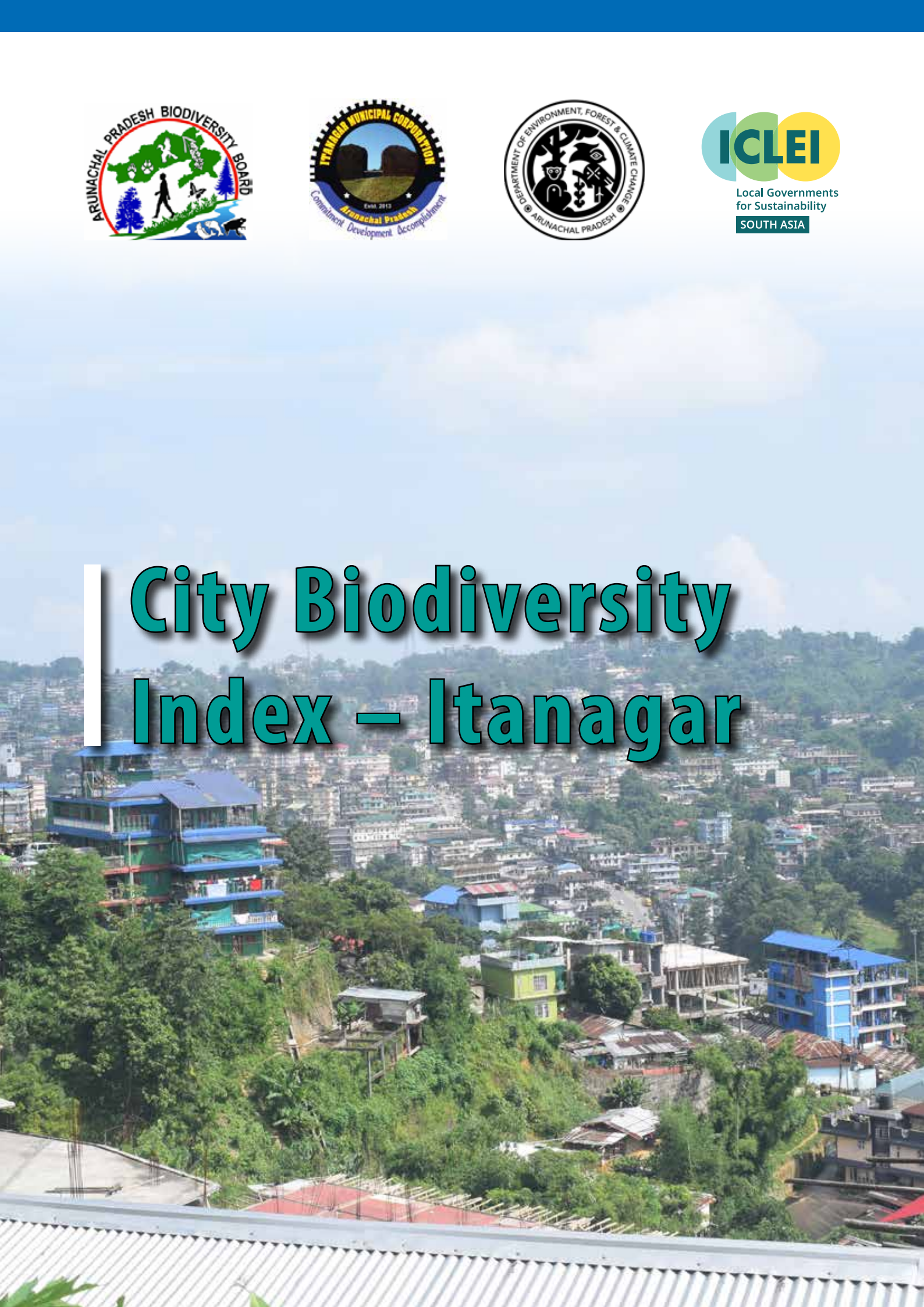
ARUNACHAL PRADESH BIODIVERSITY BOARD

ITANAGAR MUNICIPAL CORPORATION
Arunachal Pradesh
Commitment Development Accomplishment

DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE
ARUNACHAL PRADESH

ICLEI
Local Governments for Sustainability
SOUTH ASIA

# City Biodiversity Index – Itanagar



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**Prepared by:** Rithika Fernandes, Alex C.J. and Monalisa Sen

**Design:** Sasi Madambi

**Contact**
ICLEI-Local Governments for Sustainability, South Asia
C-3 Lower Ground Floor, Green Park Extension, New Delhi-110016, Tel: +91–11–4974 7200; Email: iclei-southasia@iclei.org
&
Arunachal Pradesh Biodiversity Board
Van Vihar, Chimpu, Itanagar - 791 113, Arunachal Pradesh; Email: apbb2010@gmail.com

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Our thanks are also due to Mr. Dahey Sangno, Chief Executive Officer, Itanagar Smart City Development Corporation Limited.

The authors would also like to acknowledge the contributions of Dr. G. Srinivasan, Scientist D, Zoological Survey of India, Itanagar and Dr. V. K. Rawat, Scientist Incharge, Botanical Survey of India, Itanagar for their support in developing and refining the species lists of the city.

# Message from the Honourable Mayor

**MAYOR**
**ITANAGAR MUNICIPAL CORPORATION**
ITANAGAR
Opposite Energy Park, Niti Vihar, Itanagar, Arunachal Pradesh-791 111

I am delighted to know that the Arunachal Pradesh Biodiversity Board, with technical support from ICLEI - Local Governments for Sustainability, South Asia is bringing out a publication on the City Biodiversity Index of Itanagar city.

This assessment comes at a good time as Itanagar is at the cusp of developmental transitions. This report will help us to improve our understanding of the city's biodiversity wealth and to develop effective governance mechanisms and conservation strategies.

I am happy to thank the Arunachal Pradesh Biodiversity Board and ICLEI - Local Governments for Sustainability, South Asia for developing this important tool. This will enable us to identify opportunities to integrate nature into urban development plans.

We shall work on the recommendations made in the report so that we can protect Itanagar's biological diversity and ensure a sustainable future for generations to come.

**Tamme Phassang**
Hon'ble Mayor, Itanagar

Tamme Phassang

# Message from the Honourable Chairman

सत्यमेव जयते

## ARUNACHAL PRADESH BIODIVERSITY BOARD

*(An autonomous and statutory Body)*

**Department of Environment & Forests**

**Government of Arunachal Pradesh**

The state of Arunachal Pradesh has one of the most diverse and intact biodiversity wealth in the country. It is an important part of the Eastern Himalayan region, which is one of the biodiversity hot spots of the world.

Arunachal Pradesh's capital city, Itanagar, is also known to host rich biodiversity, and several rare wildlife species on its hilly terrain. However, like in other urban areas of India, issues such as encroachment, forest fragmentation, habitat loss for wildlife, urbanisation and climate change are a growing threat to the ecological balance.

While the process of development is most essential, we also need to invest in ecosystems, alongside roads, flyovers and buildings. Nature needs to be at the heart of urban development to build resilience to environmental and climate risks.

I am happy to thank ICLEI - Local Governments for Sustainability, South Asia for the valuable work they put in for preparing the City Biodiversity Index of Itanagar, a first for the state.

**Tayek Goi**
Hon'ble Chairman, APBB

Tayek Goi

# Message from the Member Secretary

सत्यमेव जयते

## ARUNACHAL PRADESH BIODIVERSITY BOARD

*(An autonomous and statutory Body)*

**Department of Environment & Forests**

**Government of Arunachal Pradesh**

Tackling the developmental challenges with new tools and technologies improve our understanding and capacities to deal with them and help take corrective actions well in time.

In this context, the development of the City Biodiversity Index of capital city Itanagar is a significant step forward for the region. I am hopeful that the index will also help provide strategic guidance for effective management of the city's biodiversity and ecosystem services, and support the achievement of relevant national goals.

I thank ICLEI- Local Governments for Sustainability, South Asia for developing the City Biodiversity Index of Itanagar and look forward to further collaborations in conserving, protecting, and restoring our biodiversity.

**Koj Rinya, IFS**
Member Secretary, APBB

Koj Rinya, IFS

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# Abbreviations

| | |
|---|---|
| AMRUT | Atal Mission for Rejuvenation and Urban Transformation |
| APBB | Arunachal Pradesh Biodiversity Board |
| BMC | Biodiversity Management Committee |
| BSI | Botanical Survey of India |
| CBI | City Biodiversity Index |
| CBD | Convention on Biological Diversity |
| CBSE | Central Board of Secondary Education |
| C-HED | Centre for Heritage, Environment and Development |
| COP | Conference of Parties |
| EBA | Endemic Bird Area |
| GBPU | Govind Ballabh Pant University |
| IBA | Important Bird Area |
| ICSE | Indian Certificate of Secondary Education |
| IWS | Itanagar Wildlife Sanctuary |
| IMC | Itanagar Municipal Corporation |
| JNNURM | Jawaharlal Nehru National Urban Renewal Mission |
| LBSAP | Local Biodiversity Strategy and Action Plan |
| LULC | Land Use and Land Cover |
| NBSAP | National Biodiversity Strategy and Action Plan |
| NERIST | North Eastern Regional Institute of Science and Technology |
| NGO | Non-Governmental Organisation |
| NIR | Near Infrared |
| OECM | Other Effective Area-based Conservation Measures |
| PBR | People's Biodiversity Register |
| PCCF | Principal Chief Conservator of Forests |
| SCBD | Secretariat of the Convention on Biological Diversity |
| SFRI | State Forest Research Institute |
| STP | Sewage Treatment Plant |
| SUDS | Sustainable Urban Drainage Solutions |
| ULB | Urban Local Bodies |
| USGS | United States Geological Survey |
| WLS | Wildlife Sanctuary |
| ZSI | Zoological Society of India |

# Section I: About City Biodiversity Index

The City Biodiversity Index (CBI) or the Singapore Index was developed in 2008, when it was acknowledged in the Ninth Biodiversity Conference of Parties (COP) that cities and local bodies can support the implementation of a country's National Biodiversity Strategy and Action Plan (NBSAP).

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

According to the Secretariat of the Convention on Biological Diversity (SCBD),[1] 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 CBI of Itanagar was developed by ICLEI- Local Governments for Sustainability, South Asia in collaboration with the Arunachal Pradesh Biodiversity Board.

1. Secretariat of the Convention on Biological Diversity. (2014). User's manual on the Singapore Index on Cities' Biodiversity (also known as the city biodiversity index). Available at: http://www.cbd.int/en/subnational/partners-and-initiatives/city-biodiversity-index. Accessed online on 22 November 2019.

## Summary of the Scores

The CBI of Itanagar, 2023 has been prepared based on the SCBD endorsed user's manual for CBI updated in 2014. The 23 indicators that make up the index are grouped into three main components viz. Native Biodiversity, Ecosystem Services provided by biodiversity and Governance and Management of Biodiversity.

Itanagar scored a total of 31 out 72 for 18 indicators (refer Figure 1). 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 14 out of 20 as only 5 indicators were taken into consideration. The city scores well in this section, indicating that its largely intact, unmodified natural habitat represented by its forest hills, supports significant biodiversity. Indicators 11-14, which relate to "Ecosystem Services provided by Biodiversity in the City" scored 7 out of 16 points. The city scores below average here which indicates that although it has healthy ecosystems, some ecosystem functions that relate to education and recreation are missing and require planning interventions. Indicators 15-23, which correspond to "Governance and Management of Biodiversity in the City" contributed to a score of 10 out of 36 points. This is a low score as the urban local body has been recently constituted and is in the process of taking over all the functions and roles. The fact that the city has implemented the CBI at such a critical developmental stage, shows the significance and importance the administration gives to biodiversity conservation and sustainable utilization.

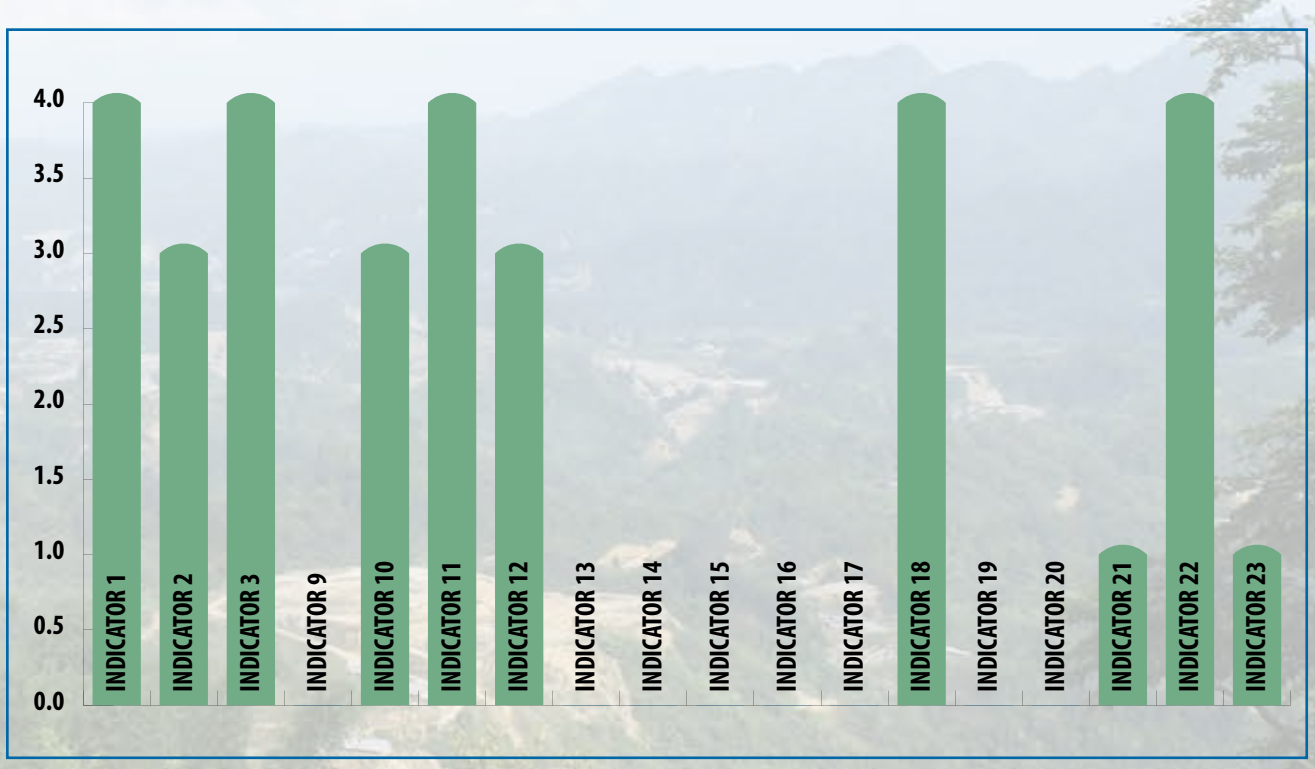


**Figure 1: Itanagar City Biodiversity Index 2023 at a Glance**

# Section II: City Biodiversity Index of Itanagar

## Part A: Profile of the City

Itanagar is the capital city of the northeastern state of Arunachal Pradesh in India. The city is located at the foothills of the Himalayas[2] between the coordinates 27°06' 00" N and 93°37'12" E. Itanagar is situated at an average elevation of 750 m above sea level, spread over an approximate area of 51.69 sq. km.[3] It exhibits a humid, subtropical type of climate where summers are hot and the winters are cold and dry. The city also experiences heavy rains during the monsoon season. Temperature in Itanagar ranges from 5°C in the cold months from November to March and 30°C from the month of April to June while mean annual rainfall is 2,289 mm. The capital region of Itanagar is the largest urban agglomeration of the State accounting for nearly 30% of its urban population, with a planning area of 271.00 sq. km

### Geophysical Characteristics

Itanagar falls under the jurisdiction of Papum Pare district, Arunachal Pradesh.[4] It is designated as a small Class III town in the district. The city is named after Ita fort, known as the fort of bricks.[5] It is nestled behind Banderdewa Hills and surrounded by the Papu Nallah and Pachin rivers. The city together with its twin town of Naharlagun forms the municipal limits of Itanagar Municipal Corporation.

### Demography

As per Census of India 2011,[6] there is a population of 59,490 in the city of Itanagar. This number constitutes 30,497 males and 28,993 females. The city further comprises of large number of people belonging to the Scheduled Tribes i.e. 34,026. Total literacy rate of the city is 74.25%. Males constitute about 54.32% and females constitute about 45.67% out of the total literate population. Hinduism is the most widely practiced religion (40.94%), followed by Christianity (29.51%), Donyi Polo (21.17%), Islam (4.52%) and Buddhism (2.88%).[7]

Amongst the many languages spoken, Nishi is the most commonly spoken language in the city, followed by Bengali, Adi, Apatani, Nepali, Hindi, Assamese and Bhojpuri.[6]

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2. Itanagar Online, "Geography of Itanagar." Accessed from https://www.itanagaronline.in/city-guide/geography-of-itanagar on 1 August 2022.
3. Government of Arunachal Pradesh, "Itanagar Capital Complex." Accessed from https://itanagar.nic.in/ on 3 August 2022.
4. Patnaik, S. K. 2013. "Cultural Diversity and Their Integration: A study of households in Itanagar Town," 4th Int. Conf. Humanit. Geogr. Econ., pp. 27–30.
5. Ministry of Urban Development, 2017. "The Smart City Challenge Smart City Proposal: Itanagar," Government of India, no. 7.
6. Census of India. 2011. "Arunachal Pradesh," District Census Handbook - Papum Pare. Directorate of Census Operations, doi: 10.4324/9780203402900-16.

## Economy

Itanagar is called the 'Land of Dawn-lit Mountains' situated at the Himalayan foothills.[8] It is the institutional hub of the state of Arunachal Pradesh.[5] The city is administrative headquarters of the Papum Pare district and hosts a range of institutions in the area of medicine, engineering, entertainment, science and technology. Some of the institutions present in the city are North Eastern Regional Institute of Science and Technology, North East Homeopathic Medical College and Hospital, Film and Television Institute and Forensic Science Laboratory. Being the capital city, Itanagar is home to many administrative buildings like that of the secretariat, line departments and related organizations of public service delivery. In addition, the city has local tourist attractions such as the Gompa Mandir (Kyong Theraveda) and Geykar Sinyik(Ganga Lake). The main economic activity in the city of Itanagar is agriculture.[9] Crops such as wheat, rice, millet, pulses, potatoes and sugarcane are preferably cultivated in the region surrounding the city of Itanagar. Jhum cultivation, also known as shifting cultivation and terrace farming are widely practiced in the region. Pineapple, apple, orange, plums, pear, walnut, chestnut, guava and other horticultural products such as spices, bamboo aromatic and medicinal plants, cardamom, ginger and mushrooms are cultivated. Handloom, handicrafts, weaving and tourism are secondary sectors which contribute substantially to the local economy. Carpet making, ornament making, wood carving, carpentry, pottery are some of the other economic activities taking place in the city.

## Biodiversity

Owing to its geographical location in the Himalayas, the city of Itanagar is rich in natural heritage.[5] The city has an abundance of natural resources in the form of lush green hills, valleys and rivers (Figure 2) but lacks a comprehensive biodiversity profile. Gekar Sinyik (Ganga Lake), a natural lake which is surrounded by a landmass of hard rock is present on the city's outskirts. It is a picnic and recreational spot with primeval vegetation, orchids masses on tall trees and tree ferns.[10] Given below is a brief description of flora and fauna found in the region of the city of Itanagar.

A land use land cover map (LULC) (Figure 2) of the city was developed by ICLEI South Asia. The map identified the city's major land use (Table 1) as being Forests (41%), followed by built-up area (25%). The LULC map was prepared through an object-based manual visual interpretation technique using Google satellite images in QGIS and Arc GIS platforms. A locally specific land classification scheme was prepared based on detailed GPS field surveys and expert consultation. According to the developed scheme, the LULC of the study area comprises forest / natural vegetation, open scrub, river, riverine, marshes, open green spaces, lakes /ponds, tree patches, open ground, paddy fields, plantation, fallow land, sparse vegetation, homesteads with mixed cultivation, urban built-ups, and road network. Based on the scheme the land class patches were delineated and the land use/land cover map has been developed by the manual visual interpretation of Google satellite data available on the HCMGIS Plugin of QGIS 3.2 at a mapping scale of 1:2500.

7. Office of the Registrar General and Census Commissioner. 2011. "C-1 Population by Religious Community."
8. Atal Mission for Rejuvenation and Urban Transformation, "Draft Proposals Report: GIS-based Master Plan of Itanagar Capital Region."
9. Government of Arunachal Pradesh. n.d. "Itanagar Capital Complex: Economy." Accessed from https://itanagar.nic.in/economy-ita/ on 1 August 2022.
10. Birdlife International. 2022. "Important Bird Areas factsheet: Itanagar Wildlife Sanctuary". Accessed from http://datazone.birdlife.org/site/factsheet/18042 on 1 August 2022.

**Flora:** Itanagar hosts a biological park comprising of a wide variety of plant species.[11] The park also exhibits a range of forest types and natural vegetation in the form of dense evergreen patches, moist deciduous forest and moist valleys of semi evergreen type. These are classified as 2B/C1/G1 Sub Himalayan light alluvial semi evergreen forests, 3½ 152 Eastern Hollock forests, 1B/C2 Upper Assam valley tropical evergreen forests. Some floral species present under these forest types include *Artocarpus heterophyllus* (Kathal), *Albizia lucida* (Moj), *Albizia falcatoria* (Sirish), *Altingia excelsa* (Jutili), *Bauhinia acuminata* (Kanchan), *Bischofia javanica* (Uriam), *Canarium strictum* (Dhuna), *Erythrina stricta* (Madar), *Ficus bengalensis* (Bor), *Ficus religiosa* (Peepal), *Michelia champaca* (Titachapa), *Morus lavigata* (Bola), *Spondias Aurilaris* (Lichu), *Sterculia villosa* (Udal), *Syzygium cumini* (saram), *Syzygium jambos* (jamera), *Tamarindus indica* (Tateli), *Pachylarnex plaiocarpa* (Phulsopa), *Madhuca butyraccoides* (Mahuna), *Hovenia acerba* (Chetahola), *Terminalia chebula* (Hilika), *Gmelia arborea* (Gamari), *Oruxylem indicum* (Bhatgila), *Mesua ferrea* (Nahar), *Michelia champaca* (Tita champa), *Zizyphus jujube* (Bogori), *Mimosa pudica* (Lajjalu), *Abroma augustum* (Pishach Karasa), *Cinnamomum Tamala* (Nalika), *Mimusops elengi* (Bakul) and *Piper mullesus* (Ham pipli).[11]

Some of the bamboo species occurring in the biological park include *Bambusa pallida* (Bijili), *Bambusa tulda* (Jati), *Bambusa vulgaris* (Bakal) and *Dendrocalamus hamiltonii* (Kako).[11]

The floristic composition of Itanagar Wildlife Sanctuary can be assumed to provide a glimpse of plant species present in Itanagar. Some of the species found in the sanctuary include *Elaeocarpus sphaericus, Podocarpus nerifolius, Livistona jenkinsiana, Lagerstroemia parviflora, Spondias pinnata* and *Artocarpus chaplasa*.[12]

Plants found around Gyekar Sinyik (Ganga) Lake include five rare plants *Cythea spinulosa*, *Podocarpus neriifolius, Garcinia pedunculata*, *Piper haridasanii, Piper longchites* and two endemic fern species *Angiopteris evecta* and *Dipteris wallichii*.

**Fauna:** Birds found in the biological park of Itanagar include *Spilornis cheela* (Crested Serpent-Eagle), *Gallus gallus* (Red Jungle fowl), *Lophura leocomelanos* (Khalij Pheasant), *Columba livia* (Blue Rock Pigeon), *Streptopelia chinensis* (Spotted Dove), *Chalcophaps indica* (Emerald Dove), *Psittacula alexandri* (Red-breasted Parakeet), *Pycnonotus cafer* (Red-vented Bulbul), *Chloropsis aurifrons* (Gold-fronted Chloropsis), *Copsychus saularis* (Oriental magpie-Robin) and *Enicurus scouleri* (Little Forktail). Different species of mammals comprise *Anouroures squamies* (House shrew), *Canis aureus* (Jackal), *Muniacus muntijack* (Barking Deer), *Paguma larvata* (Palm civet), *Rattus rattus* (House rat), *Tupia glis* (Tree shrew), *Hystrix indica* (Indian porcupine), *Martes flavigula* (Yellow-throated Morten) and *Prionodon pardicolor* (Spotted linsang). Some species of reptiles found in the biological park are *Python molurus* (Indian Rock Python), *Amphiesma stolatum* (Buff-striped keelback), *Bungarus niger* (Greater Black Krait), *Dedrelaphis pictus* (Painted Bronzeback), *Lycodon jara* (Twin-spotted Wolf snake), *Naja Naja* (Indian cobra) and *Natrix piscator* (Checkered Keelback). Amphibians found in the biological park are *Megophrys major*, *Megophrys parva*, *Uperoden globulosus*, *Amolops formorus*, E*uphlyctyis cyanophlyctis, Fejervarya nepalensis, Hoplobatrachus crassus, Phrynoglossus borealis, Rana tytleri, Rhacophorus maximus* and *Philatus shyamrupus*.[11]

Itanagar WLS hosts around 182 bird species10. The sanctuary lies in the Eastern Himalayas Endemic Bird Area (EBA 130) and is home to about four species of hornbills - *Buceros bicornis* (Great Hornbill), *Aceros undulates* (Wreathed Hornbill), *Anthracoceros albirostris* (Oriental Pied Hornbill) and *Aceros nipalensis*

11. Department of Environment and Forests. 2011. "Itanagar Biological Park Development Plan 2011 - 2021".
12. Srivastava, R. C. and Choudhary, R. K. 2006. "Floristic scenario of Itanagar Wildlife Sanctuary: a case study.," Bull. Arunachal For. Res., vol. 22, no. 1&2, pp. 17–21.
13. Ramakrishna, Mitra, S. C. and Mukherjee, A. K. 2005 "Mollusca Fauna of Itanagar Wildlife Sanctuary, Arunachal Pradesh," Zool. Surv., vol. 104, no. 3–4, pp. 1–12.

(Rufous-necked Hornbill). In addition, the sanctuary is also home to a number of threatened mammals such as *Elephas maximus* (Asian Elephant), *Panthera tigris* (Tiger), *Ursus thibetanus* (Asiatic Black Bear), *Bos frontalis* (Gaur), *Cuon alpinus* (Wild Dog) and primates such as *Macaca assamensis* (Assamese Macaque), *Macaca mulatta* (Rhesus Macaque), *Trachypithecus pileata* (Capped Langur) and *Nycticebus coucang* (Slow Loris). Molluscs such as *Paludina bengalensis, Bellamya bengalensis, Melania costula, Brotia costula, Paludomus conica, Limnaea acuminata, Limnaea luteola, Indoplanorbis exustus, Sphaerium indicum, Cyclophorus sidiensis, Pearsonia oakesi* and *Glessula crassula*[13] have been documented. Different species of thrips found here include *Mymarothrips garuda, Anaphothrips sudanensis, Ayyaria chaetophora, Fulmekiola serrata, Megalurothrips distalis, Dichromothrips nakahari* and *Megalurothrips peculiaris*.[14]

Ganga Lake also constituted within the Itanagar WLS is a butterfly hub. In a recent study by Sharma and Goswami, 2021[15] a total of 126 species of butterflies were recorded in and around Ganga Lake. These include *Papilio polytus* (Common Mormon), *Papilio demoleus* (Lime Butterfly), *Leptosia nina* (Psyche), *Cepora nadina* (Lesser Gull), *Pareronia avatar* (Pale Wanderer), *Lethe confusa* (Banded Tree brown), *Elymnias malelas* (Spotted Palmfly) and *Mycalesis mineus* (Dark-brand Bushbrown). Some birds recorded from Ganga Lake include the Striated Heron (*Butorides striata*), White-breasted Waterhen (*Amaurornis phoenicurus*), Slaty-bellied Tesia (*Tesia olivea*) and Black-crested Bulbul (*Rubigula flaviventris*). Ganga Lake has an abundant zooplankton diversity.[16] A total of 16 species belonging to three genera of protozoa, six genera of rotifer, three genera of cladocera and four genera of copepod have been recorded. Some of them include *Arcella* sp., *Ceratium* sp., *Lecane* sp., *Keratella* sp., *Asplancha* sp., *Trichocera* sp., *Amoeba* sp., *Testudinella* sp., *Brachionus* sp., *Bosmina* sp. and *Sida* sp. The lake also comprises of small populations of common macro invertebrates such as the larvae of mayfly, dragonfly, chironomids, whirling beetles, oligochaets and mollusks.

Documentation of the herpetofaunal diversity of the Zoological Survey of India campus in Itanagar, and its surrounding areas was carried out by Sinha et al. in 2021.[17] The study recorded 37 species under 32 genera of herpetofauna which comprises eight species of amphibians representing seven genera, four families and one order, while reptiles were represented by 29 species belonging to 25 genera, 10 families and two orders.

**Table 1: Area under each land class**

| S. No. | Land Class | Class Area (ha) | Percentage |
|---|---|---|---|
| 1 | Forest / Natural vegetation | 2,353.32 | 41.13 |
| 2 | Open scrub | 73.44 | 1.28 |
| 3 | River | 170.75 | 2.98 |
| 4 | Riverine/ Marshes | 105.73 | 1.85 |
| 5 | Open Green Spaces | 30.92 | 0.54 |
| 6 | Lakes and ponds | 2.83 | 0.05 |
| 7 | Tree patches | 168.52 | 2.95 |

14. Maisnam, S., Varatharajan, R., Singh, T. O. and Chakravorty, J. 2012. "Thysanoptera fauna of Itanagar Wildlife Sanctuary , Arunachal Pradesh," Zool. Surv. India, vol. 112, no. 3, pp. 35–43.

15. Sharma, N. and Goswami, P. 2021. "Species richness and diversity of butterflies (Insecta: Lepidoptera) of Ganga Lake, Itanagar Wildlife Sanctuary, Arunachal Pradesh, India," Zool. Surv. India, Arunachal Pradesh Reg. Cent., vol. 121, no. 2, pp. 231–240, doi: 10.26515/rzsi/v121/i2/2021/152867.

16. Nanda, P., Sinha, B., Muthu, J. and Sharma, H. 2020 "Study of Zooplankton Diversity of Ganga Lake (GyakarSinyik) of Itanagar, Eastern Himalayas, India, using Foldscope," Bull. Pure Appl. Sci. Zool., vol. 39a, no. 2, pp. 516–523, doi: 10.5958/2320-3188.2020.00061.3.

17. Sinha, B. Prosad, K. N. and Gurumayum, S. D. 2021. "Herpetofaunal Diversity of Zoological Survey of India Campus, Itanagar, Arunachal Pradesh, India," Rec. zool. Surv. India, vol. 121, no. 3, pp. 411–418, doi: 10.26515/rzsi/v121/i3/2021/156654.

| S. No. | Land Class | Class Area (ha) | Percentage |
|---|---|---|---|
| 8 | Open ground | 47.04 | 0.82 |
| 9 | Agriculture - paddy field | 89.73 | 1.57 |
| 10 | Agriculture –cropland / Plantation | 265.81 | 4.65 |
| 11 | Fallow land | 6.24 | 0.11 |
| 12 | Sparse vegetation | 44.46 | 0.78 |
| 13 | Homesteads with mixed cultivation | 458.68 | 8.02 |
| 14 | Urban built-ups | 1,458.29 | 25.48 |
| 15 | Land cuts/Landfill | 278.16 | 4.86 |
| 16 | Road network | 168.23 | 2.94 |

## Administration of Biodiversity

In the city of Itanagar, biodiversity is administered by the following state and city level agencies.

**Department of Environment, Forest and Climate Change, Government of Arunachal Pradesh:** This Department headed by the Principal Chief Conservator of Forests (PCCF) deals with the protection, management and conservation of forests and protected areas like the Biological Park, Itanagar Wildlife Sanctuary in the state of Arunachal Pradesh. For more information, please visit: https://arunachalforests.nic.in/index.html

**Arunachal Pradesh Biodiversity Board:** The Board plays an important role in advising the state government on matters pertaining to the conservation of biodiversity, sustainable use of its components and enable equitable sharing of benefits arising out of the utilization of biological resources. In addition, the Board performs functions in accordance with the provisions set out in the Biological Diversity Act, 2002. For more information, please visit: http://www.apbb.in

**Itanagar Municipal Corporation (IMC):** IMC is responsible for the administration of the city of Itanagar. It works for the development of the city and aims to provide basic services to its citizens. For more information, please visit: https://www.imc.arunachal.gov.in/

**Department of Town Planning and ULB's:** The Department is responsible for the preparation of a city development plan of Itanagar including components related to biodiversity, traffic and transportation plans. The Department also develops other development plans/zoning plans. For more information, please visit: https://arunachaltp.nic.in/

**Itanagar Smart City Development Corporation Limited:** This Corporation aims to develop Itanagar as the most livable and economically vibrant city in the North East. It also envisages to promote high quality of living and happiness for its citizen by providing smart infrastructure and governance facilities, as well as incorporate urban forestry and smart mobility components. For more information, please visit: https://smartnet.niua.org/users/itanagar-smart-city-limited

**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. Itanagar Municipal Corporation with support from the State Biodiversity Board has formed a BMC in January 2020. Annexure 4 provides details of the members of the BMC of Itanagar city.

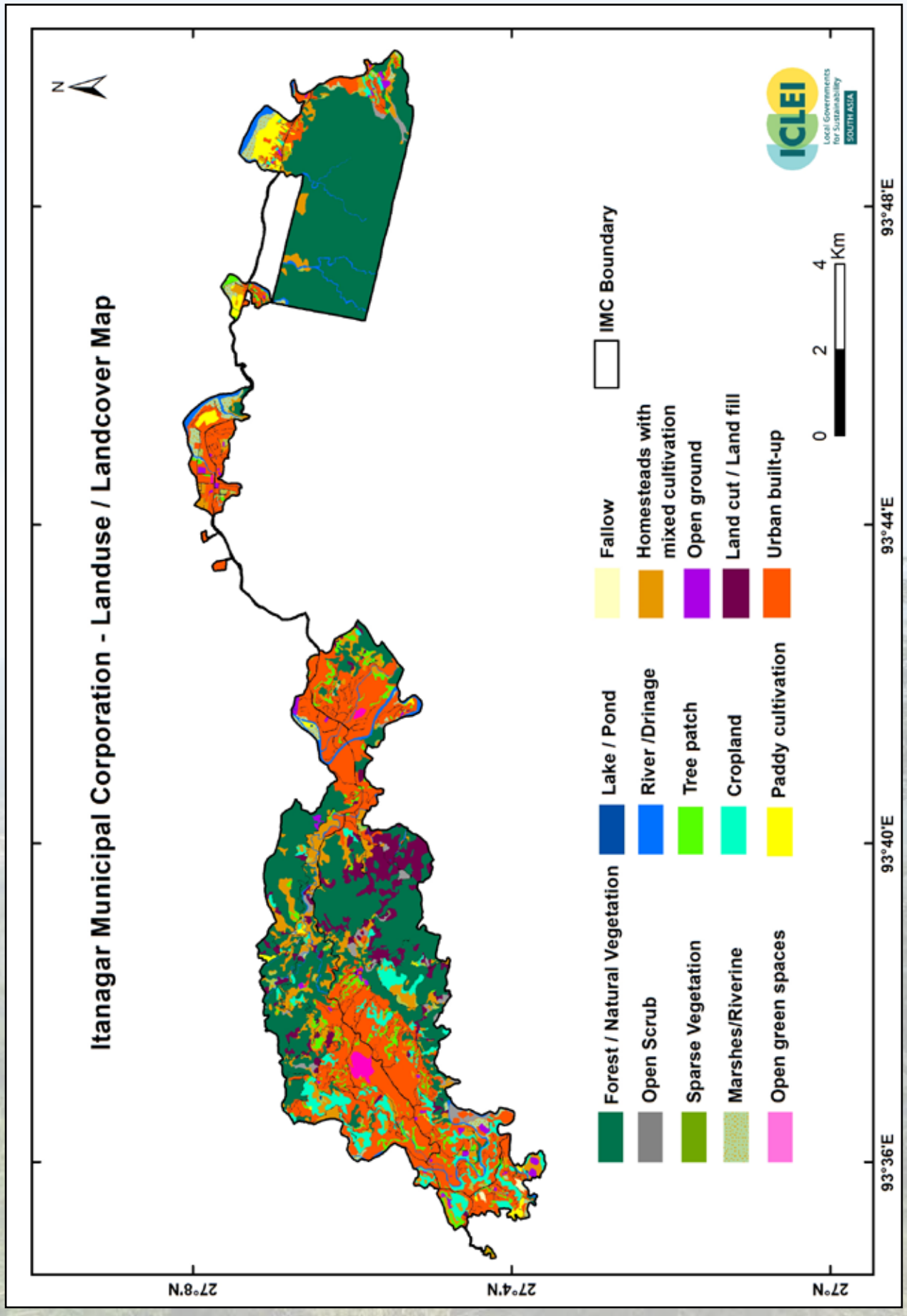



**Figure 2: Landuse Landcover map of Itanagar Municipal Corporation**

# Part B: Indicators of the Singapore Index on Cities' Biodiversity

## Native Biodiversity

### Indicator 1: Proportion of Natural Areas in the City

The definition of the Natural areas as stated in the Singapore Index Manual is "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**
(Total area of natural, restored and naturalised areas) ÷ (Total area of city) × 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 and Calculations**

The definition of natural areas in the Singapore Index manual is difficult to strictly apply within the context of Indian cities where the ground realities are significantly different. Income inequality, a high population density, and limited infrastructural outreach means that while there are native and natural ecosystems, public access to these areas cannot be completely restricted.

To calculate the proportion of natural areas in the city, a natural asset map (Figure 3) of Itanagar was prepared and referred to. Table 2 shows the various natural classes that have been identified in the natural asset map of Itanagar and used to calculate this indicator. Anthropogenically influenced land classes such as Open Green Spaces, Open ground, Paddy Fields, Cropland / Plantations, Fallow land, Homesteads with mixed cultivation were not considered.

**Table 2: Natural assets used in the calculation of indicator 1 (inside IMC boundary)**

| S.No | Land Class | Area in sq. km. |
|---|---|---|
| 1 | Forest / Natural vegetation | 23.53 |
| 2 | Open scrub | 0.73 |
| 3 | River | 1.71 |
| 4 | Riverine/ Marshes | 1.06 |
| 5 | Lakes and Ponds | 0.03 |
| | **Total** | **27.06** |

**Principal for calculating the indicator:** (Total area of natural, restored and naturalized areas) ÷ (Total area of city) × 100%

**Total area of natural, restored and naturalized areas:** 27.06 sq. km.

**Total area of city:** 51.69 sq.km.

**RESULT: 52.35%**

**SCORE: 4**

## Recommendations to Maintain Score

Itanagar is a growing city, still in the early stages of development. At this point a large part of the city's green and natural cover is still intact. However, infrastructure development activities are also being undertaken in the city. A robust and inclusive masterplan that includes how the city can maintain its green and blue cover is required to guide the city's future growth and development. The present master plan[18] should also include these aspects.

18. Department of Town and Country Planning and Remote Sensing Instruments. (n.d). Draft Master Plan Report for Itanagar Capital Region GIS Based Master Plan under AMRUT Scheme. Accessed from https://arunachaltp.nic.in/sites/default/files/Report%20IMP2031.pdf on 30 December 2022.

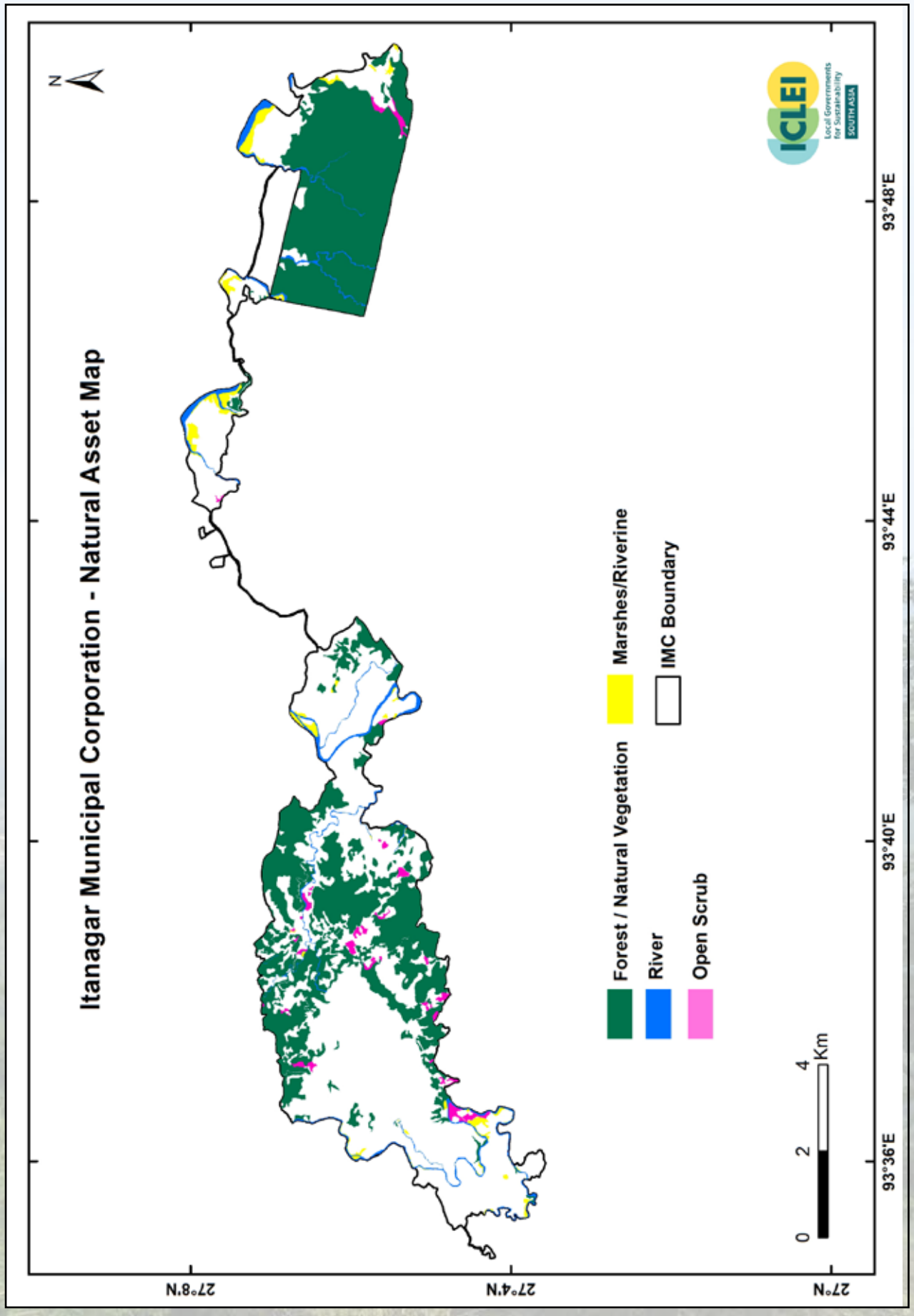



**Figure 3: Natural Areas of the City Used in the Calculation of Indicator 1**

## Indicator 2: Connectivity Measures or Ecological Networks to Counter Fragmentation

### Methodology

As per the CBI user manual

**Principle for calculation of the indicator**

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

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 and Calculations**

The patches associated with the land classes used to calculate indicator 1 i.e., Forests, Open scrub, River, Marshes and Riverine vegetation, Lakes and ponds have been considered in this calculation (Figure 4). In reality, manmade landscapes represented in Itanagar by the land classes- open green spaces, home gardens, agricultural landscapes and some natural spaces like tree patches and sparse vegetation also form a part of the ecological network to counter fragmentation for several species. However, these have not been considered following the guidelines of the CBI manual.

197 natural land classes polygons (patches) were merged with the land class River Dikrong and considered a single unit, as per the 100 m proximity rule. Therefore, the total area of this big patch (A1) was determined as 1254.36 ha. 38 patches were merged with Kharsingasa Forest, considered patch A2, with an area of 1215.65 ha (Annexure 1, Table 4).

There are 75 polygons (patches) outside the 100m buffer of these two big patches. As per the 100 m proximity rule, these patches are inter-merged into 20 patches (A3 – A22) as shown in Table 4.

$A_{total}$ = 2,706.08 ha

As per the final calculation

Indicator 2 = 1/ 2,706.08 ha x (3,072,049.78 ha2) = 1,135.24 ha

**RESULT: 1,135.24 ha**

**SCORE: 3**

## Recommendations to Improve Score

As Itanagar is still a young, growing city, a large part of its green cover is intact and far outweighs the grey infrastructure which is still in the nascent stages of being developed. For this indicator, Itanagar missed the highest score likely due to the demarcation of administrative boundaries in the eastern part of the city towards Banderdewa which is represented simply by a road and not by its encompassing ecosystems- the Dikrong river, hills and farmlands. If the area of the Dikrong river and surrounding hills was part of the IMC boundary, the city would have certainly scored the full four points. Planners and decision makers have the opportunity to guide development of the city in a sustainable and safe manner, by adopting scientific and rational land use planning based on land capacity and suitability. This would involve focussing on preserving and strengthening the green-blue infrastructure alongside grey infrastructure development.

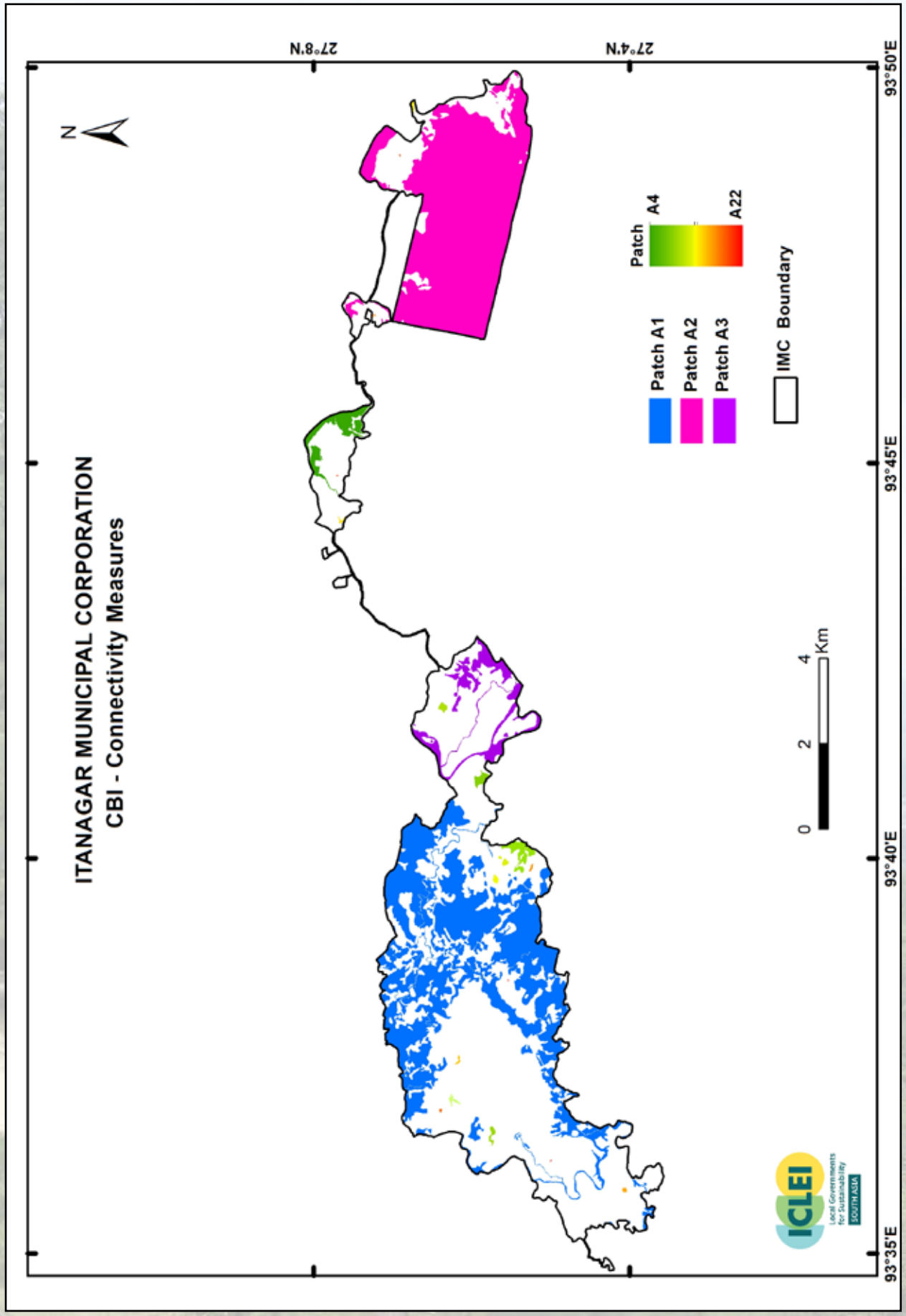



**Figure 4: Connectivity Map of IMC Showing the Patches which were Merged to Calculate Indicator 2**

## 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 and Calculations**

Secondary data available on citizen science platforms such as eBird (2022)[19] developed by Cornell Lab of Ornithology, and sightings recorded by scientists at the Zoological Society of India (ZSI) were referred to for this indicator. The list was then vetted by scientists at ZSI, Itanagar.

Of the 209 bird species that were recorded from within and around the city, 167 species are resident species of which 88 occur within anthropogenically altered spaces of the city. The list of the birds considered for calculation of this indicator is provided in Annexure 2, Table 5.

**RESULT: 88 bird species**

**SCORE: 4**

### Recommendations to Maintain Score

Available data on bird species in the city is limited. Although some lists were supplemented by the ZSI, the species recorded were for a larger area than only that present within the limits of the municipal corporation. Nonetheless, the city still scores well for this indicator. More frequent bird surveys will support future scoring of this indicator. Itanagar Municipal Corporation can collaborate with local bird watchers, universities, ZSI and schools to regularly update the data on birds in the city.

[19] https://ebird.org/hotspot/L17770108

## Indicators 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 and Calculations**

For the indicators 4-8, information was sourced from scientific publications, government reports, white papers, and citizen science platforms like eBird and iNaturalist. Taxa experts were consulted with at the final stage of list development.

In the case of indicator 4, the list of plants was compiled from various sources including the Botanical Survey of India (BSI), who also vetted the same plant list, the Department of Environment and Forests (2011),[20] Srivastava and Choudhary (2006),[21] and Kashung et al. (2021).[22] Indicator 5 was compiled from eBird and

19. Department of Environment and Forests. 2011. Itanagar Biological Park Development Plan 2011 - 2021.
20. Srinivastava R.C. and Choudhary R.K. 2006. A Floristic Scenario of Itanagar Wildlife Sanctuary- A case study. Bulletin of Arunachal Forest Research 22 (1&2) : 17-21
21. Kashung, S., P.R. Gajurel & B. Singh (2021). Distribution and diversity of climbing species in Papum Pare District of Arunachal Pradesh, India. Journal of Threatened Taxa 13(3): 17972–17983. https://doi.org/10.11609/jott.5859.13.3.17972-17983
22. Sharma, N and Goswami, P. 2021. Species richness and diversity of butterflies (Insecta:Lepidoptera) of Ganga Lake, Itanagar Wildlife Sanctuary, Arunachal Pradesh, India. Records of Zoological Survey of India, 121(2), 231-240. doi: 10.26515/rzsi/v121/i2/2021/152867.

data supplied and validated by ZSI. Indicator 6 was compiled from Sharma and Goswami (2021)[23] and vetted by the team at ZSI.

For indicators 7 and 8, two additional taxonomic groups of Freshwater Fish and Molluscs, respectively were chosen. Indicator 7 was compiled from Dam (2013),[24] Sinha and Tamang (2013),[25] Gurumayum et al. (2020)[26] and vetted by Dr. B. Sinha, ZSI, Itanagar. while Indicator 8 was compiled from Gurumayum and Temjenmongla (2021)[27] and Mitra and Mukherjee (2005)[28] and vetted by ZSI.

These lists will form the baseline for comparison when the index is revisited by the city, after 5 years. Annexure 2 provides details of the species lists that have been considered for indicators 4-8.

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

23. Sharma, N and Goswami, P. 2021. Species richness and diversity of butterflies (Insecta:Lepidoptera) of Ganga Lake, Itanagar Wildlife Sanctuary, Arunachal Pradesh, India. Records of Zoological Survey of India, 121(2), 231-240. doi: 10.26515/rzsi/v121/i2/2021/152867.
24. Dam, D. 2013. Fish fauna of Itanagar Wildlife Sanctuary, Arunachal Pradesh, India. Records of Zoological Survey of India. 113(1), pp. 225-229.
25. Sinha, B. and Tamang, L. 2012-2013. Fish Diversity of Ganga Lake in Itanagar, Arunachal Pradesh. Bulletin of Arunachal Forest Research. 28-29(1-2), 7-11.
26. Gurumayum, S. D, Nath, K. P. and Kosygin, L. 2020. Conservation status and endemicity of type fish species discovered from Arunachal Pradesh. Bulletin of Arunachal Forest Research. 35(1&2), 1-14.
27. Gurumayum, S. D. and Temjenmongla. 2021. Mollusca fauna of the campus of Arunachal Pradesh Regional Centre, Zoological Survey of India, Itanagar Wildlife Sanctuary, Arunachal Pradesh, along with two new records. Records of Zoological Survey of India. 121(2), 225-229.
28. Mitra, S.C and Mukherjee, A. K. 2005. Mollusca Fauna Of Itanagar Wildlife Sanctuary, Arunachal Pradesh. Rec. zool. Surv. India: 104 (Part 3-4) : 1-12

## Indicator 9: Proportion of Protected Natural Areas

### Methodology

**How to calculate indicator**
(Area of protected or secured natural areas) ÷ (Total area of the city) × 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 and Calculations**
Within the city there are no protected areas, that are administered by the Itanagar Municipal Corporation.

Area of protected or secured natural areas = 0 sq. km.

Total area of the city = 51.69 sq.km

Proportion of Protected Natural Area = 0÷ 51.69 × 100%

**RESULT: 0%**

**SCORE: 0**

### Recommendations to Improve Score

In order to improve their score under this indicator, the city, with support from Arunachal Pradesh Biodiversity Board, can identify biodiversity rich areas within the city. These can then be declared as OECMs and Biodiversity Heritage Sites. This will enable these biodiversity rich pockets to receive legislative protection. Such areas will help to improve the score of this indicator and also improve the overall ecological connectivity in the city region.

## Indicator 10: Proportion of Invasive Alien Species

### Methodology

**How to calculate indicator**
(Number of invasive alien species) ÷ (Number of native species) × 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 and Calculations**
In the case of Itanagar, mollusc taxon was used to carry out the invasive species analysis. Referring two main sources, Gurumayum and Temjenmongla (2021)[10] and Mitra and Mukherjee (2005)[11], the list was compiled and the nativity of each species was assessed.

A total of two invasive species were identified in the city. The total number of native molluscan species in the city is 28.

Number of Invasive Alien Species - 2

Total Number of Native Species = 28 (Annexure 2, Table 9)

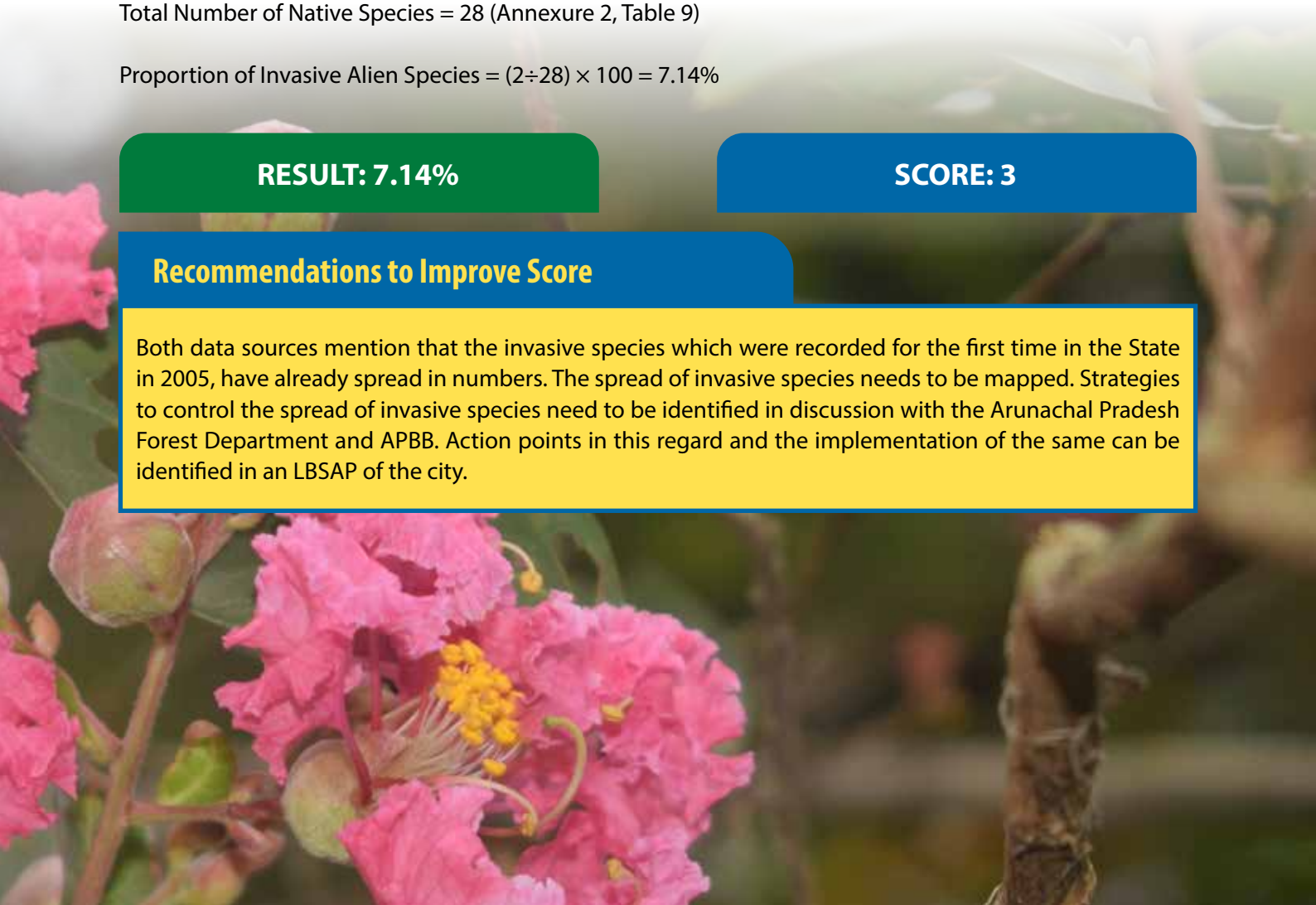
Proportion of Invasive Alien Species = (2÷28) × 100 = 7.14%

**RESULT: 7.14%**

**SCORE: 3**

### Recommendations to Improve Score

Both data sources mention that the invasive species which were recorded for the first time in the State in 2005, have already spread in numbers. The spread of invasive species needs to be mapped. Strategies to control the spread of invasive species need to be identified in discussion with the Arunachal Pradesh Forest Department and APBB. Action points in this regard and the implementation of the same can be identified in an LBSAP of the city.



## Ecosystem Services provided by Biodiversity

### Indicator 11: Regulation of Quantity of Water

#### Methodology

**How to calculate indicator**
(Total permeable area) ÷ (Total terrestrial area of the city) × 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 and Calculations**
At the city-level, data on permeable/non-permeable spaces is absent, and hence a permeability map (Figure 5) was prepared by ICLEI South Asia for the purpose of calculating this indicator. Sentinel 2A data was extracted from USGS Earth Explorer for the analysis of the IMC Area with a cloud cover of less than 1%. Red (R), Green (G), Blue (B), and Near Infrared (NIR) bands with 10m spatial resolution and vegetation red edge bands and Short-wave infrared bands with 20 m spatial resolution were pre-processed for the supervised classification process. Land use classes of Paddy fields, Plantations, River, Scrubland, Dense vegetation, Sparse vegetation, Marshes, Open ground, Land cut /Landfill and Urban built-up were considered for the classification. After the LULC classification, the respective land classes were merged and permeability map was prepared.

Total Terrestrial Area of the city = 48.70 sq.km. (Excluding area of water bodies)

Total Permeable Area (+ area of water bodies) = 38.68 sq.km.

Regulation of Quantity of Water = (38.68÷48.70) × 100

**RESULT: 79.42%**

**SCORE: 4**

#### Recommendations to Maintain Score

Itanagar lies in Earthquake Zone V and is at risk to landslides during extreme rainfall events. IMC and allied development authorities must maintain the green, unpaved spaces in the city as they will help in the percolation of water, reducing the risk of flooding, landslides and subsidence. Drainage infrastructure within the city comprises the natural drains i.e. nallahs with a small portion of Naharlagun covered with grey infrastructure. Nature based Solution (beyond rainwater harvesting), such as Sustainable Urban Drainage Solutions (SUDS) should be integrated in the master plan. The drainage of the sub-river basin should be mapped. This will help in improving water movement, plantations along the nallas and the drainage infrastructure.

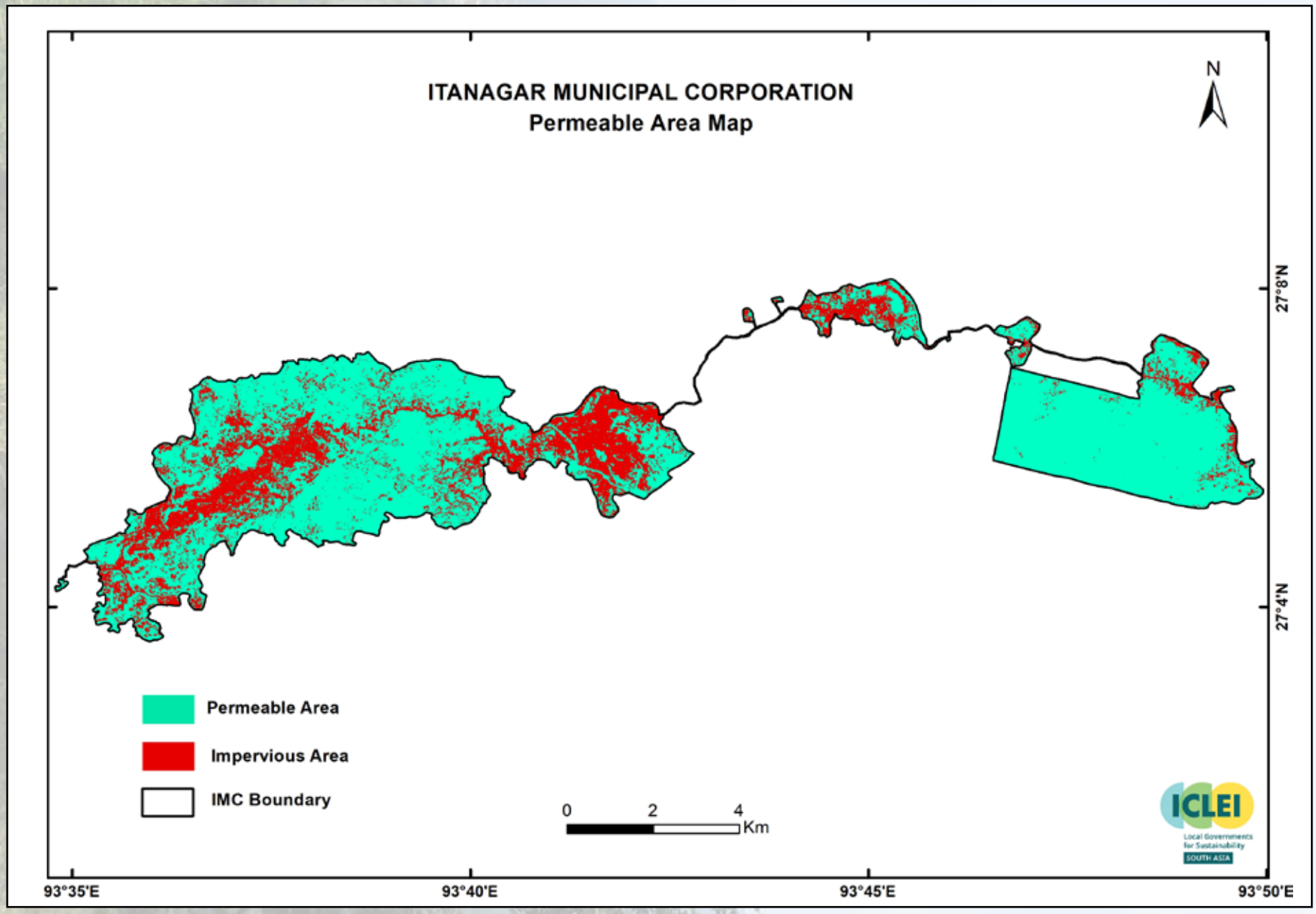



Figure 5: Permeable area under jurisdiction of IMC

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

### Methodology

**How to calculate indicator**
(Tree canopy cover) ÷ (Total terrestrial area of the city) × 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 and Calculations**
In order to calculate indicator 12, a tree cover map (Figure 6) was developed by ICLEI-Local Governments for Sustainability, South Asia using Sentinel satellite imagery (less than 1% cloud cover). The data was extracted from the USGS Earth Explorer program for the analysis of the IMC Area. Sentinel bands 2 to 8,8a,11 and 12 were pre-processed and used in the supervised classification process. Land use classes of Dense vegetation, Forest, Avenue tree patches and Plantations, were utilized in the supervised classification. After the LULC classification, the respective land classes were merged and tree cover map was prepared.

Tree cover = 1759.40 sq.km

Total terrestrial area of the city= 4870.26 sq.km

= (1759.10) / (4870.26) *100

**RESULT: 36.13%**

**SCORE: 3**

### Recommendations to Improve Score

The city scores well under this indicator but can improve its score through scientifically informed, targeted plantation drives especially around habitations and government institutional campuses. Presently roadside plantations are limited and have the scope to be improved and enhanced through planting native species of smaller trees and large shrubs. The city must also protect its current green spaces to maintain its score in future applications of the indicator.

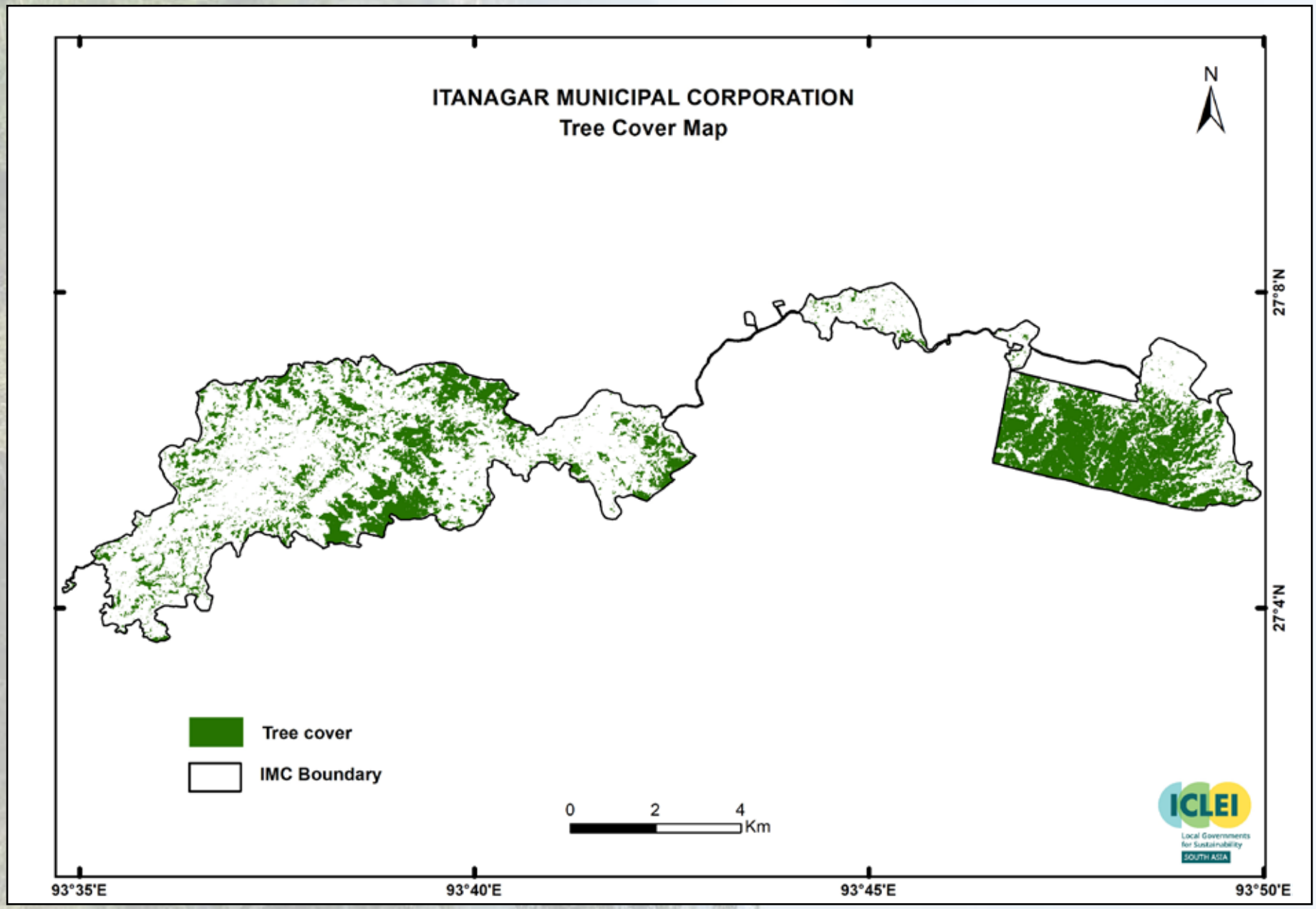



Figure 6: Tree Cover Map of Area Under Jurisdiction of IMC

## 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 and Calculations**
The main agencies that manage and develop parks in the city are IMC and the State Forest Department. The Social Forestry wing of the Arunachal Pradesh Forest Department maintains and manages some public parks such as Mahatma Gandhi Park and Indira Gandhi Park in additional to other institutional gardens at Raj Bhawan, Civil Secretariat and the Legislative Assembly. The smaller parks are managed by IMC.

Total area of parks (n = 12) in Itanagar = 26.45 ha

Recreational Services = 26.45/1000

**RESULT: 0.026 ha**

**SCORE: 0**

### Recommendations to Improve Score

As also identified in the City Draft Master Plan, Itanagar has a dearth of organised recreational spaces despite being rich in green spaces. The Arunachal Pradesh Forest Department together with IMC can identify natural spaces that can be modified into city parks without large-scale changes to its ecological structure and function, retaining native vegetation. Additionally, within neighbourhoods, together with community representatives, neighbourhood native parks and food gardens can be developed that allow for community activities, urban farming and play areas for children. The Biodiversity Management Committee (BMC) can play a significant role in the development and maintenance of community gardens. Support from corporates, through Corporate Social Responsibility funds can also be sought for the development of pocket parks. The successful example of development and maintenance of pocket parks in another mountain city in the Himalayas- Kathmandu, can be referred to by the city government.

## 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 and Calculations**

Discussions with officials of Itanagar 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.

Therefore, no formal educational visits per child below 16 years take place to parks with natural areas or protected or secured natural areas per year.

**RESULT: No formal educational visit/year**

**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 boards of secondary and senior secondary level education.

## Governance and Management of Biodiversity

### Indicator 15: Budget Allocated to Biodiversity

#### Methodology

**How to calculate indicator**
(Amount spent on biodiversity related administration) ÷ (Total budget of city) × 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 and Calculations**
Itanagar Municipal Corporation is a relatively new corporation and its budget still comes from the Arunachal Pradesh State Government in the form of an annual 'Grant in Aid' which is mostly used in carrying out solid waste management for the city (Annexure 3).

The total annual grant in aid for 2022-23 was INR 152,90,80,000.

The Itanagar Smart City Development Ltd. is a special purpose vehicle which supports the IMC in the implementation of smart city projects. Its funds come from a special smart city fund (mix of central and local funding) as well as other government funds like JNNURM, AMRUT etc. Since the Itanagar Smart City Development Limited and Itanagar Municipal Corporation are separate entities, the budget of the Smart City cannot be considered for this indicator.

Total Budget of Itanagar Municipal Corporation= 1,529.08 million INR

Total Budget Allocated for Biodiversity = (0) ÷ (152,908,000) × 100%

**RESULT: 0%**

**SCORE: 0**

### Recommendations to Improve Score

IMC is not yet financially autonomous and therefore cannot set its own municipal budgets and focus areas. Eventually as powers are appropriately devolved to the ULB, the city can take steps towards environmental stewardship by setting aside funds for green-blue infrastructure development and protection. Through appropriate planning interventions, Itanagar can incorporate sustainable infrastructure and the environmental protection for the long-term viability of its population and the area.

## 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 and Calculations**

Itanagar city is implementing the following projects and programmes related to biodiversity in the year 2021-2022 with support from other government bodies, NGOs and the private sector:

1) **City Biodiversity Index:** The CBI is being prepared by ICLEI – Local Governments for Sustainability, South Asia to analyse the present status of biodiversity and its governance in the city.
2) **Redevelopment of Polo Park:** Redevelopment of Polo Park which includes protection of the park from encroachment, improvement of facilities within the park and beautification is being carried out under the Smart City Programme.
3) **Bioremediation:** Scientific treatment of waste at Chimpu and Karsengsa dumping grounds is being carried out under the Smart City Programme.
4) **Ecotourism Park development:** Reclamation of land and development of a park with a nature experience centre that will draw in tourists and serve as a recreation spot for the locals at Hollongi is being carried out under the Smart City Programme.
5) **River Rejuvenation:** Cleaning, Afforestation activities along with installation of an STP to treat the water going into the Yagamso River is being carried out under the Smart City Programme.

**RESULT: 5** | **SCORE: 0**

### Recommendations to Improve Score

As previously stated, IMC primarily works on solid waste management in the city which also has an impact on biodiversity conservation. It is the Itanagar Smart City Development Corporation Limited, that has taken up several projects listed above, that impact biodiversity directly. The city should develop an LBSAP. Through the LBSAP, the city can take up meaningful activities that enhance its biodiversity 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 and Calculations**

The LBSAP of Itanagar city has not yet been developed.

**RESULT: No LBSAP**

**SCORE: 0**

### Recommendations to Improve Score

Developing an LBSAP can improve several indicators' score which will help the city better plan and administer its local biodiversity.

## 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 and Calculations**

Itanagar has the following biodiversity functions within its boundaries:

- Indira Gandhi Rashtriya Manav Sangrahalaya detailing the natural history of human civilization and • Itanagar Zoological Park
- Jawaharlal Nehru State Museum
- Arunachal Pradesh Science Centre
- Herbarium and museum at NERIST
- Herbarium and museum at SFRI
- Herbarium at GB Pant Institute

**RESULT: 8**

**SCORE: 4**

### Recommendations to Maintain Score

The city has biodiversity functions which are well developed. Encouraging partnerships with educational institutions such as NERIST, SFRI and GB Pant to improve accessibility for the citizens would improve public awareness and spur an interest in natural sciences. The smart city projects i.e. Redevelopment of Polo Park and Development of an Ecotourism Park could also incorporate some biodiversity functions like interpretation centres, herbal and pollinator gardens into their design.

## 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 and Calculations**

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

- Itanagar Municipal Corporation
- Itanagar Smart City Development Corporation Limited

**RESULT: 2**

**SCORE: 0**

### 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.

## Indicator 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 and Calculations**
No Formal or informal public consultation process pertaining to biodiversity exists in the city.

**RESULT: No formal or informal public consultation**

**SCORE: 0**

### Recommendations to Improve Score

It is necessary that the city incorporates a formal public consultation process to improve inclusive decision making, public participation, public ownership and transparency. The BMC can spearhead this process of public consultation.

## Indicator 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 and Calculations**

Itanagar Municipal Corporation is partnering with the following agencies on biodiversity-related activities, projects, and programmes.

1) ICLEI – Local Governments for Sustainability, South Asia and Arunachal Pradesh Biodiversity Board for development of the City Biodiversity Index

2) Arunachal Pradesh Forest Department for plantation drives

**RESULT: 2**

**SCORE: 1**

### Recommendations to Improve Score

Itanagar city needs to develop partnerships with other stakeholders and public service providers to allow for holistic, transparent development and sustained engagement on biodiversity protection and improvement within the city. According to the CBI Manual, "it is impossible for any single agency to carry out all the activities, responsibilities, projects and programmes that have biodiversity implications, hence, it is inevitable that engagement of all levels of the population must be facilitated." The BMC can commence the process of collaborations, with academic institutions, citizen scientists and so forth.

## Indicator 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 and Calculations**

Itanagar city needs to develop partnerships with other stakeholders and public service providers to allow for holistic, transparent development and sustained engagement on biodiversity protection and improvement within the city. According to the CBI Manual, "it is impossible for any single agency to carry out all the activities, responsibilities, projects and programmes that have biodiversity implications, hence, it is inevitable that engagement of all levels of the population must be facilitated." The BMC can commence the process of collaborations, with academic institutions, citizen scientists and so forth.

**RESULT: Biodiversity or elements of it are included in the school curriculum**

**SCORE: 4**

### Recommendations to Maintain Score

Although 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.

## Indicator 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 and Calculations**
The major outreach programmes instituted by Itanagar Municipal Corporation include:

1. Plantation drives carried out during Van Mahotsav and Gandhi Jayanti

**RESULT: 1 - 59**

**SCORE: 1**

### Recommendations to Improve Score

The city government should tie-up with local NGOs, governmental agencies such as the Arunachal Pradesh Forest Department, Arunachal Pradesh Biodiversity Board to undertake regular city-level outreach programmes in the sphere of biodiversity. This will help to improve the score on this indicator.

**Table 3: Summary of the Points Received for Each Indicator**

| | Maximum Score | Itanagar City's score |
|---|---|---|
| **Component – Native Biodiversity** | | |
| **Indicators** | | |
| 1. Proportion of Natural Areas in the City | 4 points | 4 points |
| 2. Connectivity Measures | 4 points | 3 points |
| 3. Native Biodiversity in Built Up Areas (Bird Species) | 4 points | 4 points |
| 4. Change in Number of Vascular Plant Species | 4 points | NA |
| 5. Change in Number of Bird Species | 4 points | NA |
| 6. Change in Number of Freshwater fish Species | 4 points | NA |
| 7. Change in Number of Species (Odonates) | 4 points | NA |
| 8. Change in Number of Species (Amphibians) | 4 points | NA |
| 9. Proportion of Protected Natural Areas | 4 points | 0 points |
| 10. Proportion of Invasive Alien Species | 4 points | 3 points |
| **Component – Ecosystem Services Provided by Biodiversity** | | |
| **Indicators** | | |
| 11. Regulation of Quantity of Water | 4 points | 4 points |
| 12. Climate Regulation: Carbon Storage and Cooling Effect of Vegetation | 4 points | 3 points |
| 13. Recreation and Education: Area of Parks with Natural Areas | 4 points | 0 points |
| 14. Recreation and Education:Number of Formal Education Visits per Child Below 16 Years to Parks with Natural Areas per Year | 4 points | 0 points |
| **Component – Governance and Management of Biodiversity** | | |
| **Indicators** | | |
| 15. Budget Allocated to Biodiversity | 4 points | 0 points |
| 16. Number of Biodiversity Projects Implemented by the City Annually | 4 points | 0 points |
| 17. Existence of Local Biodiversity Strategy and Action Plan | 4 points | 0 points |
| 18. Institutional Capacity: Number of Biodiversity Related Function | 4 points | 4 points |
| 19. Institutional Capacity: Number of City or Local Government Agencies Involved in Inter-agency Cooperation Pertaining to Biodiversity Matters | 4 points | 0 points |
| 20. Participation and Partnership: Existence of Formal or Informal Public Consultation Process | 4 points | 0 points |
| 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 | 4 points | 1 point |
| 22. Education and Awareness: Is Biodiversity or Nature Awareness Included in the School Curriculum | 4 points | 4 points |
| 23. Education and Awareness: Number of Outreach or Public Awareness Events Held in the City per Year | 4 points | 1 point |
| **Component – Native Biodiversity in the City (Sub-total for indicators 1-10)*** | | **14 / 20 points*** |
| **Component – Ecosystem Services provided by Biodiversity (Sub-total for indicators 11-14)** | | **7 / 16 points** |
| **Component – Governance and Management of Biodiversity (Sub-total for indicators 15-23)** | | **10 / 36 points** |
| **Total** | | **31 / 72 points** |

* as this is the baseline year, the score will only be applicable for five indicators out of ten

# Annexure 1 – NA Map Calculations

**Table 4: Patches of Natural Areas and Their Areas as Used in the Calculation of Indicator 2**

| Patch name | Patch Area_A | Area*Area |
|---|---|---|
| A01 | 1,254.36 | 1,573,428.15 |
| A02 | 1,215.65 | 1,477,794.65 |
| A03 | 128.61 | 16,540.76 |
| A04 | 61.58 | 3,791.75 |
| A05 | 20.21 | 408.38 |
| A06 | 7.04 | 49.51 |
| A07 | 2.85 | 8.13 |
| A08 | 2.85 | 8.11 |
| A09 | 2.44 | 5.97 |
| A10 | 2.04 | 4.15 |
| A11 | 1.92 | 3.67 |
| A12 | 1.66 | 2.77 |
| A13 | 0.99 | 0.98 |
| A14 | 0.97 | 0.94 |
| A15 | 0.96 | 0.92 |
| A16 | 0.75 | 0.57 |
| A17 | 0.46 | 0.21 |
| A18 | 0.36 | 0.13 |
| A19 | 0.10 | 0.01 |
| A20 | 0.10 | 0.01 |
| A21 | 0.09 | 0.01 |
| A22 | 0.09 | 0.01 |
| | **2,706.08** | **3,072,049.78** |

# Annexure 2 – List of Species

**Table 5: List of Birds of Itanagar used for Indicator 3 and Indicator 5**

| Sl. No. | Scientific Name | Common Name | Family | Migrant/Resident | Urban |
|---|---|---|---|---|---|
| 1 | *Gyps tenuirostris* | Slender-billed Vulture | Accipitridae | Resident | |
| 2 | *Accipiter badius* | Shikra | Accipitridae | Resident | Urban |
| 3 | *Ictinaetus malayensis* | Black Eagle | Accipitridae | Resident | |
| 4 | *Milvus migrans* | Black Kite | Accipitridae | Resident | Urban |
| 5 | *Spilornis cheela* | Crested Serpent-Eagle | Accipitridae | Resident | Urban |
| 6 | *Acrocephalus aedon* | Thick-billed Warbler | Acrocephalidae | Migrant | |
| 7 | *Acrocephalus agricola* | Paddyfield Warbler | Acrocephalidae | Migrant | |
| 8 | *Alauda gulgula* | Oriental Skylark | Alaudidae | Migrant | |
| 9 | *Mirafra assamica* | Bengal Bushlark | Alaudidae | Resident | Urban |
| 10 | *Alcedo atthis* | Common Kingfisher (Small Blue Kingfisher) | Alcedinidae | Resident | |
| 11 | *Alcedo meninting* | Blue-eared Kingfisher | Alcedinidae | Resident | |
| 12 | *Ceryle rudis* | Pied Kingfisher | Alcedinidae | Resident | |
| 13 | *Halcyon smyrnensis* | White-throated Kingfisher | Alcedinidae | Resident | Urban |
| 14 | *Tadorna ferruginea* | Ruddy Shelduck | Anatidae | Migrant | |
| 15 | *Cypsiurus balasiensis* | Asian Palm-Swift | Apodidae | Resident | Urban |
| 16 | *Hirundapus caudacutus* | White-throated Needletail | Apodidae | Resident | |
| 17 | *Ardea cinerea* | Grey Heron | Ardeidae | Resident | |
| 18 | *Ardeola grayii* | Indian Pond-Heron | Ardeidae | Resident | Urban |
| 19 | *Bubulcus ibis* | Cattle Egret | Ardeidae | Resident | Urban |
| 20 | *Egretta garzetta* | Little Egret | Ardeidae | Resident | Urban |
| 21 | *Ixobrychus cinnamomeus* | Cinnamon Bittern | Ardeidae | Resident | Urban |
| 22 | *Artamus fuscus* | Ashy Woodswallow | Artamidae | Resident | Urban |
| 23 | *Aceros undulatus* | Wreathed Hornbill | Bucerotidae | Resident | |
| 24 | *Anthracoceros albirostris* | Oriental Pied Hornbill | Bucerotidae | Resident | Urban |
| 25 | *Buceros bicornis* | Great Hornbill | Bucerotidae | Resident | |
| 26 | *Coracina macei* | Large Cuckooshrike | Campephagidae | Resident | Urban |
| 27 | *Coracina melaschistos* | Black-winged Cuckooshrike | Campephagidae | Resident | |
| 28 | *Pericrocotus speciosus* | Scarlet Minivet | Campephagidae | Resident | Urban |
| 29 | *Tesia olivia* | Slaty-bellied Tesia | Cettiidae | Resident | |
| 30 | *Charadrius dubius* | Little Ringed Plover | Charadriidae | Resident | |
| 31 | *Vanellus duvaucelii* | River Lapwing | Charadriidae | Resident | |
| 32 | *Vanellus indicus* | Red-wattled Lapwing | Charadriidae | Resident | Urban |

| Sl. No. | Scientific Name | Common Name | Family | Migrant/Resident | Urban |
|---|---|---|---|---|---|
| 33 | *Chloropsis aurifrons* | Golden-fronted Leafbird | Chloropseidae | Resident | Urban |
| 34 | *Chloropsis hardwickii* | Orange-bellied Leafbird (Orange-bellied Chloropsis) | Chloropseidae | Resident | Urban |
| 35 | *Orthotomus sutorius* | Common Tailorbird | Cisticolidae | Resident | Urban |
| 36 | *Prinia flaviventris* | Yellow-bellied Prinia | Cisticolidae | Resident | Urban |
| 37 | *Prinia inornata* | Plain Prinia | Cisticolidae | Resident | Urban |
| 38 | *Columba livia* | Rock Pigeon (Blue Rock Pigeon) | Columbidae | Resident | Urban |
| 39 | *Chalcophaps indica* | Emerald Dove | Columbidae | Resident | |
| 40 | *Ducula badia* | Mountain Imperial Pigeon | Columbidae | Resident | |
| 41 | *Spilopelia chinensis* | Spotted Dove | Columbidae | Resident | Urban |
| 42 | *Streptopelia chinensis* | Spotted Dove | Columbidae | Resident | Urban |
| 43 | *Streptopelia orientalis* | Oriental Turtle-Dove | Columbidae | Resident | Urban |
| 44 | *Treron apicauda* | Pin-tailed Green-Pigeon | Columbidae | Resident | |
| 45 | *Treron bicincta* | Orange-breasted Green Pigeon | Columbidae | Resident | |
| 46 | *Treron curvirostra* | Thick-billed Green Pigeon | Columbidae | Resident | |
| 47 | *Coracias affinis* | Indian Roller | Coraciidae | Resident | Urban |
| 48 | *Eurystomus orientalis* | Oriental Dollarbird | Coraciidae | Resident | Urban |
| 49 | *Cissa chinensis* | Common green Magpie | Corvidae | Resident | |
| 50 | *Corvus macrorhynchos* | Large-billed Crow | Corvidae | Resident | Urban |
| 51 | *Corvus splendens* | House Crow | Corvidae | Resident | Urban |
| 52 | *Dendrocitta formosae* | Grey Treepie | Corvidae | Resident | Urban |
| 53 | *Dendrocitta vagabunda* | Rufous Treepie | Corvidae | Resident | Urban |
| 54 | *Centropus bengalensis* | Lesser Coucal | Cuculidae | Resident | Urban |
| 55 | *Clamator coromandus* | Chestnut-winged Cuckoo | Cuculidae | Migrant | |
| 56 | *Cuculus canorus* | Eurasian Cuckoo | Cuculidae | Migrant | |
| 57 | *Cuculus micropterus* | Indian Cuckoo | Cuculidae | Resident | |
| 58 | *Eudynamys scolopacea* | Asian Koel | Cuculidae | Resident | Urban |
| 59 | *Hierococcyx sparverioides* | Large Hawk-Cuckoo | Cuculidae | Resident | |
| 60 | *Phaenicophaeus tristis* | Green-billed Malkoha | Cuculidae | Resident | |
| 61 | *Surniculus lugubris* | Square-tailed Drongo Cuckoo | Cuculidae | Resident | |
| 62 | *Dicaeum agile* | Thick-billed Flowerpecker | Dicaeidae | Resident | Urban |
| 63 | *Dicaeum concolor* | Plain Flowerpecker | Dicaeidae | Resident | Urban |
| 64 | *Dicaeum cruentatum* | Scarlet-backed Flowerpecker | Dicaeidae | Resident | |

| Sl. No. | Scientific Name | Common Name | Family | Migrant/Resident | Urban |
|---|---|---|---|---|---|
| 65 | *Dicaeum ignipectus* | Fire-breasted Flowerpecker | Dicaeidae | Resident | |
| 66 | *Dicrurus aeneus* | Bronzed Drongo | Dicruridae | Resident | |
| 67 | *Dicrurus hottentottus* | Spangled Drongo | Dicruridae | Resident | Urban |
| 68 | *Dicrurus leucophaeus* | Ashy Drongo | Dicruridae | Migrant | |
| 69 | *Dicrurus macrocercus* | Black Drongo | Dicruridae | Resident | Urban |
| 70 | *Dicrurus paradiseus* | Greater Racket-tailed Drongo | Dicruridae | Resident | |
| 71 | *Dicrurus remifer* | Lesser Racket-tailed Drongo | Dicruridae | Resident | |
| 72 | *Melophus lathami* | Crested Bunting | Emberizidae | Resident | |
| 73 | *Lonchura punctulata* | Scaly-breasted Munia (Spotted Munia) | Estrildidae | Resident | Urban |
| 74 | *Lonchura striata* | White-rumped Munia | Estrildidae | Resident | |
| 75 | *Psarisomus dalhousiae* | Long-tailed Broadbill | Eurylaimidae | Resident | |
| 76 | *Serilophus lunatus* | Silver-breasted Broadbill | Eurylaimidae | Resident | |
| 77 | *Falco amurensis* | Amur Falcon | Falconidae | Migrant | |
| 78 | *Falco severus* | Oriental Hobby | Falconidae | Resident | |
| 79 | *Falco tinnunculus* | Eurasian Kestrel (Common Kestrel) | Falconidae | Migrant | |
| 80 | *Microhierax melanoleucos* | Pied Falconet | Falconidae | Resident | |
| 81 | *Leucosticte nemoricola* | Plain Mountain Finch | Fringillidae | Resident | |
| 82 | *Hirundo daurica* | Red-rumped Swallow | Hirundinidae | Resident | Urban |
| 83 | *Hirundo rustica* | Barn Swallow | Hirundinidae | Migrant | |
| 84 | *Riparia paludicola* | Plain Martin | Hirundinidae | Resident | |
| 85 | *Irena puella* | Asian Fairy Bluebird | Irenidae | Resident | |
| 86 | *Lanius cristatus* | Brown Shrike | Laniidae | Resident | Urban |
| 87 | *Lanius schach* | Long-tailed Shrike | Laniidae | Resident | Urban |
| 88 | *Lanius tephronotus* | Grey-backed Shrike | Laniidae | Resident | Urban |
| 89 | *Actinodura cyanouroptera* | Blue-winged Minla | Leiothrichidae | Resident | Urban |
| 90 | *Garrulax leucolophus* | White-crested Laughingthrush | Leiothrichidae | Resident | |
| 91 | *Garrulax merulinus* | Spot-breasted Laughingthrush | Leiothrichidae | Resident | |
| 92 | *Leothrix lutea* | Red-billed Leothrix | Leiothrichidae | Resident | Urban |
| 93 | *Megalurus palustris* | Striated Grassbird | Locustellidae | Resident | |
| 94 | *Megalaima asiatica* | Blue-throated Barbet | Megalaimidae | Resident | Urban |
| 95 | *Megalaima haemacephala* | Coppersmith Barbet | Megalaimidae | Resident | Urban |
| 96 | *Psilopogon asiaticus* | Blue-throated Barbet | Megalaimidae | Resident | |
| 97 | *Psilopogon haemacephalus* | Coppersmith Barbet | Megalaimidae | Resident | |
| 98 | *Merops leschenaulti* | Chestnut-headed Bee-eater | Meropidae | Resident | Urban |

| Sl. No. | Scientific Name | Common Name | Family | Migrant/Resident | Urban |
|---|---|---|---|---|---|
| 99 | *Merops orientalis* | Green Bee-eater | Meropidae | Resident | |
| 100 | *Merops philippinus* | Blue-tailed Bee-eater | Meropidae | Migrant | |
| 101 | *Hypothymis azurea* | Black-naped Monarch | Monarchidae | Resident | Urban |
| 102 | *Terpsiphone paradisi* | Indian Paradise-flycatcher | Monarchidae | Migrant | |
| 103 | *Anthus hodgsoni* | Olive-backed Pipit | Motacillidae | Migrant | |
| 104 | *Motacilla citreola* | Citrine Wagtail | Motacillidae | Migrant | |
| 105 | *Dendronanthus indicus* | Forest Wagtail | Motacillidae | Migrant | |
| 106 | *Motacilla alba* | White Wagtail | Motacillidae | Migrant | |
| 107 | *Motacilla cinerea* | Grey Wagtail | Motacillidae | Migrant | |
| 108 | *Monticola solitarius* | Blue Rock-Thrush | Muscicapidae | Migrant | |
| 109 | *Brachypteryx hyperythra* | Rusty-bellied Shortwing | Muscicapidae | Resident | |
| 110 | *Chaimarrornis leucocephalus* | White-capped Water Redstart | Muscicapidae | Resident | Urban |
| 111 | *Copsychus malabaricus* | White-rumped Shama | Muscicapidae | Resident | |
| 112 | *Copsychus saularis* | Oriental Magpie-Robin | Muscicapidae | Resident | Urban |
| 113 | *Cyornis tickelliae* | Tickell's Blue Flycatcher | Muscicapidae | Resident | Urban |
| 114 | *Enicurus immaculatus* | Black-backed Forktail | Muscicapidae | Resident | |
| 115 | *Eumyias thalassinus* | Verditer Flycatcher | Muscicapidae | Migrant | |
| 116 | *Ficedula albicilla* | Taiga Flycatcher (Red-throated Flycatcher) | Muscicapidae | Migrant | |
| 117 | *Ficedula parva* | Red-throated Flycatcher | Muscicapidae | Migrant | |
| 118 | *Ficedula sapphira* | Sapphire Flycatcher | Muscicapidae | Migrant | |
| 119 | *Luscinia pectoralis* | Himalayan Rubythroat | Muscicapidae | Migrant | |
| 120 | *Myophonus caeruleus* | Blue Whistling-Thrush | Muscicapidae | Resident | Urban |
| 121 | *Niltava macgrigoriae* | Small Niltava | Muscicapidae | Resident | Urban |
| 122 | *Phoenicurus auroreus* | Daurian Redstart | Muscicapidae | Migrant | |
| 123 | *Phoenicurus ochruros* | Black Redstart | Muscicapidae | Migrant | |
| 124 | *Rhyacornis fuliginosus* | Plumbeous Water Redstart | Muscicapidae | Resident | Urban |
| 125 | *Saxicola ferreus* | Grey Bushchat | Muscicapidae | Resident | Urban |
| 126 | *Saxicola maurus* | Siberian Stonechat (Common Stonechat) | Muscicapidae | Migrant | |
| 127 | *Saxicola torquata* | Common Stonechat | Muscicapidae | Migrant | |
| 128 | *Aethopyga siparaja* | Crimson Sunbird | Nectariniidae | Resident | Urban |
| 129 | *Anthreptes singalensis* | Ruby-cheeked Sunbird | Nectariniidae | Resident | |
| 130 | *Arachnothera longirostra* | Little Spiderhunter | Nectariniidae | Resident | |
| 131 | *Arachnothera magna* | Streaked spiderhunter | Nectariniidae | Resident | Urban |
| 132 | *Cinnyris asiatica* | Purple Sunbird | Nectariniidae | Resident | Urban |
| 133 | *Oriolus traillii* | Maroon Oriole | Oriolidae | Resident | Urban |
| 134 | *Oriolus xanthornus* | Black-hooded Oriole | Oriolidae | Resident | Urban |
| 135 | *Chrysomma sinense* | Yellow-eyed Babbler | Paradoxornithidae | Resident | |

| Sl. No. | Scientific Name | Common Name | Family | Migrant/Resident | Urban |
|---|---|---|---|---|---|
| 136 | *Melanochlora sultanea* | Sultan Tit | Paridae | Resident | |
| 137 | *Parus cinereus* | Cinereous Tit (Great Tit) | Paridae | Resident | Urban |
| 138 | *Abroscopus superciliaris* | Yellow-bellied Warbler | Parulidae | Migrant | |
| 139 | *Passer domesticus* | House Sparrow | Passeridae | Resident | Urban |
| 140 | *Passer montanus* | Eurasian Tree Sparrow | Passeridae | Resident | Urban |
| 141 | *Alcippe dubia* | Rusty-capped Fulvetta | Pellorneidae | Resident | |
| 142 | *Alcippe nipalensis* | Nepal Fulvetta | Pellorneidae | Resident | |
| 143 | *Alcippe rufogularis* | Rufous-throated Fulvetta | Pellorneidae | Resident | |
| 144 | *Gampsorhynchus rufulus* | White-hooded Babbler | Pellorneidae | Resident | |
| 145 | *Pellorneum ruficeps* | Puff-throated Babbler | Pellorneidae | Resident | Urban |
| 146 | *Pellorneum tickelli* | Buff-breasted Babbler | Pellorneidae | Resident | |
| 147 | *Gallus gallus* | Red Jungle fowl | Phasianidae | Resident | |
| 148 | *Phylloscopus affinis* | Tickell's Leaf Warbler | Phylloscopidae | Migrant | |
| 149 | *Phylloscopus cantator* | Yellow-vented Warbler | Phylloscopidae | Migrant | |
| 150 | *Phylloscopus fuscatus* | Dusky Warbler | Phylloscopidae | Migrant | |
| 151 | *Phylloscopus reguloides* | Blyth's Leaf Warbler | Phylloscopidae | Migrant | |
| 152 | *Phylloscopus tytleri* | Greenish warbler | Phylloscopidae | Migrant | |
| 153 | *Picumnus innominatus* | Speckled Piculet | Picidae | Resident | |
| 154 | *Picus canus* | Grey-headed Woodpecker | Picidae | Resident | |
| 155 | *Picus chlorolophus* | Lesser Yellownape | Picidae | Resident | |
| 156 | *Picus flavinucha* | Greater Yellownape | Picidae | Resident | |
| 157 | *Chrysocolaptes guttacristatus* | Greater Flameback | Picidae | Resident | Urban |
| 158 | *Dendrocopos macei* | Fulvous-breasted Woodpecker | Picidae | Resident | |
| 159 | *Jynx torquilla* | Eurasian Wryneck | Picidae | Migrant | |
| 160 | *Pitta nipalensis* | Blue-naped Pitta | Pittidae | Resident | |
| 161 | *Ploceus philippinus* | Baya Weaver | Ploceidae | Resident | Urban |
| 162 | *Psittacula alexandri* | Red-breasted Parakeet | Psittacidae | Resident | Urban |
| 163 | *Psittacula finschii* | Grey-headed Parakeet | Psittacidae | Resident | Urban |
| 164 | *Psittacula krameri* | Rose-ringed Parakeet | Psittacidae | Resident | Urban |
| 165 | *Alophoixus flaveolus* | White-throated Bulbul | Pycnonotidae | Resident | |
| 166 | *Hemixos flavala* | Ashy Bulbul | Pycnonotidae | Resident | |
| 167 | *Hypsipetes leucocephalus* | Black Bulbul | Pycnonotidae | Resident | Urban |
| 168 | *Pycnonotus cafer* | Red-vented Bulbul | Pycnonotidae | Resident | Urban |
| 169 | *Pycnonotus jocosus* | Red-whiskered Bulbul | Pycnonotidae | Resident | Urban |
| 170 | *Rubigula flaviventris* | Black-crested Bulbul | Pycnonotidae | Resident | Urban |
| 171 | *Amaurornis akool* | Brown Crake | Rallidae | Resident | Urban |
| 172 | *Amaurornis phoenicurus* | White-breasted Waterhen | Rallidae | Resident | Urban |
| 173 | *Rhipidura albicollis* | White-throated Fantail | Rhipiduridae | Resident | Urban |

| Sl. No. | Scientific Name | Common Name | Family | Migrant/Resident | Urban |
|---|---|---|---|---|---|
| 174 | *Actitis hypoleucos* | Common Sandpiper | Scolopacidae | Migrant | |
| 175 | *Tringa nebularia* | Common Greenshank | Scolopacidae | Migrant | |
| 176 | *Tringa ochropus* | Green Sandpiper | Scolopacidae | Migrant | |
| 177 | *Cettia fortipes* | Brownish-flanked Bush Warbler | Scotocercidae | Migrant | |
| 178 | *Sitta castanea* | Indian Nuthatch | Sittidae | Resident | |
| 179 | *Sitta cinnamoventris* | Chestnut-bellied Nuthatch | Sittidae | Resident | |
| 180 | *Culicicapa ceylonensis* | Grey-headed Canary-Flycatcher | Stenostiridae | Migrant | |
| 181 | *Rhipidura hypoxantha* | Yellow-bellied Fantail | Stenostiridae | Resident | Urban |
| 182 | *Athene brama* | Spotted Owlet | Strigidae | Resident | Urban |
| 183 | *Glaucidium cuculoides* | Asian Barred Owlet | Strigidae | Resident | Urban |
| 184 | *Ketupa zeylonensis* | Brown Fish Owl | Strigidae | Resident | |
| 185 | *Ninox scutulata* | Brown Hawk Owl | Strigidae | Resident | Urban |
| 186 | *Otus bakkamoena* | Collared Scops Owl | Strigidae | Resident | Urban |
| 187 | *Otus sunia* | Oriental Scops-Owl | Strigidae | Migrant | |
| 188 | *Acridotheres fuscus* | Jungle Myna | Sturnidae | Resident | |
| 189 | *Acridotheres grandis* | Great Myna | Sturnidae | Resident | Urban |
| 190 | *Acridotheres tristis* | Common Myna | Sturnidae | Resident | Urban |
| 191 | *Ampeliceps coronatus* | Golden-crested Myna | Sturnidae | Resident | |
| 192 | *Gracula religiosa* | Common Hill Myna | Sturnidae | Resident | |
| 193 | *Saroglossa spiloptera* | Spot-winged Starling | Sturnidae | Migrant | |
| 194 | *Sturnia malabarica* | Chestnut-tailed Starling | Sturnidae | Resident | Urban |
| 195 | *Sturnus contra* | Indian Pied Starling | Sturnidae | Resident | Urban |
| 196 | *Mixornis gularis* | Pin-striped Tit-Babbler | Timaliidae | Resident | |
| 197 | *Pomatorhinus hypoleucos* | Large Scimitar Babbler | Timaliidae | Resident | |
| 198 | *Stachyris nigriceps* | Grey-throated Babbler | Timaliidae | Resident | |
| 199 | *Stachyris rufifrons* | Rufous-fronted Babbler | Timaliidae | Resident | |
| 200 | *Harpactes erythrocephalus* | Red-headed Trogon | Trogonidae | Resident | |
| 201 | *Cochoa viridis* | Green Cochoa | Turdidae | Resident | |
| 202 | *Turdus boulboul* | Grey-winged Blackbird | Turdidae | Resident | Urban |
| 203 | *Zoothera citrina* | Orange-headed Thrush | Turdidae | Resident | Urban |
| 204 | *Zoothera marginata* | Dark-sided Thrush | Turdidae | Migrant | |
| 205 | *Upupa epops* | Common Hoopoe | Upupidae | Resident | Urban |
| 206 | *Tephrodornis pondicerianus* | Common Woodshrike | Vangidae | Resident | |
| 207 | *Yuhina zantholeuca* | White-bellied Yuhina | Vireonidae | Resident | |
| 208 | *Yuhina flavicollis* | Whiskered Yuhina | Vireonidae | Resident | |
| 209 | *Zosterops palpebrosus* | Indian White-eye (Oriental White-eye) | Zosteropidae | Resident | Urban |

**Table 6: List of Flowering plants for Indicator 4**

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 1 | *Phlogacanthus thyrsiformis* | Acanthaceae | Shrub |
| 2 | *Barleria cristata* | Acanthaceae | Shrub |
| 3 | *Barleria prionitis* | Acanthaceae | Shrub |
| 4 | *Andrographis paniculata* | Acanthaceae | Herb |
| 5 | *Justicia adhatoda* | Acanthaceae | Shrub |
| 6 | *Thunbergia grandiflora* | Acanthaceae | Climber |
| 7 | *Thunbergia coccinea* | Acanthaceae | Climber |
| 8 | *Acanthus leucostachyus* | Acanthaceae | Herb |
| 9 | *Asystasiella neesiana* | Acanthaceae | Herb |
| 10 | *Hygrophila phlomoids* | Acanthaceae | Shrub |
| 11 | *Justicia collina* | Acanthaceae | Herb |
| 12 | *Justicia virgata* | Acanthaceae | Herb |
| 13 | *Lepidagathis incurva* | Acanthaceae | Undershrub |
| 14 | *Phlogacanthus curviflorus* | Acanthaceae | Shrub |
| 15 | *Phlogacanthus guttatus* | Acanthaceae | Shrub |
| 16 | *Pseuderanthemum album* | Acanthaceae | Undershrub |
| 17 | *Pseuderanthemum leptanthus* | Acanthaceae | Undershrub |
| 18 | *Pseuderanthemum palatiferum* | Acanthaceae | Herb |
| 19 | *Strobilsanthes hamiltoniana* | Acanthaceae | Shrub |
| 20 | *Strobilsanthes secunda* | Acanthaceae | Shrub |
| 21 | *Acorus calamus* | Acoraceae | herb |
| 22 | *Saurauia nepalensis* | Actinidiaceae | Tree |
| 23 | *Saurauia punduana* | Actinidiaceae | Tree |
| 24 | *Saurauia armata* | Actinidiaceae | Tree |
| 25 | *Actinidia strigosa* | Actinidiaceae | Climber |
| 26 | *Saurauia macrotricha* | Actinidiaceae | Tree |
| 27 | *Alangium chinense* | Alangiaceae | Tree |
| 28 | *Amaranthus caudatus* | Amaranthaceae | Herb |
| 29 | *Amaranthus viridis* | Amaranthaceae | Herb |
| 30 | *Amaranthus spinosus* | Amaranthaceae | Herb |
| 31 | *Achyranthes bidentata* | Amaranthaceae | Herb |
| 32 | *Achryanthes bidentata* | Amaranthaceae | Herb |
| 33 | *Alternanthera sessilis* | Amaranthaceae | Herb |
| 34 | *Amaranthus gracilis* | Amaranthaceae | Herb |
| 35 | *Cyathula prostrata* | Amaranthaceae | Undershrub |
| 36 | *Deeringia amaranthoides* | Amaranthaceae | Shrub |
| 37 | *Zephyranthes grandiflora* | Amaryllidaceae | Herb |
| 38 | *Zephyranthes carinata* | Amaryllidaceae | Herb |
| 39 | *Crinum asiaticum* | Amaryllidaceae | Herb |
| 40 | *Spondias axillaris* | Anacardiaceae | Tree |
| 41 | *Spondias pinnata* | Anacardiaceae | Tree |
| 42 | *Polyalthia longifolia var. pendula* | Annonaceae | Tree |
| 43 | *Polyalthea longifolia* | Annonaceae | Tree |
| 44 | *Fissistigma bicolor* | Annonaceae | Woody Climber |
| 45 | *Miliusa globosa* | Annonaceae | Shrub |
| 46 | *Centella asiatica* | Apiaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 47 | *Hydrocotyle javanica* | Apiaceae | Herb |
| 48 | *Eryngium foetidum* | Apiaceae | Herb |
| 49 | *Coriandrum sativum* | Apiaceae | Herb |
| 50 | *Cryptolepis buchanani* | Apocynaceae | Climber |
| 51 | *Plumeria acuminata* | Apocynaceae | Tree |
| 52 | *Tabernaemontana divaricata* | Apocynaceae | Shrub |
| 53 | *Catharanthus roseus* | Apocynaceae | Shrub |
| 54 | *Alstonia venenata* | Apocynaceae | Shrub |
| 55 | *Alstonia scholaris* | Apocynaceae | Tree |
| 56 | *Allamanda cathartica* | Apocynaceae | Climber |
| 57 | *Frerea indica* | Apocynaceae | Herb |
| 58 | *Rauwolfia serpentina* | Apocynaceae | Shrub |
| 59 | *Rauwolfia tetraphylla* | Apocynaceae | Shrub |
| 60 | *Dischidia oiantha* | Apocynaceae | Herb |
| 61 | *Hoya carnosa* | Apocynaceae | Climber |
| 62 | *Parabarium micranthum* | Apocynaceae | Climber |
| 63 | *Ceropegia bulbosa* | Apocynaceae | Climber |
| 64 | *Alocasia fallax* | Araceae | Herb |
| 65 | *Alocasia macrorrhiza* | Araceae | Herb |
| 66 | *Colocasia affinis* | Araceae | Herb |
| 67 | *Colocasia esculenta* | Araceae | Herb |
| 68 | *Amorphophallus bulbifer* | Araceae | Herb |
| 69 | *Caladium sp.* | Araceae | Herb |
| 70 | *Alocasia acuminale* | Araceae | Herb |
| 71 | *Lasia spinosa* | Araceae | Herb |
| 72 | *Rhaphidophora baccari* | Araceae | Climber |
| 73 | *Rhaphidophora hayi* | Araceae | Climber |
| 74 | *Rhaphidophora hookeri* | Araceae | Herb |
| 75 | *Remusatia vivipara* | Araceae | Herb |
| 76 | *Steudnera colocasifolia* | Araceae | Herb |
| 77 | *Aglaonema hookerianum* | Araceae | Herb |
| 78 | *Alocasia fornicata* | Araceae | Herb |
| 79 | *Hedera helix* | Araliaceae | Climber |
| 80 | *Aralia montana* | Araliaceae | Shrub |
| 81 | *Brassiopsis glomerulata* | Araliaceae | Shrub |
| 82 | *Schefflera venulosa* | Araliaceae | Tree |
| 83 | *Calamus guruba* | Arecaceae | Climber |
| 84 | *Calamus tenuis* | Arecaceae | Climber |
| 85 | *Calamus flagellum* | Arecaceae | Climber |
| 86 | *Calamus latifolius* | Arecaceae | Climber |
| 87 | *Calamus floribundus* | Arecaceae | Climber |
| 88 | *Areca catechu* | Arecaceae | Tree |
| 89 | *Livistona jenkinsiana* | Arecaceae | Tree |
| 90 | *Caryota urens* | Arecaceae | Tree |
| 91 | *Roystonea regia* | Arecaceae | Tree |
| 92 | *Calamus erectus* | Arecaceae | Tree |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 93 | *Calamus gracilis* | Arecaceae | Tree |
| 94 | *Pinanga gracilis* | Arecaceae | Tree |
| 95 | *Plectocomia assamica* | Arecaceae | Tree |
| 96 | *Wallichia robusta* | Arecaceae | Tree |
| 97 | *Calamus leprospadix* | Arecaceae | Shrub |
| 98 | *Wallichia densiflora* | Arecaceae | Tree |
| 99 | *Aristolochia saccata* | Aristolochiaceae | Climber |
| 100 | *Aristolochia tagala* | Aristolochiaceae | Climber |
| 101 | *Hoya globulosa* | Asclepiadaceae | Climber |
| 102 | *Asparagus racemosus* | Asparagaceae | Climber |
| 103 | *Mikania micrantha* | Asteraceae | Climber |
| 104 | *Eupatorium odoratum* | Asteraceae | Herb |
| 105 | *Stevia rebaudiana* | Asteraceae | Herb |
| 106 | *Chrysanthemum sp.* | Asteraceae | Herb |
| 107 | *Sonchus asper* | Asteraceae | Herb |
| 108 | *Tagates patula* | Asteraceae | Herb |
| 109 | *Tagetes sp.* | Asteraceae | Herb |
| 110 | *Cyanthillium cinereum* | Asteraceae | Herb |
| 111 | *Spilanthes acmella* | Asteraceae | Herb |
| 112 | *Ageratum conyzoides* | Asteraceae | Herb |
| 113 | *Ageratum houstonianum* | Asteraceae | Herb |
| 114 | *Spilanthes paniculata* | Asteraceae | Herb |
| 115 | *Adenostemma lavenia* | Asteraceae | Herb |
| 116 | *Artemisia japonica* | Asteraceae | Shrub |
| 117 | *Blumea balsamifera* | Asteraceae | Shrub |
| 118 | *Blumea fistulosa* | Asteraceae | Herb |
| 119 | *Blumea laciniata* | Asteraceae | Herb |
| 120 | *Blumea riparia* | Asteraceae | Herb |
| 121 | *Conyza leucantha* | Asteraceae | Shrub |
| 122 | *Emilia sonchifolia* | Asteraceae | Herb |
| 123 | *Erigeron bonariensis* | Asteraceae | Herb |
| 124 | *Gnaphalium affine* | Asteraceae | Herb |
| 125 | *Gynura bicolor* | Asteraceae | Herb |
| 126 | *Gynura crepidioides* | Asteraceae | Herb |
| 127 | *Inula cappa* | Asteraceae | Shrub |
| 128 | *Laggera crispata* | Asteraceae | Herb |
| 129 | *Mikania cordata* | Asteraceae | Herb |
| 130 | *Saussurea affinis* | Asteraceae | Herb |
| 131 | *Spilanthes calva* | Asteraceae | Herb |
| 132 | *Vernonia cinerea* | Asteraceae | Herb |
| 133 | *Vernonia saligna* | Asteraceae | Shrub |
| 134 | *Vernonia volkameriaefolia* | Asteraceae | Shrub |
| 135 | *Vicoa cernua* | Asteraceae | Shrub |
| 136 | *Wedelia walichii* | Asteraceae | Herb |
| 137 | *Yongia japonica* | Asteraceae | Herb |
| 138 | *Impatiens sp.* | Balsaminaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 139 | *Impatiens balsamina* | Balsaminaceae | Herb |
| 140 | *Impatiens acuminata* | Balsaminaceae | Herb |
| 141 | *Impatiens cathcartii* | Balsaminaceae | Herb |
| 142 | *Impatiens latiflora* | Balsaminaceae | Herb |
| 143 | *Impatiens porrecta* | Balsaminaceae | Herb |
| 144 | *Impatiens pulchera* | Balsaminaceae | Herb |
| 145 | *Begonia peltata* | Begoniaceae | Herb |
| 146 | *Begonia hatacoa* | Begoniaceae | Herb |
| 147 | *Begonia roxburghii* | Begoniaceae | Herb |
| 148 | *Begonia sikkimensis* | Begoniaceae | Herb |
| 149 | *Alnus nepalensis* | Betulaceae | Tree |
| 150 | *Oroxylum indicum* | Bignoniaceae | Tree |
| 151 | *Tecoma stans* | Bignoniaceae | Tree |
| 152 | *Tecomella sp.* | Bignoniaceae | Tree |
| 153 | *Sterospermum chelonoides* | Bignoniaceae | Tree |
| 154 | *Bischofia javanica* | Bischofiaceae | Tree |
| 155 | *Bixa orellana* | Bixaceae | Shrub |
| 156 | *Cordia dichotoma* | Boraginaceae | Tree |
| 157 | *Tournefortia sermentosa* | Boraginaceae | Shrub |
| 158 | *Raphanus sativus* | Brassicaceae | Herb |
| 159 | *Brassica campestris* | Brassicaceae | Herb |
| 160 | *Brassica juncea* | Brassicaceae | Herb |
| 161 | *Buddleja asiatica* | Buddlejaceae | Shrub |
| 162 | *Canarium strictum* | Burseraceae | Tree |
| 163 | *Mesua ferrea* | Calophyllaceae | Tree |
| 164 | *Codonopsis parviflora* | Campanulaceae | Shrub |
| 165 | *Lobelia pyramidalis* | Campanulaceae | Herb |
| 166 | *Pratia nummularia* | Campanulaceae | Creeper |
| 167 | *Trema orientalis* | Cannabaceae | Tree |
| 168 | *Capparis multiflora* | Capparidaceae | Shrub |
| 169 | *Stixis suaveolens* | Capparidaceae | Climber |
| 170 | *Carlemannia congesta* | Caprifoliaceae | Undershrub |
| 171 | *Carlemannia griffithii* | Caprifoliaceae | Herb |
| 172 | *Viburnum colebrookianum* | Caprifoliaceae | Shrub |
| 173 | *Carica papaya* | Caricaceae | Tree |
| 174 | *Celastrus hindsii* | Celastraceae | Woody climber |
| 175 | *Euonymus frigidus* | Celastraceae | Shrub |
| 176 | *Maytenus hookeri* | Celastraceae | Shrub |
| 177 | *Microtropis densiflora* | Celastraceae | Shrub |
| 178 | *Cleome rutidosperma* | Cleomaceae | Herb |
| 179 | *Garcinia pedunculata* | Clusiaceae | Tree |
| 180 | *Garcinia acuminata* | Clusiaceae | Tree |
| 181 | *Gloriosa superba* | Colchicaceae | Climber |
| 182 | *Terminalia myriocarpa* | Combretaceae | Tree |
| 183 | *Terminalia chebula* | Combretaceae | Tree |
| 184 | *Terminalia bellirica* | Combretaceae | Tree |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 185 | *Terminalia arjuna* | Combretaceae | Tree |
| 186 | *Terminalia citrina* | Combretaceae | Tree |
| 187 | *Terminalia myriocarpa* | Combretaceae | Tree |
| 188 | *Combretum alatum* | Combretaceae | Woody climber |
| 189 | *Aclisia subumbellata* | Commelinaceae | Herb |
| 190 | *Commelina maculata* | Commelinaceae | Herb |
| 191 | *Commelina sikkimensis* | Commelinaceae | Herb |
| 192 | *Floscopa scandens* | Commelinaceae | Herb |
| 193 | *Murdannia nudiflora* | Commelinaceae | Herb |
| 194 | *Rhopalephora scaberrima* | Commelinaceae | Herb |
| 195 | *Evolvulus alsinoides* | Convolvulaceae | Herb |
| 196 | *Ipomoea quamoclit* | Convolvulaceae | Climber |
| 197 | *Ipomoea batatas* | Convolvulaceae | Climber |
| 198 | *Argyreia argentea* | Convolvulaceae | Climber |
| 199 | *Argyreia populifolia* | Convolvulaceae | Climber |
| 200 | *Ipomoea kingii* | Convolvulaceae | Climber |
| 201 | *Ipomoea pileata* | Convolvulaceae | Herb |
| 202 | *Merremia cespitosa* | Convolvulaceae | Climber |
| 203 | *Porana paniculata* | Convolvulaceae | Climber |
| 204 | *Porana racemosa* | Convolvulaceae | Climber |
| 205 | *Cuscuta europaea* | Convolvulaceae, | Climber |
| 206 | *Alangium foetidum* | Cornaceae | Tree |
| 207 | *Costus speciosus* | Costaceae | Herb |
| 208 | *Crypteronia paniculata* | Crypteroniaceae | Tree |
| 209 | *Luffa aegyptiaca* | Cucurbitaceae | Climber |
| 210 | *Luffa acutangula* | Cucurbitaceae | Climber |
| 211 | *Lagenaria siceraria* | Cucurbitaceae | Climber |
| 212 | *Momordica charantia* | Cucurbitaceae | Climber |
| 213 | *Trichosanthes dioica* | Cucurbitaceae | Climber |
| 214 | *Cucumis maxima* | Cucurbitaceae | Climber |
| 215 | *Cucumis sativus* | Cucurbitaceae | Climber |
| 216 | *Sechium edule* | Cucurbitaceae | Climber |
| 217 | *Coccinia grandis* | Cucurbitaceae | Climber |
| 218 | *Gymnostemma pedata* | Cucurbitaceae | Climber |
| 219 | *Hodgsonia macrocarpa* | Cucurbitaceae | Climber |
| 220 | *Melothria leucocarpa* | Cucurbitaceae | Climber |
| 221 | *Melothria maderaspatana* | Cucurbitaceae | Herb |
| 222 | *Trichosanthes bracteata* | Cucurbitaceae | Climber |
| 223 | *Trichosanthes cordata* | Cucurbitaceae | Climber |
| 224 | *Trichosanthes trunctata* | Cucurbitaceae | Climber |
| 225 | *Carex cruciata* | Cyperaceae | Herb |
| 226 | *Pycreus sp.* | Cyperaceae | Herb |
| 227 | *Fimbristylis sp.* | Cyperaceae | Herb |
| 228 | *Cyperus neochinensis* | Cyperaceae | Herb |
| 229 | *Carex baccans* | Cyperaceae | Herb |
| 230 | *Cyperus iria* | Cyperaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 231 | *Cyperus pumilus* | Cyperaceae | Herb |
| 232 | *Eleocharis retroflexa* | Cyperaceae | Herb |
| 233 | *Fimbristylis dichotoma* | Cyperaceae | Herb |
| 234 | *Fimbristylis miliacea* | Cyperaceae | Herb |
| 235 | *Fimbristylis tenera* | Cyperaceae | Herb |
| 236 | *Kyllinga brevifolia* | Cyperaceae | Herb |
| 237 | *Kyllinga nemoralis* | Cyperaceae | Herb |
| 238 | *Lipocarpha chinensis* | Cyperaceae | Herb |
| 239 | *Mapania arunachalensis* | Cyperaceae | Herb |
| 240 | *Scleria terrestris* | Cyperaceae | Herb |
| 241 | *Dioscorea bulbifera* | Dioscoreaceae | Climber |
| 242 | *Dioscorea floribunda* | Dioscoreaceae | Climber |
| 243 | *Dioscorea pentaphylla* | Dioscoreaceae | Climber |
| 244 | *Dioscorea hamiltonii* | Dioscoreaceae | Climber |
| 245 | *Dioscorea pubera* | Dioscoreaceae | Climber |
| 246 | *Diospyros nigra* | Ebenaceae | Tree |
| 247 | *Diospyros toposia* | Ebenaceae | Tree |
| 248 | *Elaeocarpus floribundus* | Elaeocarpaceae | Tree |
| 249 | *Elaeocarpus sphaericus* | Elaeocarpaceae | Tree |
| 250 | *Elaeocarpus aristatus* | Elaeocarpaceae | Tree |
| 251 | *Elaeocarpus rugosus* | Elaeocarpaceae | Tree |
| 252 | *Elaeocarpus acuminatus* | Elaeocarpaceae | Tree |
| 253 | *Sloania sterculiaceae* | Elaeocarpaceae | Tree |
| 254 | *Eriocaulon achiton* | Eriocaulaceae | Herb |
| 255 | *Euphorbia tithymaloides* | Euphorbiaceae | Shrub |
| 256 | *Mallotus philippensis* | Euphorbiaceae | Tree |
| 257 | *Mannihot esculenta* | Euphorbiaceae | Shrub |
| 258 | *Euphorbia hirta* | Euphorbiaceae | Herb |
| 259 | *Euphorbia neriifolia* | Euphorbiaceae | Shrub |
| 260 | *Euphorbia royleana* | Euphorbiaceae | Shrub |
| 261 | *Acalypha hispida* | Euphorbiaceae | Shrub |
| 262 | *Ricinus communis* | Euphorbiaceae | Tree |
| 263 | *Codiaeum variegatum* | Euphorbiaceae | Shrub |
| 264 | *Euphorbia pulcherrima* | Euphorbiaceae | Shrub |
| 265 | *Macaranga peltata* | Euphorbiaceae | Tree |
| 266 | *Macaranga denticulata* | Euphorbiaceae | Tree |
| 267 | *Endospermum chinense* | Euphorbiaceae | Tree |
| 268 | *Croton roxburghii* | Euphorbiaceae | Tree |
| 269 | *Balakata baccata* | Euphorbiaceae | Tree |
| 270 | *Mangifera indica* | Euphorbiaceae | Tree |
| 271 | *Antidesma acuminatum* | Euphorbiaceae | Shrub |
| 272 | *Aporusa dioica* | Euphorbiaceae | Shrub |
| 273 | *Baccaurea ramiflora* | Euphorbiaceae | Tree |
| 274 | *Baliospermum calycinum* | Euphorbiaceae | Shrub |
| 275 | *Bridelia assamica* | Euphorbiaceae | Shrub |
| 276 | *Croton caudatus* | Euphorbiaceae | Shrub |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 277 | *Croton joufra* | Euphorbiaceae | Tree |
| 278 | *Euphorbia thymifolia* | Euphorbiaceae | Herb |
| 279 | *Mallotus ferrugineous* | Euphorbiaceae | Shrub |
| 280 | *Mallotus roxburghianus* | Euphorbiaceae | Shrub |
| 281 | *Manihot esculenta* | Euphorbiaceae | Shrub |
| 282 | *Phyllanthus urinaria* | Euphorbiaceae | Herb |
| 283 | *Sapium baccatum* | Euphorbiaceae | Tree |
| 284 | *Securinega virosa* | Euphorbiaceae | Shrub |
| 285 | *Crotalaria spectabilis* | Fabacea | Shrub |
| 286 | *Parkia timoriana* | Fabacea | Tree |
| 287 | *Mastersia assamica* | Fabacea | Creeper |
| 288 | *Mucuna pruriens* | Fabacea | Climber |
| 289 | *Delonix regia* | Fabacea | Tree |
| 290 | *Lablab purpureus* | Fabacea | Climber |
| 291 | *Falcataria falcata* | Fabaceae | Tree |
| 292 | *Bauhinia acuminata* | Fabaceae | Tree |
| 293 | *Bauhinia racemosa* | Fabaceae | Tree |
| 294 | *Bauhinia purpurea* | Fabaceae | Tree |
| 295 | *Bauhinia variegata* | Fabaceae | Tree |
| 296 | *Erythrina stricta* | Fabaceae | Tree |
| 297 | *Tamarindus indica* | Fabaceae | Tree |
| 298 | *Mimosa pudica* | Fabaceae | Shrub |
| 299 | *Mimosa rubicaulis* | Fabaceae | Shrub |
| 300 | *Acacia auriculiformis* | Fabaceae | Tree |
| 301 | *Albizia lebbeck* | Fabaceae | Tree |
| 302 | *Albizia procera* | Fabaceae | Tree |
| 303 | *Cassia javanica* | Fabaceae | Tree |
| 304 | *Senna siamea* | Fabaceae | Tree |
| 305 | *Peltophorum pterocarpum* | Fabaceae | Tree |
| 306 | *Senegalia pennata* | Fabaceae | Shrub |
| 307 | *Cassia fistula* | Fabaceae | Tree |
| 308 | *Saraca asoca* | Fabaceae | Tree |
| 309 | *Abrus precatorius* | Fabaceae | Climber |
| 310 | *Adenanthera pavonina* | Fabaceae | Tree |
| 311 | *Phaseolus vulgaris* | Fabaceae | Herb |
| 312 | *Ormosia robusta* | Fabaceae | Tree |
| 313 | *Dalbergia pinnata* | Fabaceae | Tree |
| 314 | *Crotolaria laburnifolia* | Fabaceae | Shrub |
| 315 | *Crotolaria sericea* | Fabaceae | Undershrub |
| 316 | *Dalbergia lanceolaria* | Fabaceae | Tree |
| 317 | *Desmodium concinnum* | Fabaceae | Shrub |
| 318 | *Desmodium gangeticum* | Fabaceae | Undershrub |
| 319 | *Desmodium gyroides* | Fabaceae | Shrub |
| 320 | *Desmodium triflorum* | Fabaceae | Herb |
| 321 | *Erythrina variagata* | Fabaceae | Tree |
| 322 | *Flemingia macrophylla* | Fabaceae | Shrub |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 323 | *Millettia cinerea* | Fabaceae | Climber |
| 324 | *Pueraria lobata* | Fabaceae | Climber |
| 325 | *Tephrosia candida* | Fabaceae | Shrub |
| 326 | *Uraria crinita* | Fabaceae | Shrub |
| 327 | *Cassia tora* | Fabaceae | Shrub |
| 328 | *Albizia chinensis* | Fabaceae | Tree |
| 329 | *Pithecellobium heterophyllum* | Fabaceae | Shrub |
| 330 | *Castanopsis indica* | Fagaceae | Tree |
| 331 | *Castanopsis tubuloides* | Fagaceae | Tree |
| 332 | *Castanopsis purpurella* | Fagaceae | Tree |
| 333 | *Lithocarpus dealbatus* | Fagaceae | Tree |
| 334 | *Casearia vareca* | Flacourtiaceae | Shrub |
| 335 | *Gynocardia odorata* | Flacourtiaceae | Tree |
| 336 | *Xylosma longifolium* | Flacourtiaceae | Tree |
| 337 | *Rhynchotechum vestitum* | Gesneriaceae | Herb |
| 338 | *Rhynchotechum ellipticum* | Gesneriaceae | Herb |
| 339 | *Aeschynanthus mannii* | Gesneriaceae | Epiphyte |
| 340 | *Aeschynanthus micranthus* | Gesneriaceae | Epiphyte |
| 341 | *Boeica filiformis* | Gesneriaceae | Herb |
| 342 | *Boeica hirsuta* | Gesneriaceae | Herb |
| 343 | *Didymocarpus punduana* | Gesneriaceae | Herb |
| 344 | *Lysionotus serratus* | Gesneriaceae | Herb |
| 345 | *Rynchoglossum lazulinum* | Gesneriaceae | Herb |
| 346 | *Rynchoglossum obliquum* | Gesneriaceae | Herb |
| 347 | *Rynchoglossum calycinum* | Gesneriaceae | Herb |
| 348 | *Altingia excelsa* | Hamamelidaceae | Tree |
| 349 | *Hydrangea sp.* | Hydrangeaceae | Shrub |
| 350 | *Dichroa febrifuga* | Hydrangeaceae | Shrub |
| 351 | *Cardiopteris quinqueloba* | Icacinaceae | Climber |
| 352 | *Miquelia kleinii* | Icacinaceae | Climber |
| 353 | *Belamcanda chinensis* | Iridaceae | Herb |
| 354 | *Itea macrophylla* | Iteaceae | Tree |
| 355 | *Ixonanthes khasiana* | Ixonanthaceae | Shrub |
| 356 | *Premna angolensis* | Lamiaceae | Tree |
| 357 | *Gmelina arborea* | Lamiaceae | Tree |
| 358 | *Clerodendrum inerme* | Lamiaceae | Shrub |
| 359 | *Holmskioldia sanguinea* | Lamiaceae | Shrub |
| 360 | *Ocimum sanctum* | Lamiaceae | Shrub |
| 361 | *Ocimum basilicum* | Lamiaceae | Shrub |
| 362 | *Plectranthus barbatus* | Lamiaceae | Herb |
| 363 | *Pogostemon patchouli* | Lamiaceae | Herb |
| 364 | *Leonotis nepetifolia* | Lamiaceae | Herb |
| 365 | *Clerodendrum japonicum* | Lamiaceae | Shrub |
| 366 | *Clerodendrum glandulosum* | Lamiaceae | Shrub |
| 367 | *Clerodendrum bracteatum* | Lamiaceae | Shrub |
| 368 | *Salvia officinalis* | Lamiaceae | Shrub |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 369 | *Tectona grandis* | Lamiaceae | Tree |
| 370 | *Vitex negundo* | Lamiaceae | Shrub |
| 371 | *Savia lancifolia* | Lamiaceae | Climber |
| 372 | *Achyrospermum densiflorum* | Lamiaceae | Herb |
| 373 | *Ajuga macrosperma* | Lamiaceae | Herb |
| 374 | *Epimeredi indicus* | Lamiaceae | Herb |
| 375 | *Gomphostemma niveum* | Lamiaceae | Shrub |
| 376 | *Pogostemon brachystachys* | Lamiaceae | Herb |
| 377 | *Phoebe attenuata* | Lauraceae | Tree |
| 378 | *Cinnamomum tamala* | Lauraceae | Tree |
| 379 | *Cinnamomum zeylanicum* | Lauraceae | Tree |
| 380 | *Litsea salicifolia* | Lauraceae | Tree |
| 381 | *Litsea monopetala* | Lauraceae | Shrub |
| 382 | *Neolitsea cuipala* | Lauraceae | Tree |
| 383 | *Phoebe cooperiana* | Lauraceae | Tree |
| 384 | *Cinnamomum bejolghota* | Lauraceae | Tree |
| 385 | *Lindera latifolia* | Lauraceae | Tree |
| 386 | *Litsea cubeba* | Lauraceae | Tree |
| 387 | *Litsea nitida* | Lauraceae | Tree |
| 388 | *Leea aequata* | Leeaceae | Shrub |
| 389 | *Leea macrophylla* | Leeaceae | Shrub |
| 390 | *Pithecellobium angulatum* | Leguminosae | Tree |
| 391 | *Allium cepa* | Liliaceae | Herb |
| 392 | *Allium sativum* | Liliaceae | Herb |
| 393 | *Hemerocallis sp.* | Liliaceae | Herb |
| 394 | *Strychnos nux vomica* | Loganiaceae | Tree |
| 395 | *Duabanga integrifolia* | Lythraceae | Tree |
| 396 | *Lagerstroemia parviflora* | Lythraceae | Tree |
| 397 | *Duabanga grandiflora* | Lythraceae | Tree |
| 398 | *Punica granatum* | Lythraceae | Shrub |
| 399 | *Lagerstroemia speciosa* | Lythraceae | Tree |
| 400 | *Cuphea salicifolia* | Lythraceae | Herb |
| 401 | *Lagerstroemia reginae* | Lythraceae | Tree |
| 402 | *Magnolia champaca* | Magnoliaceae | Tree |
| 403 | *Magnolia pleiocarpa* | Magnoliaceae | Tree |
| 404 | *Magnolia montana* | Magnoliaceae | Tree |
| 405 | *Magnolia grandiflora* | Magnoliaceae | Tree |
| 406 | *Michelia champaca* | Magnoliaceae | Tree |
| 407 | *Talauma hodgsonii* | Magnoliaceae | Tree |
| 408 | *Magnolia caveana* | Magnoliaceae | Tree |
| 409 | *Magnolia hodgsonii* | Magnoliaceae | Tree |
| 410 | *Pterospermum acerifolium* | Malvaceae | Tree |
| 411 | *Hibiscus rosa sinensis* | Malvaceae | Shrub |
| 412 | *Abelmoschus moschatus* | Malvaceae | Shrub |
| 413 | *Thespesia populnea* | Malvaceae | Tree |
| 414 | *Malvaviscus arboreus* | Malvaceae | Shrub |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 415 | *Abroma augusta* | Malvaceae | Shrub |
| 416 | *Urena lobata* | Malvaceae | Shrub |
| 417 | *Bombax ceiba* | Malvaceae | Tree |
| 418 | *Kydia glabrescens* | Malvaceae | Tree |
| 419 | *Sterculia hamiltonii* | Malvaceae | Tree |
| 420 | *Abutilon indicum* | Malvaceae | Shrub |
| 421 | *Hibiscus surattensis* | Malvaceae | Shrub |
| 422 | *Sida rhombifolia* | Malvaceae | Shrub |
| 423 | *Phrynium pubinerve* | Maranthaceae | Herb |
| 424 | *Osbeckia nutans* | Melastomataceae | Shrub |
| 425 | *Osbeckia stellata* | Melastomataceae | Shrub |
| 426 | *Oxyspora paniculata* | Melastomataceae | Shrub |
| 427 | *Osbeckia nepalensis* | Melastomataceae | Shrub |
| 428 | *Melastoma malabathricum* | Melastomataceae | Shrub |
| 429 | *Melastoma nepalensis* | Melastomataceae | Shrub |
| 430 | *Memecylon celastrinum* | Melastomataceae | Shrub |
| 431 | *Oxyspora cernua* | Melastomataceae | Shrub |
| 432 | *Oxyspora paniculata* | Melastomataceae | Shrub |
| 433 | *Pseudodissochaeta assamica* | Melastomataceae | Shrub |
| 434 | *Sarcopyramis nepalensis* | Melastomataceae | Herb |
| 435 | *Sonerila maculata* | Melastomataceae | Herb |
| 436 | *Chukrasia tabularis* | Meliaceae | Tree |
| 437 | *Melia azedarach* | Meliaceae | Tree |
| 438 | *Chisocheton paniculatus* | Meliaceae | Tree |
| 439 | *Aglaia spectabilis* | Meliaceae | Tree |
| 440 | *Dysoxylum gobara* | Meliaceae | Tree |
| 441 | *Melia dubia* | Meliaceae | Tree |
| 442 | *Aphanamixis chittagonga* | Meliaceae | Tree |
| 443 | *Dysoxylum alliarium* | Meliaceae | Tree |
| 444 | *Tinospora cordifolia* | Menispermaceae | Climber |
| 445 | *Stephania hernandifolia* | Menispermaceae | Climber |
| 446 | *Parabena sagittata* | Menispermaceae | Climber |
| 447 | *Albizia lucidior* | Mimosaceae | Tree |
| 448 | *Artocarpus heterophyllus* | Moraceae | Tree |
| 449 | *Ficus benghalensis* | Moraceae | Tree |
| 450 | *Ficus religiosa* | Moraceae | Tree |
| 451 | *Ficus racemosa* | Moraceae | Tree |
| 452 | *Morus laevigata* | Moraceae | Tree |
| 453 | *Artocarpus chaplasha* | Moraceae | Tree |
| 454 | *Ficus rumphii* | Moraceae | Tree |
| 455 | *Ficus elastica* | Moraceae | Tree |
| 456 | *Ficus hirta* | Moraceae | Shrub |
| 457 | *Ficus pumila* | Moraceae | Climber |
| 458 | *Ficus hispida* | Moraceae | Tree |
| 459 | *Ficus rugosa* | Moraceae | Tree |
| 460 | *Morus acidosa* | Moraceae | Shrub |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 461 | *Ficus curtipes* | Moraceae | Tree |
| 462 | *Ficus fistulosa* | Moraceae | Shrub |
| 463 | *Ficus rigida* | Moraceae | Tree |
| 464 | *Ficus semicordata* | Moraceae | Tree |
| 465 | *Ficus squamosa* | Moraceae | Shrub |
| 466 | *Ficus subincisa* | Moraceae | Shrub |
| 467 | *Musa spp.* | Musaceae | Tree |
| 468 | *Knema linifolia* | Myristicaceae | Tree |
| 469 | *Ardisia solanacea* | Myrsinaceae | Shrub |
| 470 | *Maesa chisia* | Myrsinaceae | Shrub |
| 471 | *Maesa maxima* | Myrsinaceae | Shrub |
| 472 | *Maesa ramentacea* | Myrsinaceae | Shrub |
| 473 | *Syzygium cumini* | Myrtaceae | Tree |
| 474 | *Syzygium jambos* | Myrtaceae | Tree |
| 475 | *Callistemon lanceolatus* | Myrtaceae | Tree |
| 476 | *Psidium guajava* | Myrtaceae | Tree |
| 477 | *Eucalyptus sp.* | Myrtaceae | Tree |
| 478 | *Melaleuca viminalis* | Myrtaceae | Tree |
| 479 | *Syzygium paniculatum* | Myrtaceae | Tree |
| 480 | *Syzygium suzygiodes* | Myrtaceae | Tree |
| 481 | *Callistemon citrinus* | Myrtaceae | Shrub |
| 482 | *Eucalyptus tereticornis* | Myrtaceae | Tree |
| 483 | *Syzygium anisopetalum* | Myrtaceae | Tree |
| 484 | *Syzygium fruticosum* | Myrtaceae | Tree |
| 485 | *Mirabilis jalapa* | Nyctaginaceae | Shrub |
| 486 | *Nyctanthes arbor tristis* | Oleaceae | Tree |
| 487 | *Jasminum coarctatum* | Oleaceae | Shrub |
| 488 | *Jasminum subglandulosum* | Oleaceae | Climber |
| 489 | *Ludwigia perennis* | Onagraceae | Herb |
| 490 | *Ludwigia hyssopifolia* | Onagraceae | Herb |
| 491 | *Anoectochilus brevilabris* | Orchidaceae | Herb |
| 492 | *Odontochilus lanceolatus* | Orchidaceae | herb |
| 493 | *Galeorchis roborovskii* | Orchidaceae | herb |
| 494 | *Ponerorchis chusua* | Orchidaceae | herb |
| 495 | *Cymbidium sp.* | Orchidaceae | herb |
| 496 | *Dendrobium keiki* | Orchidaceae | herb |
| 497 | *Coelogyne flaccida* | Orchidaceae | herb |
| 498 | *Cymbidium elegans* | Orchidaceae | herb |
| 499 | *Sarcoglyphis sp.* | Orchidaceae | herb |
| 500 | *Rhynchostylis sp.* | Orchidaceae | herb |
| 501 | *Arundina graminifolia* | Orchidaceae | Herb |
| 502 | *Bulbophyllum protractum* | Orchidaceae | Herb |
| 503 | *Cymbidium aloifolium* | Orchidaceae | Herb |
| 504 | *Dendrobium aphyllum* | Orchidaceae | Herb |
| 505 | *Dendrobium latiflorum* | Orchidaceae | Herb |
| 506 | *Eria flava* | Orchidaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 507 | *Nephelaphyllum pulchrum* | Orchidaceae | Herb |
| 508 | *Oberonia falcate* | Orchidaceae | Herb |
| 509 | *Pholidota imbricate* | Orchidaceae | Herb |
| 510 | *Biermannia bimaculata* | Orchidaceae | Herb |
| 511 | *Bulbophyllum affine* | Orchidaceae | Herb |
| 512 | *Bulbophyllum capillipes* | Orchidaceae | Herb |
| 513 | *Bulbophyllum delitescens* | Orchidaceae | Herb |
| 514 | *Bulbophyllum thomsoni* | Orchidaceae | Herb |
| 515 | *Calanthe sylvatica* | Orchidaceae | Herb |
| 516 | *Chiloschista parishii* | Orchidaceae | Herb |
| 517 | *Cleisocentron pallens* | Orchidaceae | Herb |
| 518 | *Cleisostoma subulatum* | Orchidaceae | Herb |
| 519 | *Cleisostoma tricallosum* | Orchidaceae | Herb |
| 520 | *Cleisostoma williamsonii* | Orchidaceae | Herb |
| 521 | *Coelogyne arunachalensis* | Orchidaceae | Herb |
| 522 | *Coelogyne ovalis* | Orchidaceae | Herb |
| 523 | *Cryptochilus luteus* | Orchidaceae | Herb |
| 524 | *Dendrobium acinaciforne* | Orchidaceae | Herb |
| 525 | *Dendrobium cathcartii* | Orchidaceae | Herb |
| 526 | *Dendrobium moschatum* | Orchidaceae | Herb |
| 527 | *Epipogium indicum* | Orchidaceae | Herb |
| 528 | *Eria acervata* | Orchidaceae | Herb |
| 529 | *Eria lasiopetala* | Orchidaceae | Herb |
| 530 | *Eria paniculata* | Orchidaceae | Herb |
| 531 | *Eria pudica* | Orchidaceae | Herb |
| 532 | *Eria sharmae* | Orchidaceae | Herb |
| 533 | *Eria stricta* | Orchidaceae | Herb |
| 534 | *Galeola nudifolia* | Orchidaceae | Herb |
| 535 | *Gastrochilus calceolaris* | Orchidaceae | Herb |
| 536 | *Goodyera procera* | Orchidaceae | Herb |
| 537 | *Kingidium deliciosum* | Orchidaceae | Herb |
| 538 | *Liparis mannii* | Orchidaceae | Herb |
| 539 | *Liparis viridiflora* | Orchidaceae | Herb |
| 540 | *Oberonia denticulata* | Orchidaceae | Herb |
| 541 | *Phalaenopsis mannii* | Orchidaceae | Herb |
| 542 | *Pholidota articulata* | Orchidaceae | Herb |
| 543 | *Pholidota pygmaea* | Orchidaceae | Herb |
| 544 | *Schoenorchis gemmata* | Orchidaceae | Herb |
| 545 | *Stereochilus hirtus* | Orchidaceae | Herb |
| 546 | *Tainia latifolia* | Orchidaceae | Herb |
| 547 | *Thrixspermum aracnites* | Orchidaceae | Herb |
| 548 | *Avverhoa carambola* | Oxalidaceae | Tree |
| 549 | *Oxalis corniculata* | Oxalidaceae | Herb |
| 550 | *Benstonea foetida* | Pandanaceae | Herb |
| 551 | *Pandanus fascicularis* | Pandanaceae | Tree |
| 552 | *Pandanus furcatus* | Pandanaceae | Tree |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 553 | *Adenia cardiophylla* | Passifloraceae | Climber |
| 554 | *Passiflora nepalensis* | Passifloraceae | Climber |
| 555 | *Eurya acuminata* | Pentaphylaceae | Shrub |
| 556 | *Phyllanthus emblica* | Phyllanthaceae | Tree |
| 557 | *Glochidion spp.* | Phyllanthaceae | Tree |
| 558 | *Phyllanthus emblica* | Phyllanthaceae | Tree |
| 559 | *Fagopyrum esculentum* | Phytolaccaceae | Herb |
| 560 | *Persicaria capitata* | Phytolaccaceae | Herb |
| 561 | *Persicaria chinensis* | Phytolaccaceae | herb |
| 562 | *Persicaria perfoliata* | Phytolaccaceae | Herb |
| 563 | *Persicaria posumbu* | Phytolaccaceae | Herb |
| 564 | *Piper mullesua* | Piperaceae | Climber |
| 565 | *Piper longum* | Piperaceae | Climber |
| 566 | *Piper haridasanii* | Piperaceae | Herb |
| 567 | *Piper longchites* | Piperaceae | Herb |
| 568 | *Piper sylvaticum* | Piperaceae | Herb |
| 569 | *Piper rhytitocarpus* | Piperaceae | Herb |
| 570 | *Piper pedicellatum* | Piperaceae | Herb |
| 571 | *Piper diffusum* | Piperaceae | Shrub |
| 572 | *Piper trioicum* | Piperaceae | Shrub |
| 573 | *Scoparia dulcis* | Plantaginaceae | Herb |
| 574 | *Plumbago zeylanica* | Plumbaginaceae | Shrub |
| 575 | *Bambusa pallida* | Poaceae | herb |
| 576 | *Bambusa tulda* | Poaceae | herb |
| 577 | *Bambusa vulgaris* | Poaceae | herb |
| 578 | *Dendrocalamus hamiltonii* | Poaceae | herb |
| 579 | *Gigantochloa parvifolia* | Poaceae | herb |
| 580 | *Vetiveria zizanioides* | Poaceae | Herb |
| 581 | *Thysanolaena maxima* | Poaceae | Herb |
| 582 | *Saccharum officinarum* | Poaceae | Herb |
| 583 | *Eleusine coracana* | Poaceae | Herb |
| 584 | *Oryza sativa* | Poaceae | Herb |
| 585 | *Arundo donax* | Poaceae | Shrub |
| 586 | *Centotheca lappacea* | Poaceae | Herb |
| 587 | *Cyrtococcum oxyphyllum* | Poaceae | Herb |
| 588 | *Echinochloa colona* | Poaceae | Herb |
| 589 | *Echinochloa crusgalli* | Poaceae | Herb |
| 590 | *Eleusine indica* | Poaceae | Herb |
| 591 | *Eragrostis gangetica* | Poaceae | Herb |
| 592 | *Eragrostis japonica* | Poaceae | Herb |
| 593 | *Eragrostis pilosa* | Poaceae | Herb |
| 594 | *Eragrostis unioloides* | Poaceae | Herb |
| 595 | *Ichnanthus vicinus* | Poaceae | Herb |
| 596 | *Microstegium ciliatum* | Poaceae | Herb |
| 597 | *Oplismenus compositus* | Poaceae | Herb |
| 598 | *Panicum incomtum* | Poaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 599 | *Panicum notatum* | Poaceae | Herb |
| 600 | *Paspalum compactum* | Poaceae | Herb |
| 601 | *Pennisetum purpureum* | Poaceae | Herb |
| 602 | *Pogonatherum paniceum* | Poaceae | Herb |
| 603 | *Pseudechinolaena polystachya* | Poaceae | Herb |
| 604 | *Saccharum longisetosum* | Poaceae | Herb |
| 605 | *Schizostachyum pallidum* | Poaceae | Herb |
| 606 | *Setaria palmifolia* | Poaceae | Herb |
| 607 | *Setaria pumila* | Poaceae | Herb |
| 608 | *Themedia villosa* | Poaceae | Herb |
| 609 | *Polygala arillata* | Polygalaceae | Shrub |
| 610 | *Polygonum sp.* | Polygonaceae | Herb |
| 611 | *Monochoria hastata* | Pontederiaceae | Herb |
| 612 | *Embelia ribes* | Primulaceae | Climber |
| 613 | *Maesa indica* | Primulaceae | Shrub |
| 614 | *Grevillea robusta* | Proteaceae | Tree |
| 615 | *Helicia robusta* | Proteaceae | Tree |
| 616 | *Putranjiva roxburghii* | Putranjivaceae | Tree |
| 617 | *Coptis teeta* | Ranunculaceae | Herb |
| 618 | *Hovenia acerba* | Rhamnaceae | Tree |
| 619 | *Ziziphus jujuba* | Rhamnaceae | Tree |
| 620 | *Ziziphus mauritiana* | Rhamnaceae | Tree |
| 621 | *Ziziphus mauritiana* | Rhamnaceae | Tree |
| 622 | *Gouania tiliaefolia* | Rhamnaceae | Climber |
| 623 | *Rhamnus napalensis* | Rhamnaceae | Climber |
| 624 | *Rosa indica* | Rosaceae | Shrub |
| 625 | *Ixora chinensis* | Rubiaceae | Shrub |
| 626 | *Neolamarckia cadamba* | Rubiaceae | Tree |
| 627 | *Rubia manjith* | Rubiaceae | Climber |
| 628 | *Chassalia curviflora* | Rubiaceae | Shrub |
| 629 | *Hedyotis costata* | Rubiaceae | Herb |
| 630 | *Hedyotis diffusa* | Rubiaceae | Herb |
| 631 | *Hedyotis glabra* | Rubiaceae | Herb |
| 632 | *Hedyotis verticillata* | Rubiaceae | Herb |
| 633 | *Hymenopogon assamicus* | Rubiaceae | Shrub |
| 634 | *Hyptianthera stricta* | Rubiaceae | Shrub |
| 635 | *Ixora roxburghii* | Rubiaceae | Shrub |
| 636 | *Lasianthus lucidus* | Rubiaceae | Shrub |
| 637 | *Morinda angustifolia* | Rubiaceae | Shrub |
| 638 | *Mussaenda glabra* | Rubiaceae | Climber |
| 639 | *Mussaenda roxburghii* | Rubiaceae | Shrub |
| 640 | *Mycetia longifolia* | Rubiaceae | Shrub |
| 641 | *Myrioneuron nutans* | Rubiaceae | Shrub |
| 642 | *Ophiorrhiza mungos* | Rubiaceae | Herb |
| 643 | *Ophiorrhiza subcapitata* | Rubiaceae | Herb |
| 644 | *Paederia foetida* | Rubiaceae | Climber |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 645 | *Psychotria calocarpa* | Rubiaceae | Undershrub |
| 646 | *Psychotria sylhetensis* | Rubiaceae | Shrub |
| 647 | *Randia fasciculata* | Rubiaceae | Tree |
| 648 | *Randia griffithii* | Rubiaceae | Shrub |
| 649 | *Richardia scabra* | Rubiaceae | Herb |
| 650 | *Spermacoce latifolia* | Rubiaceae | Herb |
| 651 | *Spiradiclis bifida* | Rubiaceae | Herb |
| 652 | *Uncaria homomalla* | Rubiaceae | Climber |
| 653 | *Aegle marmelos* | Rutaceae | Tree |
| 654 | *Murraya koenigii* | Rutaceae | Tree |
| 655 | *Murraya paniculata* | Rutaceae | Tree |
| 656 | *Micromelum minutum* | Rutaceae | Tree |
| 657 | *Zanthoxylum armatum* | Rutaceae | Tree |
| 658 | *Meliosma pinnata* | Sabiaceae | Tree |
| 659 | *Meliosma simplicifolia* | Sabiaceae | Tree |
| 660 | *Sabi limoniacea* | Sabiaceae | Slender climber |
| 661 | *Salix babylonica* | Salicaceae | Tree |
| 662 | *Sapindus sp.* | Sapindaceae | Tree |
| 663 | *Aesculus assamica* | Sapindaceae | Tree |
| 664 | *Allophylus zeylanicus* | Sapindaceae | Shrub |
| 665 | *Lepisanthes senegalensis* | Sapindaceae | Shrub |
| 666 | *Diploknema butyracea* | Sapotaceae | Tree |
| 667 | *Mimusops elengi* | Sapotaceae | Tree |
| 668 | *Chloranthus elatior* | Sauruaceae | Herb |
| 669 | *Bergenia ciliata* | Saxifragaceae | Herb |
| 670 | *Curunga amara* | Scrophulariaceae | Herb |
| 671 | *Limnophila chinensis* | Scrophulariaceae | Herb |
| 672 | *Lindenbergia hookeri* | Scrophulariaceae | Shrub |
| 673 | *Lindenbergia muraria* | Scrophulariaceae | Herb |
| 674 | *Lindernia antipoda* | Scrophulariaceae | Herb |
| 675 | *Torenia asiatica* | Scrophulariaceae | Herb |
| 676 | *Torenia diffusa* | Scrophulariaceae | Herb |
| 677 | *Torenia thouarsii* | Scrophulariaceae | Herb |
| 678 | *Ailanthus integrifolia* | Simaroubaceae | Tree |
| 679 | *Brucea mollis* | Simaroubaceae | Shrub |
| 680 | *Smilax orthoptera* | Smilacaceae | Tree |
| 681 | *Smilax zeylanica* | Smilacaceae | Woody climber |
| 682 | *Brugmansia suaveolens* | Solanaceae | Shrub |
| 683 | *Datura metel* | Solanaceae | Shrub |
| 684 | *Withania somnifera* | Solanaceae | Shrub |
| 685 | *Solanum violaceum* | Solanaceae | Shrub |
| 686 | *Solanum torvum* | Solanaceae | Shrub |
| 687 | *Solanum ciliatum* | Solanaceae | Shrub |
| 688 | *Solanum laeve* | Solanaceae | Shrub |
| 689 | *Solanum surattense* | Solanaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 690 | *Stemona tuberosa* | Stemonaceae | Climber |
| 691 | *Sterculia villosa* | Sterculiaceae | Tree |
| 692 | *Byttneria grandiflora* | Sterculiaceae | Climber |
| 693 | *Tacca integrifolia* | Taccaceae | Herb |
| 694 | *Tetrameles nudiflora* | Tetramelaceae | Tree |
| 695 | *Schima wallichii* | Theaceae | Tree |
| 696 | *Pyrenaria barringtonifolia* | Theaceae | Shrub |
| 697 | *Aquilaria agallocha* | Thymelaeaceae | Tree |
| 698 | *Grewia serrulata* | Tiliaceae | Shrub |
| 699 | *Triumfetta pilosa* | Tiliaceae | Shrub |
| 700 | *Triumfetta rhomboidea* | Tiliaceae | Shrub |
| 701 | *Pilea bracteosa* | Urticaceae | Herb |
| 702 | *Pouzolzia hirta* | Urticaceae | Herb |
| 703 | *Boehmeria glomerulifera* | Urticaceae | Shrub |
| 704 | *Dendrocnide sinuata* | Urticaceae | Shrub |
| 705 | *Elatostema lineolatum* | Urticaceae | Shrub |
| 706 | *Elatostema monandrum* | Urticaceae | Shrub |
| 707 | *Elatostema sessile* | Urticaceae | Herb |
| 708 | *Elatostema sikkimense* | Urticaceae | Herb |
| 709 | *Pilea bracteosa* | Urticaceae | Shrub |
| 710 | *Poikilospermum suaveolens* | Urticaceae | Tree |
| 711 | *Sarcochlamys pulcherrima* | Urticaceae | Shrub |
| 712 | *Agapetes variegata* | Vacciniaceae | Shrub |
| 713 | *Duranta erecta* | Verbenaceae | Shrub |
| 714 | *Lantana camara* | Verbenaceae | Shrub |
| 715 | *Stachytarpheta indica* | Verbenaceae | Shrub |
| 716 | *Callicarpa arborea* | Verbenaceae | Tree |
| 717 | *Callicarpa arborea* | Verbenaceae | Tree |
| 718 | *Callicarpa vestita* | Verbenaceae | Tree |
| 719 | *Clerodendron bracteatum* | Verbenaceae | Tree |
| 720 | *Clerodendrum colebrookianum* | Verbenaceae | Shrub |
| 721 | *Clerodendrum lasiocephalum* | Verbenaceae | Shrub |
| 722 | *Clerodendrum venosum* | Verbenaceae | Shrub |
| 723 | *Clerodendrum villosum* | Verbenaceae | Shrub |
| 724 | *Clerodendrum wallichii* | Verbenaceae | Shrub |
| 725 | *Leea indica* | Vitaceae | Shrub |
| 726 | *Leea bracteata* | Vitaceae | Shrub |
| 727 | *Leea asiatica* | Vitaceae | Shrub |
| 728 | *Cayratia mollissima* | Vitaceae | Climber |
| 729 | *Cissus javana* | Vitaceae | Climber |
| 730 | *Cissus repens* | Vitaceae | Climber |
| 731 | *Tetrastigma dubium* | Vitaceae | Climber |
| 732 | *Tetrastigma leucostaphylum* | Vitaceae | Climber |
| 733 | *Hedychium gardnerianum* | Zingiberaceae | Herb |
| 734 | *Hedychium coronarium* | Zingiberaceae | Herb |
| 735 | *Hedychium spicatum* | Zingiberaceae | Herb |

| Sl. No. | Scientific Name | Family | Habit |
|---|---|---|---|
| 736 | *Alpinia galanga* | Zingiberaceae | Herb |
| 737 | *Curcuma caesia* | Zingiberaceae | Herb |
| 738 | *Alpinia bracteata* | Zingiberaceae | Herb |
| 739 | *Alpinia malaccensis* | Zingiberaceae | Herb |
| 740 | *Globba multiflora* | Zingiberaceae | Herb |
| 741 | *Alpinia nigra* | Zingiberaceae | Herb |
| 742 | *Caolokaempferia linearis* | Zingiberaceae | Herb |
| 743 | *Hedychium stenopetalum* | Zingiberaceae | Herb |

**Table 7: List of Butterflies of Itanagar for Indicator 6**

| Sl. No. | Scientific Name | Common Name | Family |
|---|---|---|---|
| 1 | *Papilio polytus* | Common Mormon | Papilionidae |
| 2 | *Papilio memnon* | Great Mormon | Papilionidae |
| 3 | *Papilio demoleus* | Lime Butterfly | Papilionidae |
| 4 | *Papilio paris* | Paris Peacock | Papilionidae |
| 5 | *Papilio alcmenor* | Redbreast | Papilionidae |
| 6 | *Papilio helenus* | Red Helen | Papilionidae |
| 7 | *Papilio protenor* | Spangle | Papilionidae |
| 8 | *Papilio clytia* | Common Mime | Papilionidae |
| 9 | *Troides aeacus* | Golden Birdwing | Papilionidae |
| 10 | *Graphium agamemnon* | Tailed Jay | Papilionidae |
| 11 | *Graphium serpedon* | Common Blue Bottle | Papilionidae |
| 12 | *Eurema blanda* | Three Spot Grass Yellow | Pieridae |
| 13 | *Eurema hecabe* | Common Grass Yellow | Pieridae |
| 14 | *Catopsilia pomana* | Common Emigrant | Pieridae |
| 15 | *Ixias pyrene* | Yellow Orange Tip | Pieridae |
| 16 | *Hebomoia glaucippe* | Great Orange Tip | Pieridae |
| 17 | *Appias lyncida* | Chocolate Albatross | Pieridae |
| 18 | *Pieris brassicae* | Large Cabbage White | Pieridae |
| 19 | *Pieris canidia* | Indian Cabbage White | Pieridae |
| 20 | *Leptosia nina* | Psyche | Pieridae |
| 21 | *Cepora nadina* | Lesser Gull | Pieridae |
| 22 | *Delias descombesi* | Red Spot Jezebel | Pieridae |
| 23 | *Delias pasithoe* | Red-base Jezebel | Pieridae |
| 24 | *Pareronia avatar* | Pale Wanderer | Pieridae |
| 25 | *Appias libythea* | Striped Albatross | Pieridae |
| 26 | *Tirumala septentrionis* | Dark Blue Tiger | Nymphalidae |
| 27 | *Danaus genutia* | Striped Tiger | Nymphalidae |
| 28 | *Danaus melanippus* | White Tiger | Nymphalidae |
| 29 | *Danaus chrysippus* | Plain Tiger | Nymphalidae |
| 30 | *Parantica aglea* | Glassy Tiger | Nymphalidae |
| 31 | *Euploea midamus* | Blue Stripped Crow | Nymphalidae |
| 32 | *Euploea mulciber* | Striped Blue Crow | Nymphalidae |

| Sl. No. | Scientific Name | Common Name | Family |
|---|---|---|---|
| 33 | *Polyura athamas* | Common Nawab | Nymphalidae |
| 34 | *Charaxes bernardus* | Tawany Rajah | Nymphalidae |
| 35 | *Charaxes marmax* | Yellow Rajah | Nymphalidae |
| 36 | *Discophora sondaica* | Common Duffer | Nymphalidae |
| 37 | *Melantis leda* | Common Evening Brown | Nymphalidae |
| 38 | *Melantis zitenus* | Great Evening Brown | Nymphalidae |
| 39 | *Lethe confusa* | Banded Tree Brown | Nymphalidae |
| 40 | *Lethe chandica* | Angled Red Forester | Nymphalidae |
| 41 | *Lethe distans* | Scarce Red Forester | Nymphalidae |
| 42 | *Lethe kansa* | Bamboo Forester | Nymphalidae |
| 43 | *Elymnias hypermnestra* | Common Palmfly | Nymphalidae |
| 44 | *Elymnias malelas* | Spotted Palmfly | Nymphalidae |
| 45 | *Elymnias nesaea* | Sylhet Tiger Palmfly | Nymphalidae |
| 46 | *Mycalesis mineus* | Dark-brand Bushbrown | Nymphalidae |
| 47 | *Mycalesis perseus* | Common Bushbrown | Nymphalidae |
| 48 | *Mycalesis visala* | Long-brand Bushbrown | Nymphalidae |
| 49 | *Orsotrioena medus* | Nigger | Nymphalidae |
| 50 | *Ypthima baldus* | Common Fivering | Nymphalidae |
| 51 | *Ypthima huebneri* | Common Four Ring | Nymphalidae |
| 52 | *Penthema lisarda* | Yellow Kaiser | Nymphalidae |
| 53 | *Acraea issoria* | Yellow Coster | Nymphalidae |
| 54 | *Cethosia bibilis* | Red Lacewing | Nymphalidae |
| 55 | *Cethosia cyane* | Leopard Lacewing | Nymphalidae |
| 56 | *Cyrestis thyodamas* | Common Map | Nymphalidae |
| 57 | *Symbrenthia lilaea* | Common Jester | Nymphalidae |
| 58 | *Aglais caschmirensis* | Indian Tortoiseshell | Nymphalidae |
| 59 | *Junonia orithiya* | Blue Pansy | Nymphalidae |
| 60 | *Junonia hierta* | Yellow Pansy | Nymphalidae |
| 61 | *Junonia iphita* | Chocolate Pansy | Nymphalidae |
| 62 | *Junonia atlitis* | Gray Pansy | Nymphalidae |
| 63 | *Junonia almana* | Peacock Pansy | Nymphalidae |
| 64 | *Junonia lemonias* | Lemon Pansy | Nymphalidae |
| 65 | *Hypolimnas misippus* | Danaid Eggfly | Nymphalidae |
| 66 | *Hypolimnas bolina* | Great Eggfly | Nymphalidae |
| 67 | *Kallima inachus* | Orange Oakfly | Nymphalidae |
| 68 | *Kallima limborgii* | Brilliant Oakleaf | Nymphalidae |
| 69 | *Pantoporia sandaka* | Extra Lascar | Nymphalidae |
| 70 | *Pantoporia hordonia* | Common Lascar | Nymphalidae |
| 71 | *Argyreus hyperbius* | Indian Fritllary | Nymphalidae |
| 72 | *Moduza procris* | Commander | Nymphalidae |
| 73 | *Athyma perius* | Common Sergeant | Nymphalidae |
| 74 | *Athyma inara* | Himalayan Colour Sergeant | Nymphalidae |
| 75 | *Athyma nefte* | Colour Sergeant | Nymphalidae |
| 76 | *Athyma selenophora* | Staff Sergeant | Nymphalidae |
| 77 | *Athyma ranga* | Blackvein Sergeant | Nymphalidae |
| 78 | *Athyma zeroca* | Small Staff Sergeant | Nymphalidae |

| Sl. No. | Scientific Name | Common Name | Family |
|---|---|---|---|
| 79 | *Neptis hylas* | Common Sailer | Nymphalidae |
| 80 | *Neptis clinia* | Clear Sailer | Nymphalidae |
| 81 | *Neptis soma* | Sullied Sailer | Nymphalidae |
| 82 | *Neptis sappho* | Pallas's Sailer | Nymphalidae |
| 83 | *Neptis yerburi* | Yerbury's Sailer | Nymphalidae |
| 84 | *Tanaecia lepidea* | Gray Count | Nymphalidae |
| 85 | *Tanaecia jahnu* | Plain Earl | Nymphalidae |
| 86 | *Ariadne merione* | Common Castor | Nymphalidae |
| 87 | *Doleschallia bisaltide* | Autumn Leaf | Nymphalidae |
| 88 | *Euthalia aconthea* | Common Baron | Nymphalidae |
| 89 | *Sumalia doraxa* | Green Commodore | Nymphalidae |
| 90 | *Pseudergolis wedah* | Tabby | Nymphalidae |
| 91 | *Cheritra freja* | Common Imperial | Lycaenidae |
| 92 | *Hypolycaena erylus* | Common Tit | Lycaenidae |
| 93 | *Rapala pheretima* | Copper Flash | Lycaenidae |
| 94 | *Rapala nissa* | Common Flash | Lycaenidae |
| 95 | *Arhopala pseudocentaurus* | Western Oak Blue | Lycaenidae |
| 96 | *Heliophorus tamu* | Powery Green Sapphire | Lycaenidae |
| 97 | *Heliophorus epicles* | Purple Sapphire | Lycaenidae |
| 98 | *Castalius rosimon* | Common Pierrot | Lycaenidae |
| 99 | *Lampides boeticus* | Pea Blue | Lycaenidae |
| 100 | *Zizeeria karsandra* | Dark Glass Blue | Lycaenidae |
| 101 | *Zizina otis* | Lesser Grass Blue | Lycaenidae |
| 102 | *Zizula hylax* | Tiny Grass Blue | Lycaenidae |
| 103 | *Chilades lajus* | Lime Blue | Lycaenidae |
| 104 | *Petrelaea dana* | Dingy Lime Blue | Lycaenidae |
| 105 | *Anthene emolus* | Common Ciliate Blue | Lycaenidae |
| 106 | *Acytolepis puspa* | Common Hedge Blue | Lycaenidae |
| 107 | *Prostas dubiosa indica* | Tailess Line Blue | Lycaenidae |
| 108 | *Prostas nora* | Common Line Blue | Lycaenidae |
| 109 | *Zeltus amasa* | Fluffy Tit | Lycaenidae |
| 110 | *Pseudozizeeria maha* | Pale Grass Blue | Lycaenidae |
| 111 | *Jamides elpis* | Glistening Cerulean | Lycaenidae |
| 112 | *Jamides alecto* | Matallic Cerulean | Lycaenidae |
| 113 | *Yashoda tripuncata* | Branded Yamfly | Lycaenidae |
| 114 | *Laxura atymnus* | Yamfly | Lycaenidae |
| 115 | *Nacaduba beroe* | Opaque 6-Lineblue | Lycaenidae |
| 116 | *Suasa lisides* | Red Imperials | Lycaenidae |
| 117 | *Zemeros flegyas* | Punchinello | Lycaenidae |
| 118 | *Spalgis epius* | Apeely | Lycaenidae |
| 119 | *Pseudocoladenia dan* | Fulvous Pied Flat | Hesperiidae |
| 120 | *Baoris farri* | Paintbrush Swift | Hesperiidae |
| 121 | *Gangara thyrsis* | Giant Redeye | Hesperiidae |
| 122 | *Borbo cinnara* | Rice Swift | Hesperiidae |
| 123 | *Notocrypta paralysos* | Common Banded Demon | Hesperiidae |
| 124 | *Koruthaialos butleri* | Dark Velvate Bob | Hesperiidae |

| Sl. No. | Scientific Name | Common Name | Family |
|---|---|---|---|
| 125 | *Pelopidas assamensis* | Great Swift | Hesperiidae |
| 126 | *Hasora chromus* | Common Banded Awl | Hesperiidae |

**Table 8: List of Fish Fauna of Itanagar for Indicator 7**

| Sl. No. | *Scientific Name* | Family |
|---|---|---|
| 1 | *Aspidoparia jaya* | Cyprinidae |
| 2 | *Barilius bendelisis* | Cyprinidae |
| 3 | *Barilius barna* | Cyprinidae |
| 4 | *Barilius tileo* | Cyprinidae |
| 5 | *Raiamas bola* | Cyprinidae |
| 6 | *Danio dangila* | Cyprinidae |
| 7 | *Danio rerio* | Cyprinidae |
| 8 | *Devario aequipinnatus* | Cyprinidae |
| 9 | *Devario devario* | Cyprinidae |
| 10 | *Rasbora rasbora* | Cyprinidae |
| 11 | *Tor pulitora* | Cyprinidae |
| 12 | *Tor tor* | Cyprinidae |
| 13 | *Neolissochilus hexagonolepis* | Cyprinidae |
| 14 | *Chagunius chagunio* | Cyprinidae |
| 15 | *Puntius chola* | Cyprinidae |
| 16 | *Puntius conchonius* | Cyprinidae |
| 17 | *Puntius sophore* | Cyprinidae |
| 18 | *Puntius ticto* | Cyprinidae |
| 19 | *Cyprinion semiplotum* | Cyprinidae |
| 20 | *Labeo gonius* | Cyprinidae |
| 21 | *Bangana dero* | Cyprinidae |
| 22 | *Crossocheilus latius* | Cyprinidae |
| 23 | *Schizothorax sp.* | Cyprinidae |
| 24 | *Schizothorax richardsoni* | Cyprinidae |
| 25 | *Schizothorax esocinus* | Cyprinidae |
| 26 | *Garra annandalei* | Cyprinidae |
| 27 | *Garra lissorhynchus* | Cyprinidae |
| 28 | *Garra gotyla* | Cyprinidae |
| 29 | *Garra mcclelland* | Cyprinidae |
| 30 | *Oreichthys cosuatis* | Cyprinidae |
| 31 | *Psilorhynchus balitora* | Psilorhynchidae |
| 32 | *Acanthocobitis botia* | Balitoridae |
| 33 | *Balitora brucei* | Balitoridae |
| 34 | *Schistura rupecula* | Balitoridae |
| 35 | *Schistura devdevi* | Balitoridae |
| 36 | *Schistura sikimaiensis* | Balitoridae |
| 37 | *Aborichthys elongatus* | Balitoridae |
| 38 | *Aborichthys kempi* | Balitoridae |
| 39 | *Botia rostrata* | Cobitidae |
| 40 | *Botia dario* | Cobitidae |
| 41 | *Lepidocephalichthys guntea* | Cobitidae |

| Sl. No. | *Scientific Name* | Family |
|---|---|---|
| 42 | *Lepidocephalichthys annandalei* | Cobitidae |
| 43 | *Mystus tengara* | Bagridae |
| 44 | *Mystus montanus* | Bagridae |
| 45 | *Amblyceps arunachalensis* | Amblycipitidae |
| 46 | *Amblyceps mangois* | Amblycipitidae |
| 47 | *Glyptothorax indicus* | Sisoridae |
| 48 | *Glyptothorax cavia* | Sisoridae |
| 49 | *Glyptothorax telchitta* | Sisoridae |
| 50 | *Glyptothorax brevipinnis* | Sisoridae |
| 51 | *Glyptothorax pectinopterus* | Sisoridae |
| 52 | *Bagarius bagarius* | Sisoridae |
| 53 | *Hara hara* | Erithistidae |
| 54 | *Pseudolaguvia shawi* | Erithistidae |
| 55 | *Clarius magur* | Claridae |
| 56 | *Heteropneustes fossilis* | Heteropneustidae |
| 57 | *Chaca chaca* | Chacidae |
| 58 | *Olyra longicaudata* | Olyridae |
| 59 | *Xenentodon cancila* | Belonidae |
| 60 | *Chanda nama* | Chandidae |
| 61 | *Parambassis ranga* | Chandidae |
| 62 | *Parambassis baculis* | Chandidae |
| 63 | *Badis badis* | Badidae |
| 64 | *Oreochromis mossambicus* | Cichlidae |
| 65 | *Channa striata* | Channidae |
| 66 | *Channa marulius* | Channidae |
| 67 | *Rasbora daniconius* | Cyprinidae |
| 68 | *Mastacembalus armatus* | Mastacembelidae |
| 69 | *Macrognathus sp.* | Mastacembelidae |
| 70 | *Channa orientalis* | Channidae |
| 71 | *Channa punctatus* | Channidae |
| 72 | *Lepidocephalichthys arunachalensis* | Cobitidae |
| 73 | *Bhavania arunachalensis* | Balitoridae |
| 74 | *Aborichthys cataracta* | Nemacheilidae |
| 75 | *Aborichthys iphipaniensis* | Nemacheilidae |
| 76 | *Aborichthys kailashi* | Nemacheilidae |
| 77 | *Aborichthys kempi* | Nemacheilidae |
| 78 | *Aborichthys pangenesis* | Nemacheilidae |
| 79 | *Aborichthys tikaderi* | Nemacheilidae |
| 80 | *Aborichthys verticauda* | Nemacheilidae |
| 81 | *Aborichthys waikhomi* | Nemacheilidae |
| 82 | *Aborichthys uniobarensis* | Nemacheilidae |
| 83 | *Mustura dikrongensis* | Nemacheilidae |
| 84 | *Mustura harkishore* | Nemacheilidae |
| 85 | *Mustura walongensis* | Nemacheilidae |
| 86 | *Schistura tirapensis* | Nemacheilidae |
| 87 | *Schistura rebuw* | Nemacheilidae |

| Sl. No. | *Scientific Name* | Family |
|---|---|---|
| 88 | *Psilorhynchus arunachalensis* | Psilorhynchidae |
| 89 | *Garra alticaputus* | Cyprinidae |
| 90 | *Garra arunachalensis* | Cyprinidae |
| 91 | *Garra arupi* | Cyprinidae |
| 92 | *Garra birostris* | Cyprinidae |
| 93 | *Garra kalpangi* | Cyprinidae |
| 94 | *Garra kempi* | Cyprinidae |
| 95 | *Garra kimini* | Cyprinidae |
| 96 | *Garra magnacavus* | Cyprinidae |
| 97 | *Garra magnidiscus* | Cyprinidae |
| 98 | *Garra minima* | Cyprinidae |
| 99 | *Garra quadratirostris* | Cyprinidae |
| 100 | *Garra nigricauda* | Cyprinidae |
| 101 | *Garra ranganensis* | Cyprinidae |
| 102 | *Garra rupicola* | Cyprinidae |
| 103 | *Garra tamangi* | Cyprinidae |
| 104 | *Pethia arunachalensis* | Cyprinidae |
| 105 | *Schizothorax sikusirumensis* | Cyprinidae |
| 106 | *Opsarius arunachalensis* | Danionidae |
| 107 | *Devario horai* | Danionidae |
| 108 | *Rasbora kobonensis* | Danionidae |
| 109 | *Mystus prabini* | Bagridae |
| 110 | *Olyra parviocula* | Bagridae |
| 111 | *Amblyceps apangi* | Amblycipitidae |
| 112 | *Amblyceps waikhomi* | Amblycipitidae |
| 113 | *Creteuchiloglanis arunachalensis* | Sisoridae |
| 114 | *Creteuchiloglanis kamengensis* | Sisoridae |
| 115 | *Creteuchiloglanis payjab* | Sisoridae |
| 116 | *Creteuchiloglanis tawangensis* | Sisoridae |
| 117 | *Erethistoides senkhiensis* | Sisoridae |
| 118 | *Exostoma kottelati* | Sisoridae |
| 119 | *Exostoma tenuicaudata* | Sisoridae |
| 120 | *Glyptothorax dikrongensis* | Sisoridae |
| 121 | *Glyptothorax pantherinus* | Sisoridae |
| 122 | *Oreoglanis majusculus* | Sisoridae |
| 123 | *Oreoglanis pangenensis* | Sisoridae |
| 124 | *Pseudolaguvia jiyaensis* | Sisoridae |
| 125 | *Pseudolaguvia magna* | Sisoridae |
| 126 | *Pseudolaguvia viriosa* | Sisoridae |
| 127 | *Pseudecheneis sirenica* | Sisoridae |
| 128 | *Pterocryptis indicus* | Siluridae |
| 129 | *Badis triocellus* | Badidae |
| 130 | *Badis singenensis* | Badidae |
| 131 | *Channa pmanensis* | Channidae |
| 132 | *Channa melanostigma* | Channidae |
| 133 | *Monopterus hodgarti* | Synbranchidae |

**Table 9: List of Molluscs of Itanagar for Indicators 8 and 10**

| Sl. No. | Scientific Name | Family | Nativity |
|---|---|---|---|
| 1 | *Lissachatina fulica* | Achatinidae | Invasive |
| 2 | *Allopeas gracile* | Achatinidae | Native |
| 3 | *Glessula naja* | Achatinidae | Native |
| 4 | *Rishetia tenuispira* | Achatinidae | Native |
| 5 | *Rishetia nevilli* | Achatinidae | Native |
| 6 | *Girasia crocea* | Helicarionidae | Native |
| 7 | *Girasia hookeri* | Helicarionidae | Native |
| 8 | *Macrochlamys atricolor* | Ariophantidae | Native |
| 9 | *Macrochlamys indica* | Ariophantidae | Native |
| 10 | *Bradybaena cestus* | Camaenidae | Native |
| 11 | *Eleutherocaulis alte* | Veronicellidae | Native |
| 12 | *Radix rufescens* | Lymnaeidae | Native |
| 13 | *Racesina luteola* | Lymnaeidae | Native |
| 14 | *Filopaludina bengalensis* | Viviparidae | Native |
| 15 | *Brotia costula* | Pachychilidae | Native |
| 16 | *Paludomus crassa* | Paludomidae | Native |
| 17 | *Lymnaea acuminata* | Lymnaeidae | Native |
| 18 | *Indoplanorbis exustus* | Planorbidae | Native |
| 19 | *Musculium indicum* | Sphaeriidae | Native |
| 20 | *Cyclophorus sidiensis* | Cyclophoridae | Native |
| 21 | *Pearsonia oakesi* | Cyclophoridae | Native |
| 22 | *Glessula crassula* | Subulinidae | Native |
| 23 | *Glessula crassilabris* | Subulinidae | Native |
| 24 | *Sivella castra* | Helicarionidae | Native |
| 25 | *Cryptaustenia silcharensis* | Helicarionidae | Native |
| 26 | *Endothyrella plectostoma* | Plectopylidae | Native |
| 27 | *Aegista tapeina* | Camaenidae | Native |
| 28 | *Bradybaena similaris* | Camaenidae | Invasive |

**Table 10: List of Reptiles of Itanagar**

| Sl. No. | Scientific name | Family | Common Name |
|---|---|---|---|
| 1 | *Calotes versicolor* | Agamidae | Oriental Garden Lizard |
| 2 | *Calotes jerdoni* | Agamidae | Jerdon's Forest Lizard |
| | *Hemidactylus frenatus* | Gekkonidae | Asian House Gecko |
| 4 | *Hemidactylus brookii* | Gekkonidae | Brook's House Gecko |
| 5 | *Gekko gecko* | Gekkonidae | Tokay Gecko |
| 67 | *Varanus bengalensis* | Varanidae | Bengal Monitor Lizard |
| 8 | *Eutropis multifasciata* | Scincidae | Many Lined Grass Skink |
| 9 | *Typhlops diardii* | Typhlopidae | Diard's Blind Snake |
| 10 | *Indotyphlops braminus* | Typhlopidae | Brahminy Blind Snake |
| 11 | *Amphiesma stolatum* | Colubridae | Striped Keelback |
| 12 | *Coelognathus radiata* | Colubridae | Copper-headed Trinket |
| 13 | *Dendrelaphis pictus* | Colubridae | Painted Bronzeback |
| 14 | *Elaphe mandarina* | Colubridae | Mandarian rat snake |
| 15 | *Lycodon jara* | Colubridae | Yellow-spotted Wolf Snake |
| 16 | *Oligodon albocinctus* | Colubridae | White-barred Kukri Snake |

| Sl. No. | Scientific name | Family | Common Name |
|---|---|---|---|
| 17 | *Oligodon cinereus* | Colubridae | Black-barred Kukri Snake |
| 18 | *Oreocryptophis porphyraceus* | Colubridae | Black-banded Trinket |
| 19 | *Ptyas korros* | Colubridae | Indo-Chinese Rat Snake |
| 20 | *Rhabdophis himalayanus* | Colubridae | Himalayan Keelback |
| 21 | *Rhabdophis subminiatus* | Colubridae | Red-headed Keelback |
| 22 | *Fowlea piscator* | Colubridae | Checkered Keelback |
| 23 | *Bungarus niger* | Elapidae | Greater Black Krait |
| 24 | *Calliophis macclellandi* | Elapidae | McClelland's Coral Snake |
| 25 | *Naja kaouthia* | Elapidae | Monocled Cobra |
| 26 | *Psammodynastes pulverulentus* | Lamprophiidae | Common Mock Viper |
| 27 | *Trimeresurus stejnegeri* | Viperidae | Stejneger's pit viper |
| 28 | *Protobothrops mucrosquamatus* | Viperidae | Brown spotted pit viper |
| 29 | *Cuora mouhotii* | Geoemydidae | Keeled Box Turtle |
| 30 | *Cyclemys gemeli* | Geoemydidae | Assam Leaf Turtle |
| 31 | *Elaphe taeniura* | Colubridae | Beauty Snake |

**Table 11: List of Ferns Found in Itanagar**

| Sl. No. | Scientific Name | Family | Status |
|---|---|---|---|
| 1 | *Asplenium nidus* | Aspleniaceae | Native |
| 2 | *Asplenium phyllitides* | Aspleniaceae | Native |
| 3 | *Asplenium nitidum* | Aspleniaceae | Native |
| 4 | *Asplenium cheilosorum* | Aspleniaceae | Native |
| 5 | *Asplenium excisum* | Aspleniaceae | Native |
| 6 | *Asplenium ensiforme* | Aspleniaceae | Native |
| 7 | *Asplenium finlaysonianum* | Aspleniaceae | Native |
| 8 | *Asplenium griffithianum* | Aspleniaceae | Native |
| 9 | *Asplenium laciniatum* | Aspleniaceae | Native |
| 10 | *Asplenium nidoides* | Aspleniaceae | Native |
| 11 | *Blechnum orientale* | Blechnaceae | Native |
| 12 | *Cyathea andersonii* | Cyatheaceae | Native |
| 13 | *Cyathea gigantea* | Cyatheaceae | Native |
| 14 | *Cyathea spinulosa* | Cyatheaceae | Native |
| 15 | *Cyathea brunoniana* | Cyatheaceae | Native |
| 16 | *Cyathea henryi* | Cyatheaceae | Native |
| 17 | *Cyathea khasyana* | Cyatheaceae | Native |
| 18 | *Davallia assamica* | Davalliaceae | Native |
| 19 | *Davallia trichomanoides* | Davalliaceae | Native |
| 20 | *Microlepia rhomboidea* | Dennstaedtiaceae | Native |
| 21 | *Histioteris incisa* | Dennstaedtiaceae | Native |
| 22 | *Microlepia hancei* | Dennstaedtiaceae | Native |
| 23 | *Microlepia hookeriana* | Dennstaedtiaceae | Native |
| 24 | *Microlepia platyphylla* | Dennstaedtiaceae | Native |
| 25 | *Microlepia speluncae* | Dennstaedtiaceae | Native |
| 26 | *Microlepia strigosa* | Dennstaedtiaceae | Native |
| 27 | *Monachosorum henryi* | Dennstaedtiaceae | Native |
| 28 | *Pteridium revolutum* | Dennstaedtiaceae | Native |

| Sl. No. | Scientific Name | Family | Status |
|---|---|---|---|
| 29 | *Cibotium barometz* | Dicksoniaceae | Native |
| 30 | *Dillenia indica* | Dilleniaceae | Native |
| 31 | *Dipteris wallichii* | Dipteridaceae | Native |
| 32 | *Polystichum punctiferum* | Dryopteridaceae | Native |
| 33 | *Arachnoides amabilis* | Dryopteridaceae | Introduced |
| 34 | *Dryopteris sparsa* | Dryopteridaceae | Native |
| 35 | *Dryopteris hirtipes* | Dryopteridaceae | Introduced |
| 36 | *Peranema aspidioides* | Dryopteridaceae | Native |
| 37 | *Nothoperanema hendersonii* | Dryopteridaceae | Native |
| 38 | *Pleocnemia submembranacea* | Dryopteridaceae | Native |
| 39 | *Polystichum lentum* | Dryopteridaceae | Native |
| 40 | *Polystichum semifertile* | Dryopteridaceae | Native |
| 41 | *Polystichum pseudotsus-simense* | Dryopteridaceae | Native |
| 42 | *Tectaria coadunata* | Dryopteridaceae | Native |
| 43 | *Tectaria fuscipes* | Dryopteridaceae | Native |
| 44 | *Tectaria heterocarpa* | Dryopteridaceae | Native |
| 45 | *Tectaria ingens* | Dryopteridaceae | Native |
| 46 | *Tectaria polymorpha* | Dryopteridaceae | Native |
| 47 | *Tectaria simonsii* | Dryopteridaceae | Native |
| 48 | *Tectaria subconfluens* | Dryopteridaceae | Native |
| 49 | *Tectaria vasta* | Dryopteridaceae | Native |
| 50 | *Equisetum ramosissimum* | Equisetaceae | Native |
| 51 | *Dicranopteris splendida* | Gleicheniaceae | Native |
| 52 | *Dicranopteris taiwanensis* | Gleicheniaceae | Introduced |
| 53 | *Dicranopteris linearis* | Gleicheniaceae | Native |
| 54 | *Dicranopteris lanigera* | Gleicheniaceae | Native |
| 55 | *Diplopterygium blotianum* | Gleicheniaceae | Native |
| 56 | *Lindsaea himalaica* | Lindsaeaceae | Native |
| 57 | *Lindsaea odorata* | Lindsaeaceae | Native |
| 58 | *Odontosoria chinensis* | Lindsaeaceae | Native |
| 59 | *Lindsaea ensifolia* | Lindsaeaceae | Native |
| 60 | *Bolbitis asplenifolia* | Lomariopsidaceae | Native |
| 61 | *Bolbitis costata* | Lomariopsidaceae | Native |
| 62 | *Bolbitis heteroclita* | Lomariopsidaceae | Native |
| 63 | *Bolbitis major* | Lomariopsidaceae | Native |
| 64 | *Elaphoglossum marginatum* | Lomariopsidaceae | Native |
| 65 | *Lycopodium japonicum* | Lycopodiaceae | Native |
| 66 | *Huperzia phlegmaria* | Lycopodiaceae | Native |
| 67 | *Huperzia squarrosa* | Lycopodiaceae | Native |
| 68 | *Lygodium japonicum* | Lygodiaceae | Native |
| 69 | *Lygodium flexuosum* | Lygodiaceae | Native |
| 70 | *Lygodium salicifolium* | Lygodiaceae | Native |
| 71 | *Angioteri sevecta* | Marattiaceae | Native |
| 72 | *Angiopteris crassipes* | Marattiaceae | Native |
| 73 | *Christensenia aesculifolia* | Marattiaceae | Native |
| 74 | *Nephrolepis cordifolia* | Nephrolepidaceae | Native |

| Sl. No. | Scientific Name | Family | Status |
|---|---|---|---|
| 75 | *Nephrolepis biserrata* | Nephrolepidaceae | Native |
| 76 | *Botrychium daucifolium* | Ophioglossaceae | Native |
| 77 | *Botrychium lanuginosum* | Ophioglossaceae | Native |
| 78 | *Ophioglossum reticulatum* | Ophioglossaceae | Native |
| 79 | *Osmunda cinnamomea* | Osmundaceae | Native |
| 80 | *Osmunda japonica* | Osmundaceae | Native |
| 81 | *Drynaria quercifolia* | Polypodiaceae | Native |
| 82 | *Lemnaphyllum microphyllum* | Polypodiaceae | Native |
| 83 | *Arthromeris mairei* | Polypodiaceae | Native |
| 84 | *Arthromeris wallichiana* | Polypodiaceae | Native |
| 85 | *Leptochilus deccurrens* | Polypodiaceae | Native |
| 86 | *Leptochilus insignis* | Polypodiaceae | Native |
| 87 | *Leptochilus pteropus* | Polypodiaceae | Native |
| 88 | *Microsorium membranaceum* | Polypodiaceae | Native |
| 89 | *Microsorum punctatum* | Polypodiaceae | Native |
| 90 | *Phymatosorus cuspidatus* | Polypodiaceae | Native |
| 91 | *Pyrrosia costata* | Polypodiaceae | Native |
| 92 | *Pyrrosia lanceolata* | Polypodiaceae | Native |
| 93 | *Pyrrosia mannii* | Polypodiaceae | Native |
| 94 | *Pyrrosia nuda* | Polypodiaceae | Native |
| 95 | *Pyrrosia porosa* | Polypodiaceae | Native |
| 96 | *Pyrrosia nummulariaefolia* | Polypodiaceae | Native |
| 97 | *Belvisia henryi* | Polypodicaeae | Native |
| 98 | *Colysis elliptica* | Polypodicaeae | Native |
| 99 | *colysis hemionitidae* | Polypodicaeae | Native |
| 100 | *Colysis pedunculata* | Polypodicaeae | Native |
| 101 | *Drymoglossum piloselloides* | Polypodicaeae | Native |
| 102 | *Pseudodrynaria coronans* | Polypodicaeae | Native |
| 103 | *Drynaria propinqua* | Polypodicaeae | Native |
| 104 | *Lemmaphyllum carnosum* | Polypodicaeae | Native |
| 105 | *Lemmaphyllum rostratum* | Polypodicaeae | Native |
| 106 | *Lepisorus contortus* | Polypodicaeae | Native |
| 107 | *Lepisorus sublinearis* | Polypodicaeae | Native |
| 108 | *Lepisorus thunbergianus* | Polypodicaeae | Native |
| 109 | *Aleuritopteris bicolor* | Pteridaceae | Native |
| 110 | *Onychium siliculosum* | Pteridaceae | Native |
| 111 | *Pityrogramma calomelanos* | Pteridaceae | Native |
| 112 | *Pteris biaurita* | Pteridaceae | Native |
| 113 | *Pteris cretica* | Pteridaceae | Native |
| 114 | *Pteris normalis* | Pteridaceae | Native |
| 115 | *Adiantum capillus-veneris* | Pteridaceae | Native |
| 116 | *Adiantum philippense* | Pteridaceae | Native |
| 117 | *Cheilanthes tenuifolia* | Pteridaceae | Introduced |
| 118 | *Coniogramme fraxinea* | Pteridaceae | Native |
| 119 | *Onychium japonicum* | Pteridaceae | Introduced |
| 120 | *Pteris arisanensis* | Pteridaceae | Native |

| Sl. No. | Scientific Name | Family | Status |
|---|---|---|---|
| 121 | *Pteris assamica* | Pteridaceae | Native |
| 122 | *Pteris semipinnata* | Pteridaceae | Native |
| 123 | *Pteris ensiformis* | Pteridaceae | Native |
| 124 | *Pteris longipinnula* | Pteridaceae | Native |
| 125 | *Pteris pseudopellucida* | Pteridaceae | Native |
| 126 | *Pteris vittata* | Pteridaceae | Native |
| 127 | *Pteris wallichiana* | Pteridaceae | Native |
| 128 | *Lycopodiella cernua* | Selaginellaceae | Native |
| 129 | *Selaginella helferi* | Selaginellaceae | Native |
| 130 | *Selaginella inaequalifolia* | Selaginellaceae | Native |
| 131 | *Selaginella pentagona* | Selaginellaceae | Native |
| 132 | *Thelypteris aurita* | Thelypteridaceae | Native |
| 133 | *Thelypteris auriculata* | Thelypteridaceae | Native |
| 134 | *Thelypteris arida* | Thelypteridaceae | Native |
| 135 | *Thelyptris crinipes* | Thelypteridaceae | Native |
| 136 | *Thelypteris dentata* | Thelypteridaceae | Native |
| 137 | *Thelypteris lakhimpurensis* | Thelypteridaceae | Native |
| 138 | *Thelypteris torresiana* | Thelypteridaceae | Native |
| 139 | *Thelypteris nudata* | Thelypteridaceae | Native |
| 140 | *Thelypteris ornata* | Thelypteridaceae | Native |
| 141 | *Thelypteris procera* | Thelypteridaceae | Native |
| 142 | *Thelypteris rectangularis* | Thelypteridaceae | Native |
| 143 | *Thelypteris tenera* | Thelypteridaceae | Native |
| 144 | *Thelypteris loyalii* | Thelypteridaceae | Native |
| 145 | *Antrophyum reticulatu* | Vittariaceae | Native |
| 146 | *Vittaria elongata* | Vittariaceae | Native |
| 147 | *Diplazium esculentum* | Woodsiaceae | Native |
| 148 | *Diplazium donianum* | Woodsiaceae | Native |
| 149 | *Deparia boryana* | Woodsiaceae | Native |
| 150 | *Diplazium chattagramicum* | Woodsiaceae | Native |
| 151 | *Diplazium crinitum* | Woodsiaceae | Native |
| 152 | *Diplazium dilatatum* | Woodsiaceae | Native |
| 153 | *Diplazium latifolium* | Woodsiaceae | Native |
| 154 | *Diplazium sikkimense* | Woodsiaceae | Native |

# Annexure 3 – Grant in Aid

| Sl. No. | Component | Amount |
|---|---|---|
| 1 | Salary | 11,800,000 |
| 2 | Door to door garbage collection and solid waste management | 120,000,000 |
| 3 | Solid waste management | 60,000,000 |
| 4 | 14th Finance Commission Grant | 891,480,000 |
| 5 | 15th Finance Commission Grant | 445,800,000 |
| | **Total** | **1,529,080,000** |

# Annexure 4 – Biodiversity Management Committee

| Sl.No. | Designation | Role |
|---|---|---|
| 1 | Deputy Commissioner cum Administrator | Chairperson |
| 2 | Extra Assistant Commissioner | Member |
| 3 | Administrative Officer | Member |
| 4 | Finance and Account Officer | Member |
| 5 | Forest Range Officer | Member |
| 6 | Extra Assistant Commissioner (IMC) | Member Secretary |


Thupten Gatsaling

# NOTES

**ICLEI - Local Governments for Sustainability, South Asia**
C-3 Lower Ground Floor, Green Park Extension, New Delhi – 110016, India
Tel: +91–11–4974 7200;
Email: iclei-southasia@iclei.org

**Arunachal Pradesh Biodiversity Board**
Van Vihar, Chimpu, Itanagar - 791 113, Arunachal Pradesh
Email: apbb2010@gmail.com