity Management Committee of Gangtok city

Name	Designation
Shakti Singh Choudhary	Chairman
Pradeep Chettri	Member
Prashant Rai	Member
Kunzang Namgyal	Member
Lashey Noma	Member
Geeta D. Tewari	Member

Sikkim Forest, Environment and Wildlife Management Department: The Forest, Environment and Wildlife department of Sikkim is headed by the Principal Chief Conservator of Forest cum-Principal Secretary. The department is mainly engaged in the protection and conservation of the forest, which comprises of 81 percent of the total area of the state. The Sikkim Biodiversity Board, formed under Sec 22 of the Biological Diversity Act, 2002 is a part of the Forest, Environment and Wildlife Department, Government of Sikkim. The board acquired its role and responsibilities from the Biological Diversity Act, 2002. For more information, please visit <http://www.sikkimforest.gov.in/> and <http://sbbsikkim.nic.in/about.html>.

Gangtok Smart City Development Limited: Under the Smart Cities Mission of the Government of India, Gangtok Smart City Development Limited (GSCDL) has established to improve the livability of Gangtok city. GSDL in association with the Gangtok Municipal Corporation is implementing projects related to infrastructure development in an ecologically responsible manner. GSDL has recently installed one biogas plant for recycling of organic waste. The plant helps in the diversion of organic waste from the dumping site, thereby reducing GHG emissions as well as helping to improve the local ecosystem. GSDL also has plans to undertake roof top gardening in the central market and parking lot. For more information, please visit: <http://smartcitygangtok.com/>



PART II: Indicators of the Index on Cities' Biodiversity

Native Biodiversity

Indicator 1: Proportion of Natural Areas in the City

According to the Singapore Index Manual, natural areas are defined as "Natural areas comprise predominantly native species and natural ecosystems, which are not, or no longer, or only slightly influenced by human actions, except where such actions are intended to conserve, enhance or restore native biodiversity."

Methodology

As per the CBI user manual

Principle for calculation of the indicator

$(\text{Total area of natural, restored and naturalised areas}) \div (\text{Total area of city}) \times 100\%$

Scoring Range: (based on the CBI user manual)

0 point:	<1.0%
1 point:	1.0% - 6.9%
2 points:	7.0% - 13.9%
3 points:	14.0% - 20.0%
4 points:	> 20.0%

City Data

To calculate the proportion of natural areas in the city, the natural asset map of Gangtok (Figure 3) which was developed under the INTERACT-Bio project was referred to. Several of these categories do not fit into the definition of natural areas laid out in the Singapore Index such as open grounds/playground, agricultural land, homesteads with mixed cultivation, and tree patches. For calculation of indicator 1, the land classes of dense natural vegetation (forest), mixed sparse vegetation, and river were considered for the total natural area of the city.

Table 6 below details the various classes of natural assets identified within the map that apply to indicator 1.

Table 6: Area wise distribution of natural assets (inside KMC boundary)

Sl. No.	Land Class	Area in ha	Area in sq. km.
1	River	35.52	0.36
2	Dense Natural Vegetation (Forest)	647.57	6.48
3	Mixed sparse vegetation	185.83	1.86
	Total		8.7

Total Natural Area = $(6.48 + 1.86 + 0.36) = 8.7$ sq. km.

Total Area = 19.2 sq.km.

RESULT: 45%

SCORE: 4

Recommendations to Improve Score

This is a good score for the city. The city administration should strive to maintain the same. The city administration should also encourage plantations along some barren hill slopes and open grounds. The involvement of citizens and NGOs in the same will also help.



Indicator 2: Connectivity Measures or Ecological Networks to Counter Fragmentation

Methodology

As per the CBI user manual

Principle for calculation of the indicator

$$\frac{1}{A_{total}} * (A_1^2 + A_2^2 + A_3^2 + \dots + A_n^2)$$

Where:

- A_{total} is the total area of all natural areas
- A_1 to A_n are areas that are distinct from each other (i.e. more than or equal to 100m apart)
- n is the total number of connected natural areas

This measures effective mesh size of the natural areas in the city. A_1 to A_n may consist of areas that are the sum of two or more smaller patches which are connected. In general, patches are considered as connected if they are less than 100m apart.

Scoring Range: (based on the CBI user manual)

- 0 point: < 200 ha
- 1 point: 201 - 500 ha
- 2 points: 501 - 1000 ha
- 3 points: 1001 - 1500 ha
- 4 points: > 1500 ha

City Data

There are 193 natural area polygons in the Gangtok Natural Asset map. Out of these, 148 polygon (patches) can be merged with the river and be considered as a single unit as per the 100m proximity rule. So the total area of this big patch (A_1) is 788.08 ha (refer Figure 4).

There are 45 patches which are outside the 100m buffer of this big patch. As per the 100 m proximity tool these 45 patches can be merged to form 20 patches ($A_2 - A_{21}$).

$$A_{total} = 865.91 \text{ ha}$$

The values of A_1 to A_{21} are provided in Annexure 3.

As per the final calculation

$$\text{Result} = 1/865.91 * (621854.17) = 718.15 \text{ ha}$$

RESULT: 718.15 ha

SCORE: 2

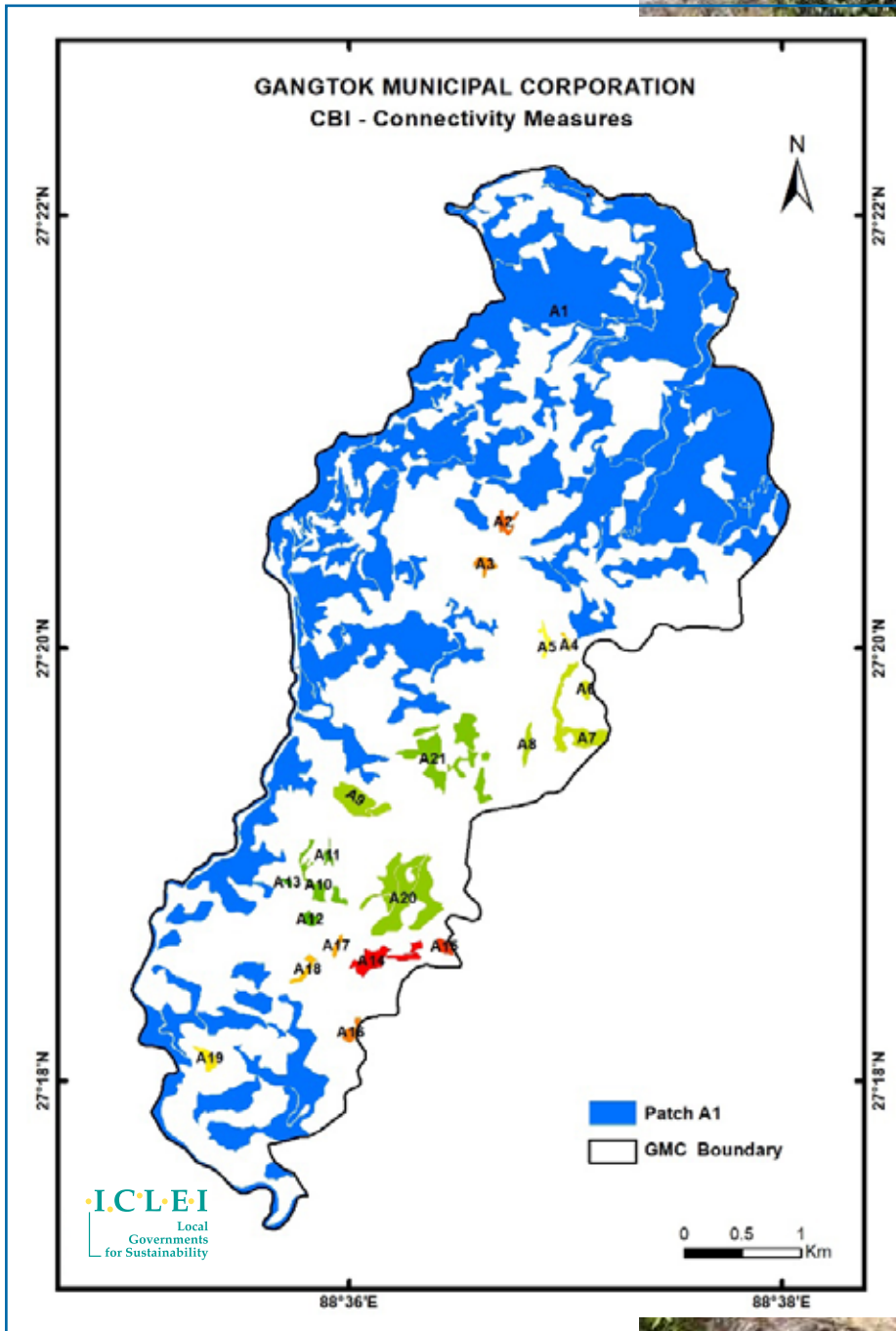


Figure 4: Patches of natural areas within the boundary of GMC

Recommendations to Improve Score

The city can work towards the improvement of this score by improving connectivity between natural areas. This may be through scientific plantations on the barren hill slopes and open grounds or restoration of water bodies. The city's natural areas should also receive protection through a local legislative framework. The LBSAP (presently under development) can also help develop an action plan for the same.

Indicator 3: Native Biodiversity in Built Up Areas (Bird Species)

Methodology

How to calculate indicator

Number of native bird species in built up areas where built up areas include impermeable surfaces like buildings, roads, drainage channels, etc., and anthropogenic green spaces like roof gardens, roadside planting, golf courses, private gardens, cemeteries, lawns, urban parks, etc. Areas that are counted as natural areas in indicator 1 should not be included in this indicator.

Scoring Range: (based on the CBI user manual)

- 0 point: < 19 bird species
- 1 point: 19 - 27 bird species
- 2 points: 28 - 46 bird species
- 3 points: 47 - 68 bird species
- 4 points: > 68 bird species

City Data

Secondary data available on citizen science platforms such as eBird (2019) developed by Cornell Lab of Ornithology, iNaturalist which is a joint initiative of the California Academy of Sciences and the National Geographic Society, various books such as the Biodiversity of Raj Bhavan and lists maintained by Sikkim Forest, Environment and Wildlife Management Department were referred to. Birds sighted within the municipal corporation limits were considered. Sightings from natural areas considered in indicator 1, were excluded.

Of the 184 bird species that were recorded from the city, 71 species are native species that occur within anthropogenically altered spaces of the city. The native bird diversity within the city is high because of dense forests surrounding the city. The list of the birds considered for calculation of this indicator is provided in Annexure 2.

RESULT: 71 Species

SCORE: 4

Recommendations to Improve Score

This is a good score for the city. To maintain this score, the city needs to ensure the maintenance of its natural and agricultural spaces which provide a heterogeneous mosaic of habitats and resources for birds of the city.

Indicator 4 - 8: Change in Number of Native Species

Methodology

How to calculate indicator

The change in number of native species is used for indicators 4 to 8. The three core groups are:

- Indicator 4 : vascular plants
- Indicator 5 : birds
- Indicator 6 : butterflies

These groups have been selected as data are most easily available and to enable some common comparison.

Cities can select any two other taxonomic groups for indicators 7 and 8 (e.g., bryophytes, fungi, amphibians, reptiles, freshwater fish, molluscs, dragonflies, beetles, spiders, hard corals, marine fish, seagrasses, sponges, etc.)

The above data from the first application of the Singapore Index would be recorded in Part I: Profile of the City as the baseline.

Net change in species from the previous survey to the most recent survey is calculated as:

Total increase in number of species (as a result of re-introduction, rediscovery, new species found, etc.) minus number of species that have gone extinct.

Scoring Range: (based on the CBI user manual)

- 0 point: Maintaining or a decrease in the number of species
- 1 point: 1 species increase
- 2 points: 2 species increase
- 3 points: 3 species increase
- 4 points: 4 species or more increase

City Data

Apart from isolated studies compiled by organisations and citizen science platforms (ebird and iNaturalist) there has not been a comprehensive compilation of the biodiversity of Gangtok city.

For the indicator 4-8, data from Biodiversity of Raj Bhavan Gangtok, Sikkim Forest, Environment and Wildlife Management Department, citizen science platforms like e-Bird and inaturalist were considered. Taxa experts were consulted with at the final stage of the list development. Annexure 2 provides details of the species lists that have been considered for indicators 4-8.

For indicators 7 and 8, two additional taxonomic groups of Freshwater Fish and Reptiles, respectively were chosen. These lists will form the baseline for comparison when the index is revisited by the city, after 5 years.

RESULT: Since this is the baseline year for the species count, the city will not receive a score on the indicators 4-8 and it will be excluded from the overall calculation.

Indicator 9: Proportion of Protected Natural Areas

Methodology

How to calculate indicator

$(\text{Area of protected or secured natural areas}) \div (\text{Total area of the city}) \times 100\%$

Scoring Range: (based on the CBI user manual)

0 point:	< 1.4%
1 point:	1.4% - 7.3%
2 points:	7.4% - 11.1%
3 points:	11.2% - 19.4%
4 points:	> 19.4%

City Data

The Deorali Orchid Sanctuary, established in 1970 by the Sikkim Forest, Environment and Wildlife Management Department, is a protected area within the city limit. The sanctuary is spread across two hectares of the natural area, adjoining the Institute of Tibetology by the side of the National Highway.

Total Area of the Orchid Sanctuary = 0.02 sq.km

Total Area of the city = 19.2 sq.km

Proportion of Protected Natural Area = $0.02 \div 19.2 \times 100\% = 0.1\%$

In comparison to the total area of the city, only 0.1% area comes under the protected natural area in the city.

RESULT: 0.1%

SCORE: 0

Recommendations to Improve Score

The city can improve its score for this indicator by increasing the protection of its natural areas. The city can encourage more community-based conservation through the recently formed Biodiversity Management Committee. The Biodiversity Management Committee can also help to identify areas that can be declared as Biodiversity Heritage Sites.

Indicator 10: Proportion of Invasive Alien Species

Methodology

How to calculate indicator

$(\text{Number of invasive alien species}) \div (\text{Number of native species}) \times 100\%$

Scoring Range: (based on the CBI user manual)

0 point:	> 30.0%
1 point:	20.1% - 30.0%
2 points:	11.1% - 20.0%
3 points:	1.0% - 11.0%
4 points:	< 1.0%

City Data

The taxa for which information on alien species is most easily available is terrestrial plants. Hajra and Das (1982) recorded 47 exotic species of vascular plants belonging to 44 genera in Gangtok city. The list of 47 species was matched with the list provided by Sekar (2012) to identify the alien invasive species. The publication 'Biodiversity of Raj Bhavan' (Ganguli-Lachungpa, 2010) was also referred to for calculation of this indicator. A total of 22 invasive alien terrestrial plant species were identified in the city. The total number of native vascular plant species in the city is 465. Table 7 provides a list of invasive species found in Gangtok City. The information on the nativity status of the plant species found in Gangtok was collected through an online search (refer Annexure 2 for more details).

Table 7: List of Invasive Species

S. No.	Scientific Name	Common Name
1	<i>Ageratum conyzoides</i>	Billygoat-weed
2	<i>Ageratum houstonianum</i>	
3	<i>Bidens pilosa</i>	Cobbler's pegs
4	<i>Cassia floribunda</i>	
5	<i>Cecropia peltata</i>	Trumpet tree
6	<i>Celosia argentea var. cristata</i>	Cocks Comb
7	<i>Epipremnum aureum</i>	Golden pothos
8	<i>Eucalyptus grandis</i>	Flooded Gum
9	<i>Eucalyptus tereticornis</i>	Gum tree
10	<i>Eucalyptus globulus</i>	Tasmanian Blue Gum
11	<i>Galinsoga parviflora</i>	Guasca
12	<i>Ipomoea nil</i>	Japanese morning glory
13	<i>Ipomoea purpurea</i>	Common Morning Glory
14	<i>Ipomoea quamoclit</i>	Cypress Vine
15	<i>Jacaranda mimosifolia</i>	
16	<i>Lantana camara</i>	Lantana
17	<i>Mimosa pudica</i>	Touch me not
18	<i>Mirabilis jalapa</i>	Four O'clock

S. No.	Scientific Name	Common Name
19	<i>Parthenium hysterophorus</i>	Carrot weed
20	<i>Solanum jasminoides</i>	Potato Vine
21	<i>Scindapsus aureus</i>	English Ivy
22	<i>Solanum nigrum</i>	Black Nightshade

Total Number of Invasive Alien Species = 22

Total Number of Native Species = 465 (Annexure 2)

Proportion of Invasive Alien Species = $(22 \div 465) \times 100 = 4.73\%$

RESULT: 4.73%

SCORE: 3

Recommendations to Improve Score

It is important that a detailed inventorisation of the floral diversity is carried out. Risk assessment of the alien invasive species that come through this documentation also needs to be conducted. The risk assessment will help to understand the threat that the invasive alien species (high, medium, low and insignificant) pose to the ecosystems. This assessment will also help to develop strategies to control the spread of invasive species. Action points in this regard and the implementation of the same can be identified in the LBSAP of the city.



Indicator 11: Regulation of Quantity of Water

Methodology

How to calculate indicator

$(\text{Total permeable area}) \div (\text{Total terrestrial area of the city}) \times 100\%$

Scoring Range: (based on the CBI user manual)

0 point:	< 33.1%
1 point:	33.1% - 39.7%
2 points:	39.8% - 64.2%
3 points:	64.3% - 75.0%
4 points:	> 75.0%

City Data

At the city-level, data on permeable/non-permeable spaces are absent, and hence the Natural Asset Map prepared by ICLEI South Asia was referred. The details of the land classes used to calculate this indicator are provided below, in Table 8.

A field exercise carried out during the development of the Natural Asset Map found that trees or woody shrubs occupy at least 50% of the area of homesteads in the city. Therefore, 50% of the area under homesteads has also been considered.

Table 8: Land class used to calculate Permeable Area

Land Class	Area (sq.km.)
Dense Natural Vegetation (Forest)	6.48
Mixed sparse vegetation	1.86
Tree patches	0.34
Agriculture land	1.95
River	0.36
Homesteads with Mixed Cultivation (50%)	1.46
Total Permeable Area	12.45

Total Terrestrial Area of the city = 18.84 sq.km. (excluding area of water bodies)

Total Permeable Area = 12.45 sq.km.

Regulation of Quantity of Water = $\text{Total permeable area} \div \text{Total terrestrial area of the city} \times 100\%$

RESULT: 66.08%

SCORE: 3

Recommendations to Improve Score

The city's water resources, formed by the rivers, natural streams, and the jhoras are fragile, due to encroachments, solid waste dumping, and lack of community awareness (ICLEI South Asia, 2016). This has significant repercussions on the regulation of the quantity of water through the urban landscape. The city needs to look into green solutions to address these issues of water pollution. Plantation along barren hill slopes and in open grounds will also help to support the regulation of water in the city.



Indicator 12: Climate Regulation: Carbon Storage and Cooling Effect of Vegetation

Methodology

How to calculate indicator

$(\text{Tree canopy cover}) \div (\text{Total terrestrial area of the city}) \times 100\%$

Scoring Range: (based on the CBI user manual)

0 point:	< 10.5%
1 point:	10.5% - 19.1%
2 points:	19.2% - 29.0%
3 points:	29.1% - 59.7%
4 points:	> 59.7%

City Data

This indicator has been also calculated from the natural asset map. Dense natural vegetation, tree patches, mixed sparse vegetation, agriculture, and homesteads with mixed cultivation have been used for this calculation. About 50% of the sparse vegetation in the area is composed of vegetation comprising of small trees, which has been included in the calculation of this indicator. Trees and woody shrubs are commonly found in around 50% of the agricultural area and homesteads in the region. The same has also been included in the calculation of this indicator.

Tree cover = Dense Natural Vegetation (Forest) + Tree patches + 50% Mixed sparse vegetation + 50% Agriculture land + 50% area of Homesteads with Mixed Cultivation.

Tree cover = 647.57 + 33.86 + 0.5 (185.83+195.39+292.19) = 1018.14 ha or 10.18 sq.km

Total terrestrial area of the city = 18.84 sq.km

RESULT: 54.08%

SCORE: 3

Recommendations to Improve Score

The city can improve their score for this indicator by increasing the vegetation surface area, which can be achieved by greening along barren hill slopes and in open grounds. The city corporation can involve the local community, NGOs and the BMC for the same.

Indicator 13: Recreational Services

Methodology

How to calculate indicator

(Area of parks with natural areas and protected or secured natural areas)/1000 persons

Scoring Range: (based on the CBI user manual)

- 0 point: < 0.1 ha/1000 persons
- 1 point: 0.1 - 0.3 ha/1000 persons
- 2 points: 0.4 - 0.6 ha/1000 persons
- 3 points: 0.7 - 0.9 ha/1000 persons
- 4 points: > 0.9 ha/1000 persons

City Data

According to the City Development Plan, Gangtok (2015), the city primarily lacks organized recreational facilities such as parks and children playfields. However, Deorali Orchid Sanctuary (2 ha), Rigde Park (0.53 ha), and Chogyal Park (3.23 ha) are being used by locals for some form of recreation. Therefore, the area of these three parks is considered for calculation of the indicator.

Deorali Orchid Sanctuary = 2 ha

Rigid Park = 0.53 ha

Chogyal Park = 3.23 ha

Recreational Services = $2 + 0.53 + 3.23 = 5.76/1000$

RESULT: 0.00567ha

SCORE: 0

Recommendations to Improve Score

To improve this score, the city needs to set aside more green space for public access and recreation. Since the city faces issues with the availability of land for such activities, some of the open grounds in the city can be used for the same. The city can also look into development of corridors or linear parks. The LBSAP can provide guidance on the same.

Indicator 14: Educational Services

Methodology

How to calculate indicator

Average number of formal educational visits per child below 16 years to parks with natural areas or protected or secured natural areas per year

Scoring Range: (based on the CBI user manual)

0 point:	0 formal educational visit/year
1 point:	1 formal educational visit/year
2 points:	2 formal educational visits/year
3 points:	3 formal educational visits/year
4 points:	> 3 formal educational visits/year

City Data

Discussions with officials of Gangtok Municipal Corporation and other stakeholders yielded the information that park visits are not mandatory for schools, as per the set curriculum. However, schools do voluntarily organize these visits, in accordance with their schedule.

RESULT: No formal educational visit

SCORE: 0

Recommendations to Improve Score

Though the city administration does not have any influence on the curriculum of the various boards followed by schools in the city, they can give a directive to all schools to include such visits in their curriculum. A suggestion for the same can also be sent by the city government (through the state government) to all the school boards.

Indicator 15: Budget Allocated to Biodiversity

Methodology

How to calculate indicator

$(\text{Amount spent on biodiversity related administration}) \div (\text{Total budget of city}) \times 100\%$

Scoring Range: (based on the CBI user manual)

- 0 point: < 0.4%
- 1 point: 0.4% - 2.2%
- 2 points: 2.3% - 2.7%
- 3 points: 2.8% - 3.7%
- 4 points: > 3.7%

City Data

The following budget allocations in the municipal budget for the financial year 2019-20 contribute to biodiversity conservation:

1. Biodiversity Conservation and Natural Resource Management in Gangtok= 0.15 million INR
2. Preparation of People’s Biodiversity Register= 0.075 million INR

Total Budget of Gangtok Municipal Corporation = 253.5 million INR

Total Budget Allocated for the Biodiversity = $(0.15 + 0.075) \div (253.5) \times 100$

RESULT: 0.08%

SCORE: 0

Recommendations to Improve Score

The city needs to actively work to improve the score on this indicator. The city should take up a more active role in biodiversity governance, by developing its LBSAP and incorporating the financial commitment in the annual municipal budget for initiatives proposed in the LBSAP.

Indicator 16: Number of Biodiversity Projects Implemented by the City Annually

Methodology

How to calculate indicator

Number of programmes and projects that are being implemented by the city authorities, possibly in partnership with private sector, NGOs, etc. per year.

In addition to submitting the total number of projects and programmes carried out, cities are encouraged to provide a listing of the projects and to categorise the list into projects that are:

1. Biodiversity related
2. Ecosystems services related

Scoring Range: (based on the CBI user manual)

- 0 point: < 12 programmes/projects
- 1 point: 12 - 21 programmes/projects
- 2 points: 22 - 39 programmes/projects
- 3 points: 40 - 71 programmes/projects
- 4 points: > 71 programmes/projects

City Data

Gangtok city has implemented the following projects and programmes related to biodiversity in the year 2019-2020 with support from NGOs and the private sector:

- 1. Development of People's Biodiversity Register:** With support from the Sikkim State Biodiversity Board, the Biodiversity Management Committee of Gangtok Municipal Corporation is developing the People's Biodiversity Register. Technical support for the same is being provided by ICLEI South Asia.
- 2. Clean Sikkim Green Sikkim:** The project is being implemented by Gangtok Municipal Corporation with support from the Urban Development and Housing Department and Public Health and Irrigation Department, Government of Sikkim.
- 3. Paryavarn Mahotsav:** Gangtok Municipal Corporation with support of the Forest, Environment, and Wildlife Management Department, Government of Sikkim celebrates Paryavarn Mahotsav from 15th to 30th June every year.
- 4. Interact Bio Project:** The project is being implemented with support from ICLEI-Local Governments for Sustainability, South Asia.

RESULT: < 12

SCORE: 0

Recommendations to Improve Score

This is another sector in which the city needs to take proactive steps to improve the score. The city should develop its LBSAP and can take up activities identified therein, through partnerships with State agencies, Local NGOs, academic institutions and the private sector.

Indicator 17: Policies, Rules and Regulations – Existence of Local Biodiversity Strategy and Action Plan

Methodology

How to calculate indicator

Status of LBSAP (or any equivalent plan); number of associated CBD initiatives.

Scoring Range: (based on the CBI user manual)

- 0 point: No LBSAP*
- 1 point: LBSAP not aligned with NBSAP
- 2 points: LBSAP incorporates elements of NBSAP, but does not include any CBD initiatives**
- 3 points: LBSAP incorporates elements of NBSAP, and includes one to three CBD initiatives
- 4 points: LBSAP incorporates elements of NBSAP, and includes four or more CBD initiatives

* LBSAP or equivalent.

** The thematic programmes of work and cross-cutting issues of the CBD are listed in <http://www.cbd.int/programmes/>. The Strategic Plan for Biodiversity (2011-2020), including the Aichi Biodiversity Targets can also be used as a reference framework (<http://www.cbd.int/sp/default.shtml>).

City Data

The LBSAP of Gangtok city is presently being developed under the INTERACT-Bio Project in conjunction with ICLEI South Asia.

RESULT: LBSAP being prepared

SCORE: 0

Recommendations to Improve Score

The city has already initiated the development of the LBSAP. Once the same is ratified by the city council, measures identified in the LBSAP should be implemented through incorporation in the annual municipal budget.

Indicator 18 : Institutional Capacity - Essential Biodiversity Related Functions

Methodology

How to calculate indicator

Number of essential biodiversity related functions* that the city uses.

*The functions could include the following: biodiversity centre, botanical garden, herbarium, zoological garden or museum, insectarium, etc.

Scoring Range: (based on the CBI user manual)

- 0 point: No functions
- 1 point: 1 function
- 2 points: 2 functions
- 3 points: 3 functions
- 4 points: > 3 functions

City Data

Gangtok city has a Ridge park which is a flower exhibition center that hosts the annual orchid flower show. The city also has :

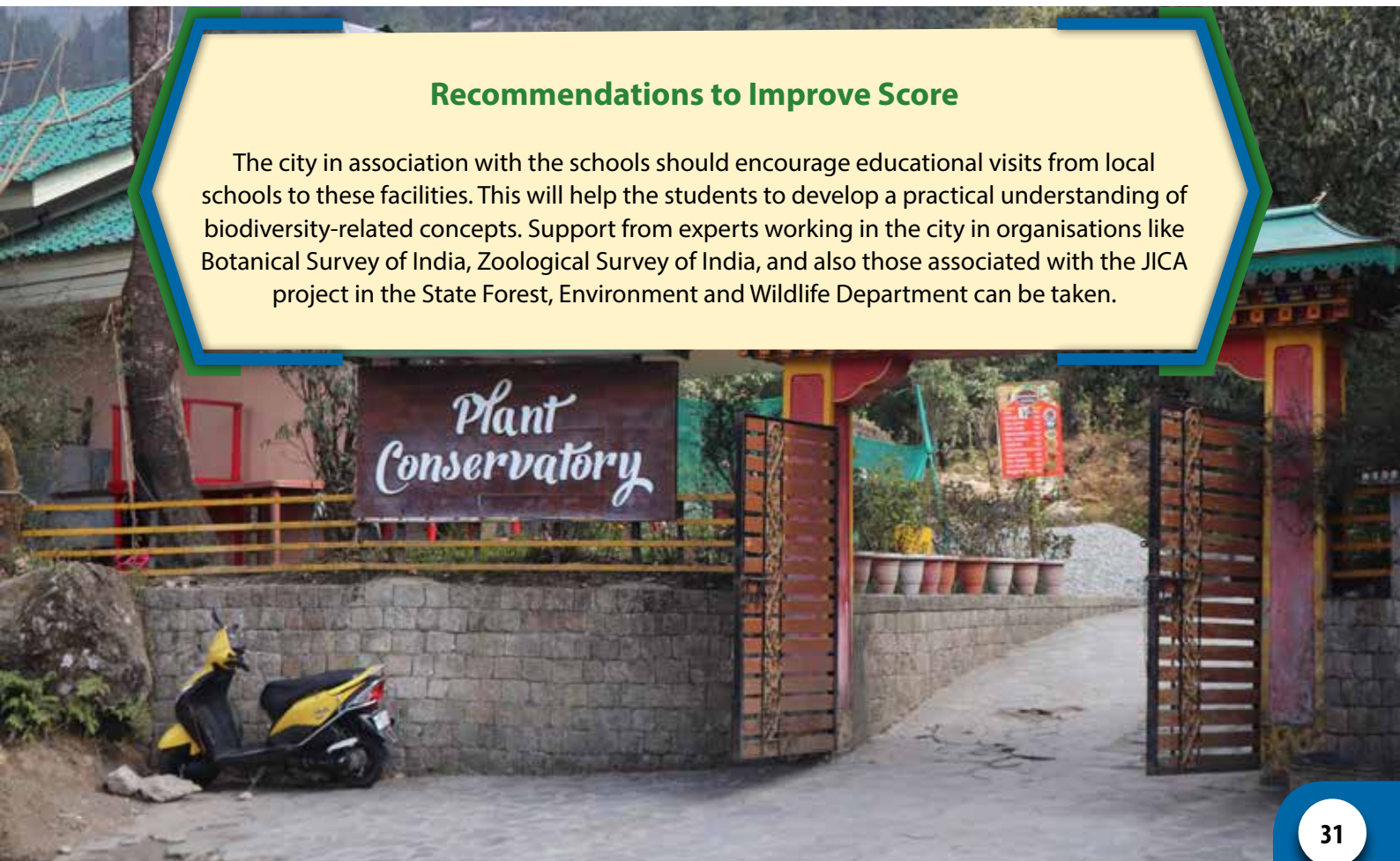
- Himalayan Zoological Park,
- Sikkim Deer Park
- Plant Conservatory

RESULT: 4

SCORE: 4

Recommendations to Improve Score

The city in association with the schools should encourage educational visits from local schools to these facilities. This will help the students to develop a practical understanding of biodiversity-related concepts. Support from experts working in the city in organisations like Botanical Survey of India, Zoological Survey of India, and also those associated with the JICA project in the State Forest, Environment and Wildlife Department can be taken.



Indicator 19 : Institutional Capacity - Inter-Agency Co-Operation

Methodology

How to calculate indicator

Number of city or local government agencies involved in inter-agency co-operation pertaining to biodiversity matters.

Scoring Range: (based on the CBI user manual)

- 0 point: 1 or 2 agencies* cooperate on biodiversity matters
- 1 point: 3 agencies cooperate on biodiversity matters
- 2 points: 4 agencies cooperate on biodiversity matters
- 3 points: 5 agencies cooperate on biodiversity matters
- 4 points: > 5 agencies cooperate on biodiversity matters

* Agencies could include departments or authorities responsible for biodiversity, planning, water, transport, development, finance, infrastructure, etc.

City Data

Biodiversity issues are cross-sectorial and, hence, involve inter-agency efforts. Therefore Gangtok Municipal Corporation works in close association with various local government agencies. Given below are various local government agencies that are involved in matters related to biodiversity conservation in the city.

1. Gangtok Municipal Corporation
2. Biodiversity Management Committee
3. Gangtok Smart City Development Limited

RESULT: 3

SCORE: 1

Recommendations to Improve Score

To improve this score the city administration can look at establishing an outreach organisation of the corporation, which will be registered separately and will function independently. This organisation will assist the city corporation in undertaking and monitoring projects and programmes related to biodiversity conservation. The city can study the example of the Centre for Heritage, Environment and Development (c-hed), established by Kochi Municipal Corporation in this regard.

Indicators 20 : Participation and Partnership - Formal or Informal Public Consultation

Methodology

How to calculate indicator

Existence and state of formal or informal public consultation process pertaining to biodiversity related matters.

Scoring Range: (based on the CBI user manual)

- 0 point: No routine formal or informal process
- 1 point: Formal or informal process being considered as part of the routine process
- 2 points: Formal or informal process being planned as part of the routine process
- 3 points: Formal or informal process in the process of being implemented as part of the routine process
- 4 points: Formal or informal process exists as part of the routine process

City Data

Gangtok Municipal Corporation holds regular consultation meetings on various aspects related to infrastructure development and it is part of the routine process. The present PBR is also being developed through public consultation.

RESULT: Formal or Informal Process Exist

SCORE: 4

Recommendations to Improve Score

The city administration should regularly follow this process of participatory governance and sustain this high score.



Indicators 21 : Participation and Partnership - Institutional Partnership

Methodology

How to calculate indicator

Number of agencies/private companies/NGOs/academic institutions/international organisations with which the city is partnering in biodiversity activities, projects and programmes.

Instances of inter-agency co-operation listed in Indicator 19 should not be listed here again.

Scoring Range: (based on the CBI user manual)

- 0 point: No formal or informal partnerships
- 1 point: City in partnership with 1-6 other national or subnational agencies/private companies/NGOs/academic institutions/international organisations
- 2 points: City in partnership with 7-12 other national or subnational agencies/private companies/NGOs/academic institutions/international organisations
- 3 points: City in partnership with 13-19 other national or subnational agencies/private companies/NGOs/academic institutions/international organisations
- 4 points: City in partnership with 20 or more other national or subnational agencies/private companies/NGOs/academic institutions/international organisations

City Data

The following are the agencies with whom the Municipal Corporation is partnering with for biodiversity-related activities, projects, and programmes.

1. ICLEI South Asia for implementation of INTERACT- Bio project
2. Iora Ecological Solutions, through Shakti Foundation for development of a GHG inventory
3. WWF India for a waste audit
4. State Forest, Environment and Wildlife Management Department for managing the plant conservatory through JICA project and the Zoo
5. State Urban Development and Housing Department and Public Health and Irrigation Department for the Clean Sikkim Green Sikkim project
6. State Pollution Control Board for project on Biodiversity Conservation and Natural Resource Management

RESULT: 4

SCORE: 1

Recommendations to Improve Score

There are several NGOs based in the city who work on issues related to biodiversity conservation. The city government should tie-up with them to improve their score on this indicator. Partnerships with state agriculture, horticulture, and animal husbandry departments can also help to improve this score.

Indicators 22: Education and Awareness - Is Biodiversity or Nature Awareness included in the School Curriculum

Methodology

How to calculate indicator

Is biodiversity or nature awareness included in the school curriculum (e.g. biology, geography, etc.)?

Scoring Range: (based on the CBI user manual)

- 0 point: Biodiversity or elements of it are not covered in the school curriculum
- 1 point: Biodiversity or elements of it are being considered for inclusion in the school curriculum
- 2 points: Biodiversity or elements of it are being planned for inclusion in the school curriculum
- 3 points: Biodiversity or elements of it are in the process of being implemented in the school curriculum
- 4 points: Biodiversity or elements of it are included in the school curriculum

City Data

The schools within the city follow the curriculum of various boards such as the State Board, CBSE and ICSE. All of these boards have included biodiversity and nature awareness in various subjects like Biology, Geography and Environmental Sciences. Therefore, biodiversity or elements of it are included in the school curriculum. Besides, under the Green School Programme of Sikkim, eco-clubs have been established in every school. These clubs work for the improvement of biodiversity in the schools. These activities are included in the school curriculum.

RESULT: Yes

SCORE: 4

Recommendations to Improve Score

Though the score is high, to make the learning more holistic for the students, the city government should encourage schools to have regular field visits also incorporated as part of the activities in the curriculum. This can be done through the eco-clubs for each school.

Indicators 23: Education and Awareness - Number of Outreach or Public Awareness Events

Methodology

How to calculate indicator

Number of outreach or public awareness events held in the city per year.

Scoring Range: (based on the CBI user manual)

- 0 point: 0 outreach events/year
- 1 point: 1 - 59 outreach events/year
- 2 points: 60 -149 outreach events/year
- 3 points: 150-300 outreach events/year
- 4 points: > 300 outreach events/year

City Data

The major city-level programme instituted by Gangtok Municipal Corporation is the Paryavaran Mahostav which is celebrated every year from 15th June to 30th June. The Municipal Corporation has also conducted Swachh Bharat Mission awareness programmes to make citizens aware of the adverse impacts of improper waste management on the local ecosystem.

RESULT: 1 - 59

SCORE: 1

Recommendations to Improve Score

The city government should tie-up with local NGOs to undertake regular city-level outreach programmes. This will help to improve the score on this indicator. The BMC can take a lead role in fostering these partnerships.



Table 9: Summary of the Points

	Score
Component – Native Biodiversity	
Indicators	
1. Proportion of Natural Areas in the City	4
2. Connectivity Measures	2
3. Native Biodiversity in Built Up Areas (Bird Species)	4
4. Change in Number of Vascular Plant Species	N/A
5. Change in Number of bird Species	N/A
6. Change in number of Native Butterfly Species. N	N/A
7. Change in Number of Native Species (any other taxonomic group selected by the city)	N/A
8. Change in Number of Native Species (any other taxonomic group selected by the city)	N/A
9. Proportion of Protected Natural Areas	0
10. Proportion of Invasive Alien Species	3
Component – Ecosystem Services Provided by Biodiversity	
Indicators	
11. Regulation of Quantity of Water	3
12. Climate Regulation: Carbon Storage and Cooling Effect of Vegetation	3
13. Recreation and Education: Area of Parks with Natural Areas	0
14. Recreation and Education: Number of Formal Education Visits per Child Below 16 Years to Parks with Natural Areas per Year	0
Component – Governance and Management of Biodiversity	
Indicators	
15. Budget Allocated to Biodiversity	0
16. Number of Biodiversity Projects Implemented by the City Annually	0
17. Existence of Local Biodiversity Strategy and Action Plan	0
18. Institutional Capacity: Number of Biodiversity Related Function	4
19. Institutional Capacity: Number of City or Local Government Agencies Involved in Inter-agency Cooperation Pertaining to Biodiversity Matters	1
20. Participation and Partnership: Existence of Formal or Informal Public Consultation Process	4
21. Participation and Partnership: Number of Agencies/Private Companies/NGOs/Academic Institutions/International Organisations with which the City is Partnering in Biodiversity Activities, Projects and Programmes	1
22. Education and Awareness: Is Biodiversity or Nature Awareness Included in the School Curriculum	4
23. Education and Awareness: Number of Outreach or Public Awareness Events Held in the City per Year	1
Component – Native Biodiversity in the City (Sub-total for indicators 1-10)*	13/20
Component – Ecosystem Services provided by Biodiversity (Sub-total for indicators 11-14)	6/16
Component – Governance and Management of Biodiversity (Sub-total for indicators 15-23)	15/36
Total	34/72

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Annexure 2 – List of Species

Table 10: List of Birds used for calculation of Indicator 3 and 5

S. No.	Scientific Name	Common Name	Status	Urban or Forest
1.	<i>Ictinaetus malayensis</i>	Black Eagle	Resident	Forest
2.	<i>Spilornis cheela</i>	Crested Serpent Eagle	Resident	Forest
3.	<i>Falco tinnunculus</i>	Common Kestrel	Resident	Urban
4.	<i>Lophura leucomelanos</i>	Kalij Pheasant	Resident	Forest
5.	<i>Columba livia</i>	Rock Pigeon	Resident	Urban
6.	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Resident	Urban
7.	<i>Streptopelia chinensis</i>	Spotted Dove	Resident	Urban
8.	<i>Macropygia unchall</i>	Barred Cuckoo Dove	Resident	Forest
9.	<i>Psittacula himalayana</i>	Slaty-headed Parakeet	Resident	Urban
10.	<i>Hierococyx sparverioides</i>	Large Hawk Cuckoo	Resident	Forest
11.	<i>Cuculus micropterus</i>	Indian Cuckoo	Resident	Forest
12.	<i>Cuculus canorus</i>	Common Cuckoo	Migrant	Forest
13.	<i>Cuculus saturates</i>	Himalayan Cuckoo	Resident	Forest
14.	<i>Cuculus poliocephalus</i>	Lesser Cuckoo	Resident	Forest
15.	<i>Surniculus lugubris</i>	Square-tailed Drongo-Cuckoo	Resident	Forest
16.	<i>Otus bakkamoena</i>	Indian Scops Owl	Resident	Urban
17.	<i>Strix leptogrammica</i>	Brown Wood Owl	Resident	Forest
18.	<i>Glaucidium brodiei</i>	Collared Owlet	Resident	Urban
19.	<i>Glaucidium cuculoides</i>	Asian Barred Owlet	Resident	Urban
20.	<i>Upupa epops</i>	Hoopoe	Resident	Urban
21.	<i>Megalaima virens</i>	Great Barbet	Resident	Urban
22.	<i>Megalaima asiatica</i>	Blue-throated Barbet	Resident	Urban
23.	<i>Megalaima lineata</i>	Lineated Barbet	Resident	Urban
24.	<i>Sasia ochracea</i>	White-browed Piculet	Resident	Forest
25.	<i>Picus chlorolophus</i>	Lesser Yellownape	Resident	Forest
26.	<i>Delichon nipalensis</i>	Nepal House Martin	Resident	Urban
27.	<i>Motacilla cinerea</i>	Grey Wagtail	Migrant	Urban
28.	<i>Pericrocotus brevirostris</i>	Short-billed Minivet	Resident	Forest
29.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Resident	Urban
30.	<i>Hypsipetes leucocephalus</i>	Himalayan Black Bulbul	Resident	Urban
31.	<i>Lanius schach</i>	Long-tailed Shrike	Resident	Urban
32.	<i>Lanius tephronotus</i>	Grey-backed Shrike	Resident	Urban
33.	<i>Myophonus caeruleus</i>	Blue -whistling Thrush	Resident	Urban
34.	<i>Turdus unicolor</i>	Tickell's Thrush	Migrant	Forest
35.	<i>Brachypteryx hyperythra</i>	Rusty Bellied Shortwing	Resident	Forest
36.	<i>Luscinia brunnea</i>	Indian Blue Robin	Resident	Forest
37.	<i>Tarsiger chrysaeus</i>	Golden Bush Robin	Resident	Forest
38.	<i>Copsychus saularis</i>	Oriental Magpie Robin	Resident	Urban

S. No.	Scientific Name	Common Name	Status	Urban or Forest
39.	<i>Phoenicurus frontalis</i>	Blue-fronted Redstart	Resident	Urban
40.	<i>Chaimarrornis leucocephalus</i>	White-capped Redstart	Resident	Urban
41.	<i>Myiomela leucura</i>	White-tailed Blue Robin	Resident	Forest
42.	<i>Enicurus schistaceus</i>	Slaty-backed Forktail	Resident	Urban - around the nalas
43.	<i>Saxicola ferrea</i>	Grey-bush Chat	Resident	Urban
44.	<i>Garrulax striatus</i>	Striated Laughingthrush	Resident	Urban
45.	<i>Trochalopteron imbricatum</i>	Bhutan Laughingthrush	Resident	Urban
46.	<i>Garrulax subunicolor</i>	Scaly Laughingthrush	Resident	Forest
47.	<i>Pomatorhinus ruficollis</i>	Streak-breasted Scimitar Babbler	Resident	Forest
48.	<i>Pnoepyga albiventer</i>	Scaly-breasted Wren-Babbler	Resident	Forest
49.	<i>Leiothrix argentauris</i>	Silver-eared Mesia	Resident	Forest
50.	<i>Leiothrix lutea</i>	Red-billed Leiothrix	Resident	Urban
51.	<i>Actinodura cyanouroptera</i>	Blue-winged Minla	Resident	Foresr
52.	<i>Actinodura strigula</i>	Chestnut-tailed Minla	Resident	Forest
53.	<i>Minla ignotincta</i>	Red-tailed Minla	Resident	Forest
54.	<i>Lioparus chrysotis</i>	Golden breasted Fulvetta	Resident	Forest
55.	<i>Heterophasia capistrata</i>	Rufous Sibia	Resident	Urban
56.	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Resident	Urban
57.	<i>Prinia atrogularis</i>	Black-throated Prinia	Resident	Forest
58.	<i>Horornis fortipes</i>	Brown-flanked Bush Warbler	Resident	Forest
59.	<i>Orthotomus sutorius</i>	Common Tailorbird	Resident	Urban
60.	<i>Phylloscopus reguloides</i>	Blyth's Reed Warbler	Resident	Urban
61.	<i>Eumyias thalassina</i>	Verditer Flycatcher	Resident	Forest
62.	<i>Niltava sundara</i>	Rufous-bellied Niltava	Resident	Forest
63.	<i>Culicicapa ceylonensis</i>	Grey-headed Canary Flycatcher	Resident	Urban
64.	<i>Rhipidura albicollis</i>	White-throated Fantail	Resident	Urban
65.	<i>Aegithalos concinnus</i>	Black-throated Bushtit	Resident	Forest
66.	<i>Parus monticolus</i>	Green backed Tit	Resident	Urban
67.	<i>Sitta castanea</i>	Indian Nuthatch	Resident	Forest
68.	<i>Dicaeum ignipectus</i>	Fire-breasted Flowerpecker	Resident	Forest
69.	<i>Aethopyga gouldiae</i>	Mrs. Gould's Sunbird	Resident	Forest
70.	<i>Aethopyga saturate</i>	Black-throated Sunbird	Resident	Forest
71.	<i>Aethopyga ignicauda</i>	Fire-tailed Sunbird	Resident	Forest
72.	<i>Zosterops palpebrosus</i>	Indian White-eye	Resident	Urban
73.	<i>Chloris spinoides</i>	Yellow-breasted Greenfinch	Resident	Forest
74.	<i>Carpodacus nipalensis</i>	Dark breasted Rosefinch	Resident	Forest
75.	<i>Lonchura striata</i>	White-rumped Munia	Resident	Forest
76.	<i>Passer domesticus</i>	House Sparrow	Resident	Urban
77.	<i>Passer montanus</i>	Eurasian tree Sparrow	Resident	Urban
78.	<i>Passer rutilans</i>	Russet Sparrow	Resident	Urban
79.	<i>Acridotheres tristis</i>	Common Myna	Resident	Urban
80.	<i>Gracula religiosa</i>	Common Hill Myna	Resident	Forest
81.	<i>Oriolus traillii</i>	Maroon Oriole	Resident	Urban

S. No.	Scientific Name	Common Name	Status	Urban or Forest
82.	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Resident	Urban
83.	<i>Cissa chinensis</i>	Common Green Magpie	Resident	Urban
84.	<i>Dendrocitta formosae</i>	Himalayan Treepie	Resident	Urban
85.	<i>Corvus splendens</i>	House Crow	Resident	Urban
86.	<i>Corvus macrorhynchos</i>	Large-billed Crow	Resident	Urban
87.	<i>Phoenicurus fuliginosus</i>	Plumbeous Water Redstart	Resident	Urban
88.	<i>Trochalopteron erythrocephalum</i>	Chestnut Crowned Laughingthrush	Resident	Urban
89.	<i>Dicrurus hottentottus</i>	Hair-crested Drongo	Resident	Urban
90.	<i>Mycerobas affinis</i>	Collared Grosbeak	Resident	Forest
91.	<i>Pyrrhoplectes epauletta</i>	Gold-naped Finch	Resident	Forest
92.	<i>Niltava macgrigoriae</i>	Small Niltava	Resident	Forest
93.	<i>Phoenicurus hodgsoni</i>	Hodgson's Redstart	Resident	Urban
94.	<i>Ficefula strophciata</i>	Rufous-orgetted Flycatcher	Resident	Forest
95.	<i>Prunella strophciata</i>	Rufous-breasted Accentor	Resident	Forest
96.	<i>Pycnonotus leucogenys</i>	Himalayan Bulbul	Resident	Urban
97.	<i>Garrulax leucolophus</i>	White-crested Laughingthrush	Resident	Forest
98.	<i>Actinodura egertoni</i>	Rusty-fronted Barwing	Resident	Forest
99.	<i>Picus canus</i>	Grey-headed Woodpecker	Resident	Forest
100.	<i>Pericrocotus speciosus</i>	Scarlet Minivet	Resident	Urban
101.	<i>Trochalopteron affine</i>	Black-faced Laughingthrush	Resident	Forest
102.	<i>Urocissa erythroryncha</i>	Red-billed Blue Magpie	Resident	Urban
103.	<i>Carpodacus sipahi</i>	Scarlet Finch	Resident	Forest
104.	<i>Chrysophlegma flavinucha</i>	Greater Yellownape	Resident	Forest
105.	<i>Hirundo rustica</i>	Barn Swallow	Migrant	Forest
106.	<i>Dicrurus macrocercus</i>	Black Drongo	Resident	Urban
107.	<i>Phylloscopus xanthoschistos</i>	Grey-hooded Warbler	Resident	Urban
108.	<i>Phylloscopus whistleri</i>	Whistler's Warbler	Resident	Urban
109.	<i>Horornis flavolivaceus</i>	Aberrant Bush-warbler	Resident	Forest
110.	<i>Phylloscopus chloronotus</i>	Lemon-rumped Warbler	Resident	Forest
111.	<i>Yuhina occipitalis</i>	Rufous-vented Yuhina	Resident	Forest
112.	<i>Pellorneum ruficeps</i>	Puff throated Babbler	Resident	Forest
113.	<i>Alcippe nipalensis</i>	Nepal Fulvetta	Resident	Forest
114.	<i>Paradoxornis nipalensis</i>	Black-throated Parrotbill	Resident	Forest
115.	<i>Enicurus maculatus</i>	Spotted Forktail	Resident	Urban-around the nalas
116.	<i>Niltava grandis</i>	Large Niltava	Resident	Forest
117.	<i>Niltava sundara</i>	Rufous-bellied Niltava	Resident	Forest
118.	<i>Muscicapa sibirica</i>	Dark-sided Flycatcher	Resident	Urban
119.	<i>Ficedula tricolor</i>	Slaty-blue Flycatcher	Resident	Urban
120.	<i>Cyornis rubeculoides</i>	Blue throated Flycatcher	Resident	Forest
121.	<i>Anthracoseros albirostris</i>	Oriental Pied Hornbill	Resident	Urban
122.	<i>Gyps himalayensis</i>	Himalayan Griffon	Resident	Forest
123.	<i>Gyps bengalensis</i>	White-backed Vulture	Resident	Forest
124.	<i>Arborophila mandellii</i>	Chestnut-breasted Partridge	Resident	Forest

S. No.	Scientific Name	Common Name	Status	Urban or Forest
125.	<i>Sitta himalayensis</i>	White-tailed Nuthatch	Resident	Forest
126.	<i>Sitta cinnamoventris</i>	Chestnut bellied Nuthatch	Resident	Forest
127.	<i>Certhia nipalensis</i>	Rusty-flanked Treecreeper	Resident	Forest
128.	<i>Certhia familiaris</i>	Eurasian Treecreeper	Resident	Forest
129.	<i>Arborophila torqueola</i>	Common Hill Partridge	Resident	Forest
130.	<i>Actinodura nipalensis</i>	Hoary-throated Barwing	Resident	Forest
131.	<i>Yuhina bakeri</i>	White-naped Yuhina	Resident	Forest
132.	<i>Ducula badia</i>	Mountain Imperial Pigeon	Resident	Forest
133.	<i>Phaenicophaeus tristis</i>	Green -billed Malkoha	Resident	Forest
134.	<i>Chloropsis hardwickii</i>	Orange-bellied Chloropsis	Resident	Forest
135.	<i>Cinclus pallasii</i>	Brown Dipper	Resident	Forest
136.	<i>Lophotriorchis kienerii</i>	Rufous bellied Eagle	Resident	Forest
137.	<i>Accipiter trivirgatus</i>	Crested Goshawk	Resident	Urban
138.	<i>Buteo burmanicus</i>	Himalayan Buzzard	Resident	Urban
139.	<i>Accipiter badius</i>	Shikra	Resident	Urban
140.	<i>Aquila nipalensis</i>	Steppe Eagle	Migrant	Forest
141.	<i>Otus lettia</i>	Collared Scops Owl	Resident	Urban
142.	<i>Otus spilocephalus</i>	Mountain Scops Owl	Resident	Forest
143.	<i>Pycnonotus striatus</i>	Striated Bulbul	Resident	Forest
144.	<i>Tarsiger rufilatus</i>	Himalayan Bluetail	Resident	Forest
145.	<i>Aethopyga nipalensis</i>	Green-tailed Sunbird	Resident	Urban
146.	<i>Nisaetus nipalensis</i>	Mountain Hawk Eagle	Resident	Forest
147.	<i>Phylloscopus maculipennis</i>	Ashy throated Warbler	Resident	Forest
148.	<i>Aerodramus brevirostris</i>	Himalayan Swiftlet	Resident	Urban
149.	<i>Minla ignotincta</i>	Red tailed Minla	Resident	Forest
150.	<i>Pericrocotus ethologus</i>	Long tailed Minivet	Resident	Forest
151.	<i>Phylloscopus pulcher</i>	Buff barred Warbler	Resident	Forest
152.	<i>Phylloscopus castaniceps</i>	Chestnut-crowned Warbler	Resident	Forest
153.	<i>Tesia cyanivente</i>	Gray bellied Tesia	Resident	Forest
154.	<i>Alcippe castaneiceps</i>	Rufous winged Fulvetta	Resident	Forest
155.	<i>Turdus boulboul</i>	Gray winged Blackbird	Resident	Forest
156.	<i>Lioparus chrysotis</i>	Golden-breasted Fulvetta	Resident	Forest
157.	<i>Myiomela leucura</i>	White tailed Robin	Resident	Forest
158.	<i>Aegithalos concinnus</i>	Black-throated Tit	Resident	Forest
159.	<i>Stachyridopsis ruficeps</i>	Rufous-capped Babbler	Resident	Forest
160.	<i>Muscicapa ferruginea</i>	Ferruginous Flycatcher	Resident	Forest
161.	<i>Brachypteryx hyperythra</i>	Rusty Bellied Shortwing	Resident	Forest
162.	<i>Pyrrhula nipalensis</i>	Brown Bullfinch	Resident	Forest
163.	<i>Apus nipalensis</i>	House Swift	Migrant	Forest
164.	<i>Phylloscopus affinis</i>	Tickell's Leafwarbler	Resident	Forest
165.	<i>Psilopogon franklinii</i>	Golden-throated Barbet	Resident	Forest
166.	<i>Lanius cristatus</i>	Brown Shrike	Migrant	Forest
167.	<i>Sylviparus modestus</i>	Yellow-browed Tit	Resident	Forest
168.	<i>Pnoepyga pusilla</i>	Pygmy Cupwing	Resident	Forest
169.	<i>Cettia castaneocoronata</i>	Chestnut-headed Tesia	Resident	Forest

S. No.	Scientific Name	Common Name	Status	Urban or Forest
170.	<i>Horornis fortipes</i>	Brownish-flanked Bush-warbler	Resident	Forest
171.	<i>Actinodura egertoni</i>	Rusty-fronted Barwing	Resident	Forest
172.	<i>Elachura Formosa</i>	Spotted Elachura	Resident	Forest
173.	<i>Brachypteryx leucophris</i>	Lesser Shortwing	Resident	Forest
174.	<i>Pterorhinus caerulatus</i>	Gray-sided Laughingthrush	Resident	Forest
175.	<i>Trochalopteron squamatum</i>	Blue-winged Laughingthrush	Resident	Forest
176.	<i>Yuhina gularis</i>	Stripe-throated Yuhina	Resident	Forest
177.	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Resident	Urban
178.	<i>Sturnia malabarica</i>	Chestnut-tailed Starling	Resident	Urban
179.	<i>Anthus rufulus</i>	Paddyfield Pipit	Resident	Urban
180.	<i>Eudynamys scolopaceus</i>	Asian Koel	Resident	Urban
181.	<i>Actitis hypoleucos</i>	Common Sandpiper	Migrant	Forest
182.	<i>Tringa ochropus</i>	Green Sandpiper	Migrant	Forest
183.	<i>Pyrrhocorax pyrrhocorax</i>	Red Billed Chough	Resident	Urban
184.	<i>Milvus migrans</i>	Black Kite	Resident	Urban

Table 11: List of Vascular Plant Species used for calculation of Indicators 4 and 10

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
1.	<i>Abies densa</i>	East-Himalayan Silver Fir	Tree	Native
2.	<i>Abutilon pictum</i>	Indian Mallow	Shrub	Naturalised
3.	<i>Acacia catechu</i>	Black Catechu	Tree	Native
4.	<i>Acalypha wilkesiana</i>	Copperleaf	Shrub	Naturalised
5.	<i>Acampe praemorsa</i>	Wight's Acampe	Herb	Native
6.	<i>Acampe rigida</i>	Stiff Acampe	Herb	Native
7.	<i>Acer campbelii</i>		Tree	Native
8.	<i>Acer sikkimense</i>		Tree	Native
9.	<i>Acer stachyophyllum</i>		Tree	Native
10.	<i>Acer sterculiaceum</i>	Himalayan Maple	Tree	Native
11.	<i>Achrochaena punctate</i>		Herb	Native
12.	<i>Acmella uliginosa</i>	Marsh Para Cress	Herb	Naturalised
13.	<i>Aconogonum molle</i>		Herb	Native
14.	<i>Acorus calamus</i>	Sweet Flag	Herb	Native
15.	<i>Adatoda vasica</i>	Adusa	Tree	Native
16.	<i>Aegle marmelos</i>	Bael	Tree	Native
17.	<i>Aerides multiflora</i>	Fox Tail Orchid	Shrub	Native
18.	<i>Aesculus assamica</i>	Himalayan Horse chestnut	Tree	Native
19.	<i>Aesculus indica</i>	Indian Horse chestnut	Tree	Native
20.	<i>Agapetes serpens</i>	Himalayan Lantern,	Shrub	Native
21.	<i>Ageratum conyzoides</i>	Billygoat-weed	Herb	Invasive
22.	<i>Ageratum houstonianum</i>		Shrub	Invasive
23.	<i>Aglaonema commutatum</i>	Silver Evergreen	Herb	Native
24.	<i>Aglaonema commutatum cv. Silver Kin</i>	Silver King evergreen	Herb	Native

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
25.	<i>Aglaonema modestum</i>	Chinese Evergreen	Herb	Native
26.	<i>Ajuga lobate</i>	Leaf Bugleweed	Herb	Native
27.	<i>Alangium alpinum</i>		Tree	Native
28.	<i>Albizia lebbek</i>	Siris Tree	Tree	Native
29.	<i>Albizia procera</i>	White Siris	Tree	Native
30.	<i>Alcea rosea</i>	Common Hollyhock	Herb	Native
31.	<i>Allamanda cathartica</i>	Golden trumpet	Shrub	Naturalised
32.	<i>Allium cepa</i>	Bulb Onion	Tree	Naturalised
33.	<i>Allium practii</i>		Herb	Native
34.	<i>Allium sativum</i>	Garlic	Herb	Naturalised
35.	<i>Alloteropsis semialata</i>	Black seed	Herb	Native
36.	<i>Alnus nepalensis</i>	Utis	Tree	Native
37.	<i>Alocasia micholitziana</i> 'Frydek'	Green Velvet Alocasia	Herb	Native
38.	<i>Aloe vera</i>	Ghrirkumari	Herb	Naturalised
39.	<i>Alstonia scholaris</i>	Devils tree	Tree	Native
40.	<i>Amaryllis belladonna</i>	Amaryllis	Tree	Native
41.	<i>Amomum subulatum</i>	Black Cardamom	Herb	Native
42.	<i>Amorphophallus bulbifer</i>	Devil's Tongue	Herb	Native
43.	<i>Anaphalis margaritacea</i>	Western Pearly Everlasting	Herb	Naturalised
44.	<i>Anaphalis triplinervis</i>	Pearly Everlasting	Herb	Native
45.	<i>Anemone vitifolia</i>	Grapeleaf Anemone	Herb	Naturalised
46.	<i>Annanas cosmosus</i>		Tree	Naturalised
47.	<i>Anthogonium gracile</i>	Slender Anthogonium	Herb	Native
48.	<i>Anthurium andraeanum</i>	flamingo lily	Herb	Naturalised
49.	<i>Aphelandra squarrosa</i>	Zebra Plant	Shrub	Naturalised
50.	<i>Apluda mutica</i>	Mauritian grass	Herb	Native
51.	<i>Aragpanthus africanus</i>	African Lily	Herb	Naturalised
52.	<i>Ardisia macrocarpa</i>	Himalayan Coralberry	Shrub	Native
53.	<i>Arisaema speciosum</i>	Grand Cobra Lily	Herb	Native
54.	<i>Artemisia myriantha</i>		Herb	Native
55.	<i>Artemisia vulgaris</i>	Common Mugwort	Herb	Native
56.	<i>Arthraxon castratus</i>	Carpet Grass	Herb	Native
57.	<i>Artocarpus heterophyllus</i>	Jackfruit	Tree	Native
58.	<i>Arundinaria maling</i>	Cane	Herb	Native
59.	<i>Arundinaria suberecta</i>	Sanu Mailing	Herb	Native
60.	<i>Asparagus densiflorus</i> cv. <i>Myers</i>	Plume Asparagus	Herb	Naturalised
61.	<i>Asparagus racemosus</i>	Statwari	Herb	Native
62.	<i>Aspidistra elatior</i>	Cast-iron plant	Herb	Naturalised
63.	<i>Aspidistra elatior</i> cv. <i>Variegata</i>	Variegated cast-iron Plant	Herb	Naturalised
64.	<i>Aster</i> sp.	Aster	Herb	Naturalised
65.	<i>Astilbe rivularis</i>	River Astilbe	Shrub	Native
66.	<i>Asystasia macrocarpa</i>	Chinese Violet	Shrub	Native
67.	<i>Aucuba japonica</i> cv. <i>variegata</i>	Gold-dust Plant	Shrub	Naturalised
68.	<i>Azadirachta indica</i>	Neem	Tree	Native

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
69.	<i>Azalea formosa</i>	Azaleas	Shrub	Native
70.	<i>Bambusa bambos</i>	Thorny Bamboo	Herb	Native
71.	<i>Bambusa multiplex</i>	Hedge Bamboo	Herb	Native
72.	<i>Bambusa nutans</i>	Nodding Bamboo	Herb	Native
73.	<i>Bambusa pallida</i>		Herb	Native
74.	<i>Bambusa tulda</i>	Indian Timber Bambo	Herb	Native
75.	<i>Bambusa Vulgaris</i>	Common Bamboo	Herb	Native
76.	<i>Barleria cristata</i>	Philippine Violet	Herb	Native
77.	<i>Bauhinia acuminata</i>	Dwarf White Bauhinia	Herb	Native
78.	<i>Bauhinia variegata</i>	Orchid tree	Herb	Native
79.	<i>Bauhinia vahlii</i>	Maloo Creeper	Herb	Native
80.	<i>Beaucarnea recurvate</i>	Ponytail Palm	Tree	Naturalised
81.	<i>Begonia palmata</i>		Herb	Native
82.	<i>Beilschmiedia roxburghiana</i>	Thulo Tarshing	Tree	Native
83.	<i>Bellis perennis</i>	Common Daisy	Herb	Naturalised
84.	<i>Berginia ciliate</i>	Friilly Bergenia	Herb	Native
85.	<i>Betula alnoides</i>	Himalayan Birch	Tree	Native
86.	<i>Bidens pilosa</i>	Cobbler's pegs	Herb	Invasive
87.	<i>Bidens tripartita</i>	Burr Marigold	Herb	Naturalised
88.	<i>Biophytum sensitivum</i>	Little Tree	Herb	Native
89.	<i>Boehmeria hamiltoniana</i>		Herb	Native
90.	<i>Boehmeria macrophylla</i>	False Nettle	Herb	Native
91.	<i>Bombax ceiba</i>	Cotton tree	Tree	Native
92.	<i>Bothriocbloa bladhii</i>	Blue stem	Herb	Native
93.	<i>Bougainvillea glabra</i>	Paper Flower	Tree	Naturalised
94.	<i>Brassaia actinophylla</i>	Schefflera	Tree	Naturalised
95.	<i>Brassica juncea</i>	Brown mustard	Herb	Native
96.	<i>Brassica nigra</i>	Black Mustard	Herb	Naturalised
97.	<i>Brassica oleracea var. botrytis</i>	Cauliflower	Herb	Naturalised
98.	<i>Brassica oleracea</i>	Cabbage	Herb	Naturalised
99.	<i>Brassica oleracea var. acephala</i>	Ornamental Kale and Cabba	Herb	Naturalised
100.	<i>Bromeliads sps.</i>	Bromeliads	Herb	Naturalised
101.	<i>Brugmansia suaveolens</i>	Angel's Trumpet	Tree	Naturalised
102.	<i>Buddleja asiatica</i>	Bai Bei Feng	Shrub	Native
103.	<i>Buddleja davidii</i>	Summer Lilac	Shrub	Native
104.	<i>Bulbophyllum cylindraceum</i>		Herb	Native
105.	<i>Bulbophyllum helenae</i>		Herb	Native
106.	<i>Bulbophyllum hirtum</i>	The Bristly Bulbophyllum	Herb	Native
107.	<i>Bulbophyllum leopardinum</i>		Herb	Native
108.	<i>Bulbophyllum odoratissimum</i>	The Fragrant Bulbophyllum	Herb	Native
109.	<i>Bulbophyllum reptans</i>	The Crawling Bulbophyllum	Herb	Native
110.	<i>Bulbophyllum umbellatum</i>	The Umbrella Bulbophyllum	Herb	Native
111.	<i>Bulbophyllum viridiflorum</i>		Herb	Native
112.	<i>Butea monosperma</i>	Flame of forest	Tree	Native

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113.	<i>Calamagrostis emodensis</i>	Reed grass	Herb	Native
114.	<i>Calanthe puberula</i>	Christmas Orchid	Herb	Native
115.	<i>Calanthe sylvatica</i>	Forest Calanthe	Herb	Native
116.	<i>Calceolaria tripartita</i>	Slipper Flower	Herb	Native
117.	<i>Calendula officinalis</i>	Common Marigold	Herb	Naturalised
118.	<i>Callicarpa arborea</i>	Beautyberry Tree	Tree	Native
119.	<i>Callostylis bambusifolia</i>	Bamboo-Leaf Eria	Herb	Native
120.	<i>Callostylis rigida</i>		Herb	Native
121.	<i>Camellia japonica</i>		Shrub	Naturalised
122.	<i>Camellia kissi</i>		Tree	Native
123.	<i>Camellia sinensis</i>	Tea Plant	Tree	Native
124.	<i>Campanula pallida</i>	Pale Bellflower	Herb	Native
125.	<i>Capillipedium assimile</i>		Herb	Native
126.	<i>Capsicum annum</i>	Sweet Pepper	Herb/	Naturalised
127.	<i>Campsis radicans</i>	Trumpet Vine	Shrub	Naturalised
128.	<i>Cardiocrinum giganteum</i>	The Giant Himalayan Lily	Shrub	Native
129.	<i>Carica papaya</i>	Papaya	Shrub	Naturalised
130.	<i>Caryota mitis</i>	Fishtail palm	Tree	Native
131.	<i>Cassia floribunda</i>		Shrub	Invasive
132.	<i>Cassia fistula</i>	Golden Shower	Tree	Native
133.	<i>Castanopsis indica</i>	Indian chestnut	Tree	Native
134.	<i>Castanopsis tribuloides</i>		Tree	Naturalised
135.	<i>Casuarina equisetifolia</i>	Whistling Pine	Tree	Naturalised
136.	<i>Catharanthus roseus</i>	Cape Periwinkle	Herb	Naturalised
137.	<i>Cattleya labiate</i>	Crimson Cattleya	Herb	Naturalised
138.	<i>Celosia argentea var. cristata</i>	Cocks Comb	Herb	Invasive
139.	<i>Cephalostachyum capitatum</i>		Herb	Native
140.	<i>Cephalostachyum capitatum</i> Var. <i>deco</i>	Gope bans	Herb	Native
141.	<i>Cephalostachyum fushsianum</i>	Palom	Herb	Native
142.	<i>Cephalostachyum hookernia</i>	Pareng/Singhana	Herb	Native
143.	<i>Cephalostachyum intermedia</i>	Tita Nigalo	Herb	Native
144.	<i>Cecropia peltata</i>	Trumpet tree		Invasive
145.	<i>Cephalostachyum latiforum</i>	Gopa Bans	Herb	Native
146.	<i>Cestrum aurantiacum</i>	Orange Cestrum	Shrub	Naturalised
147.	<i>Cestrum elegans</i>	Red Cestrum	Shrub	Naturalised
148.	<i>Cestrum fasciculatum</i>	Early Jessamine	Shrub	Naturalised
149.	<i>Cestrum nocturnum</i>	Night-blooming Jessamine	Shrub	Naturalised
150.	<i>Chamaedorea elegans</i>	Parlour palm	Tree	Naturalised
151.	<i>Chamaedorea erumpens</i>	Bamboo Palm	Tree	Native
152.	<i>Chimnobambusa intermedia</i>		Herb	Native
153.	<i>Chimonobambusa hookeriana</i>		Herb	Native
154.	<i>Chiritia macrophylla</i>		Shrub	Native
155.	<i>Chiritia urticifolia</i>	Nettle-leaves Chiritia	Shrub	Native

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156.	<i>Chlorophytum comosum</i>	Spider Plant	Tree	Naturalised
157.	<i>Chlorophytum nepalensis</i>		Tree	Native
158.	<i>Choerospondias axillaris</i>	Nepali Hog Plum	Tree	Native
159.	<i>Chrysanthemum indicum</i>	Indian Chrysanthemum	Herb	Native
160.	<i>Chrysopogon aciculatus</i>	Golden false Beardgrass	Herb	Native
161.	<i>Cinnamomum obtusifolium</i>		Tree	Native
162.	<i>Citrus aurantium</i>	Bigarade Orange	Tree	Naturalised
163.	<i>Citrus paradise</i>	Grapefruit	Tree	Native
164.	<i>Citrus reticulata</i>	Mandarin	Tree	Native
165.	<i>Citrus sinensis</i>	Sweet Orange	Tree	Native
166.	<i>Cleisostoma linearilobatum</i>	Garay	Herb	Native
167.	<i>Cleisostoma racemiferum</i>		Herb	Native
168.	<i>Clematis acuminata</i>		Shrub	Native
169.	<i>Clematis buchananiana</i>	Lemon Clematis	Shrub	Native
170.	<i>Clematis connata</i>	Himalayan Clematis	Shrub	Native
171.	<i>Clerodendrum bracteatum Walp.</i>	Bracted Glory	Shrub	Native
172.	<i>Clerodendrum colebrookianum</i>	East Indian Glorybower	Shrub	Native
173.	<i>Clerodendrum japonicum</i>	Japanese Glorybower	Shrub	Native
174.	<i>Clerodendrum thomsoniae</i>	Bleeding Heart Vine	Shrub	Naturalised
175.	<i>Clitoria ternatea</i>	Butterfly pea	Herb	Native
176.	<i>Clivia miniata</i>	Bush Lily	Tree	Naturalised
177.	<i>Codiaeum variegatum</i>	Fire Croton	Herb	Naturalised
178.	<i>Coelogyne barbata</i>	The Bearded Coelogyne	Herb	Native
179.	<i>Coelogyne corymbosa</i>	The Umbrella Coelogyne	Herb	Native
180.	<i>Coelogyne cristata</i>	Crested Coelogyne	Herb	Native
181.	<i>Coelogyne fimbriata</i>	Fringed Coelogyne	Herb	Native
182.	<i>Coelogyne fuscescens</i>	Orcher Yellow Coelogyne	Herb	Native
183.	<i>Coelogyne nitida</i>	Shining Coelogyne	Herb	Native
184.	<i>Coelogyne occultata</i>	The Hidden Coelogyne	Herb	Native
185.	<i>Coelogyne orchracia</i>		Herb	Native
186.	<i>Coelogyne ovalisa</i>	Oval Coelogyne	Herb	Native
187.	<i>Coelogyne prolifera</i>	Seattle Orchid	Herb	Native
188.	<i>Coelogyne stricta</i>	Erect Coelogyne	Herb	Native
189.	<i>Colocasia esculenta</i>	Taro	Herb	Naturalised
190.	<i>Commelina paludosa</i>		Herb	Native
191.	<i>Cordyline terminalis</i>	Ti plant	Shrub	Naturalised
192.	<i>Coriandrum sativum</i>	Dhania	Herb	Naturalised
193.	<i>Coriaria terminalis</i>		Shrub	Native
194.	<i>Cotoneaster microphyllus</i>	Littleleaf Cotoneaster	Shrub	Native
195.	<i>Craniotome furcate</i>	Multicoloured Catmint	Herb	Native
196.	<i>Crassula argentea</i>	Jade plant	Tree	Naturalised
197.	<i>Crepidium khasianum</i>	Khasi-boot Orchid	Herb	Native
198.	<i>Crotolaria tetragona</i>	Eastern Rattlepod	Herb	Native
199.	<i>Cryptochilus lutues</i>		Herb	Native

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200.	<i>Cryptochilus sanguineus</i>	Red Cryptochilus	Herb	Native
201.	<i>Cryptomeria japonica</i>	Japanese Cedar	Tree	Naturalised
202.	<i>Cucumis sativus</i>	Cucumber	Herb	Native
203.	<i>Cupressus corneyana</i>		Tree	Naturalised
204.	<i>Curculigo carssifolia</i>		Herb	Native
205.	<i>Curcuma aromatic</i>	Wild Turmeric	Herb	Native
206.	<i>Curcuma caesia</i>	Black Turmeric	Herb	Native
207.	<i>Curcuma longa</i>	Turmeric	Herb	Native
208.	<i>Cyanotis vaga</i>	Wandering Dew-grass	Herb	Native
209.	<i>Cyclamen persicum</i>	Sow Bread	Herb	Naturalised
210.	<i>Cymbidium aloifolium</i>	Aloe Leaf Cymbidium	Herb	Native
211.	<i>Cymbidium cochleare</i>		Herb	Native
212.	<i>Cymbidium devonianum</i>	Devon's Cymbidium	Herb	Native
213.	<i>Cymbidium elegans</i>	The Elegant Cymbidium	Herb	Native
214.	<i>Cymbidium erythraeum</i>	The Indian Cymbidium	Herb	Native
215.	<i>Cymbidium hookerianum</i>	Hooker's Cymbidium	Herb	Native
216.	<i>Cymbopogon citratus</i>	Lemon grass	Herb	Native
217.	<i>Cynodon dactylon</i>	Bermuda grass	Herb	Native
218.	<i>Cyphomandra betacea</i>	Tamarillo	Shrub	Native
219.	<i>Dactylicapnos scandens</i>	Athens Yellow Bleeding Heart	Herb	Native
220.	<i>Dahlia imperialis</i>	The Bell Tree Dahlia	Shrub	Naturalised
221.	<i>Dahlia pinnata</i>	Garden Dahlia	Tree	Naturalised
222.	<i>Dalbergia latifolia</i>	North Indian rosewood	Tree	Native
223.	<i>Daphne bholua</i>	Nepalese Paper Plant	Shrub	Native
224.	<i>Daphne involucrate</i>		Shrub	Native
225.	<i>Daphne papyracea</i>	Indian Paper Plant	Shrub	Native
226.	<i>Daphniphyllum himalayense</i>		Tree	Native
227.	<i>Darlingtonia californica</i>	Cobra Lily	Tree	Naturalised
228.	<i>Debregeasia longifolia</i>	Orange Wild Rhea	Shrub	Native
229.	<i>Delonix regia</i>	Poinciana	Tree	Native
230.	<i>Dendrobium amoenum</i>	Lovely Dendrobium	Herb	Native
231.	<i>Dendrobium amplum</i>		Herb	Native
232.	<i>Dendrobium aphyllum</i>	Hooded Orchid	Herb	Native
233.	<i>Dendrobium chrysanthum</i>	Golden Yellow- flower Dendrobium	Herb	Native
234.	<i>Dendrobium densiflorum</i>		Herb	Native
235.	<i>Dendrobium denudans</i>	Bare Dendrobium	Herb	Native
236.	<i>Dendrobium eriiflorum</i>	The Eria-liked Flowered Dendrobium	Herb	Native
237.	<i>Dendrobium fimbriatum</i>		Herb	Native
238.	<i>Dendrobium gibsonii</i>	Gibson's Dendrobium	Herb	Native
239.	<i>Dendrobium heterocarpum</i>		Herb	Native
240.	<i>Dendrobium hookerianum</i>	Andy's Dendrobium	Herb	Native
241.	<i>Dendrobium longicornu</i>	The Long-horned Dendrobium	Herb	Native

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242.	<i>Dendrobium moniliforme</i>		Herb	Native
243.	<i>Dendrobium moschatum</i>	Musk Dendrobium	Herb	Native
244.	<i>Dendrobium nobile</i>	Noble Dendrobium	Herb	Native
245.	<i>Dendrocalamus hamiltonii</i>	Tama Bamboo	Herb	Native
246.	<i>Dendrocalamus hookeri</i>	Bhalu Bans	Herb	Native
247.	<i>Dendrocalamus patellaris</i>		Herb	Native
248.	<i>Dendrocalamus sikkimensis</i>		Herb	Native
249.	<i>Desmodium multiflorum</i>	Many Flower Desmodium	Shrub	Native
250.	<i>Dichanthium annulatum</i>	Sheda Grass	Herb	Native
251.	<i>Dichroa febrifuga</i>	Blue-green Hydrangea	Tree	Native
252.	<i>Dicliptera bupleuroides</i>	Thorowax Foldiwng	Herb	Native
253.	<i>Didymocarpus aurantiacus</i>	Orange Stone Flower	Herb	Native
254.	<i>Didymocarpus pulcher</i>	Pretty Stone Flower	Herb	Native
255.	<i>Dieffenbachia amoena</i>	Giant Dumbcane	Herb	Naturalised
256.	<i>Dieffenbachia maculate</i>	Spotted Dumbcane	Herb	Naturalised
257.	<i>Dienia ophrydis</i>		Herb	Native
258.	<i>Digitaria ciliaris</i>	Crab Grass	Herb	Native
259.	<i>Dillenia indica</i>	Elephant Apple	Tree	Native
260.	<i>Diploknema butyracea</i>	Indian Butter Tree	Tree	Native
261.	<i>Dobinea vulgaris</i>		Shrub	Native
262.	<i>Dolichos lablab</i>	Hyacinth Bean	Herb	Native
263.	<i>Dombeya mastersii</i>		Shrub	Naturalised
264.	<i>Dombeya wallichii</i>	Pinkball	Shrub	Native
265.	<i>Dracaena deremensis cv. Warneckii</i>	Striped Dracaena	Tree	Naturalised
266.	<i>Dracaena fragrans cv. massangeana</i>	Corn Plant	Shrub	Naturalised
267.	<i>Dracaena godseffiana</i>	Gold Dust Dracaena	Shrub	Naturalised
268.	<i>Dracaena marginata</i>	Red Margined Dracaena	Shrub	Naturalised
269.	<i>Draceana fragrans</i>	Cornstalk Draceana	Shrub	Native
270.	<i>Drymaria cordata</i>	Tropical Chickweed	Herb	Naturalised
271.	<i>Drymaria villosa</i>		Herb	Native
272.	<i>Duabanga grandiflora</i>	Duabanga	Tree	Native
273.	<i>Duhaldea cuspidate</i>	Lancekeaf Inula	Herb	Native
274.	<i>Duranta erecta</i>	Golden Dew Drop	Shrub	Naturalised
275.	<i>Duranta repens</i>	Prickly Duranta	Shrub	Naturalised
276.	<i>Dyopsis lutescens</i>	Areca Palm	Shrub	Naturalised
277.	<i>E. crus-galli</i>	Barnyard Grass	Herb	Native
278.	<i>Echinocarpus dasycarpus</i>		Tree	Native
279.	<i>Echinochloa colonum</i>	Awnless barnyard grass,	Herb	Native
280.	<i>Edgeworthia gardneri</i>	Paperbush	Shrub	Native
281.	<i>Elaeagnus conferta</i>	Wild Olive	Shrub	Native
282.	<i>Elaeocarpus lanceaefolis</i>	Lanceleaf Marble Tree	Tree	Native
283.	<i>Elatostema hookerianum</i>		Herb	Naturalised

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284.	<i>Elsholtzia fruticose</i>	Shurby Mint	Shrub	Native
285.	<i>Engelhardia spicata</i>	Mauwa	Tree	Native
286.	<i>Engelhardtia aceriflora</i>		Tree	Native
287.	<i>Epigeneium amplum</i>		Herb	Native
288.	<i>Epigeneium rotundatum</i>		Herb	Native
289.	<i>Epipremnum aureum</i>	Golden Pothos	Herb	Invasive
290.	<i>Eranthemum pulchellum</i>	Blue Sage	Shrub	Native
291.	<i>Eria coronaria</i>	Crowned-lip Eria	Herb	Native
292.	<i>Eria lasiopetala</i>		Herb	Native
293.	<i>Eria pannea</i>	The Flag Eria	Herb	Native
294.	<i>Eragrosiis curvela</i>	Weeping Love Grass	Herb	Naturalised
295.	<i>Erigeron karvinskianus</i>	Swan River Daisy	Herb	Naturalised
296.	<i>Erythrina arborescens</i>	Himalayan Coral Tree	Tree	Native
297.	<i>Erythrina stricta</i>	Coppersmith Barbet	Tree	Native
298.	<i>Erythrina suberosa</i>	Corky coral tree	Tree	Native
299.	<i>Erythrina variegata</i>	Coral tree	Tree	Native
300.	<i>Esmeralda clarkei</i>	Arachnanthe bella	Herb	Native
301.	<i>Eucalyptus grandis</i>	Flooded Gum	Tree	Invasive
302.	<i>Eucalyptus globulus</i>	Tasmanian Blue Gum	Tree	Invasive
303.	<i>Eucalyptus tereticornis</i>	Gum tree	Tree	Invasive
304.	<i>Eulaliopsis binata</i>	Babui	Herb	Native
305.	<i>Eupatorium adenophorum</i>	Sticky Snakeroot	Herb	Naturalised
306.	<i>Eupatorium glandulosum</i>	Goatweed	Herb	Naturalised
307.	<i>Eupatorium perfoliatum</i>	Bonesets	Herb	Naturalised
308.	<i>Eupatorium cannabinum</i>	Holy Rope	Herb	Naturalised
309.	<i>Eupatorium odoratum</i>	Siam Weed	Herb	Naturalised
310.	<i>Euphorbia pulcherrima</i>	Poinsettia	Shrub	Naturalised
311.	<i>Eurya acuminata</i>	Tapering Leaf Eurya	Tree	Native
312.	<i>Eurya japonica</i>	Cocklebur	Tree	Naturalised
313.	<i>Evodia fraxinifolia</i>		Tree	Native
314.	<i>Exbucklandia populnea</i>	Pipli Tree	Tree	Naturalised
315.	<i>Fagopyrum esculentum</i>	Buckwheat	Herb	Native
316.	<i>Ficus benjamina</i>	Weeping Fig	Tree	Native
317.	<i>Ficus elastic</i>	Rubber Plant	Tree	Native
318.	<i>Ficus elastica cv. Decora</i>	India rubber plant	Tree	Native
319.	<i>Ficus racemose</i>	Cluster Fig Tree	Tree	Native
320.	<i>Ficus religiosa</i>	Sacred Fig	Tree	Native
321.	<i>Floscopa scandens</i>	Creeping Flower Cup	Shrub	Native
322.	<i>Fuchsia hybrid</i>	Hybrid Fuchsia	Shrub	Naturalised
323.	<i>Fuchsia magellanica</i>	Hummingbird fuchsia	Shrub	Naturalised
324.	<i>Galeola falconeri</i>	Falconer's Galeola	Herb	Native
325.	<i>Galinsoga parviflora</i>	Guasca	Herb	Invasive
326.	<i>Gastrochilus calceolaris</i>	Shoe-shaped Belly-li Orchid	Herb	Naturalised
327.	<i>Gaultheria fragrantissima</i>	Fragrant Wintergreen	Shrub	Native

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328.	<i>Gentiana capitata</i>	Clustered Gentian	Herb	Naturalised
329.	<i>Geranium nepalense</i>	Nepalese Crne's Bill	Herb	Native
330.	<i>Ginkgo biloba</i>	Gingko	Tree	Naturalised
331.	<i>Girardinia diversifolia</i>	Himalayan Nettle	Herb	Native
332.	<i>Grevillea robusta</i>	Slik Oak	Tree	Naturalised
333.	<i>Gladiolus dalenii</i>	Gladiolus	Tree	Naturalised
334.	<i>Gomphrena globosa</i>	Globe Amarantha	Herb	Naturalised
335.	<i>Gynura cusimbua</i>	Malabar Spianch	Herb	Native
336.	<i>Habenaria dentata</i>	Toothed Habenaria	Herb	Native
337.	<i>Habenaria pectinata</i>	Comb Habenaria	Herb	Native
338.	<i>Hedera helix</i>	Common Ivy	Herb	Naturalised
339.	<i>Hedychium coccineum</i>	Orange Gingerlily	Shrub	Native
340.	<i>Hedychium densiflorum</i>	Dense Gingerlily	Shrub	Native
341.	<i>Hedychium gardenarianum</i>	Khaili Gingerlily	Herb	Native
342.	<i>Hedychium spicatum</i>	Spiked Gingerlily	Shrub	Native
343.	<i>Heliconia stricta</i>	Erect Lobster Claw	Herb	Naturalised
344.	<i>Hemarthria compressa</i>	Whip grass	Herb	Native
345.	<i>Hemerocallis fulva</i>	Orange Daylily	Tree	Native
346.	<i>Hemerocallis lilioasphodelus</i>	Day Lilies	Shrub	Native
347.	<i>Hemiphragma heterophyllum</i>	Nash Jhaar	Herb	Native
348.	<i>Heracleum wallichii</i>	Chimphin	Shrub	Naturalised
349.	<i>Herpetospermum pedunculosuma</i>	Himalayan Bitter Gourd	Herb	Native
350.	<i>Herpysma longicaulis</i>		Herb	Native
351.	<i>Hibiscus rosa-sinensis</i>	Rose mallows	Shrub	Naturalised
352.	<i>Himalayacalamus hookerianus</i>	Padang	Herb	Native
353.	<i>Hippophae salicifolia</i>	Willow-leaved Sea Buckthorn	Shrub	Native
354.	<i>Houttuynia cordata</i>	Fish Mint	Herb	Naturalised
355.	<i>Howea forsterana</i>	Kentia palm	Tree	Native
356.	<i>Hoya linearis</i>	Waxplant	Herb	Native
357.	<i>Hydrangea aspera</i>	Hydrangea	Shrub	Native
358.	<i>Hydrangea febrifuga</i>		Shrub	Native
359.	<i>Hydrangea macrophylla</i>	Bigleaf Hydrangea	Shrub	Native
360.	<i>Hydrocotyle himalaica</i>	Himalayan Pennywort	Shrub	Native
361.	<i>Hypericum elodeoides</i>		Shrub	Native
362.	<i>Ilex dipyrrena</i>	Himalayan Holly	Tree	Native
363.	<i>Impatiens argute</i>	Eastern Himalayan Balasam	Shrub	Native
364.	<i>Impatiens decipiens</i>	Deceptive Balsam	Shrub	Native
365.	<i>Impatiens discolor</i>		Shrub	Native
366.	<i>Impatiens drepanophora</i>	Sickle-Bearing Balsam	Shrub	Native
367.	<i>Impatiens jurpia</i>		Shrub	Native
368.	<i>Impatiens latifolia</i>	Baba Budan Balsam	Shrub	Native
369.	<i>Impatiens monticola</i>	Mountain Balsam	Shrub	Native
370.	<i>Impatiens puberula</i>	Impatiens mollis	Shrub	Native

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371.	<i>Impatiens racemosa</i>	Yellow Long-Tailed Balsam	Shrub	Native
372.	<i>Impatiens radiata</i>	Spreading Rays Balsam	Shrub	Native
373.	<i>Impatiens stenantha</i>	Narrow Flowered Balsam	Shrub	Native
374.	<i>Impatiens uncipectala</i>		Shrub	Native
375.	<i>Impatiens walleriana</i>	Sultan's Balsam	Herb	Naturalised
376.	<i>Imperata cylindrica</i>	Cogon Grass	Herb	Native
377.	<i>Iresina herbstii</i>	Blood Leaf	Herb	Naturalised
378.	<i>Ipomoea cairica</i>	Railway creeper	Tree	Native
379.	<i>Ipomoea congesta</i>	Blue Dawn Flower	Herb	Naturalised
380.	<i>Ipomoea nil</i>	Japanese Morning Glory	Herb	Invasive
381.	<i>Ipomoea purpurea</i>	Common Morning Glory	Shrub	Invasive
382.	<i>Ipomoea quamoclit</i>	Cypress Vine	Herb	Invasive
383.	<i>Ipomoea sloteri</i>	Cardinal	Tree	Naturalised
384.	<i>Ipomoea tricolor</i>		Herb	Naturalised
385.	<i>Iresine lindenii</i>	Blood-leaf Iresine	Herb	Naturalised
386.	<i>Isodon lophanthoides</i>	Crested Flower Isodon	Herb	Native
387.	<i>Jacaranda mimosifolia</i>		Tree	Invasive
388.	<i>Jasminum decursiva</i>		Herb	Naturalised
389.	<i>Jasminum mesnyi</i>	Primrose Jasmine	Herb	Naturalised
390.	<i>Jasminum nervosum</i>	Wild Kund	Shrub	Naturalised
391.	<i>Jasminum sambac</i>	Jasmine	Shrub	Native
392.	<i>Juglans regia</i>	Walnut	Tree	Native
393.	<i>Justicia adhatoda</i>	Malabar Nut	Shrub	Native
394.	<i>Koenigia mollis</i>	Sikkim Knotweed	Herb	Native
395.	<i>Kydia calycina</i>	Kydia	Tree	Native
396.	<i>Lagerstroemia flos</i>	Pride of India	Tree	Native
397.	<i>Lagerstroemia indica</i>	Crape Myrtle	Shrub	Naturalised
398.	<i>Lagerstroemia speciose</i>	Queen Crape Myrtle	Tree	Native
399.	<i>Lantana camara</i>	Lantana	Shrub	Invasive
400.	<i>Laportea bulbifera</i>		Herb	Native
401.	<i>Leucaena leucocephala</i>	Wild Tamarind	Tree	Naturalised
402.	<i>Leucosceptrum canum</i>	Hairy White-Wand	Shrub or Tree	Native
403.	<i>Lilium candidum</i>	Lilium	Tree	Naturalised
404.	<i>Lilium lancifolium</i>	Tiger lily	Tree	Naturalised
405.	<i>Lilium x asiatica</i>	Asiatic lily	Tree	Native
406.	<i>Lindenbergia grandiflora</i>	Large-Flower Lindenbergia	Herb	Native
407.	<i>Liparis bistrata</i>		Shrub	Native
408.	<i>Liparis resupinata</i>		Shrub	Native
409.	<i>Lithocarpus elegans</i>	Elegant Himalayan Oak	Tree	Native
410.	<i>Lithocarpus pachyphyllus</i>	Thick Leaved Oak	Tree	Native
411.	<i>Luculia gratissima</i>	Pleasant Luculia	Shrub	Native
412.	<i>Luffa acutangula</i>	Bitter Luffa	Herb	Native
413.	<i>Lycoris radiata</i>	Red Spider Lily	Tree	Native
414.	<i>Lysimachia deltoidea</i>		Herb	Native

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
415.	<i>Lysionotus serratus</i>		Herb	Native
416.	<i>Macaranga denticulate</i>		Tree	Native
417.	<i>Machilus edulis</i>		Tree	Naturalised
418.	<i>Mackaya indica</i>		Shrub	Native
419.	<i>Maesa chisia</i>		Shrub	Native
420.	<i>Maesa rugose</i>		Shrub	Native
421.	<i>Magnolia grandiflora</i>	Bull Bay	Tree	Naturalised
422.	<i>Magnolia campbellii</i>	Campbell's Magnolia	Tree	Native
423.	<i>Magnolia cathcartii</i>	Cathcart's Magnolia	Tree	Native
424.	<i>Magnolia globose</i>	Globe Magnolia	Tree	Native
425.	<i>Magnolia lanuginosa</i>	Phusrey Champ	Tree	Native
426.	<i>Magnolia soulangiana</i>	Saucer Magnolia	Shrub	Native
427.	<i>Magnolia virginiana</i>	Sweetbay Magnolia	Tree	Naturalised
428.	<i>Mahonia acanthifolia G.Don</i>	Keshari	Shrub	Native
429.	<i>Malus sikkimensis</i>	Sikkim Crabapple	Tree	Native
430.	<i>Mangifera indica</i>	Mango	Tree	Native
431.	<i>Melastoma malabathricum</i>	Malabar Melastome	Shrub	Naturalised
432.	<i>Melaleuca styphelioides</i>		Tree	Naturalised
433.	<i>Mentha viridis</i>	Pudina	Herb	Naturalised
434.	<i>Mesua ferrea</i>	Ceylon ironwood	Tree	Native
435.	<i>Michelia cathcartii</i>	Titey Chanp	Tree	Native
436.	<i>Michelia doltsopa</i>	Kisopa Magnolia	Tree	Native
437.	<i>Michelia kisopa</i>	Kisopa Magnolia	Tree	Native
438.	<i>Michelia veluntia</i>		Tree	Native
439.	<i>Mimosa pudica</i>	Touch me not	Shrub/Tree	Invasive
440.	<i>Mirabilis jalapa</i>	Four O'clock	Herb	Invasive
441.	<i>Miscanthus nepalensis</i>	Silver Grass	Herb	Native
442.	<i>Monomeria barbata</i>		Herb	Native
443.	<i>Monstera deliciosa</i>	Split-leaf Philodendron	Herb	Native
444.	<i>Montana bipinnatifida</i>		Shrub	Naturalised
445.	<i>Mucuna macrocarpa</i>		Herb	Native
446.	<i>Mucuna pruriens</i>	Velvet Bean	Shrub	Native
447.	<i>Murraya koenigii</i>	Curry Tree	Tree	Native
448.	<i>Musa paradisiaca</i>	Banana	Herb	Naturalised
449.	<i>Musa sikkimensis</i>		Shrub	Native
450.	<i>Mussaenda roxburghii</i>	East Himalayan Mussaenda	Shrub	Native
451.	<i>Narcissus papyraceus</i>	Daffodil	Herb	Naturalised
452.	<i>Neohouzeaua dullooa</i> (<i>Teinostachyum</i>)	Tokri Bans	Herb	Native
453.	<i>Neoregelia flandria</i>		Herb	Naturalised
454.	<i>Nepenthes khasiana</i>		Herb	Native
455.	<i>Nephrolepis exatata</i> cv. <i>Bostoniensis</i>	Boston Fern	Tree	Naturalised
456.	<i>Nicandra physalodes</i>	Shoofly Plant	Herb	Naturalised

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
457.	<i>Nyssa javanica</i>		Tree	Naturalised
458.	<i>Oberonia acaulis</i>	Stem-Less Oberonia	Herb	Native
459.	<i>Ocimum sanctum</i>	Tulsi	Shrub	Native
460.	<i>Ocimum tenuiflorum</i>		Shrub	Native
461.	<i>Odontochilus lanceolatus</i>		Shrub	Native
462.	<i>Ophiopgon intermedius</i>	Himalayan Lily Turf	Herb	Native
463.	<i>Ornithochilus difformis</i>	Himalayan Bird-Lip Orchid	Herb	Native
464.	<i>Ornithogalum thyrsoides</i>	Wonder Flower	Tree	Naturalised
465.	<i>Oroxylum indicum</i>	Totola	Tree	Native
466.	<i>Oryza sativa</i>	Rice	Herb	Native
467.	<i>Osbeckia nepalensis</i>	Nepal Pink Osbeckia	Shrub	Native
468.	<i>Osbeckia stellate</i>		Shrub	Native
469.	<i>Ostodes paniculata</i>	Panicled Bone-Tree	Tree	Native
470.	<i>Otochilus fuscus</i>	Dusky Otochilus	Herb	Native
471.	<i>Oxalis corniculata</i>	Creeping Wood Sorrel	Herb	Native
472.	<i>Oxalis corniculata</i>	Chari Ammilo	Herb	Native
473.	<i>Oxalis latifolia</i>	Wood Sorrel	Herb	Native
474.	<i>Oxyspora paniculata</i>	Bristletips	Shrub	Native
475.	<i>Panicum auritum</i>	Cupscale Grass	Herb	Native
476.	<i>Panisea uniflora</i>	One-Flowered Panisea	Herb	Native
477.	<i>Papaver rhoeas</i>	Common Poppy	Herb	Naturalised
478.	<i>Papilionanthe uniflora</i>		Herb	Native
479.	<i>Parthenium hysterophorus</i>	Carrot Weed	Herb	Invasive
480.	<i>Paris polyphylla</i>	Himalayan Paris	Shrub	Native
481.	<i>Paspalidium flavidum</i>	Yellow Watercrown Grass	Herb	Native
482.	<i>Passiflora edulis</i>	Granadilla	Shrub	Naturalised
483.	<i>Pelargonium graveolens</i>	Geranium	Shrub	Naturalised
484.	<i>Peperomia caperata</i>	Emerald Ripple Peperomia	Herb	Naturalised
485.	<i>Peperomia obtusifolia</i>	Oval-leaf Peperomia	Tree	Naturalised
486.	<i>Pericallis hybrid</i>	Cineraria	Tree	Naturalised
487.	<i>Peristylus constrictus</i>	Constricted Peristylus	Shrub	Native
488.	<i>Persea americana</i>		Tree	Naturalised
489.	<i>Persea fructifera</i>	Pumpsi	Tree	Native
490.	<i>Persicaria capitata</i>	Pink Knotweed	Herb	Native
491.	<i>Petunia atkinsiana</i>	Petunia	Tree	Naturalised
492.	<i>Phaius flavus</i>		Herb	Native
493.	<i>Phaius wallichii</i>	Wallich's Phaius	Herb	Native
494.	<i>Phalaenopsis amabilis</i>	Moth Orchids	Herb	Naturalised
495.	<i>Phalaenopsis taenialis</i>	Bandage-Like Phalaenopsis	Herb	Native
496.	<i>Phalaris minor</i>	Little Seed Canary Grass	Herb	Native
497.	<i>Phaseolus vulgaris</i>	Common Bean	Herb	Naturalised
498.	<i>Philodendron bipennifolium</i>	Fiddle-leaf Philodendron	Tree	Naturalised
499.	<i>Philodendron scandens</i>	Sweet Heart	Tree	Naturalised
500.	<i>Philodendron selloum</i>	Tree Philodendron	Tree	Naturalised

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
501.	<i>Pholidota articulata</i>	Jointed Pholidota	Herb	Native
502.	<i>Pholidota imbricata</i>	Necklace Orchid	Herb	Native
503.	<i>Pholidota recurve</i>		Herb	Native
504.	<i>Phyllostachys assamica</i>		Shrub	Native
505.	<i>Phyllostachys heterocycle</i>		Shrub	Native
506.	<i>Phyllostachyus edulis</i>		Herb	Native
507.	<i>Phyllostachyus pubescens</i>	Gyansi Bans	Herb	Native
508.	<i>Phytolacca acinosa</i>		Shrub	Native
509.	<i>Pilea cadierei</i>	Aluminum plant	Herb	Naturalised
510.	<i>Pilea involucrate</i>	Friendship plant	Herb	Naturalised
511.	<i>Pinalia spicata</i>		Herb	Native
512.	<i>Pinus patula</i>	Mexican Weeping Pine	Tree	Naturalised
513.	<i>Pinus wallichiana</i>	Himalayan Blue Pine	Tree	Native
514.	<i>Piper boeckoneriaefolium</i>		Herb	Native
515.	<i>Piper boehmeriifolium</i>	False-Nettle Leaved Pepper	Herb	Native
516.	<i>Piper longum</i>	Long Pepper	Herb	Native
517.	<i>Piper peeploides</i>		Herb	Native
518.	<i>Pisum sativum</i>		Herb	Native
519.	<i>Plantago erosa</i>		Herb	Native
520.	<i>Platanthera edgeworthii</i>		Herb	Native
521.	<i>Plectranthus australis</i>	Swedish Ivy	Herb	Naturalised
522.	<i>Pleione hookeriana</i>	Hooker's Pleione	Herb	Native
523.	<i>Pleione humilis</i>	Low Growing Pleione	Herb	Native
524.	<i>Pleione praecox</i>	Early Blooming Pleione	Herb	Native
525.	<i>Plumeria rubra</i>	Common White Frangipani	Tree	Naturalised
526.	<i>Podophyllum hexandrum</i>	Bankankari	Shrub	Native
527.	<i>Polyalthia longifolia</i>	False Ashoka tree	Tree	Native
528.	<i>Polygonatum multiflorum</i>		Herb	Native
529.	<i>Polyscias balfouriana</i> cv. <i>Marginata</i>	Variegated aralia	Shrub	Native
530.	<i>Polyscias fruticose</i>	Aralia	Shrub	Native
531.	<i>Potentilla indica</i>	Indian Strawberry	Herb	Native
532.	<i>Pouzolzia rugulosa</i>		Tree	Native
533.	<i>Primula obonica</i>	German Primrose purple	Herb	Naturalised
534.	<i>Prunus cerasoides</i>	Wild Himalayan Cherry	Tree	Native
535.	<i>Prunus domestica</i>	Garden Plum	Tree	Native
536.	<i>Prunus nepalensis</i>		Tree	Native
537.	<i>Prunus persica</i>	Peach	Tree	Naturalised
538.	<i>Prunus serrulata</i>	Cherry Tree	Tree	Native
539.	<i>Pseudocaryopteris bicolor</i>	Bluebeard	Shrub	Native
540.	<i>Pseudostachyum polymorphum</i>	Filling bans	Herb	Native
541.	<i>Psidium guajava</i>	Red Malaysian Guava	Tree	Naturalised
542.	<i>Pterospermum acerifolium</i>	Kanak Champa	Tree	Native
543.	<i>Pyrostegia venusta</i>	Flame Vine	Shrub	Naturalised

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
544.	<i>Pyrus communis</i>	Pear	Tree	Naturalised
545.	<i>Quercus lamellose</i>	Layered Acorn Oak	Tree	Native
546.	<i>Quercus lineata</i>		Tree	Native
547.	<i>Raphanas sativas</i>	Mula	Herb	Native
548.	<i>Raphidophoa decursiva</i>		Herb	Native
549.	<i>Rauwolfia serpentine</i>	Sarpgandha	Shrub	Native
550.	<i>Rhaphidophora decursiva</i>	Creeping Philodendron	Tree	Native
551.	<i>Rhaphidophora pertusa</i>	Perforated Philodendron	Tree	Native
552.	<i>Rhododendron arboretum</i>	Tree Rhododendron	Tree	Native
553.	<i>Rhododendron grande</i>	Grand Rhododendron	Tree	Native
554.	<i>Rhododendron niveum</i>	Bell Snow Rhododendron	Tree	Native
555.	<i>Rhoeo spathacea</i>	Moses-in-the-cradle	Tree	Naturalised
556.	<i>Rhynchoglossum obliquum</i>	Small Flowered Rhynchoglossum	Herb	Native
557.	<i>Rhynchostylis retusa</i>	Foxtail Orchid	Herb	Native
558.	<i>Ricinus communis</i>	Castor Bean	Shrub	Naturalised
559.	<i>Rohdea nepalensis</i>		Herb	Native
560.	<i>Rubus acuminatus</i>		Shrub	Native
561.	<i>Rubus ellipticus</i>	Yellow Himalayan Raspberry	Shrub	Native
562.	<i>Rubus reticulatus</i>		Shrub	Native
563.	<i>Rumex nepalensis</i>	Nepalese Raspberry	Herb	Native
564.	<i>Rumex obtusifolius</i>		Herb	Naturalised
565.	<i>Salvia splendens</i>	Scarlet Sage	Shrub	Naturalised
566.	<i>Sambucus adnate</i>	East Himalayan Elder	Shrub	Native
567.	<i>Sambucus javanica</i>	Chinese Elder	Tree	Native
568.	<i>Sansevieria trifasciata</i>	Mother in Laws Tongue	Herb	Naturalised
569.	<i>Saraca asoca</i>	Indian Ashok tree	Tree	Native
570.	<i>Saraca indica</i>		Tree	Native
571.	<i>Sarcopyramis napalensis</i>		Herb	Native
572.	<i>Salix babylonica</i>	Weeping Willow	Tree	Naturalised
573.	<i>Schefflera arboricola</i>	Dwarf Umbrella Tree	Tree	Naturalised
574.	<i>Schefflera impressa</i>		Shrub	Naturalised
575.	<i>Schima wallichii</i>	Schima	Tree	Native
576.	<i>Schisandra grandiflora</i>	Large-Flowered Magnolia Vine	Shrub	Native
577.	<i>Schisandra rubriflora</i>		Shrub	Native
578.	<i>Scindapsus aureus</i>	English Ivy	Herb	Invasive
579.	<i>Sechium edule</i>	Chowchow	Herb	Naturalised
580.	<i>Sedum morganianum</i>	Donkey Tail	Tree	Naturalised
581.	<i>Semiarundinaria patlingii</i>	Maling	Herb	Native
582.	<i>Senecio cappa</i>		Herb	Native
583.	<i>Senecio scandens</i>	Climbing Senecio	Herb	Native
584.	<i>Setaria palmifolia</i>	Palm Grass	Herb	Native
585.	<i>Shorea robusta</i>	Sal	Tree	Native

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
586.	<i>Sida acuta</i>	Common Wireweed	Herb	Naturalised
587.	<i>Sinarundinaria hookeriana</i>		Shrub	Native
588.	<i>Sinarundinaria intermedia</i>	Intermediate Cane Bamboo	Shrub	Native
589.	<i>Smilax ferox</i>		Shrub	Native
590.	<i>Smilax ovalifolia</i>	Kumarika	Shrub	Native
591.	<i>Solanum lycopersicum</i>	Ramveda	Shrub	Naturalised
592.	<i>Solanum jasminoides</i>	Patato Vine	Shrub	Invasive
593.	<i>Solanum nigrum</i>	Black Nightshade	Shrub	Invasive
594.	<i>Solanum tuberosum</i>	Potato	Herb	Naturalised
595.	<i>Sonerila erecta</i>	Erect Sonerila	Herb	Native
596.	<i>Spathodea campanulata</i>	African Tulip Tree	Tree	Naturalised
597.	<i>Spathoglottis ixioides</i>		Herb	Native
598.	<i>Spinacia oleracea</i>	Palak	Herb	Naturalised
599.	<i>Spiranthes sinensis</i>	Chinese Lady's-Tresses	Shrub	Native
600.	<i>Spirea prunifolia</i>		Herb	Naturalised
601.	<i>Strelitzia reginae</i>	Bird of Paradise	Herb	Naturalised
602.	<i>Streptolirion volubile</i>	Climbing Twisted-Lily	Herb	Naturalised
603.	<i>Sunipia bicolor</i>		Herb	Native
604.	<i>Sunipia cirrhata</i>		Herb	Native
605.	<i>Swertia bimaculata</i>	Double-Spotted Swertia	Herb	Native
606.	<i>Swertia chirayta</i>	Chirayita	Tree	Native
607.	<i>Swertia cordata</i>	Heart-Leaf Swertia	Herb	Native
608.	<i>Swertia nervosa</i>		Herb	Native
609.	<i>Symingtonia populnea</i>	Pipli Tree	Tree	Native
610.	<i>Symplocos kuroki</i>		Tree	Naturalised
611.	<i>Symplocos glomerata</i>	Clustered Sapphire Berry	Shrub	Native
612.	<i>Symplocos theifolia</i>		Tree	Native
613.	<i>Syngonium podophyllum</i>	Arrowhead Plant	Herb	Naturalised
614.	<i>Syzygium cumini</i>	Jamun	Tree	Native
615.	<i>Tagetes erecta</i>	African Marigold	Herb	Naturalised
616.	<i>Tagetes patula</i>	French Marigold	Herb	Naturalised
617.	<i>Tarlmounia elliptica</i>	Curtain Creeper	Herb	Native
618.	<i>Taxus baccata</i>	Dhengre Salla	Tree	Native
619.	<i>Tecoma stans</i>	Yellow Elder	Tree	Naturalised
620.	<i>Tectona grandis</i>	Teak	Tree	Native
621.	<i>Teinostychium falconeri</i>	Phurse Nigalo	Herb	Native
622.	<i>Terminalia bellirica</i>	Baheda	Tree	Native
623.	<i>Terminalia chebula</i>	Chebulic Myrobalan	Tree	Native
624.	<i>Thanocalamus goostratus</i>	Tshi/Kishome bans	Herb	Native
625.	<i>Thanocalmus aristatus</i>	Rato Nigalo	Herb	Native
626.	<i>Thespesia lampas</i>	Common Mallow	Tree	Native
627.	<i>Thrixspermum pygmaeum</i>		Herb	Native
628.	<i>Thunbergia laurifolia</i>	Blue Trumpet Vine	Herb	Native
629.	<i>Thuja orientalis</i>	Chinese Arbor-vitae	Shrub	Naturalised

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
630.	<i>Thunbergia mysorensis</i>	Mysore Clock Vine	Herb	Native
631.	<i>Thunia alba</i>	White Thunia	Herb	Native
632.	<i>Tibouchina urvilleana</i>	Princess Flower	Shrub	Naturalised
633.	<i>Tibouchina semidecandra</i>	Glory Bush	Shrub	Naturalised
634.	<i>Toona ciliate</i>	Toon Tree	Tree	Native
635.	<i>Torenia cordifolia</i>	Indian Wishbone Flower	Herb	Native
636.	<i>Toricellia tiliifolia</i>		Shrub	Naturalised
637.	<i>Tradescantia fluminensis</i>	Inch Plant	Herb	Naturalised
638.	<i>Tradescantia virginiana</i>	Virginia Spiderwort	Herb	Naturalised
639.	<i>Tradescantia zebrine</i>	Striped Wandering Jew	Herb	Naturalised
640.	<i>Trichosanthes tricuspidata</i>	Indrayan	Herb	Native
641.	<i>Trigonella foenum graecum</i>	Fenugreek	Herb	Naturalised
642.	<i>Trachycarpus fortune</i>	Windmill Palm	Tree	Naturalised
643.	<i>Triticum aestivum</i>	Wheat	Herb	Native
644.	<i>Tropaeolum majous</i>	Garden Nasturtium	Herb	Naturalised
645.	<i>Tropaeolum minor</i>		Herb	Naturalised
646.	<i>Uraria lagopus</i>		Shrub	Native
647.	<i>Urena lobate</i>	Caesarweed	Herb	Native
648.	<i>Uritca dioca</i>	Sisnu	Herb	Native
649.	<i>Utricularia striatula</i>	Striped Bladderwort	Herb	Native
650.	<i>Vaccinium retusum</i>	Blunt-Leaf Cranberry	Shrub	Native
651.	<i>Vaccinium vacciniaceum</i>	Tibetan Blueberry	Shrub	Native
652.	<i>Vanda cristata</i>	Comb Vanda	Herb	Native
653.	<i>Vandopsis undulata</i>	Wavy-Petal Vandopsis	Herb	Native
654.	<i>Vetiveria zizanioides</i>	Khus Grass	Herb	Native
655.	<i>Viburnum cortinifolium</i>	Smoketree Leaved Viburnum	Shrub	Native
656.	<i>Viburnum nervosum</i>	Veined-Leaf Viburnum	Shrub	Native
657.	<i>Vigna unguiculata subsp. unguiculata</i>	Bootmaas	Shrub	Naturalised
658.	<i>Viola pilosa</i>	Smooth-Leaf White Violet	Herb	Naturalised
659.	<i>Viola sikkimensis</i>		Herb	Native
660.	<i>Viola tricolor</i>	Heart's Ease	Tree	Native
661.	<i>Viscum articulatum</i>	Leafless Mistletoe	Herb	Native
662.	<i>Wightia speciosissima</i>	Wightia Tree	Tree	Native
663.	<i>Wisteria sinensis</i>	Chinese Wisteria	Herb	Naturalised
664.	<i>Wrightia tinctoria</i>	Sweet Indrajao	Tree	Native
665.	<i>Zantedeschia aethiopica</i>	Calla Lily	Tree	Naturalised
666.	<i>Zantedeschia elliottiana</i>	Golden Calla Lily	Tree	Naturalised
667.	<i>Zea mays</i>	Maize	Shrub	Naturalised
668.	<i>Zebrina pendula</i>	Wandering Jew	Herb	Naturalised
669.	<i>Zephyranthes citrina</i>	Yellow Rain Lily	Tree	Naturalised
670.	<i>Zephyranthes rosea</i>	Rosy Rain Lily	Tree	Naturalised
671.	<i>Zeuxine goodyeroides</i>	Goodyera Zeuxine	Shrub	Native
672.	<i>Zingiber officinale</i>	Ginger	Herb	Native

S. No.	Scientific Name	Common Name	Type of Plant	Native / Naturalised / Invasive
673.	<i>Zinnia elegans</i>	Zinnia	Herb	Naturalised
674.	<i>Ziziphus mauritiana</i>	Ber	Tree	Native

Table 12: List of Butterfly Species for Indicator 6

S. No.	Scientific Name	Common name
1	<i>Abisara fylla</i>	Dark Judy
2	<i>Aglaia caschmirensis</i>	Indian Tortoiseshell
3	<i>Argyreus hyperbius hyperbius</i>	Indian Fritillary
4	<i>Cethosia biblis</i>	Red Lacewing
5	<i>Children children childroni</i>	Large silver Stripe
6	<i>Cyrestis thyodamas</i>	Common Map
7	<i>Delias bellanona ithiela</i>	Hill Jezebel
8	<i>Delias descombesi</i>	Red-spot Jezebel
9	<i>Delias pasithoe</i>	Red based Jezebel
10	<i>Deudorix epijarbas</i>	Dark Cornelian
11	<i>Dodona dipaea</i>	Lesser Punch
12	<i>Dodona ouida ouida</i>	Darjeeling Mixed Punch
13	<i>Doleschallia bisaltide</i>	Autumn Leaf
14	<i>Elymnias malelas</i>	Spotted Palm Fly
15	<i>Euthalia sahadeva sahadeva</i>	Green Duke
16	<i>Euthalia telchima</i>	Blue Baron
17	<i>Halpe sp.</i>	Ace
18	<i>Hebomoia glaucippe glaucippe</i>	Great-range Tip
19	<i>Heliophorus androcles</i>	Green Sapphire
20	<i>Heliophorus brahma</i>	Golden Sapphire
21	<i>Heliophorus epicles</i>	Purple Sapphire
22	<i>Junonia hierta</i>	Yellow Pansy
23	<i>Junonia orithya ocyala</i>	Dark Blue Pansy
24	<i>Lethe confuse</i>	Banded Tree Brown
25	<i>Lethe dakwania</i>	White-wedged Wood brown
26	<i>Lethe insana dinarbas</i>	Himalayan Common Forester
27	<i>Lethe jalaurida</i>	Small-silver Fork
28	<i>Lethe sinorix</i>	Tailed Red Forester
29	<i>Lethe sura</i>	Lilac Fork
30	<i>Melanitis leda isimene</i>	Common-evening Brown
31	<i>Melanitis pheduma bela</i>	Dark evening Brown
32	<i>Mooreana trichoneura</i>	Yellow Flat
33	<i>Mycalesis mineus</i>	Dark-branded Bush Brown
34	<i>Mycalesis mucianus</i>	South China Bush Brown
35	<i>Mycalesis francisca sanatana</i>	Himalayan Lilacine Bush Brown
36	<i>Papilio paris</i>	Paris Peacock
37	<i>Papilio paris paris</i>	Chinese Paris Peacock
38	<i>Papilio protenorprotentor</i>	Kumaon Spangle

S. No.	Scientific Name	Common name
39	<i>Parantica sita</i>	Chestnut Tiger
40	<i>Pseudocoladenia dan</i>	Fulvous Pied Flat
41	<i>Sebastonyma sp.</i>	Tufted Ace
42	<i>Symbrenthia hypostis cotanda</i>	Himalayan jester
43	<i>Symbrenthia niphanda</i>	Blue tail Jester
44	<i>Symbrenthia hypselis</i>	Spotted Jester
45	<i>Symbrenthia lilaea</i>	Common Jester
46	<i>Tanaecia julii</i>	Common Earl
47	<i>Taraka hamada</i>	Forest Pierrot
48	<i>Telinga nicotia</i>	Bright-eye Bush-brown
49	<i>Vanessa cardui</i>	Painted Lady
50	<i>Vanessa indica indica</i>	Himalayan Red Admiral
51	<i>Zeltus amasa</i>	Fluffy Tit
52	<i>Zemeros flegyas</i>	Punchinello

Table 13: List of Reptiles for Indicator 7

S. No.	Scientific Name	Common Name
1	<i>Japalura variegata</i>	The Variegated Mountained Lizard
2	<i>Ophiosaurus gracilis</i>	Dopasia Gracilis
3	<i>Pythas mucosa</i>	Rat Snake
4	<i>Trachischium guentheri</i>	Rosebelly Worm-eating snake
5	<i>Bungarus bungaroides</i>	Northeastern Hill Krait
6	<i>Naja naja</i>	Indian Cobra
7	<i>Gloydius himalayanus</i>	Himalayan Pit Viper
8	<i>Ovophis monticola</i>	Mountain Pit Viper
9	<i>Japalura tricarinata</i>	Three-keeled Mountain Lizard
10	<i>Sphenomorphus indicus</i>	Indian Forest Skink
11	<i>Hemidactylus frenatus</i>	Asian House Gecko
12	<i>Japalura tricarinata</i>	Cloud Forest Jalapure

Table 14: List of Freshwater Fish for Indicator 8

S. No.	Scientific Name	Common Name	Habitat
1	<i>Acanthopthalmus pangia</i>	The Khuli Loach	Freshwater
2	<i>Anguilla bengalensis</i>	The Mottled Eel	Freshwater
3	<i>Bagarius bagarius</i>	The Devil Catfish	Freshwater
4	<i>Balitora Brucei</i>	Gray's Stone Loach	Freshwater
5	<i>Barilius bendelisis bendelisis</i>		Freshwater
6	<i>Barilius bendelisis chedra</i>		Freshwater
7	<i>Barilius vagra</i>		Freshwater
8	<i>Channa orientalis</i>	Asiatic Snakehead	Freshwater
9	<i>Clupisoma Bhandari</i>		Freshwater
10	<i>Crossocheilus latius latius</i>	The Stone Roller	Freshwater

S. No.	Scientific Name	Common Name	Habitat
11	<i>Danio aequipinnatus</i>	Giant Danio	Freshwater
12	<i>Danio naganensis</i>		Freshwater
13	<i>Euchiloglanis hodgarti</i>		Freshwater
14	<i>Garra annandalei</i>	Tunga Garra	Freshwater
15	<i>Garra gotyla</i>	Sucker Head	Freshwater
16	<i>Garra gotyla stenorhynchus</i>	Nilgris Garra	Freshwater
17	<i>Garra lamta</i>	Lamta Garra	Freshwater
18	<i>Garra maclellandi</i>	Cauvery Garra	Freshwater
19	<i>Garra mullya</i>	Mullya Garra	Freshwater
20	<i>Glyptothorax basnetti</i>		Freshwater
21	<i>Glyptothorax bhutiai</i>		Freshwater
22	<i>Glyptothorax conirostris</i>		Freshwater
23	<i>Glyptothorax deyi</i>		Freshwater
24	<i>Glyptothorax gracilis</i>		Freshwater
25	<i>Glyptothorax sinense manipurensis</i>		Freshwater
26	<i>Glyptothorax sinense sikkimensis</i>		Freshwater
27	<i>Glyptothorax trilineatus</i>		Freshwater
28	<i>Labeo dero</i>	Kalaban	Freshwater
29	<i>Labeo pangusia</i>	Pangusia Labeo	Freshwater
30	<i>Laguvia ribeiroi jorethanensis</i>		Freshwater
31	<i>Laguvia riberoi riberoi</i>		Freshwater
32	<i>Neolissocheilus hexagonolepis</i>	Copper Mahseer	Freshwater
33	<i>Noemacheilus beavani</i>		Freshwater
34	<i>Noemacheilus carletoni</i>		Freshwater
35	<i>Noemacheilus corica</i>	Ray Finned Fish	Freshwater
36	<i>Noemacheilus devdevi</i>		Freshwater
37	<i>Noemacheilus kangjupkhulensis</i>		Freshwater
38	<i>Noemacheilus multifasciatus</i>		Freshwater
39	<i>Noemacheilus scaturigina</i>		Freshwater
40	<i>Noemacheilus sikkimensis</i>		Freshwater
41	<i>Noemacheilus spilopterus</i>		Freshwater
42	<i>Pangasius pangasius</i>	Pangas Catfish	Freshwater
43	<i>Pseudecheneis sulcatus</i>	Sucker Throat Catfish	Freshwater
44	<i>Salmo trutta fario</i>	Brown Trout	Freshwater
45	<i>Schizopyge progastus</i>	Dinnawah Snow Trout	Freshwater
46	<i>Schizothorax richardsonii</i>	Snow Trout	Freshwater
47	<i>Semiplotus semiplotus</i>		Freshwater
48	<i>Tor putitora</i>	King Mahseer	Freshwater



Table 15: List of Mammals

S. No	Scientific Name	Common Name
1	<i>Talpa micrura</i>	Himalayan Mole
2	<i>Suncus murinus</i>	Asian-house Shrew
3	<i>Rousettus leschenaultia</i>	Leschenault's Rousette
4	<i>Canis aureus</i>	Golden Jackel
5	<i>Mustela kathiah</i>	Yellow-bellied Weasel
6	<i>Martes flavigula</i>	Yellow-throated Marten
7	<i>Paguma larvata</i>	Masked Palm Civet
8	<i>Prionailurus begalensis</i>	Leopard Cat
9	<i>Muntiacus muntjak</i>	Common Muntjac
10	<i>Dremomys lokriah</i>	Orange-belled Himalayan Squirrel
11	<i>Petaurista magnificus</i>	Hodgson's Giant Flying Squirrel
12	<i>Mus Pahari</i>	Sikkim Mouse
13	<i>Rattus sikkimensis</i>	Indochinese Forest Rat
14	<i>Presbytis entellus</i>	Common Langur
15	<i>Macaca mulatta</i>	Rhesus Monkey
16	<i>Macaca assamensis pelops</i>	Assamese Macaque
17	<i>Herpesies auropunctatus auropunctatus</i>	Small Indian Mongoose
18	<i>Pteropus giganteus</i>	Flying Fox
19	<i>Rousettus leschenaultia</i>	Fulvous Fruit Bat
20	<i>Ochotona himalayana</i>	Himalayan Pika
21	<i>Mus musculus</i>	House Mouse
22	<i>Bubalus bubalis</i>	Water buffalo
23	<i>Capra aegagrus hircus</i>	Goat
24	<i>Sus scrofa domesticus</i>	Pig
25	<i>Felis catus</i>	Cat
26	<i>Canis lupus familiaris</i>	Dog
27	<i>Ovis aries</i>	Sheep
28	<i>Bos Taurus</i>	Cow
29	<i>Callosciurus pygerythrus</i>	Irrawady squirrel
30	<i>Muntiacus vaginalis</i>	Northern Red Muntjac



Annexure 3 – Connectivity Measures - Value of A_1 to A_n

Object ID	Patch name	Patch area (ha)
1	A1	788.02
2	A2	1.58
3	A3	1.53
4	A4	0.42
5	A5	0.91
6	A6	1.10
7	A7	8.16
8	A8	1.61
9	A9	7.12
10	A10	3.92
11	A11	0.82
12	A12	1.08
13	A13	0.39
14	A14	5.84
15	A15	1.20
16	A16	1.43
17	A17	0.74
18	A18	1.38
19	A19	1.72
20	A20	20.56
21	A21	16.39
Total		865.91







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