Local Biodiversity Strategy And Action Plan for Mira Bhaindar Municipal Corporation

December 2020

Prepared by
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LOCAL BIODIVERSITY STRATEGY AND ACTION PLAN (LBSAP)

MIRA BHAINDAR CITY

December 2020

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Acknowledgement

We are thankful to Mayor of Mira Bhaindar City and Municipal Commissioner, Mira Bhaindar Municipal Corporation (MBMC) for assigning us this unique opportunity to prepare Local Biodiversity Strategy and Action Plan (LBSAP) for Mira Bhaindar city.

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Ashok Jain
Managing Director

Executive Summary

In these times of rapid decline of biodiversity due to urbanization and climate change, conservation efforts are an urgent need. Biodiversity Conservation efforts at a local scale are of immense significance depicted by the saying 'local actions have global implications'. The global Aichi Targets 2020, National Biodiversity strategy and action plan (NBSAP) of India, National Biodiversity Targets (NBTs) all begin with the local action, which is guided by the LBSAP i.e. Local Biodiversity strategy and action plan. LBSAP, along with the city biodiversity index, identifies biodiversity – the existing biodiversity and the strength and weaknesses in its management methods and formulates better strategies for the conservation of the urban biodiversity.

Mira-Bhaindar City has been evaluated by the city biodiversity index, which provided an overview of the biodiversity. The city consists of incredible diversity of habitats, such as Mangroves, fresh water swamps, waterbodies like lakes and river, dry deciduous forests and urban greenery called 'dense green patches'. These habitats hold unique biodiversity. The unique floral species include the Burma Mangrove (*Bruguiera gymnorrhiza*), the Ylang Ylang tree (*Cananga odorata*), Rusty Acacia (*Acacia ferruginea*) – a globally VULNERABLE species as per the IUCN. Orchids like Foxtail Orchid (*Rhynchostylis retusa*), Ground yellow orchid (*Habenaria marginata*), etc. are recorded from the forests of Mira-Bhaindar City. Many other species of butterflies, birds, reptiles and mammals are present in the city owing to its proximity to the Sanjay Gandhi National Park. However, the increasing urbanization leading to loss of natural habitats that supports all this biodiversity is a matter of concern. Hence, it is essential to identify the need of these habitats and take suitable efforts urgently before this natural heritage is inadvertently lost to the city forever. These suitable conservation efforts are elaborated in the present report.

Taxa	Species
Trees	257
Shrubs and climbers	132
Herbs and grasses	340
Butterflies	94
Birds	223
Amphibians	5
Reptiles	17
Mammals	21

This Local Biodiversity Strategy and Action Plan (LBSAP) for the city of Mira-Bhaindar is prepared based on baseline study for preparation of the Public Biodiversity Register (PBR), City Biodiversity Index and discussions the various government and non-government stakeholders. Some other biodiversity management projects like mangrove restoration, creation of 'Biodiversity Park' in the city also supplement the formulation of LBSAP for Mira-Bhaindar City. Based on these references and elaborate discussions with the stakeholders, following the strategies are designed for the conservation of the city's Biodiversity –

- Awareness about the biodiversity and the environment
- Promotion of Native Biodiversity
- Promotion of collaboration with key stakeholders
- Management of invasive species
- Promotion of Eco-tourism in the City
- Improvement of 'Habitat Connectivity' in the City
- Waterbody Conservation
- Increasing greenery in the Concrete; and
- Animal conflict mitigation
- Online Portal for Biodiversity under 'Citizen Science Initiative'

The report elaborates these strategies and their implementable action plans while justifying them with the help of the concept, methodology of implementation, agencies and locations for implementation. Various tables in the report explain the costing and the time matrix for this implementation that supports the priority matrix of the measures. To explain these strategies in brief –

- **Biodiversity and Environment Awareness**

Awareness is the key to gaining the community support for conservation efforts. The feeling of belonging with the nature and the species belonging to the community encourages positive action from the people and acceptance of the favourable changes in policies implemented by the management. Hence, activities like *installation of posters and signage* all over the city and in biodiversity-rich areas that highlight the beautiful species in the vicinity. *Awareness sessions* organized and delivered by NGOs working for Biodiversity conservation would take people closer to understanding biodiversity in their surroundings and connect them with it better. Awareness can be created and inculcated into lives further by *celebrating global and national days* dedicated to environment and biodiversity. The MBMC is suggested to organize city-level events like seminars, photography competitions, nature walks in accordance with the theme of the days to enhance the citizens' understanding and feelings towards nature. Publishing a *coffee table book* and *short film on biodiversity of Mira-Bhaindar City* are suggested to increase the charm of city's natural heritage.

- **Promotion of Native Biodiversity**

For the city biodiversity index, the statistics of native and exotic biodiversity in the city has been evaluated. Although MBMC has been found to have greater percentage of native species of plants, birds and other species, their inculcation in the urban greenery is lacking. To inculcate native species in the green spaces of the city, the *nurseries* in Mira-Bhaindar City have to be equipped with the saplings of native species. These saplings will come in handy when the species are to be added in the existing or new gardens, green spaces and even private gardens.

- **Collaboration with NGOs**

The city biodiversity index evaluated the efforts in conservation based on the number of organizations the municipal corporation collaborated with to formulate and implement conservation measures. This strategy aims to increase the score of the city for this indicator. Implementable agencies have been mentioned with the strategies that can benefit from collaborations.

- **Management of invasive alien species**

Pigeons are notorious invasive birds that have many ill-effects on the biodiversity as well as human lives. They have proliferated in the city due to the infrastructure that imitates their natural habitats and support all their needs. To curb this population in order to make space for the native biodiversity, measures the would discourage the bird like *shutting down of kabutar khanas*, *fine on feeding the pigeons* and *promotion of native birds* by creating habitats that deters pigeons are suggested.

While promoting the native diversity, it is important to eliminate factors that hinder the establishment of native species in the first place. One such factor is presence of exotic species which take up habitats and threaten the presence of native species. *Mapping of the existing populations of invasive alien species* in the city and *subsequent planning of the strategies for their population management* is suggested in the report.

- **Participatory Ecotourism for Biodiversity Park**

Merging biodiversity with tourism has proven to be successful. A similar model can be replicated in the *Jamdar Pada* village of Mira-Bhaindar City, which is a fisherfolk village surrounded with great

habitats and immense biodiversity. Promotion of this model village for ecotourism will generate livelihood for the community and encourage more villages to follow the suit. The system aims to create harmony between human activities, biodiversity and sustainable living.

- **Improvement of habitat connectivity in the city**

When biodiversity is concerned, creating and conserving isolated habitats is not enough. The faunal diversity especially has a tendency of migrating and changing localities. To facilitate this while ensuring safety of the animals, it is essential to connect the different pockets of habitats in the city. These connections can be created in the form of *roadside plantations* and *median plantations*. Thoughtfully selected native species that attract and support faunal diversity is suggested along the roads and the in medians.

- **Increasing greenery in grey**

Urbanization affects natural habitats mainly due to concretization. But these concrete structures can still be used efficiently for creation of greenery but introducing *vertical gardens* and *terrace gardens* in the city. Vertical gardens can be created in locations like metro bridge pillars, public buildings, compound walls, etc. Terrace gardens can be employed in government office buildings, residential complexes, etc. There are multiple benefits of these gardens which are discussed elaborately in the report.

- **Prevention of Animal-vehicle collisions**

Faunal diversity is affected due to human and vehicle traffic in the cities. To help them find a safe passage, measures have been suggested in the present report. These measures include studying animal mortality rate due to collision with vehicles followed by analysis of the causes and formulation of possible solutions. Popular possible solutions implemented worldwide and suitable for the city from survey of the major roads in the city are *installation of reflection boards* that deter animals from crossing roads when vehicles are approaching; and construction of *Canopy Bridge* at the identified location in the city.

- **Online portal for Biodiversity under 'Citizen Science' Initiative**

One-stop guide and documentation of the city's biodiversity on an online portal is suggested. The portal will created and maintained by MBMC. The inputs will be provided by the students and citizens of the city which will be guided periodically by local naturalists. The naturalists will conduct guided nature trails and help with sighting and identifying the biodiversity in the city. The inputs will also be curated by these naturalists to avoid false information. Thus, a reliable, scientific database will be created of Mira-Bhaindar City. Taking help from citizens will encourage conservation and support to biodiversity conservation activities.

These measures are analysed for their feasibility, cost efficiency and duration of implementation. The measures will not only make Mira-Bhaindar City more conscious and suitable for its rich biodiversity but also increase the city biodiversity index incredibly.

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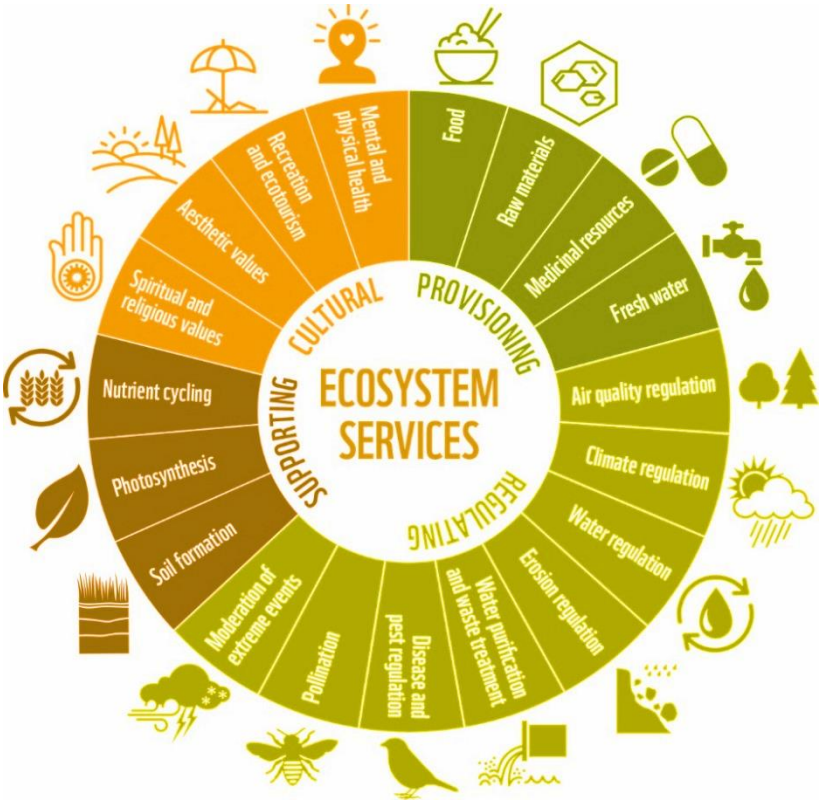
Biodiversity and Ecosystem Services

Our planet is a home to a very wide range of life forms from microscopic bacteria to huge mammals like whales and elephants. They exist in different biomes from hot deserts of tropics to cold mountains and poles. Thus, Earth depicts a huge biological diversity in its diverse ecosystems.

Biodiversity, an abbreviation of the phrase biological diversity, is a complex topic, covering many aspects of biological variation. In popular usage, the word biodiversity generally refers to all the individuals and species living in a particular area. If we consider this area at its largest scale—the entire world—then biodiversity can be summarized as "life on earth." It covers all the living organisms from common to critically endangered species. Along with the living species, biodiversity also includes various habitats that provide shelter and food to organisms. It highlights the interconnections and interdependence of habitats and species. Biodiversity is defined as the variety of life on earth at all its levels, from genes to biogeographic regions, and the ecological and evolutionary processes that sustain it.

The ecosystem services are expounded under 4 classes, labelled as provisioning, regulating, habitat or supporting services and cultural services. Noteworthy provisioning services such as fresh water ecosystem for providing water to cities , the vegetation and forests influencing the quantity of water available, the medicinal resources provided by the diverse ecosystems play essential role along with a range of important regulating services, like the clean air quality and cool micro climatic conditions, carbon sequestration and storage, protection against natural disasters and waste water treatments, habitats for species and cultural services like the recreational and psychological and physical health facilities and aesthetics. Thus, healthy ecosystems are the foundation for the cities' local economy to thrive, reduce municipal costs and provide its citizens with an enhanced quality of life and secured livelihoods.



Scenario of increasing population and urban areas

Cities personify growth and act as hub of opportunities and economic progress. They are the major contributors to the nations' GDP. Indian cities with nearly one third of the population contribute three fourth of the GDP and 90 percent of government revenue. Thus, increased urbanization reflect higher per capita income and globally economists believe that nearly all countries become 50% urbanized till they reach the middle income status and all high income countries are about 70-80% urbanized.

An increased level of urbanization is a consequence of both - growth in the human population and the percentage of people desiring to live in urban areas. Globally, only 13% of the world population lived in the cities in 1900. It increased to 3.2 billion that is 49% of the world population in 2005 and in 2030 it is expected to reach 60% of the world's population (CBD, 2012). Urbanization is both a challenge and an opportunity for managing ecosystem services globally. Less than 2% of the earth's surface is occupied by urban areas but this accommodates 3.5 billion people viz. 50% of the world's population.

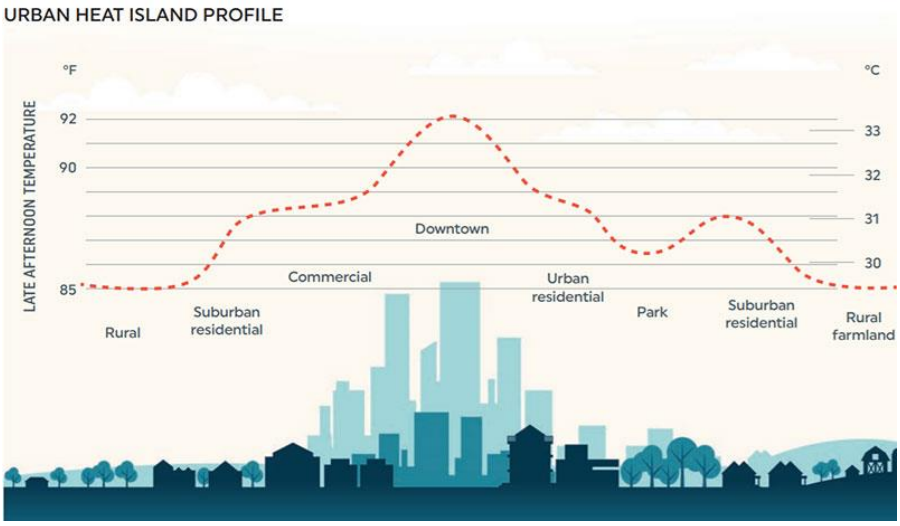
The CBD estimates that by 2050 the global urban population will be almost double of the 2010 urban population. The statistics also reveal that 60% of the area that is projected to be urban in 2030 is yet to be built and most of this growth is due in small and medium towns and not in megacities. This rapid urbanization will heavily tell upon our critical natural capital reserves, gobbling prime agricultural lands, increased water consumption and subsequently slaying biodiversity and ecosystem services.

Urban expansion is occurring fast in areas adjacent to biodiversity hotspot areas and faster in low elevation that are geographically plain areas and biodiversity rich coastal zones. It will also cause an increase in urban heat Island effect.

The massive urbanization in India can be expressed by the fact that today 30% of India's urban population forms around 11% of the world's urban population, and by 2031 Indian cities will be home to 15% of the world's urban population. Despite the current low level and slow pace of urbanization in India, the sheer magnitude or volume of urban population is a matter of concern. India is booming with an urban population from the last decade. The increase is larger than the increase in urban population of many other countries. Therefore, it is imperative to understand urbanization despite low levels, as its magnitude in India is the second largest in the world (CBD, 2012).

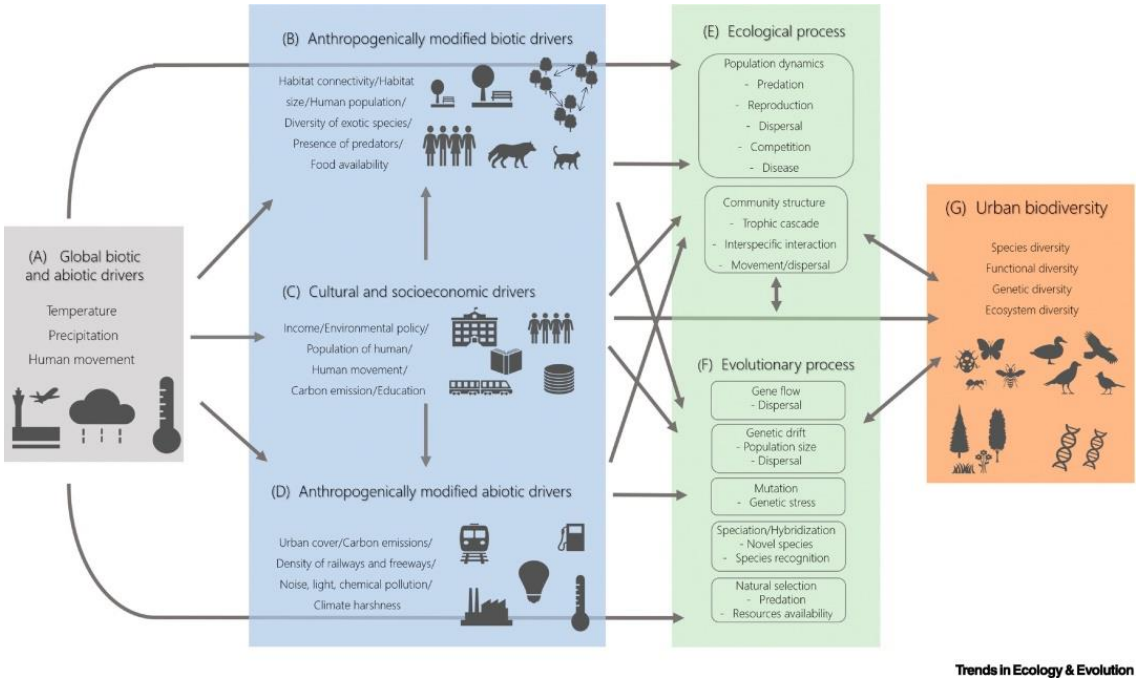
MBMC Market; Photo credit: Free Press Journal

Heat Islands



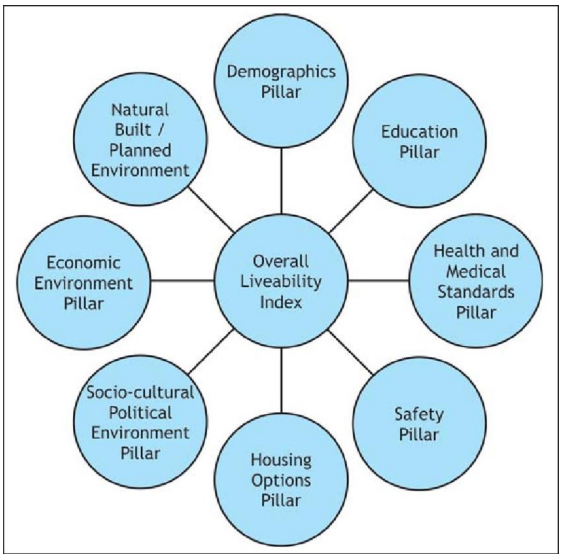
Heat islands or Urban Heat Islands are defined as urban areas that are significantly hotter (1-3 degree Celsius) than surrounding rural areas. This effect is amplified during the evenings and night time than during the day. Heat islands are created as urban areas develop; we have more concrete buildings, roads and pavement. Because of the properties of concrete and other materials like glass, that govern urban settings, the urban area is categorized as surfaces with high absorption and low reflectivity. When the sun heats these surfaces up, they absorb the heat and rise up to extreme temperatures. The annual mean air temperature of a city becomes warmer than its surroundings. Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality. Increasing tree and vegetative cover, installing green roofs, installing cool—mainly reflective—roofs, using cool pavements (either reflective or permeable), and utilizing smart growth practices can minimize the effects of heat islands.

Urban Biodiversity

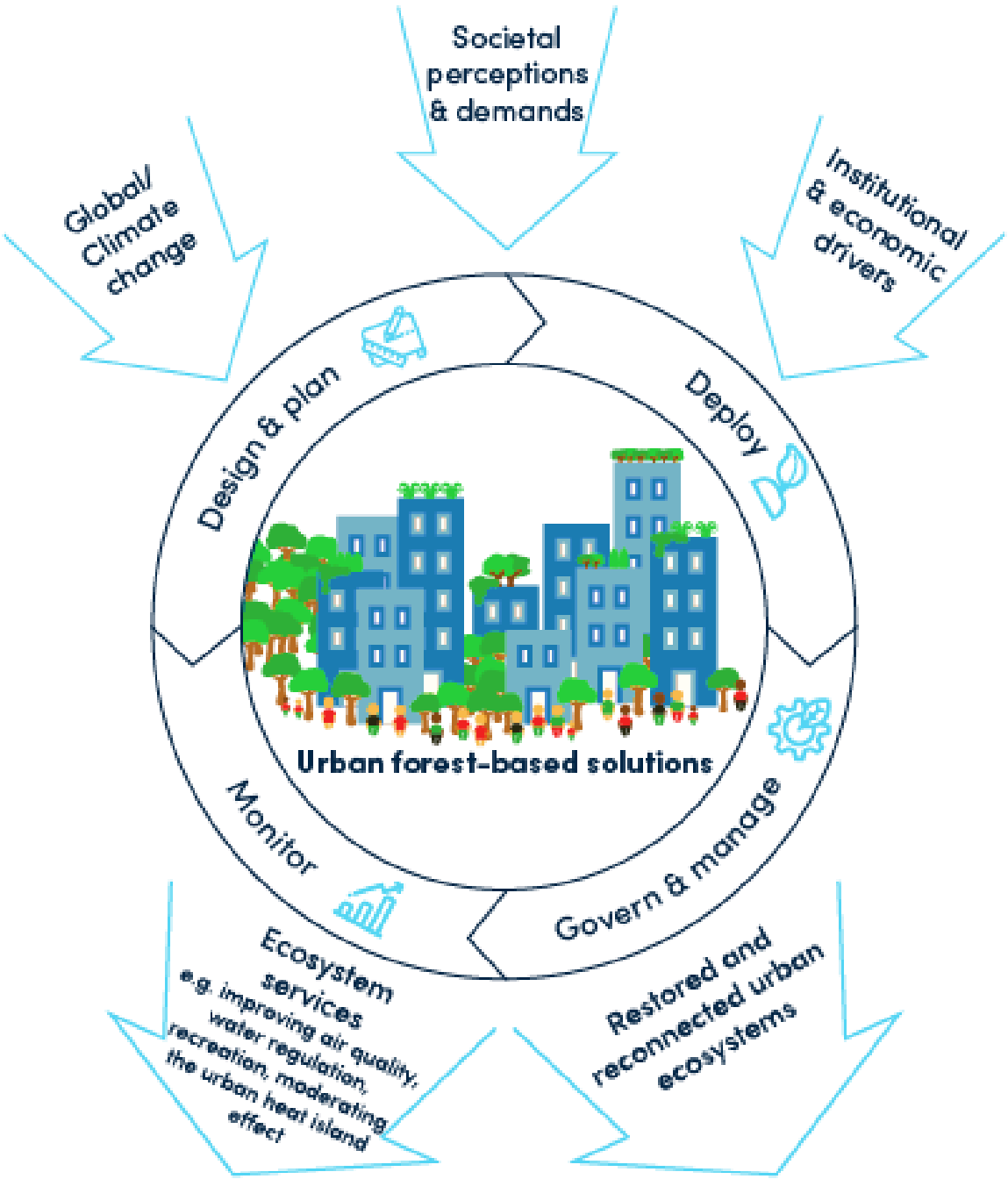


With the continual growth of the world's urban population, biodiversity in towns and cities will play a critical role in global biodiversity. India already contains three of the world's ten largest cities that are Mumbai, Kolkata and Delhi. India also has the world's ten fastest growing cities which are Ghaziabad, Faridabad and Surat (CBD, 2012). This rapid urbanization will have significant implications on the city's environment, ecology and sustainability. Moreover, urbanization, refurbishes the rural surroundings landscape, revamps standard of living, increases natural resource consumption and ecosystem services, changes livelihood and create wastes, often dumped in the rural hinterland, increasing the ecological footprint of the cities. An unplanned rampant urbanization will cause severe loss of biodiversity and unscrupulous exploitation of ecosystems thereby degrading their services. Thus, for healthy urban habitats, it is necessary that city administrators not only build upon the grey infrastructure (housing, physical and social infrastructure) but also protect, conserve and build upon the green infrastructure.

As in most developing countries, it is the rural parts of the country that drive India's governments but its economy is increasingly being determined by cities, as densely packed networks of economic activity, cities create opportunities for the growth of both labor and consumer markets. Yet, India's largest cities are faced with numerous crises such as clogging with polluted air, choked transportation networks, and broken real estate markets that make housing unaffordable for their residents. These issues left unaddressed lower the index of city liveability, and of the Indian economy as a whole.



Today cities require a healthy natural environment that continues to provide a range of benefits called as ecosystem services like the clean air, water, protection from floods that will ensure better quality of life. The cities can remain healthy by integrating ecosystem services and biodiversity in city urban planning and management incorporating green infrastructure in the grey areas. There is also a need to integrate citizen participation and capacity building of the ULBs as mandatory mechanisms to achieve liveability in Indian cities. An ecologically planned land use development with reduced pressure on biodiversity can guide the city to achieve its objectives of sustainable development. These are also prime strategies of the Aichi Targets to be achieved by 2020. The Aichi Targets also talk about safeguarding eco system services, species and genetic diversity, enhance the benefits to all from biodiversity and ecosystem services and the targets have to be implemented through urban ecological planning and capacity building.



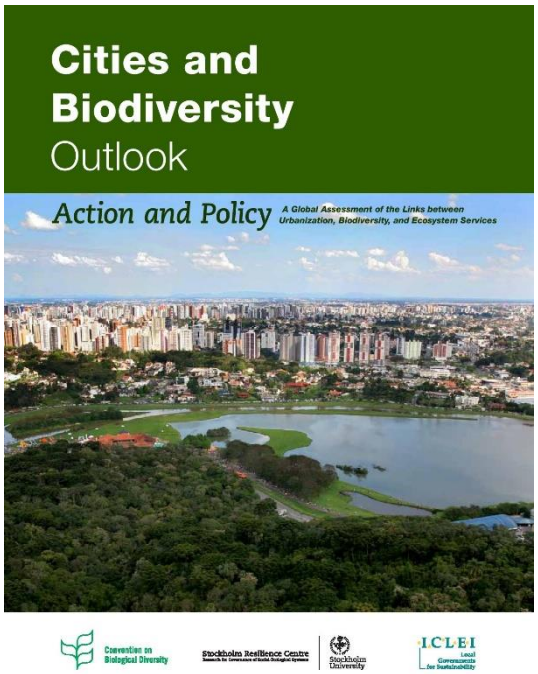
Human well-being e.g related to public health, liveability, social inclusion	Biodiversity benefits
Sustainable urban development	

CBD and Urban Biodiversity

There is a growing attentiveness among the societies that biological diversity is a global asset of incredible value to present and forthcoming generations. At the same time, the threat to species and their environments has never been as great as it is today. Species extinction caused by human activities continues at an alarming rate. With due consideration of this fact, convention of biological diversity (hereafter referred as the CBD) was effectively initiated by United Nations Environment Programme (UNEP) in 1993 with the following three objectives:

- **The conservation of biological diversity**
- **The sustainable use of the components of biological diversity**
- **The fair and equitable sharing of the benefits arising out of the utilization of genetic resources**

In decision X/2, the tenth meeting of the Conference of the Parties to the CBD (COP 10), held in 2010 in Nagoya, Japan, adopted a revised and updated Strategic Plan for Biodiversity 2011-2020, including twenty Aichi Biodiversity Targets. This plan provides an overarching framework on biodiversity for Parties to the CBD and all others involved in biodiversity management and policy development (Secretariat of Convention of Biological Diversity, 2013). According to the articles 6, 10a and 26 of the CBD, all the parties need to report their current status of biodiversity, the ongoing conservation programmes and develop policy instruments for sustainable use of biological resources (Secretariat of Convention of Biological Diversity, 2011). This resulted in all the parties to the CBD requiring developing National Biodiversity Strategic and Action Plans (NBSAP) for bringing biodiversity conservation in sectorial and cross-sectorial activities.



Cities and Biodiversity outlook; Report by CBD

To translate the targets of the CBD into concrete plans and workable actions, it was important to bring policy and action changes at sub-national and local levels. The United Nations University Institute of Advanced Studies argued that (UNU-IAS) NBSAPs will have limited impact on the ground if they are not translated into sub-national actions. One of the ways of achieving this is through the development of biodiversity strategies and action plans at Provincial, State, and/or local levels as distinct planning instruments. This gave rise to development of State Biodiversity Strategy and Action Plan (SBSAP) and Local Biodiversity Strategy and Action Plan (LBSAP) at state and local levels.

*The **Convention on Biological Diversity (CBD)** is one of the three "Rio Conventions", emerging from the UN conference on Environment and Development, also known as the 'Earth Summit'. This conference was held in Rio de Janerio in 1992. CBD entered into force on 29th December 1993. It was inspired by the world community's growing commitment to sustainable development. The CBD is a comprehensive, binding agreement covering the use and conservation of biodiversity. It requires countries to develop and implement strategies for sustainable use and protection of biodiversity, and provides a forum for continuing international dialogue on biodiversity-related issues through the conferences of the parties (COPs). There are currently 194 parties (countries) to the convention.*

India is a party to the convention on biological diversity since 19th May 1994. Pursuant to the CBD, a first major step was the development of the National Policy and Macro level Action Strategy that called for consolidating existing biodiversity conservation programmes and initiating new steps in conformity with the spirit of the Convention. The 'National Biodiversity Strategy and Action Plan (NBSAP)' was formulated in the year 2008 and then revised in 2014. It defines targets, activities and associated agencies for achieving the goals, drawing upon the main principle in the National Environment Policy (NEP) that human beings are at the centre of concerns of sustainable development and they are entitled to a healthy and productive life in harmony with nature. As a part of NBSAP, India developed 12 National Biodiversity targets which are in alignment with the AICHI targets formed by CBD. (Refer Aichi Target Box for details)

Following the ratification of CBD and after widespread consultations, India also enacted the Biological Diversity Act in 2002 and notified the Rules in 2004, to give effect to the provisions of the CBD, including those relating to its third objective on Access and Benefit Sharing (ABS). India was one of the first few countries to enact such legislation. The Act is to be implemented through a three-tiered institutional structure: National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), Biodiversity Management Committees (BMCs) at the local level, in line with the provisions for decentralized governance contained in the Constitution. The Biological Diversity Act is a path-breaking and progressive legislation which has the potential to positively impact biodiversity conservation in the country

Local Biodiversity Strategy and Action Plan

LBSAP primarily is a document that spells out the strategies and action plan for preservation of the green (that also contains the blue infrastructure – the water bodies like rivers, lakes, ponds, creeks, wetlands) infrastructure (hubs and corridors, sacred groves, open spaces, parks, farm lands) or land conservation as well as its integration with the grey infrastructure that is the built infrastructure constituting of both the physical and social infrastructure and the restoration of the brown field sites that is the degraded or the derelict lands. In other words, LBSAP is a document that enables integration of ecological (that is biodiversity and ecosystem services) and environmental planning with urban planning and management. The document advocates for green development and maintenance of green assets and also propagates green economy that will make urban habitats more sustainable and liveable.

The first mention of the idea of "Think global, act local" is traced back in the book entitled "Cities in Evolution" by Scottish town planner, biologist and social activist Patrick Geddes. Since then, it has been used by many different people from distinct parts of the world in different subjects but precisely in environmental strategies. It proposes to take actions at a local level while aiming a larger goal (Think Globally, Act Locally, 2018). Biodiversity conservation also blends with this concept and requires practical implementation at local levels. Steps to conserve biodiversity at local levels help conserve different gene pools of a species and promotes its further survival and longevity on a global scale.

The LBSAP is to be prepared by the local city governments of nations who were signatories to the Convention on Biological Diversity (CBD) at the tenth meeting of the convention. India, being a party to the Convention has endorsed the decision of preparing a Plan of action at the National, sub – national governments, cities and other local authorities for preserving Biodiversity. The country is ready with its plan of actions at the national level. However, conservation of biodiversity and ecosystem services requires both top down and bottom up approach. For abetting the implementation of the CBD and the Aichi Biodiversity targets, efforts have to be made at the national, sub-national or the state, regional that is at the district level and most essentially at the local level that is at the city and the village level who are directly affected by the loss of biodiversity and therefore can pal a crucial role in preservation, enhancement and management of ecosystem services.

LBSAP is a guide for the local authorities to undertake practical measures for conserving biodiversity and ecosystem services. It runs on lines of national biodiversity strategy and action plan (NBSAP) of a country at a smaller spatial scale. It was first formally acknowledged in decision X/22 at the 10th meeting of conference of parties (COP 10) to the Convention on Biological Diversity (CBD COP 10) in Nagoya, Japan, in October 2010. The decision solicits to encourage local governments to develop and implement LBSAPs in support of NBSAPs and indeed, in support of the Convention. An LBSAP can be a stand-alone document, but only incorporation of its core principles into broader city plans are creditable because virtually all line functions are affected by, and impact on biodiversity.

Profile of Mira Bhaindar City

History

Mira Bhaindar is a city which has its own Historic value. It was an important port for business during past. This port has seen some most important Historic Legends right from Alexander to Peshwas and some great kings who have travelled through this port. The city is surrounded by big mountains on both the side boundaries along with Arabian Sea guarding the west side of the city. The city has a rich natural heritage of Sanjay Gandhi National Park, Vasai Creek, Beaches of Gorai and Uttan, and the historic heritage of Ghodbunder Fort. So the city of Bhaindar is situated in the heart of the nature.

Being a neighbouring city of Mumbai, the growth of the city is tremendous still the city has managed to keep its originality like small scale industries, farming, fishing, sand and salt cultivation as its major business. The small scale industry situated in Bhaindar (E) ranks Third in Asia. Agri and Koli are the original residents of this city, but there are people of all other religion and casts.

On 12th June 1985, five gram panchayats naming Bhayandar, Kashi, Mira, Navghar and Ghodbunder were integrated to form Mira Bhayandar Municipal Corporation. In 1990, the city got extended by including 4 other gram panchayats named Chena, Varsova, Rai – Murdhe, Dongri – Uttan.

City Description

Mira-Bhaindar area is situated at the northern threshold of Brihan Mumbai Metropolis and has been identified as one of the growth centres. The city has gradually developed into an important residential locality due to its proximity to Mumbai and the lower cost of living. Bhaindar is divided into two parts by the Mumbai suburban rail line - East and West. The West was traditionally residential, and the East was predominantly an industrial area.

Recent population growth and a flurry of construction have blurred the boundaries between Bhaindar and neighbouring Mira Road on the East side of the rail tracks, turning it into a populous suburb. Government-owned Salt Pans and marshland in West Mira Road have restricted the southward spread of Bhaindar. Mira Road is situated on the island Salcette. A marshy creek divides Mira Road from Mumbai. Earlier, Mira Road was divided into two main parts, Shanti Nagar and Naya Nagar. In recent times, several new localities like Jangid, Silver Park, Beverly Park, and Evershine Enclave have come up. Shanti Nagar is a cosmopolitan locality.

Location

Mira-Bhaindar is a city, in the district of Thane with an area 79.4 sq. km., in the western state of Maharashtra, in India, located around 20 km. to the north of Mumbai on the Mumbai-Ahmedabad highway. It lies between 72046'41.93"E and 72056'27.27"E and 19019'11.4"N and 19014'14.73"N.

Physical Features

The city of Mira-Bhaindar falls on the Deccan lava terrain. Geographically, it is located in the northern part of the Konkan region, in the west of the Sahyadri hill range. The rich forest of Sanjay Gandhi National Park lies in the east of the city boundary and the Arabian Sea to the west. The city is flanked by Vasai creek in the north and Manori creek in the south. Beyond Manori creek lies the urban expanse of Mumbai city.

Demography

According to the Census, 2011, the total population of MBMC is 809,378; of which males and females are 429,260 and 380,118 respectively. Although Mira and Bhaindar city has population of 809,378; its urban / metropolitan population is 18,394,912 of which 9,872,271 are males and 8,522,641 are females.

Mira-Bhaindar City	Total
City Population	809,378
Literates	656,293
Children (0-6)	88,015
Average Literacy (%)	90.98 %
Sex Ratio	886
Child Sex Ratio	898

Climate

The climate in October is wet and hot followed by cool and pleasant weather from December to February and dry and hot weather from March to June. The climate of Mira-Bhaindar is typically coastal, sultry, and not hot. There are virtually two distinct seasons, namely Monsoon and dry season. The dry season includes summer and winter.

Rainfall

The rainy season starts at the beginning of June and ends in the last week of September. Annual mean rainfall of 2400 mm. The maximum rainfall occurs in July averaging to 800 mm.

Humidity

The humidity ranges from 49% to 87% with the highest humidity in July.

Ecosystems and Biodiversity

Mira Bhaindar city is surrounded by creek on one side and the forest on the other, resulting in rich biodiversity in its vicinity. It is home to more than 200 species of birds, various species of reptiles and amphibians, and large as well as small wild mammals. Due to its proximity to Sanjay Gandhi National Park, there have been sightings of the Leopard in the boundaries of the city limits.

Creek area shelters rich diversity of birds due to the presence of the Mangrove forest. Mangroves here consists of *Avicennia marina*, *Rhizophora mucronata*, *Salvadora persica*, *Acanthus ilicifolius*, etc. Mangroves are known to shelter fishes, birds, reptiles, and even some mammals. Mangrove forests of Mira Bhaindar provide resting and roosting place to native as well as migratory bird species, making these forests as an important component for sustaining the annual migration of these birds. Apart from the birds, mangrove swamps act as nursaries for fishes and other marine animals. Bhaindar has locals harvesting crabs and fishes for their survival as well as, as a source of earning.

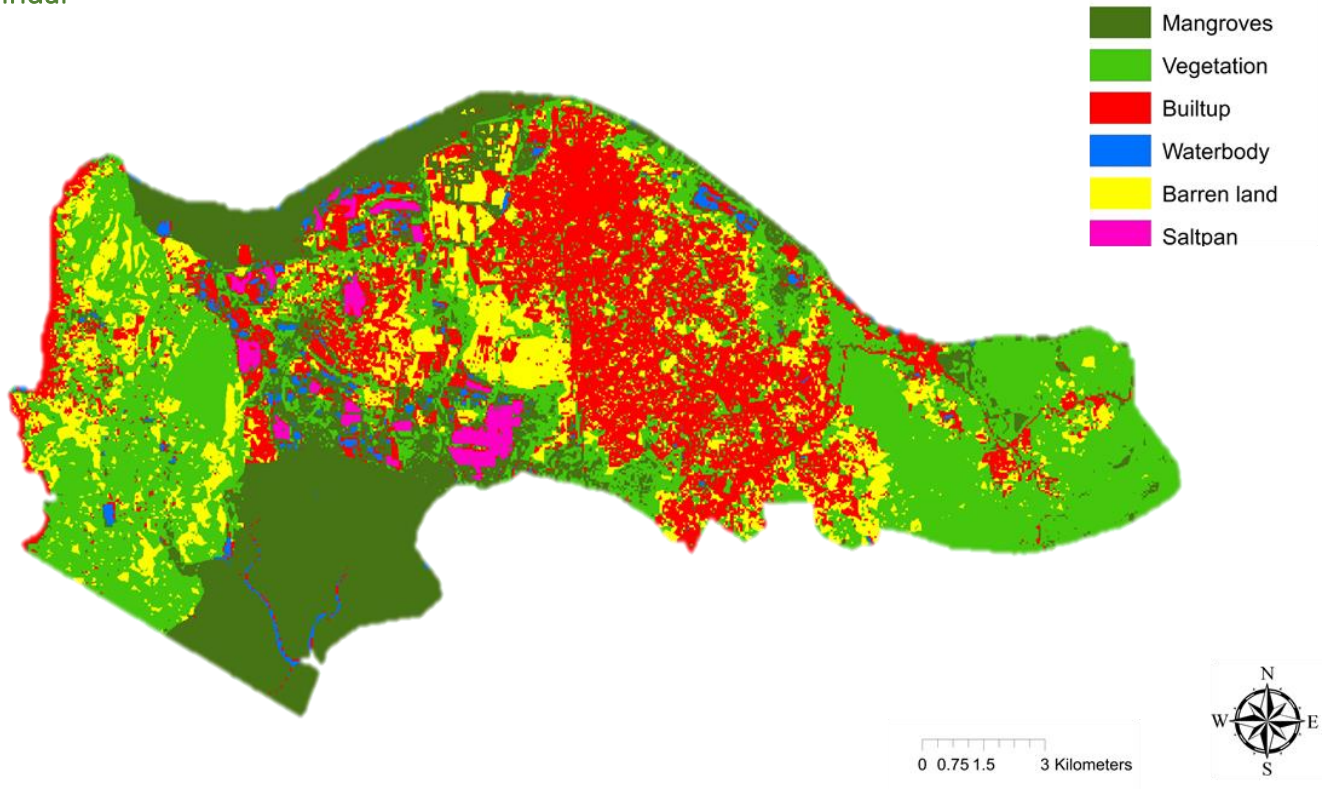
The Forest side of the city is separated by a major road, connecting the MBMC city to Thane city on the east and Vasai-Virar on the north. This forest is home to many rare and endangered species of animals as well as plants. Reptiles like Indian Rock Python, Russell ’s viper, Indian Spectacled Cobra etc. are commonly found reptiles in this patch.

The urban fauna includes species of birds like House Sparrow, House Crow, Black Kite, etc. and an Invasive species of bird which is Blue Rock Pigeon. Some birds like Cattle Egret, Little Egret, White-spotted Fantail, etc. have been observed in urban infrastructure such as gardens, drainage, buildings, green spaces, etc. adding to the urban diversity of the city.

Recorded Biodiversity of MBMC		
Taxa		Number of Species
Flora	Trees	257
	Shrubs	63
	Herbs	273
	Climbers	69
	Orchids	4
	Grass	67
	Mangroves	10
Fauna	Amphibians	5
	Birds	223
	Butterflies	94
	Crustaceans	4
	Fish	11
	Mammals	21
	Molluscans	7
	Platyhelminthes	1
	Reptiles	17

Garden Lizard (Calotes versicolor) in MBMC

Location and Landuse Map of Mira Bhaindar



Mira Bhaindar has vegetation, built up and mangroves as major habitats. The dominant land use of vegetation in MBMC is due to presence of part of Sanjay Gandhi National Park (SGNP) and a nice lush green areas near Uttan. SGNP has a presence of mixed deciduous forest area. The MBMC is blessed with good mangrove cover of around 18 sq. km. which dominates the coastal habitat. A small part of the city has salt pans and sandy shores. MBMC also possess good amount of waterbody areas which include creeklet and inland waterbodies. There are 47 waterbodies in MBMC out of which 3 are coastal.

Action strategies for management of Biodiversity

Strategies for conservation of the biodiversity of the city of Mira-Bhaindar is based on documents such as the Public Biodiversity Register (PBR) and other activities like Tree Census of the city and preparation of plan for creation of a Biodiversity Park in the city. A short recce of the implementation locations was done to confirm feasibility of the action plan and to check more lacunas if any. Based on all the background study, 9 strategies and action plans thereunder are formulated suitable for the city's biodiversity and management. These implementations are SMART i.e.

S = Specific to the city and nature-based,

M = Measureable in terms of their outcomes,

A = Achievable to the management as well as the natural systems involved

R = Realistic as they are based on ground observations and background studies, and

T = Time based with respect to their execution and observation of the outcomes

These strategies also align with the National Biodiversity Strategy and Action Plan targets which are thoughtfully prepared in accordance with the Aichi targets of CBD. Apart from these objectives, the strategies stress on the city's present biodiversity and its aim to retain it for the years to come. Accordingly, the strategies are prioritized using a priority matrix which considers the ecological approach, timeframe of implementation, cost, feasibility, number of stakeholders and implementation and maintenance frequency.

The implementation of actions strategies mentioned in LBSAP to be carried out in 5 years span

Priority matrix of strategies

Each strategy is described in terms of concept and need of implementation. The related action plans are elaborated using methodology, location and agencies of implementation. The ambitious yet feasible strategies will help achieve the MBMC's aim of inculcating Biodiversity in administration and bring biodiversity conservation in mainstream management. The score key of the strategies to prioritize them is presented in following table –

Criterion	Score		
	(7-9)	(4-6)	(0-3)
Ecological Approach	Conservation	Restoration	Enhancement
Timeframe	Less than 1 year	1 to 3 years	More than 3 years
Cost	Low	Medium	High
Feasibility	Easy	Moderate	Difficult
Stakeholder Involvement	Internal stakeholders	Combination of internal and external	External Stakeholder
Implementation frequency	Not recurring	1 to 3 years	6 months or less
Monitoring/ Maintenance frequency	One time / during implementation	1-3 years	Once in every six months or less

The scoring and thereby prioritization of the strategies and underlying action plans is presented in the following table –

Prioritization of Strategies and Action Plan

Strategies	Ecological Approach	Time frame	Cost	Feasibility	Stakeholder involvement	Implementation Frequency	Monitoring Frequency	Total
Biodiversity and Environment Awareness	**7**	**8**	**7.2**	**8.8**	**6.4**	**7.4**	**7.2**	
Signage & Posters	7	8	3	8	8	9	6	
Awareness Sessions	7	9	9	9	6	6	6	
Celebration of Environmental Days	7	9	8	9	6	6	6	**52**
Coffee-table Book	7	7	8	9	6	8	9	
Short film on MBMC's biodiversity	7	7	8	9	6	8	9	
Citizen Science Portal for Biodiversity	**9**	**8**	**5**	**9**	**6**	**9**	**6**	**52**
Management of invasive species	**5.3**	**9**	**8.7**	**8.3**	**7**	**4.3**	**5.3**	
Shutting of Kabootar Khanas	4	9	9	9	8	9	9	
Prohibition by imposing fine on feeding pigeons	7	9	9	9	7	0	2	**48**
Mapping of alien invasive species and management	5	9	8	7	6	4	5	
Promotion of Native Species	**7**	**8.3**	**7**	**7**	**5.3**	**6**	**5**	
Equipping the city with local, native plant saplings	7	9	6	6	5	5	3	**45.7**
Incorporation of native species in existing and upcoming gardens	6	9	6	6	5	6	6	

Strategies	Ecological Approach	Time frame	Cost	Feasibility	Stakeholder involvement	Implementation Frequency	Monitoring Frequency	Total
Strategic selection of size and design of bird boxes and bird baths to discourage invasive species	8	7	9	9	6	7	6	
Promotion of Ecotourism for Biodiversity Park	**9**	**5**	**6**	**6.5**	**5**	**9**	**5**	**45.5**
Ecovillage model in 'Jamdarpada'	9	5	9	7	4	9	5	
Biodiversity Park	9	5	3	6	6	9	5	
Promotion of Collaboration with key stakeholders	**7**	**7**	**9**	**7**	**5**	**5**	**5**	**45**
Improvement of 'Habitat Connectivity' in the City	**6**	**7**	**7**	**6**	**9**	**9**	**1**	**45**
Roadside plantation	6	7	7	6	9	9	1	
Median Plantation	6	7	7	6	9	9	1	
Prevention of Animal-vehicle Collisions	**8**	**6.5**	**4.5**	**6**	**4.5**	**9**	**5.5**	**44**
Study	7	7	4	9	5	9	5	
Canopy bridge	9	6	5	3	4	9	6	
Habitat Conservation : City's Lakes	**7**	**5**	**2**	**6**	**6**	**9**	**3**	**38**
Incorporating greenery in grey	**3**	**7.5**	**6.5**	**7.5**	**6.5**	**8**	**0**	**39**
Vertical Gardens	3	7	4	6	6	9	0	
Terrace gardens	3	8	9	9	7	7	0	

Alignment with NBSAP and Aichi Targets

Aichi Targets

The tenth meeting of conference of parties (COP10) to the convention on biological diversity (CBD) achieved big results. A new strategic plan to the CBD known as "Strategic plan for Biodiversity 2011-2020' formed in COP10. This plan provided a set of 20 ambitious yet achievable targets, divided into 5 strategic goals, collectively known as **'Aichi Target'**. The national biodiversity strategy and action plan to be prepared by every country should aim in achieving these Aichi targets

Aichi Goals and Targets

Strategic Goal A
Address the underlying causes of Biodiversity loss by mainstreaming biodiversity across the governments and the society
Targets – 1, 2, 3, 4

Strategic Goal B
Reduce the direct pressures on Biodiversity and promote sustainable living
Targets – 5, 6, 7, 8, 9, 10

Strategic Goal C
To improve the status of Biodiversity by safeguarding Ecosystems, species and genetic diversity
Targets – 11, 12, 13

Strategic Goal D
Enhance the benefits to all from Biodiversity and Ecosystem services
Targets – 14, 15, 16

Strategic Goal E
Enhance implementation through participatory planning, knowledge, management and capacity building
Targets – 17, 18, 19, 20

India's National Biodiversity Targets

Target 1 – By 2020, a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2 – By 2020, values of biodiversity are integrated into national and state planning processes, development programs, and poverty alleviation strategies.

Target 3 – Strategies for reducing the rate of degradation, fragmentation, and loss of all the natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.

Target 4 – By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed.

Target 5 – By 2020, measures are adopted for sustainable management of agriculture, forestry, and fisheries.

Target 6 – Ecologically representative areas under terrestrial and inland water, and also coastal and marine zones, especially those of particular importance for species, biodiversity, and ecosystem services, are conserved effectively and equitably, based on protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20% of the geographic area of the country, by 2020.

Target 7 – By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives, including other socioeconomically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Target 8 – By 2020, ecosystem services, especially those relating to water, human health, livelihoods, and well-being, are enumerated and measures to safeguard them are identified, considering the needs of women and local communities, particularly the poor and vulnerable sections.

Target 9 – By 2015, Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislation.

Target 10 – By 2020, an effective, participatory, and updated national biodiversity action plan is made operational at different levels of governance.

Target 11 – By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge as per national legislation and international obligations.

Target 12 – By 2020, opportunities to increase the availability of financial, human, and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.

The table below elaborates how the proposed strategies for the Mira-Bhaindar City fulfill the national Biodiversity targets of India and Aichi goals and the targets set to conserve and enhance biodiversity all over the world.

Strategies	Actions	Alignment with NBT	Corresponding Aichi Targets
Biodiversity and Environment Awareness	Signage & Posters	1, 12	1, 19, 20
	Awareness Sessions		
	Citizen Science Portal for Biodiversity		
	Celebration of Environmental Days		
	Coffee-table Book		
	Short film on MBMC's biodiversity		
Promotion of Native Species	Equipping the city with local, native plant saplings	12	12, 13, 19, 20
	Incorporation of native species in existing and upcoming gardens		
	Strategic selection of size and design of bird boxes and bird baths to discourage invasive species		
Promotion of Collaboration with key stakeholders	-	12	17, 19, 20
Management of invasive species	Shutting of Kabootar Khanas	4	9
	Prohibition by imposing fine on feeding pigeons		
	Mapping of alien invasive species		
Promotion of Ecotourism for Biodiversity Park	Ecovillage model in 'Jamdarpada'	11	3, 4, 6, 7, 10, 11, 14, 18
	Biodiversity Park	1, 2	5, 15
Improvement of 'Habitat Connectivity' in the City	Roadside plantation	3	5, 15
	Median Plantation		
Conservation of natural Habitats in the city	Waterbody Conservation	3	11
Incorporating greenery in grey	Vertical Gardens	2, 7, 9, 12	15
	Terrace gardens		
Prevention of Animal-vehicle Collisions	Study	3	5, 10
	Canopy bridge		

Description of proposed Strategies

Biodiversity and Environment Awareness

Concept:

Nature and Biodiversity are always assumed to be present in the forest. To clear that misconception, it is essential to showcase the beautiful biodiversity found in and nearby the city. Activities like nature trails, mangrove walks, birding trails, etc. will inscribe the natural beauty and diverse wealth of the city in the citizens, which will lead to more awareness and better contribution toward biodiversity conservation implementations.

Methodology:

The awareness will be brought about at various levels and in various ways. Activities will focus on students as well as adult citizens. Students will be made aware of the environment, biodiversity and human impact on both through their curriculum as well as co-curricular sessions by naturalists and environmental experts.

These experts will also interact with citizens in monthly events organized by MBMC or by partner NGOs in the arranged nature trails and workshops.

To make biodiversity a regular visual,

- Biodiversity information posters will be installed along the roads, attached to the streetlights.
- Biodiversity information standees will be placed in gardens and along the jogging tracks and other public places where people travel often and spend leisure time.
- Metro pillars can be used to for artworks and installations regarding biodiversity and environment.
- Planned Graffiti on empty walls, sides of over bridges, etc. will beautify the city and educate the citizens.

Action plan – Signage and Posters

Pictorial information boards and signages should be installed throughout the city boundaries / limits, hoardings depicting rich floral, faunal and habitat diversity of MBMC region.

Example of information posters to be installed in the city

Graphical content is always known to be eye-catching and is more communicating. Eye-catching pictures with messages, is known to convey the information to the viewer more efficiently. Hence, showcasing city's rich floral, faunal, and habitat diversity through such graphical sign-boards will add to the goal of the strategy; awareness.

Location of implementation:

- Considering the lack of space in the crowded city, it is necessary to undertake a study for identifying locations for installations of such sign-boards.
- Number of daily onlookers, visibility span, area with diversity, or animal crossing area etc. should be considered while selecting a site for installation.
- Streetlights, Metro pillars, etc. can be good locations where these sign boards can be installed.
- Infrastructure related to Metro, Railways, Bus etc. Pillars and walls shall be efficient places for installation of sign-boards, as these locations continuously receive crowd in numbers for majority of hours in a day. These elements of government / corporate infrastructure will not involve ownership issues and issues related to taking permissions unlike private lands or properties making it more feasible to implement.

Information posters can also describe the landscapes in the city

Implementation agencies:

- The boards and signage can be designed by **NGOs** working with nature education and outreach. The locations of installation, target audience and MBMCs goal for information depicted will be considered in the design.
- Installation of the boards can be outsourced or implemented by MBMC itself.

Implementation estimate: Rs. 5000 per unit

Action plan - Awareness sessions

An expert taking detailed awareness sessions and questions from the crowd have been an effective awareness strategy for the conservation of biodiversity. There are various days in the calendar year which are celebrated nationally or internationally for environmental causes and these can be utilized to conduct such awareness lecture sessions for the crowd.

Awareness sessions can include use of informative slide shows, audio-visual documentaries, posters, etc. which will add to the knowledge of the recipients. Various activities like painting, sketching, essay, etc. among participants shall be encouraged during such awareness sessions.

Representation of Outdoor sessions

Implementation location: Outdoor or Indoor session within jurisdiction of Mira Bhaindar

Implementation agencies: Environment NGO's, Educational Institutions, Private Environment companies

Implementation estimate: Rs. 50,000 per event including expertise charges

Representation of indoor sessions

Action plan – Celebration of Environmental days

Global organizations that work for the environmental and biodiversity conservation have designated days of the year to raise awareness and celebrate natural entities like habitats, bird migration, natural resources like water, soil, ozone layer, etc. To take forward the purpose of observing these days, people's participation should be encouraged at the local levels.

Campaign poster on occasion of World Wildlife Week

MBMC is suggested to organize city-level events surrounding the theme of the environmental days that involve organizations, naturalists, students and citizens of the city. Competitions like photography, essay writing, elocution/speech, biodiversity count, etc. should be organized with attractive awards and recognition for the participation. This will inculcate biodiversity into the curriculum and lives of the people and help creating awareness about the nature and biodiversity.

Date	Wildlife and environment days
2-Feb	World Wetland Day
14-Mar	International day of Action for Rivers
20-Mar	World Sparrow Day
22-Apr	Earth Day
22-May	World Biodiversity Day
5-Jun	World Environment Day
1-July - 7-July	Van Mahotsav Saptah
23-Sep	World River Day
1-Oct - 7-Oct	Wildlife Week
3-Oct	World Habitat Day
12-Oct	World Migratory Bird Day
21-Nov	World Fisheries Day
5-Dec	World Soil Day

Implementation location:
All over the city, schools, educational institutes

Implementation agencies:
MBMC, NGOs, Schools, nature education societies

Implementation estimate: Rs. 50,000 per event including expertise charges

Action plan – Coffee table book 'Biodiversity of Mira-Bhaindar'

An extensive document that showcases the biodiversity of the city in a colourful, attractive way is suggested in this action plan. This book will be open for distribution and sale to the schools, businesses, educational institutes, NGOs and citizens of the city as an effective documentation of the city's natural heritage. It will also act as a guide book that will encourage people's participation in nature trail and biodiversity observation activities. The book will thus incorporate biodiversity in people's lives and evoke a feeling of oneness with the species and natural wealth of the city, which will encourage active participation and support for nature conservation activities.

Implementation agencies: MBMC, NGOs**,** City-based photographers, etc.

Implementation estimate: Rs. 5,000 per book including conceptualization, photography, design, editing and printing

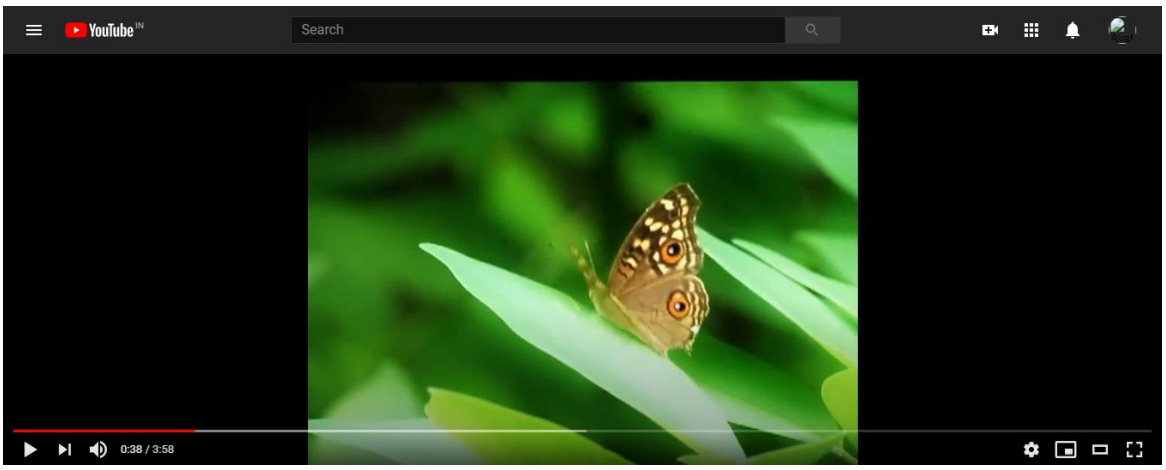
Action plan – Short film: 'Biodiversity of Mira-Bhaindar City'

Like the coffee table book, the biodiversity of the city can be captured in movement in a short film that will record and showcase the beautiful habitats of the city and the biodiversity they hold. This short film will be broadcasted on global platform, which will enthrall not only the local citizens but people of the entire world. Seeing the animals and moving in their natural habitat will also invoke wonder, curiosity and respect for the city's biodiverse heritage thus encouraging participation in documentation and conservation of the plant and animal biodiversity of the city.

A short film on the biodiversity of the Goregaon film city of Mumbai is prepared. The area is known to be beaming with biodiversity and this video gives a vivid moving-speaking proof of the fact. Such a short film on biodiversity of Mira-Bhaindar city is suggested to be made to promote the unique habitats and biodiversity that the city supports.

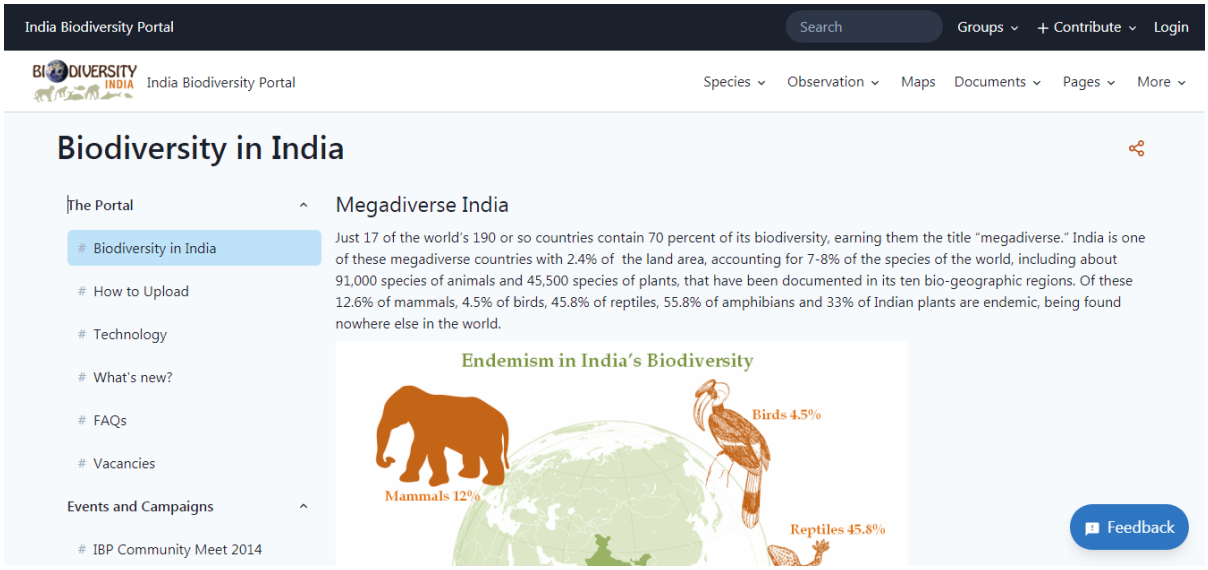
Implementation agency: MBMC, filmmakers, NGOs

Broad estimate: Rs. 20,00,000 /-



Strategy – Online Portal for biodiversity under citizen science initiative

Natural systems, including biological phenomena are always changing. Monitoring of t hese is not only essential for the sake of pure scientific reasons but also to know potential impacts on these due to externalities. Because of its inherent quality, biodiversity cannot be measured by machines the way non-biological natural phenomena can be (such as rain gauges for rainfall measurements). Human eyes and ears are the only instruments most apt to observe biodiversity. However, because of its changing nature, it is practically difficult for a single biologist (or a small group of biologists) to monitor continuously, changes in biodiversity. Field Biologists have long realized this drawback. To overcome this, initiatives known as Citizen Science Projects have been developed, first in western developed countries of North America and Europe and now, even in India. Citizen Science is a term used for research which relies on data recorded by ordinary citizens, who may even be from a non-technical or "non-science" background. A tailor-made biodiversity-monitoring tool for PCMC on an online platform can be created that is designed keeping in mind the features of the site. This tool would be linked to larger country-wide initiatives. The portal will document the contribution by the people for sightings of flora and fauna observed and related information viz. location, date and time etc. This upload will be verified by the local experts in PCMC and the data will be added/ updated in the database. The data obtained from this method will also be useful for updating the Peoples' Biodiversity Register of PCMC.



Implementation agencies: Website developers, Citizens and students of the Mira-Bhaindar city, Naturalists that can guide the 'citizen scientists'

Implementation estimate:
Rs. 1,00,00,000/- (Server/development of portal)
Rs. 50,00,000/- (Maintenance for 5 years)

Strategy – Management of Invasive species

Concept:

Due to anthropogenic intervention in the location of various plant and animal species, it is becoming an increasing trend that there is far more biodiversity in certain parts of the world than naturally possible. But such introduction of species for a noble cause such as economic or aesthetic purposes may start growing in the wild and invade native ecosystems, thus becoming disastrous 'alien invasive species' (McNeely, 2001)

Invasive alien species are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health. In particular, they impact adversely upon biodiversity, including decline or elimination of native species - through competition, predation, or transmission of pathogens - and the disruption of local ecosystems and ecosystem functions. (CBD, 2009)

The emphasis while managing invasive species in the city is mainly on the pigeons. '*Columba livia*' or as we know by the common name of Rock Pigeon, is a species of bird introduced all over the world as food source, or as the game bird. These birds prefer to live near human habitat. It is well known that pigeons have become invasive in the urban areas such as Mira-Bhaindar City and their presence in such great numbers is causing hazard to the citizens as well as other bird diversity in the area. It is essential to curb their population and implement measures to reduce their numbers in the cities. This strategy focuses on managing the pigeon menace in the city.

Impacts from Rock Pigeon invasion:

Rock pigeons are known to transmit pigeon ornithosis, encephalitis, Exotic Newcastle Disease, cryptococcosis, toxoplasmosis, salmonella food poisoning, and several other diseases (Weber, 1979). This is critical if gets overlooked.

Some facts about these pigeons:

- Rock Pigeons are not native to India.
- They are known to spread diseases to humans (Weber, 1979)
- Rock Pigeons also take-up the natural habitat of native avifauna
- Rock pigeon excreta damages property

Sealing of Kabootar Khana

In 2019, one such Kabootar Khana was sealed by BMC (BrihanMumbai Municipal Corporation) near Khar market (Baliga, 2019).

Action plan – Shutting of Kabootar Khanas

Kabootar Khanas are places where humans feed pigeons with grains. Such places shelter hundreds of pigeons and there are pigeon excreta everywhere; which is the cause of the diseases. Closing such places permanently is the ideal way to solve to problem at the root. With the increasing pollution, it is better to reduce sources of diseases causing breathing problems.

Implementation locations: Existing Kabutar Khanas, places in the city where pigeons gather in vast numbers

Implementation agency: MBMC

Action plan – Prohibition by imposing fine on feeding pigeons

'Feeding bird is not allowed' Warning signs

It is necessary to have strict law enforcement for such feeding activities. Feeding pigeons an easy meal makes it easier for them to establish themselves and increase competition between native species and pigeons for space as well as for food. Hence, feeding activities should be totally stopped and strict penalties should be implied for the same.

Implementation locations: All over the city – People will be notified through circulars and mass media such as radio, newspapers and local TV channels about imposition of the ban and fine on feeding pigeons and other birds.

Implementation agency: MBMC

Action plan – Mapping of alien invasive species and its management

Declaration of an exotic species as invasive is a debatable affair. We follow the methodology used by S. Sandilyan (CEBPOL) to compile the 'Invasive alien species of India' to identify the invasive species (S.Sandilyan, 2018) from list of floral diversity of Mira-Bhaindar city compiled during the preparation of Peoples Biodiversity Register (PBR). Further, the shortlisted invasiveness attributes are evaluated for each of the identified species to categorize it into the category 'invasive alien species' –

Sr. No.	Attribute
Invasiveness	
1.	IE – Invasive Elsewhere
2.	RMS – Rapid multiplication and spread in different ecosystems
3.	MMR – Multiple modes of reproduction
4.	MMD – Multiple modes of seed dispersal
Impacts	
1.	B1 – Affecting ecosystem functions and services
2.	B2 – Biodiversity loss
3.	B3 – Economic loss and health hazard
Invasion areas (spread)	
1.	RE – Range extension

Based on this document and above mentioned criteria, following species have been identified in the Mira-Bhaindar City that are categorized as alien invasive species –

Species	Common name	Invasiveness				Impacts			RE
		IE	RMS	MMR	MMD	B1	B2	B3	
Acacia auriculiformis	Australian Acacia	✓	✓	✓	✓	✓	✓		✓
Alternanthera paronychioides	Aligator weed	✓	✓	✓	✓	✓	✓		✓
Antigonon leptopus	Icecream creeper	✓	✓	✓		✓	✓		✓
Argemone mexicana	Mexican Poppy	✓	✓			✓	✓		✓
Chromolaena odorata	Siam Weed	✓	✓	✓	✓	✓	✓	✓	✓
Eichhornia crassipes	Water Hyacinth	✓	✓	✓	✓	✓	✓	✓	✓
Evolvulus nummularius	Roundleaf Bindweed	✓	✓		✓	✓	✓		✓
Hyptis suaveolens	American Mint	✓	✓	✓	✓	✓	✓		✓
Lantana camara	Lantana	✓	✓	✓	✓	✓	✓	✓	✓
Leucaena leucocephala	White Babool	✓	✓		✓	✓	✓		✓
Muntingia calabura	Singapore Cherry	✓	✓	✓	✓	✓	✓	✓	✓
Parthenium hysterophorus	Congress Grass	✓	✓	✓	✓	✓	✓	✓	✓
Prosopis juliflora	Mesquite	✓	✓	✓	✓	✓	✓		✓

Many of these weeds are invasive all over the world and efforts have been taken globally to control and manage their population. Although the impact of invasive alien species on a habitat and the native biodiversity is predictable, which is harmful, the urgency of implementation, management methodology and budget for the population management depends on the extent of present impact of the invasive species.

Methodology:

To determine the current status of alien invasive species in an area, mapping of the population is required. 2 methods are generally followed for mapping of alien invasive species –

A. Use of GIS for the mapping
B. Ground truthing and documentation

These are extensive processes which give accurate idea about the invasion of exotic species and the amount of damage already faced by the native biodiversity of the area. Both these methods need to be implemented to understand the extent of alien species invasion in Mira-Bhaindar City, after which the implementation methodology and other specifications can be mapped out.

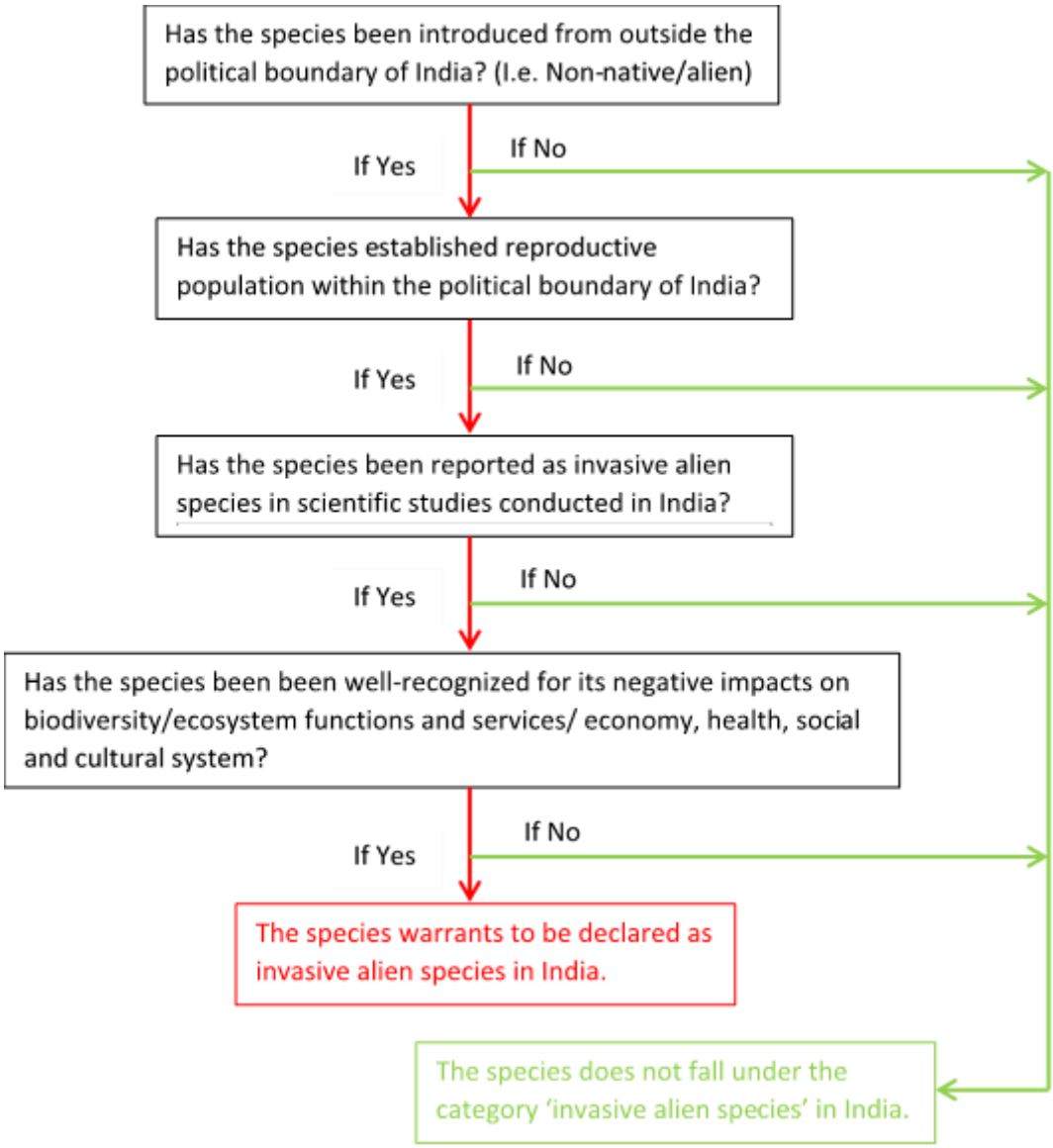
Implementation location:

Locations with heavy infestation of alien invasive floral species identified through mapping and ground-truthing methods

Implementation agencies: Terracon Ecotech Pvt. Ltd., NGOs, etc.

Implementation estimates: Rs. 5,00,000 for mapping of invasive species population using GIS
Rs. 5,00,000 for ground truthing of the population

STEPS FOR CATEGORIZATION OF INVASIVE SPECIES



Replacement of Invasive Species with Native Vegetation

Concept and Method:

Different species will have different ways of removal and management. These species can be managed in following manner:

Leucaena and Gliricidia:

Leucaena is a weed in forest nurseries in India, solarisation was found to be 100% effective in killing all plants and seeds, Being a highly palatable species, grazing could be used as a means of control, and grazing by goats was found to control *L. leucocephala* in Hawaii. PIER (2007) notes that chemical control is possible, with triclopyr applied to foliage, tebuthiuron applied to the soil, or triclopyr ester, 2,4-D in diesel and to a lesser extent diesel alone as a basal bark treatments. In combination with

mechanical cutting, treatment of cut stumps is effective with picloram but not with dicamba, and with triclopyr ester applied to stump bark. The biological measure of control is seed predator, Bean Weevil or *Acanthoscelides macrophthalmus* (Coleoptera: Chrysomelidae : Bruchinae)(M.Tuda et al, 2009).

Lantana camara:

The principal method for management of *Lantana camara* is control of regrowth. Mechanical clearing and uprooting the plants are easy measures for smaller areas. **Cut root-stock method of removal of adult clumps of Lantana** – cutting the plant 3-5 cm below soil level at the zone between stem and tap root of the individual. In this method, the side branches should not be cut. The plant should be bent by holding a bamboo/wooden stick under a branch of the plant and pushing it towards ground. This way, it becomes easy to reach the main clump of the plant and cut it. After removal, the clumps must be placed upside down to prevent regeneration. These clumps can be dried and used as fuel.

General Methods for Eradication of invasive species

- Invasive plant removal in '**inside out**' fashion – removal from maximum density area, moving towards lesser dense patches. In case of slopes, the removal should begin from slopes and lead into valleys.
- Removal operation should be carried out when **minimum population is in flowering or fruiting stage. Ideal time is before monsoon season.**
- Immediate **Ecological landscape restoration** after removal of invasive is very important in preventing regeneration and also secondary invasion from other plants like *Parthenium sp,* etc. Quick-growing **native grasses and legume species** can be used for immediate plantation at invasive-free sites.
- Weeding out of new saplings in the next 3 growing seasons (Monsoons) is essential for complete eradication of invasive from a patch of land. Special attention for this task must be near popular bird perches, as birds are major seed-dispersers of many plant seeds.
- **Burning** of cleared land should be **avoided,** as burnt lands are more favourable for invasion of some plants.
- **Artefacts preparation can be promoted as a strategy for management of the removed plants**

Timeline:

The task will be a very detailed activity and would require a time frame of 1 to 3 years

Implementation Estimates:

Activity	Details	Cost (INR)
Removal of plants from the infested areas	-	50,000/- per ha
Treatment of cut stumps to prevent regrowth	-	35,000/- per ha
Shrub / Tree plantation	(- in general spacing 2sq.m between 2 shrubs) – Cost of Plants	Rs. 15 /- per plant
	Digging Pits (0.2 m3), Cost of soil and manure	Rs. 840 /- per m3
Manpower	Labour cost for Plantation	Rs. 300/- to 450/- per day

Strategy – Promotion of Native species

Greenery is the breathing lungs of an urban area. To improve these lungs for the biodiversity, it is essential to maintain the species composition, density, numbers and distribution of the plants in the city. Several components can be used for these activities. These components and the interventions are discussed in this section.

Concept:
Native plant species are crucial for supporting native faunal diversity, for the reason that the two have evolved together and are used to each other. Exotic trees may provide shelter but cannot provide food to the birds and other animals in the locality. Plantation of exotic trees, although add to green cover, is not helpful in creating a self-sustaining ecosystem. Hence, using native trees and shrubs when creating a green space, is very essential.

Action plan – Equipping the city Nurseries with local, native plant saplings

Methodology:
Plantation of native species requires the supply of seeds and saplings. The local native species are mostly not available with the plant nurseries. These nurseries emphasize on stocking up on exotic and decorative plants that are in higher demand. Hence, in order to convince and encourage plant-keepers to breed and sell native plant species, there is a need to increase demand for the native trees, shrubs and flowering herbs.

There are numerous nurseries established in the city. These nurseries can be approached and educated on the importance of availability and utilization of native species instead of ornamental exotic species in public as well as private spaces.

To equip them with seeds/saplings of the native trees, local people from the low-income groups can be encouraged to participate in the seed collection and sapling creation activities. These activities can be incentivized to encourage and reward participation. The saplings then can be sold privately or to the nurseries for further distribution.

Connecting this task with the 'awareness' strategy, the citizens can be shown information on beautiful, locally present native plant species. This will encourage them to plant these species rather than exotic, variegated saplings in their households and societies. The presence of native species will support more faunal diversity, especially of birds and butterflies, which will be definitely noticeable to the citizens and their transition to native saplings will thus be fruitful and encouraging. This awareness can be brought about by talk sessions by experts, poster displays in public places, gardens, etc. More information on this is elaborated in the awareness strategy section.

Implementation agencies: Local Nurseries, citizens to collect seeds of native plants, MBMC to fund

Implementation location: Exiting nurseries, forest department nurseries, new nurseries

Implementation estimate: Rs. 200 per sapling

Action plan - Incorporation of native species in existing and upcoming gardens

Methodology:
Gardens utilize exotic floral species to create a green, colourful façade. Although this purpose is achieved with exotic, foliage plants, the gardens do not offer much too faunal biodiversity that cannot utilize these exotic greenery. Hence, to achieve beauty as well as utility of the immense green spaces in the city, its floral species composition needs to be enhanced to support more biodiversity.

Based on the Public biodiversity register of Mira-Bhaindar City, the local native species can be identified. Once these species are made available in the local nurseries, they can easily be incorporated into the garden plans. Native plants can be strategically selected to achieve beautification while providing natural food and shelter to birds and animals in the area.

To support birds (except pigeons) in the city, suitable birdbaths and bird boxes can be installed in the gardens amongst the native vegetation. This will provide security and attract and retain more bird diversity and help maintain their population.

Implementation location: Existing nurseries in the city, creation of new MBMC-funded nursery for native plants

Implementation agencies: Existing Nurseries, MBMC

Implementation estimate: Rs. 200 per sapling

Action plan – Strategic selection of size and design of bird boxes and bird baths to discourage invasive birds

Care should be taken while designing bird bath structure or boxes that it should be designed in a way that it is inaccessible to pigeons and small native birds can easily utilize the same without having to compete with the invasive pigeons.

Implementation locations:
Roadside trees, tree cover in residential areas, suitable locations where bird population frequents

Implementation agencies:
MBMC, NGOs

Small size of opening to bird box will encourage smaller native birds

Implementation estimate: Rs.500 – Rs 1000 per box

Strategy – Participatory Ecotourism for Biodiversity Park

Concept:

The International Ecotourism Society (TIES) defines ecotourism as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education"

The concept of ecotourism deals with building environmental and cultural awareness, providing positive experience for visitors and the hosts, direct financial benefits for conservation, locals, and private industries, designing and constructing low-impact facilities, and most importantly, recognizing the rights and spiritual beliefs of the indigenous Communities and work in partnership with them to create empowerment.

Such type of tourism not only improves tourism experience, but also creates a trustworthy relationship between all the stakeholders, facilitating sustainable tourism.

Participatory approach

Involvement of local communities in the ecotourism activities is the key for success of this conservation strategy. Fishermen communities are well acquainted with the area and are facing decrease in their catch in the recent times. These fishermen can be local sentinel for the protection of the nearby mangrove forests. With a proper training they can also contribute in reporting illegal activities if takes place to the forest department and can also handle the emergencies.

These locals should be trained properly to be able to handle different types of crowd and also should be made aware of ways to handle different age groups. Such trainings shall produce a very good nature guide from the local communities and help them generate an alternate revenue, which in turn will promote youngsters from the communities and indirectly add to the conservation of the natural areas including mangroves.

By establishing participatory eco-tourism which benefits locals as well as the ecosystem, it is the win win situation for all the stakeholders.

Action plan – Ecovillage model in 'Jamdarpada'

The concept of an 'Eco-village' is simply a nature-based self-sustaining village enhancing eco-tourism experience of the visitors. A visit to Eco-village would add to the learning experience of tourists about sustainable lifestyle of the villagers, the traditional knowledge of the villagers about the biodiversity and their culture, and would also contribute to the alternate livelihood options for the native villagers. Various activities that can be setup in the Eco-village are explained further as the action plans.

It was crucial to identify a location efficient enough to be able to cater the needs of the eco-village as well as would contribute to the biodiversity conservation. The village in the vicinity of Uttan named 'Jamdar Pada' was found to be a perfect destination to be developed as an Eco-village. It lies on the way to Uttan beach, and it is easily accessible by decent road connectivity, making it an easiliy approachable location for the tourists.

To reach the village one has to descend a small hillock using a path surrounded by wild vegetation harboring faunal elements like birds, butterflies, dragonflies etc. Path leading to the village is beautiful and it gives a bird's eye view of the surrounding landscape and in terms of difficulty, it is not at all tiring and rather a safe terrain. Jamdar Pada also has a creek in the end, which is surrounded by a nice patch of mangroves sheltering various birds, crustaceans, fishes etc.

On the top of the hillock there is ample amount of space available for parking, also the place has Uttan beach in the vicinity; already popular among tourists, and beautifully developed 'Keshav Srushti' project that works towards education and social development. As these locations attract tourists, the location is lucrative to popularize the first Ecovillage of Mira-Bhaindar City.

Creek near Jamdarpada village

Methodology:
To execute creation of the ecovillage, it is suggested to involve individuals of the village in ecotourism by incentivizing their contribution. Their involvement can be encouraged through following activities –

Encourage 'crab culture'

Mud-crab harvest

- Mira Bhaindar being a coastal city, has rich mangrove habitat in its vicinity, which is home to various crustaceans. Sustainable agro-tourism can be achieved with the help of local administration, Corporation and Forest Department.
- Mud-crabs are marketed throughout India for consumption and are harvested in huge numbers in western coast.
- Considering the potential habitat for the Mud-crab Aquaculture, it can be promoted in the village of Jamdar Pada.
- Training to locals shall be given on the building, maintenance, and harvesting the mud-crab aquafarm, followed by connecting them to a market giving them the returns of their efforts.
- These farming techniques can be shown to tourists and facilities should be made available for the tourists to buy the produce.

Annual fest can be arranged to celebrate the harvest in traditional, sustainable way. Traditional local cuisine can be promoted by making it available to the visitors during ecotourism

Implementation Location: 19.256613 E72.802185

Implementation agencies: MBMC, residents of Jamdarpada, NGOs

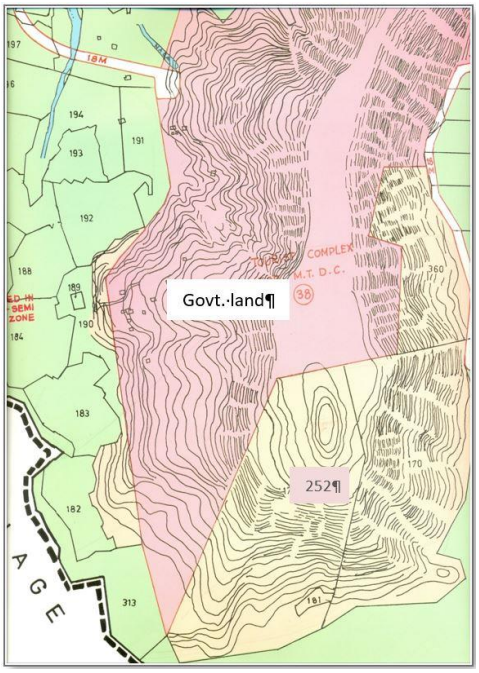
Implementation estimate: Rs. 5,00,000 for setting up crab culture

Action plan – Biodiversity Park

A Biodiversity Park is developed keeping in mind the needs of human visitors as well as the requirements of local wildlife. It is a showcase of the region's native biota. It performs the dual function of being recreational destination as well as preserving a region's ecosystem. It also has a feel of wilderness and adventure to it.

Need for a Biodiversity Park:
Aesthetically pleasing landscape with rich flora and fauna is present in the parts of western Mira Bhaindar. These forests not only add to the aesthetic value of the city but also provide essential ecosystem services. For ground water recharge, permeable, non-concretized land is important, for offsetting the urban 'heat island' effect, for maintaining local climatic conditions, and for mitigating the adverse impacts of climate change, canopy cover is important.

Sr. No.	Attributes	Description
1	Entrance Co-ordinates	19.258038, 72.798431
2	Area	~31 ha
3	Elevation	Highest point: 190 ft Lowest point: 10 ft above sea level
4	Approach Road	Road leading to 'Kishan Gopal Rajpuriya Vanprasthashram', Gorai, Dr. Hedgewar Marg, Bhaindar (W)
5	Nearby tourist locations	Keshav Srushti, Uttan Beach
6	Nearest railway station	Bhaindar railway station



Terrain map of the proposed site

The location previously identified for creation of Biodiversity Park in Mira-Bhaindar city was surveyed newly to analyze the status of the area and identify existing biodiversity. This location is in close vicinity of Jamdar Pada, in the form of a neat paver block lined path leading down a hill surrounded by wild vegetation laden with floral and faunal diversity. This path leads to the village, followed by beautiful mangrove patch.

Methodology:

This opportunistic area provides the perfect location for creation of Biodiversity Park with features like nature trail and mangrove trail. As the trails would be passing through Jamdar Pada, which will be made into a model ecovillage, the park will provide multiple lessons in environment, sustainable living and of course, Biodiversity.

Park entrance:

Entrance to the Park is a gateway to a mesmerizing world, a sweet spot between the urban world visitors left behind and the natural world they will be entering soon. It shall have basic amenities such as Parking space, Ticket Booth, Restrooms, waiting areas, etc.

Pervious concrete shall be used for the Parking Space and for the pathways. It allows rainwater to seep in the soil, helping groundwater recharge. This system goes well with the idea of a non-intrusive method of development and hence is being adopted for the Park.

Such pervious concrete should be used for pathways created for vehicular traffic, which will facilitate percolation of water. With this approach, rain water harvesting should also be set, which will reduce the burden on water requirement.

Activities:

For engaging visitors with nature, there shall be dedicated activity areas in the Biodiversity park adding to the learning as well as fun experience of the visitors. Few of the suggestions are as follows –

- Nature Interpretation Centre (NIC)
- Exhibition area
- Cafeteria
- Nature trail
- Mangrove Board Walk
- View Point
- Butterfly Garden

Nature interpretation center (NIC) shall have all the information about the park and its rich diversity in creative graphical forms such as graphical sign boards either printed or digital, miniature models, etc. Interactive panels will add to the knowledge of the visitors in a fun way through exciting facts about nature. It shall also have a small viewing area to be able to conduct small talks, presentations etc. It shall also have facilities for audio-visual experience for such presentations. NIC shall give importance in displaying mangrove diversity and richness of Mira Bhaindar area.

Exhibition area - NIC shall have area in its surrounding to be used as exhibition area where events can be held annually or on the special occasions such as various national as well as international environmental days.

Cafeteria serving preparations prepared by locals shall be in place and also shall have clean restrooms. Cafeteria area shall be with flowering native local shrubs which will attract butterflies over some time.

Nature trail – Dedicated pathways in the nearby forest patches can be used to take bird watching or nature appreciation trails for the participants. This can also be helpful for the systematic documentation of biodiversity of the Biodiversity park area. Bird watching trails can be led by local people of the area and these locals can be trained for helping visitors observe local as well as migratory birds.

Mangrove Board Walk – The dedicated nature trails can be taken through mangrove patch. To facilitate ease of walk in the mangrove patches there should be placing of wooden board walks. This will bring the visitors close to the otherwise inaccessible aspects of the mangrove swamps.

Boardwalks are sustainable roadways that allow visitors an upclose experience of the habitat

View Point – View point should be constructed at highest point giving best landscape view of the surrounding area. There can be use of spotting scopes at such points where people can observe birds from a safe distance without startling it.

View overlooking mangrove forest from the proposed view point of the Biodiversity Park

Butterfly Gardens – The existing local flowering native species of flora should be inventorised and based on it a suitable flowering species should be planted to create a butterfly garden. Over the time period butterflies shall visit these flowering plants for nectaring and also for laying eggs (depending on the species)

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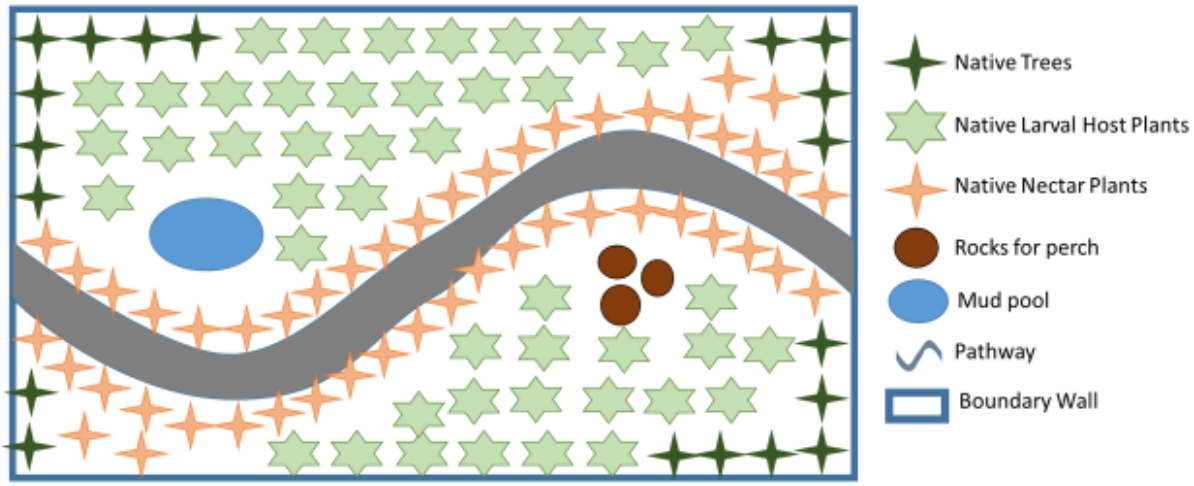
Certain improvements like plantation a few more native species of trees, shrubs and climbers can be made at the location to support, encourage and enhance the existing biodiversity. Currently, tree species like Indian charcoal tree (*Trema orientalis*), Indian Mulberry (*Morinda pubescens*), Hairy Fig (*Ficus hispida*), Toddy Palm (*Borassus flabellifer*), Teak (*Tectona grandis*), East Indian Screw Tree (*Helicteres isora*), etc. are observed along the path. Cassava/Tapioca (*Manihot esculenta*) saplings are found growing wild, likely to have escaped agricultural farm. Other annual herbs like Common Wireweed (*Sida acuta*), Sweet Hibiscus (*Abelmoschus manihot*), Fuzzy Rattlepod (*Crotalaria hebecarpa*), which attract butterflies, are also observed.

While developing new butterfly park, the arrangements of the nectar and larval plants are also important. The larval host plants should be planted on the interiors where there will be minimal disturbance due to humans. However, the nectar plants should be planted at the peripheries to get a clear view of the butterflies. The following image is for depiction purpose and the design of the butterfly park should be carried out after studying the actual site.



Depiction of conditions for creation of Butterfly Park

Faunal diversity observed in the area includes Butterflies namely Common Pierrot, Castor, Baron, Plain Tiger and Jezebel, etc. Birds like Black Drongo, Oriental Honey Buzzard, Black Kite, Red whiskered Bulbul, Large-billed Crow, etc. were recorded on the track. Other faunal species like Signature spider, Indian Garden Lizard, Weevil, *Euchromia polymena* insects, etc. were also observed in the wild vegetation.

Common Pierrot Butterfly in the wild vegetation

The fact that such a wonderful biodiversity was observed in a short time spent at the selected location supplements the need for creation of Biodiversity Park. People will be able to witness the incredible biodiversity the city hosts and this experience will lead to greater awareness and sensitivity towards the urban biodiversity and its conservation.

Implementation location: 19.258038, 72.798431

Location of various attributes of the Biodiversity Park

Implementation agencies: MBMC, NGOs, city nurseries, educational institutions in the city, citizens and students

Implementation estimate:
Rs. 60,00,000 (Including Boardwalk, view point, NIC and cafeteria, parking, entrace)
Rs. 2,000 per sq. m. (Butterfly garden)

The brilliant flowering of East-Indian Screw Tree (Helicteres isora)

Strategy – Promotion of Collaboration with key stakeholders

Concept:
City biodiversity index (CBI) evaluates the status of biodiversity and inclination and preparedness of a city to make changes through implementations to support and maintain its floral, faunal and habitat diversity. This evaluation also considers collaborations between the Municipal Corporation and other bodies in the city that work with the biodiversity.

To implement the action plans to improve locally present native species in the city, MBMC can call out to city-based NGOs and other organizations. These organizations can take up the responsibilities of execution as per the prescribed methodology and even suggest other ways of implementations. These interactions and partnerships that spell good news for the city's biodiversity will thus also enhance MBMC's CBI score.

Methodology:
2 main avenues have been shortlisted from reconnaissance survey of Mira-Bhaindar city. NGOs can be employed for following implementations –

A. Installation of birdbaths, bird boxes in the city

The contacted organization can survey and shortlist locations in the city's gardens, public places and residential areas. It will also be responsible for procuring the birdbaths and bird boxes from allotted funds for the installation.

B. Solid-waste management in the city

Solid waste is a major concern all over the world. Delicate habitats in the city like River Chena are seen suffering due to dumping of plastic and other waste by the residents. Along with policy changes and imposition of fines on such dumping of waste, an innovative mechanism of solid waste management needs to be incorporated in the river and the mangrove areas. This task can be carried out via NGOs that have prior experience and fair ideas regarding solid waste management.

All other strategies can be planned and executed with the help of NGOs. The need is mentioned in 'implementation agencies' section of the respective action plans.

Representative images for bird baths/ waterhole

Strategy – Improvement of 'Habitat Connectivity' in the City

Concept:

Creation and maintenance of habitats is vital for attracting and supporting native biodiversity in an area. But even if multiple, disjointed habitats are created; biodiversity does not feel at home. Hence, connectivity between different native flora locations is very important to create a complete ecosystem.

These connections need not be elaborate forests or green spaces. Connectivity can be established by creating lines of native flora that joins the different native-flora green islands in the city. Linear infrastructure in the city offers ready-made lines for this purpose in the form of roadside and median plantations, as well as traffic islands. Gardens that will be enhanced through the 'promotion of Native biodiversity' strategy will already be on-board. Mira-Bhaindar has immense scope for roadside and median plantations as the city is well-connected through roadways but not well-adorned with effective vegetation.

Action plan – Roadside plantation

Indian Laburnum or Amaltash, a native species, makes a beautiful roadside avenue

Roadsides have various pre-requisites for plantation –

- The trees should have dense and widespread canopy so as to provide shade and keep the roads cool
- The trees should not bear fruits or shed too many leaves that would litter the road.
- The trunk should not spread beyond designated area and damage the road infrastructure.
- The avenue trees should not have easily breakable branches that would fall and damage vehicles or passersby.
- The trees should not require by should be easy to trim and have good coppicing capacity.

Methodology:

While keeping in line with these requirements, native trees can be selected that bear fruits and flowers that can support native fauna and provide food and shelter until the next green island in the city, which provides a more permanent refuge. This is the whole purpose of connectivity and this is what attracts and safeguards the faunal population in an urban landscape. The list of such native trees is provided below –

Native species to be planted along the roadsides in the City

Sr. No.	Scientific name	Common name
1	*Adenanthera pavonina*	Red Bead Tree
2	*Ailanthus excelsa*	Indian Tree of Heaven
3	*Albizzia lebbeck*	Siris
4	*Albizzia procera*	White Siris
5	*Alstonia scholaris*	Scholar's Tree
6	*Anogeissus latifolia*	Indian Axlewood
7	*Azadirachta indica*	Neem
8	*Barringtonia asiatica*	Sea Poison Tree
9	*Bauhinia purpurea*	Orchid Tree
10	*Bombax ceiba*	Red Silk Cotton
11	*Bombax insigne*	Showy Silk Cotton Tree
12	*Callophyllum inophyllum*	Sultan Champa
13	*Cassia fistula*	Golden Shower
14	*Cochlospermum religiosum*	Buttercup Tree
15	*Cordia dichotoma*	Indian Cherry
16	*Dalbergia latifolia*	Black Rosewood
17	*Dillenia indica*	Elephant Apple
18	*Ehretia laevis*	Chamror
19	*Erythrina variegata*	Indian Coral Tree
20	*Fernandoa adenophylla*	Katsagon
21	*Filicium decipiens*	Fern Tree
22	*Gmelina arborea*	Gamhar
23	*Haldinia cordifolia*	Kaim
24	*Lagerstroemia speciosa*	Queen Crape Myrtle
25	*Macaranga peltata*	Chandada
26	*Mimusops elengi*	Spanish Cherry
27	*Pisonia umbellifera*	Lettuce Tree
28	*Pongamia pinnata*	Pongam Tree
29	*Pterygota alata*	Buddha Coconut
30	*Putranjiva roxburghii*	Lucky Bean Tree
31	*Stereospermum chelonoides*	Fragrant Padri Tree
32	*Toona ciliata*	Toon Tree
33	*Trema orientalis*	Indian Charcoal Tree
34	*Vitex negundo*	Chaste Tree
35	*Wrightia arborea*	Woolly Dyeing Rosebay

Implementation locations:
Poorly planted roadsides in the city to be identified using GIS methods and surveys

Implementation agencies:
Native tree species nurseries in the city, forest department, MBMC, NGOs

Implementation estimate: Rs. 250 per tree (Adult sapling to be used to ensure good survival rate)

Action plan – Median Plantation

Cycas plants and Indian and support butterflies and thus act as connecting link between 2 habitats in the city

Scope for median plantation on Uttan Road, Bhaindar West

Methodology:

Unlike avenue plantation, medinas do not provide much space for trees to grow. However, they are perfect for shrubs and small trees that can still attract and support butterflies, insects and small birds and mammals. Thinking of these lines, some native shrubs are enlisted in the table below, which can replace the existing Bougainvillea bushes and adorn the empty medians in the city.

Species to be planted in the medians

Sr. No.	Scientific name	Common name
1	*Abutilon indicum*	Indian Mallow
2	*Bauhinia racemosa*	Bidi Leaf Tree
3	*Caesalpinia pulcherima*	Peacock Flower
4	*Calotropis gigantea*	Crown Flower
5	*Capparis sepiaria*	Wild Caper Bush
6	*Careya arborea*	Wild Guava
7	*Cissus woodrowii*	Woodrow's Grape Tree
8	*Citrus limon*	Lemon
9	*Colebrookea oppositifolia*	Squirrel Tail
10	*Cycas circinalis*	Cycas
11	*Flemingia macrophylla*	Large-leaf Flemingia
12	*Flueggea leucopyrus*	Indian Snow Berry
13	*Grewia asiatica*	Phalsa
14	*Helicteris isora*	East Indian Screw Tree
15	*Hygrophila auriculata*	Marsh Barbel
16	*Ixora coccinea*	Jungle Geranium
17	*Murraya paniculata*	Orange Jasmine
18	*Phyllanthus reticulatus*	Black Honey Shrub
19	*Pisonia umbellifera*	Lettuce Tree
20	Punica granatum	Pomegranate
21	*Solanum torvum*	Turkey Berry
22	*Tarenna asiatica*	Asiatic Tarenna
23	*Vitex negundo*	Chaste Tree
24	*Volkameria inermis*	Glory Bower

Implementation agency: Local nurseries, MBMC, NGOs

Implementation location: Barren medians in the city

Implementation estimate: Rs. 500 per sapling including maintenance

Strategy – Prevention of Animal-vehicle Collisions

Concept:

Human-wildlife or Human-animal conflict occurs when animal pose a direct and recurring threat to the safety or livelihood of people leading to the persecution of that species. Animals getting hit by vehicular traffic, birds spreading diseases, Wild Boars, Nilgais, etc. damaging crops, carnivorous animals attacking crop etc. are some of the examples of human-animal conflict in which most of the times the animals causing damage is persecuted. This problem if not solved, can change the attitude of the humans towards those particular animals and can endanger the species to extinction.

Representation of Road Kills

One of the major conflicts which is faced by the wildlife and humans all over the world is 'Animal-vehicle collision'. It is a major traffic safety concern since it results in considerable medical and economic cost. Such accidents often kill the wild animals on the spot. In some countries, accidents of ungulates with vehicles often cause damage to the vehicle, human and also the animal itself. Solutions are required to prevent such accidents from occurring, in order to conserve the wild animal diversity city possess in its vicinity.

Action plan – Study of animal mortality

- **Studying animal mortality due to collision with vehicles**

Animals are known to be active in the twilight and early in the morning during dawn. Majority of animals are known to take strolls for various reasons viz. quenching thirst, hunting, inspecting and marking territory etc. Human infrastructure often collides with territory of many animals which animals do not recognise speeding vehicles during these active hours that often leads to the vehicles running over the animals crossing the roads passing through their habitat.

MBMC city has Sanjay Gandhi National Park in its proximity, and the area near the park is known for animal movement of animals such as Leopard, Civet cats, Snakes etc.

Recent event of Leopard dying in an accident near Kashimira junction (Nair, 2020) indicates animal using the area and also accident happened due to lack of corridor.

To successfully implement an action strategy there is need for identifying locations frequently used by majority of animals near highway.

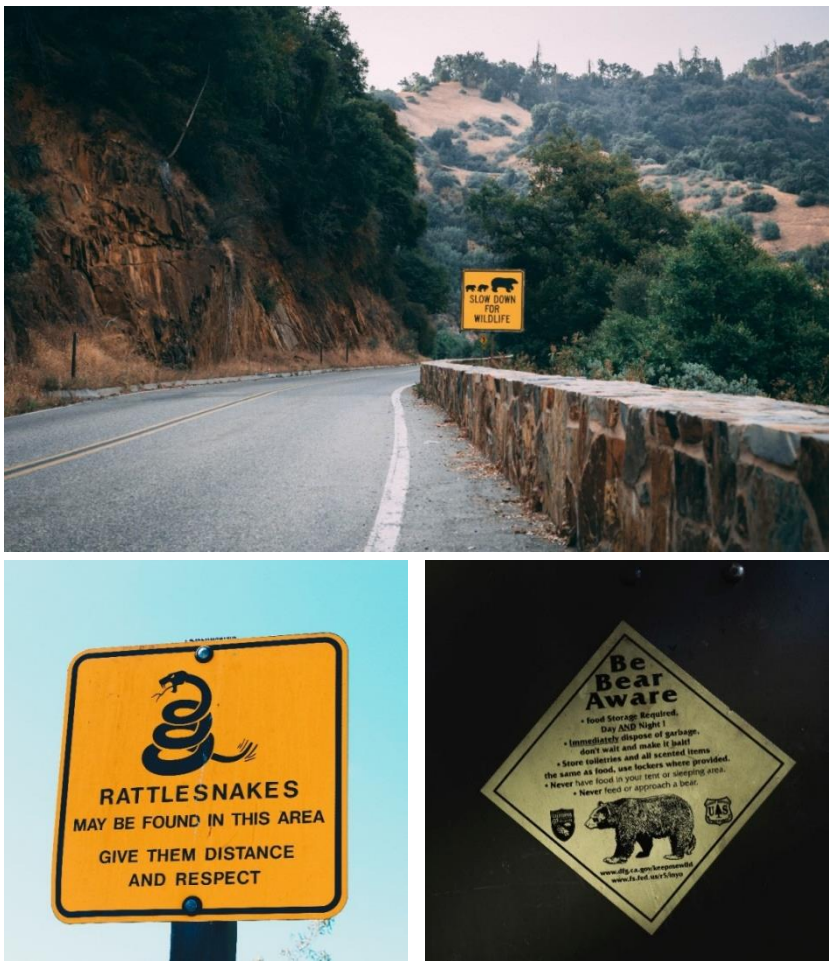
- Survey along the highway for the sighting of faunal elements. Including survey of locals for presence of wild animals.
- Camera traps along the survey points identified through direct sightings and or socio-ecological interviews

- **Identifying cause of the problem**

  For patches / locations where passes are not possible, a study need to be undertaken to find root cause of animals preferring the identified patch for its daily route.

Alternative route if can be created in case where the corridor / animal over/under pass construction is not feasible.

- **Feasibility survey of identified patches / locations with high mortality**
  Considering crowded city with very regular traffic on the highway in the project area, there needs to be a feasibility study for the construction of animal crossing passes or corridors.
- **Installation of reflective sign boards**
  The reflective sign board will inform the citizens passing by about presence of wild animals crossing the roads
  In the vicinity of the areas with high rate of animal movement, there should be installations of reflective sign boards, indicating presence of important wild animal and it is an area of animal crossing.



Sign boards indicating presence of Wildlife installed all over the world

Such sign-boards should also mention about penalty of over-speeding and penalty for wildlife schedules.

Implementation estimate:
Rs. 10,00,000 (Study and feasibility survey along the roads to identify locations)
Rs. 8,000 (per reflective sign board)

Action plan – Construction of 'Canopy Bridge / Overpass'

The survival and resilience of animals to environmental changes depends in part on their ability to move safely throughout the environment to find food, reproduce and migrate between habitat patches (Taylor et al, 1993). These are essential life functions for the species and require presence of contiguous habitat systems over large areas across political boundaries. The contiguous natural habitats of the world are mostly either destroyed, degraded or are under threat due to expanding human settlements both in urban as well as rural areas.

- *Habitat connectivity links or conservation buffers are essential biodiversity management tools.*
- *Preserving landscape connectivity between good habitat has become a key conservation priority in recent years*
- *Connect fragmented habitats to restore connectivity between two or more isolated wildlife populations.*
- *Essential for effective biodiversity management*

Key Concept of Biodiversity Corridor

The canopy bridge will help animals move freely without having to fall prey to the vehicular traffic. Such structures primarily help small mammals Civets, Macaques, Langurs, Small Cats etc. It can also be used as perch by birds and once the vegetation convers the bridge over time; it can be used by insects too.

The proposed location has a raised lands on both sides of the road that provide natural elevation for the canopy bridge. The raised lands are part of Sanjay Gandhi National Park and this canopy bridge will aid in connection of the same which is disturbed due to the road. The location has board installed as a warning for leopard crossing. The Ghodbunder road has a history of animal vehicle collisions. This bridge will act as a mitigation measure for the impact on wildlife movement caused due to the road.

An engineering design will have to be created before the implementation. Material Selection will be based on the proposed design. Canopy bridges can be of sustainable material and vegetation can be grown on such structure.

Graphical representation of a canopy bridge over road passing through Ghodbunder road

Such structures created can also be monitored through camera traps for checking animal presence as well as to determine major movement activity duration.

Implementation Location: N19.280155 E72.929947

Implementation agencies: MBMC, NGOs, Construction companies, Forest Department of Maharashtra

Implementation estimate: Rs. 50,00,000 – 1,00,00,000 /- based on the use of nature based products

Conceptual representation of biodiversity corridor

A CASE STUDY OF BIODIVERSITY CORRIDOR

Biodiversity Corridor at Banff National Park

The overpass or "Ecoduct" constructed over Trans-Canada Highway at Banff National Park, Canada. Image source: http://highwaywilding.org

The Banff National Park, Alberta, Canada is country's oldest and one of the most visited national parks in the world. However, this park has been affected by the tension between conservation and development interests throughout its history. The park is bisected by the major commercial Trans-Canada Highway (TCH), which was proposed by the Public Works Canada to be developed into a four-lane highway in 1978. Although the work on developing the highway followed later, a range of engineered mitigation measures that included construction of a variety of wildlife crossings, have helped in the maintenance of large animal populations for the past 25 years and allowed the gathering of valuable data.

Wildlife overpass and underpass at Banff National Park in Alberta, Canada. Photo credit: flickr/Roswellgirl, Source: http://www.smithsonianmag.com

The TCH has 24 wildlife crossings in total to ensure wildlife connectivity, with 22 under-passes and 2 over-passes. The results have been very interesting and positive. A study on the effects of wildlife crossings on wildlife connectivity has shown evidences that:

- *10 species of large mammals used Banff's 24 wildlife crossings more than 84,000 times in 10 years.*
- *Grizzly bear crossings increased from 6 in 1996 to 100 in 2006.*
- *Traffic related mortality of large animals reduced by 80%*

Please click on the document link below to know more about wildlife crossings at Banff
http://onlinepubs.trb.org/onlinepubs/trnews/trnews249hwyhabitats.pdf

Strategy – Habitat Conservation

Concept:
Over exploitation of the freshwater resources is increasingly building pressure on demand-supply gap of water requirement. Increasing need of water in addition to adverse effects of climate change is creating pressure on the existing resources available from the surface water bodies. Waterbodies are threatened due to drainage for agriculture, settlement and urbanization, pollution etc. At global level anthropogenic activities are leading to rapidly shrinking of waterbodies. The importance of waterbodies is now been increasingly understood in recent years.

Lakes & wetlands constitute an important component of fresh water resources. These water bodies support biodiversity and play a critical role for the population living in their catchments as they influence their health, society and economic prospects. Due to the pressures of urbanization, there has been tremendous stress on the water bodies. Siltation, encroachment, sewage ingression, solid waste dumping, effluent discharge and reclamation have resulted in their pollution and further degradation.

India is also a signatory to Ramsar convention on wetlands and convention of Biological Diversity. A guideline issued by Ministry of Environment and Forest & Climate Change (MoEF & CC) on 2nd February 2007 states the need and approach towards conservation of the wetlands and waterbodies.

Methodology:
Considering the current water crisis and the water related health problems, it is important to take immediate action in protection, restoration and improvement of the water bodies. To address the above issues we have identified four government owned waterbodies for improvement along with recommendations for development plans. Currently they are in bad condition depending on their water appearance and quality as well as invasive immediate landuse. These waterbodies are facing multiple threats due to various incongruent uses.

A survey of the waterbodies in the city indicated that developing these waterbodies will involve incorporation of –

- Solid waste management near the waterbody
- Development and repair of infrastructure that affects the waterbodies, like the inlets and outlets, etc.
- Desiltation of the lakes
- Deweeding in and around the lakes to promote native biodiversity

Following are a few lakes shortlisted from all the lakes in the city that require attention. Site-specific interventions to develop these lakes have been briefly discussed in each section.

Implementation locations:

Lake A: Golkonda Lake

Golkonda Lake (19.27625°N 72.79805°E) with area of 0.7150 ha comes under Mira Bhayandar Municipal Corporation. It is surrounded by rural settlements, Golkonda Resort. Locals from nearby settlements use this lake mainly for swimming, bathing and mass washing a possible threat to the lake. Solid waste dumping was observed around the lake. It is also used by Golkonda resort. Due to reducing water level during summer, constant drawing of water could be a probable threat. The water appeared to be green in color due to presence of algae and aquatic plants. Solid Waste, Plastic, Nirmalya was seen floating on the water surface. Encroachments/ built forms along the edge of the lake were also observed within 50m radius of the lake.

Suggestions to safeguard the lake are as follows:

1. Regular weed removal and bioremediation.
2. Installation of garbage bins at various points near the lake.
3. Installation of a Nirmalya Bin in the lake vicinity.
4. Policy level interventions to prohibit solid waste dumping in the area.
5. Policy level interventions to stop mass washing at the lake.
6. Encroachment on the lake boundary should be removed.

Lake B: Gaondevi Baludyan Lake

Gaondevi Baludyan Lake (19.29771°N 72.82985°E) with area of 0.2661 ha comes under Mira Bhayandar Municipal Corporation. It is surrounded by open spaces, residential areas and commercial areas. Locals use the lake to carry out various activities such as idol immersion and religious activity as well as gardening. Water appeared to be lightly colored. Even though Garbage bins are installed at various points near the lake, debris such as solid waste, construction waste, and Nirmalya were observed floating on the water surface.

Suggestions to safeguard the lake are as follows:

1. Installation of a Nirmalya Bin in the lake vicinity.
2. Policy level interventions to prohibit solid waste dumping in the area.
3. An area in the lake to be demarcated for idol immersion and to perform religious activities. This area can be separated from the other part of the lake by constructing a small bund inside the lake. The section can be lined at the bottom.

Lake C: Jari Mari Lake

Jari Mari Lake Lake (19.27239°N 72.88673°E) with area of 0.5263 ha comes under Mira Bhayandar Municipal Corporation. It is surrounded by a park, temples, residential and commercial areas. The lake water is temporarily used for beautification, and construction activities. Also used for religious activities like Chhat Pooja. The lake appears to be green in color due to presence of aquatic plants. Religious activities carried out at the lake leads to Nirmalya; it is dumped at the lake.

Suggestions to safeguard the lake are as follows:

1. Installation of a Nirmalya Bin in the lake vicinity.
2. Policy level interventions to prohibit solid waste dumping in the area.
3. The local government should make solid waste management plan for the annual pooja
4. Periodic removal of water hyacinth should be planned.

Lake D: Uttan Road Lake

This Lake (19.28203°N 72.79437°E) with area of 0.3423 ha comes under Mira Bhayandar Municipal Corporation. It is surrounded by open spaces, farm lands and residential areas. Locals use the lake for swimming, bathing, irrigation, cattle wading, solid waste dumping as well as mass washing. This may deteriorate water quality. Water from the lake is used for construction of residential areas near the lake. Water appeared to be lightly colored. Scum, solid waste and plastic was observed on the lake surface. As per the Mira-Bhayandar Municipal Corporation's Development Plan, the lake has not been demarcated as a waterbody/tank. Mountains have been proposed as part of the lake and within its 50 m buffer.

Suggestions to safeguard the lake are as follows:

1. Policy level interventions to prohibit solid waste dumping in the area.
2. Stop cattle wading and mass washing activities
3. A ghat should be demarcated for bathing and washing activities. Appropriate treatment solutions to be provided in this area.
4. Water withdrawal if unauthorised, should be regulated
5. The community need to be trained in waste management.

Implementation agnecies: MBMC, NGOs, Private Companies

Implementation estimate: Rs. 55,000 per Cu. m. for desilting,
Rs. 15,000 per sq. m. for deweeding,
Rs. 10,00,000 per lake for other activities

Strategy – Incorporation of 'Greenery in Grey'

Concept:

Concretization is a concern as it is competing for space with the natural areas in the city. Natural areas in the city act as carbon sinks, natural coolants and biodiversity hubs, which is why they are extremely essential for sustainability of the city ecosystem in terms of carbon sequestration, temperature regulation and overall health of the city's biodiversity and its citizens.

While it is essential to achieve development to provide housing and workplace for the people, alternatives are required to incorporate natural spaces and vegetation in the urban infrastructure. This can be achieved by 2 methods discussed in this section.

Action plan – Vertical Gardens

The space constraints in the city are well-known. To find space for plantation for their obvious environmental benefits is an impossible task when housing and developmental projects are struggling to find space. Yet, none can deny the benefits and requirement of greenery in the city for its immense ecological, climatic, environmental and emotional benefits. The solution to these conflicts is 'Vertical gardens'.

Vertical spaces are easy to find in the cities. Plantation of saplings along the vertical surfaces on the buildings and walls can have immense good outcomes for the city's appearance, air quality and more. Following are some telltale benefits of the vertical greenery (Alliance) in urban ecosystems –

- **Excellent temperature control** – Studies have shown that the surfaces with vertical garden can remain up to 10° C cooler than non-green surfaces.
- **Improving air quality** – vertical gardens effectively trap the dust and other pollutants from air and improve the air quality.
- **Reduce carbon footprint** (Kleenheat) – Due to carbon dioxide, carbon monoxide and other carbon pollutants trapped by the vertical garden, the carbon emission is compensated thus reducing carbon footprint of residential areas and even cities investing in vertical gardens.
- **Aesthetic benefits** – The vertical gardens provide a rich green look to the buildings. These gardens can also be employed to recycle organic waste. Vertical gardens can be used as barriers against sound and air pollution and even provide privacy without having to use artificial curtains. Being in proximity of plants is known to reduce stress levels and form a soothing environment. Thus, vertical gardens are ideal for a stressful urban setup.
- **Self-grown food** – Vertical gardens can also be used to grow microgreens, providing a one-stop salad station for families and even small businesses.
- **Low maintenance** – Vertical gardens do not need regular maintenance and grow on their own, which makes them ideal for implementing in public spaces.

Methodology:

With all these benefits in sight, vertical gardening is an obvious choice for an innovative, booming city like Mira-Bhaindar. Probable locations for growing vertical garden are –

- **Metro and over bridge pillars** – there are multiple over bridges in the city and metros are under development. These pillars provide ideal environment for growth of plants.

- **Corporate building faces** – multistory buildings and complexes in the city would be more than convinced when all the benefits of vertical gardens are stated. The gardens could help these organizations save up on artificial barriers, lighting and air conditioners.
- **Compound walls** – walls separating residential areas and business complexes can install vertical gardens to reduce their carbon footprint, create an efficient sound and dust barrier and maintain a cool environment, while imparting a greener, rainforest-like look to the premises.

For installation of vertical gardens, ready-made units are available with nurseries and green solution organizations at approximately Rs. 650 – Rs. 1600 per square foot. Following is the list of plants that can be grown fuss-free in this setup –

Sr. No.	Horticultural / Trade name of the plant varieties	Habit
1.	Aralia "Green"	Shrub
2.	Aralia "Variegated"	Shrub
3.	Dendrobium orchids	Herb
4.	Dracaena "coffee"	Shrub
5.	Dracaena "green"	Shrub
6.	Dracaena "Song of India"	Shrub
7.	Dracaena "Song of Jamaica"	Shrub
8.	Dracaena "Tricolour"	Shrub
9.	Dracaena "variegated	Shrub
10.	Jade	Herb
11.	Money plant "Gold king"	Climber
12.	Money plant "Gold"	Climber
13.	Money plant "Green"	Climber
14.	Money plant "Green"	Climber
15.	Money plant "King"	Climber
16.	Money plant "Marbled queen"	Climber
17.	Money plant "Marbled"	Climber
18.	Money plant "N'Joy"	Climber
19.	Money plant "Variegated"	Climber
20.	Oxycardium "Brazil"	Climber
21.	Oxycardium "Bronze"	Climber
22.	Oxycardium "Gold"	Climber
23.	Oxycardium "Green"	Climber
24.	Oxycardium "Variegated"	Climber
25.	Pandanus "green"	Shrub
26.	Pandanus "Variegated"	Shrub
27.	Pepromoea "Green"	Herb
28.	Pepromoea "Variegated"	Herb
29.	Pilea "Green"	Herb
30.	Schefflera "Green"	Shrub
31.	Schefflera "Variegated"	Shrub
32.	*Spathiphyllum*	Herb
33.	*Tradescantia pallida*	Herb
34.	*Philodendron xanadu* "Variegated"	Climber
35.	*Philodendron xanadu* "Green"	Climber

Implementation locations:
Overbridge/metro bridge Pillars, petrol pump pillars, compound walls, vertical surfaces in government buildings and residential complexes.

Vertical gardens on overbridge and petrol pump pillars

Implementation agencies: Nurseries, NGOs, horticultural organizations, etc.

Implementation estimate: Rs. 1500 per square foot of vertical space

Action plan – Terrace gardens

Concept:
Terrace is available in all high rise buildings and is often not utilized by the residents. Roof or terrace garden thus become a good option to help the environment while making effective use of the available space in the concrete structures.

Roof gardens, as the name suggests, are gardens created on the flat roofs of buildings and houses. These gardens comprise of herb beds, shrubs and even trees planted in confined spaces like pots, which makes the set up neat and easily manageable. Roof gardens provide space for growing one's own food, creating a visually pleasing space to rest and relax, rainwater harvesting systems, butterfly gardens, etc. Here are some evident benefits (Walker, 2013)of roof gardens –

- **CO_2 fixation** – Plants in the roof garden function like regular plants that use up carbon dioxide from the air and convert it into food through photosynthesis. Thus, carbon fixation is number one benefit of any greenery.
- **Oxygen production** – releasing oxygen is a part of the regular photosynthesis process of plants. Release of fresh oxygen keeps the surrounding air fresh and healthy.
- **Heat management** – plants create cooler microclimates and thus keep the area cool, thus saving expenditure on air conditioners.
- **Habitat for wildlife** – Roofs being relatively undisturbed and thus safe havens for wildlife in the urbanscape. Butterflies, Insects, Birds and small animals find habitat in the roof gardens of all sizes.
- **Rainwater harvesting** – The best way to harvest rainwater is to let it into soil. Roof gardens provide this soil that captures and provides the rainwater to the growing plants. If the building does not have rainwater harvesting system installed, this is an easier method to achieve the same.

- **Stormwater runoff prevention** – since rainwater is being trapped on the roof itself, there is no to very less runoff of the rainwater, thus creating neat and effective system to trap water and prevent mess due to stormwater.

Methodology:
There are 4 types of roof gardens –

Extensive – This type has very fine layer of soil and involves plantation of lichens and mosses. This is not suitable and useful to Mira-Bhaindar City

Semi-intensive – Semi-intensive gardens have a deeper layer of soil and can grow low-maintenance herbs and small bushes. These are suitable for preparation of butterfly gardens in the City.

Intensive – Intensive type of roof gardens are full-fledged like backyard gardens with a thick layer of soil that can support shrubs and even trees.

Potted roof gardens – If soil layer is not to be laid on the terrace directly, large drums can be used as pots for plantation of trees and smaller pots and vessels for plantation of shrubs and herbs. This type of garden is easier to set up and maintain and does not require much constructional variation in the building roof. Even this type is suitable for implementation in Mira-Bhaindar city.

Mumbai residents convert terrace into garden, grow 15 kinds of veggies, herbs organically

Initiative was launched last December by residents of Monisha society in Bandra to treat wet waste generated by 24 household, who now plan to harvest seasonal vegetables

MUMBAI Updated: Dec 04, 2016, 23:45 IST

Akash Sakaria
Hindustan Times

Residents of Monisha society show their terrace garden.(Bhushan Koyande/HT)

Implementation locations:
Government buildings, residential areas in the city

Implementation agencies:
NGOs, nurseries, private apartment owners

Implementation estimate: Rs. 200 per potted plant

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Annexures

Annexure 1: List of Vascular Plants

SN	Scientific name	Common name	Habit	Origin
1	*Abrus precatorius*	Coral Bead Vine	Climber	Native
2	*Abutilon indicum*	Indian Mallow	Shrub	Native
3	*Abutilon persicum*	Persian Mallow	Shrub	Native
4	*Acacia auriculiformis*	Australian Acacia	Tree	Exotic
5	*Acacia catechu*	Black Cutch Tree	Tree	Native
6	*Acacia chundra*	Red Cutch Tree	Tree	Native
7	*Acacia ferruginea*	Rusty Acacia	Tree	Native
8	*Acacia leuocophloea*	White Babool	Tree	Native
9	*Acacia mangium*	Hickory Wattle	Tree	Exotic
10	*Acacia nilotica*	Babool	Tree	Native
11	*Acacia pennata*	Climbing Wattle	Climber	Native
12	*Acacia polyacantha*	White Thorn	Tree	Native
13	*Acalypha indica*	Indian Copperleaf	Herb	Native
14	*Acanthospermum hispidum*	Bristly Starbur	Herb	Native
15	*Acanthus illicifolius*	Sea Holly	Shrub	Native
16	*Achyranthes aspera*	Prickly Chaff Flower	Herb	Native
17	*Achyranthes bidentata*	Ox Knee	Herb	Native
18	*Achyranthes porphyrostachya*	-	Herb	Native
19	*Acmella paniculata*	Panicled Spot Flower	Herb	Native
20	*Adelocaryum coelestinum*	Common Hill Borage	Herb	Native
21	*Adenanthera pavonina*	Red Bead Tree	Tree	Native
22	*Adenostemma lavenia*	Sticky Daisy	Herb	Native
23	*Aegiceras corniculatum*	River Mangrove	Shrub	Native
24	*Aeginetia indica*	Forest Ghost Flower	Herb	Native
25	*Aegle marmelos*	Bengal Quince	Tree	Native
26	*Aeluropus lagopoides*	Mangrove Grass	Herb	Native
27	*Aerva lanata*	Mountain Knot Grass	Herb	Native
28	*Aerva sanguinolenta*	Climbing Wool Plant	Herb	Native
29	*Aeschynomene americana*	American Joint Vetch	Herb	Exotic
30	*Aeschynomene indica*	Indian Joint Vetch	Herb	Exotic
31	*Agave sisalana*	Century Plant	Herb	Exotic
32	*Ageratum conyzoides*	Goat Weed	Herb	Exotic
33	*Ailanthus excelsa*	Indian Tree of Heaven	Tree	Native
34	*Alangium salvifolium*	Hill Sack Tree	Tree	Native
35	*Albizia saman*	Rain Tree	Tree	Exotic
36	*Albizzia lebbeck*	Siris	Tree	Native
37	*Albizzia procera*	White Siris	Tree	Native
38	*Alseodaphne semicarpifolia*	Nelthare	Tree	Native
39	*Alstonia scholaris*	Scholar's Tree	Tree	Native
40	*Alternanthera philoxeroides*	Alligator Weed	Herb	Exotic

SN	Scientific name	Common name	Habit	Origin
41	*Alternanthera paronychioides*	Smooth Chaff Flower	Herb	Exotic
42	*Alternanthera pulchella*	Joyweed	Herb	Exotic
43	*Alternanthera sessilis*	Sessile Joyweed	Herb	Native
44	*Alysicarpus buplerifolius*	Lanceleaf Alyce Clover	Herb	Native
45	*Alysicarpus glumaceus*	-	Herb	Native
46	*Alysicarpus hamosus*	Round-leaf Alyce Clover	Herb	Native
47	*Alysicarpus heyneanus*	Heyne's Alyce Clover	Herb	Native
48	*Alysicarpus longifolius*	Longleaf Alyce Clover	Herb	Native
49	*Alysicarpus vaginalis*	Alyce Clover	Herb	Native
50	*Alysicarpus vaginalis var. nummularifolius*	-	Herb	Native
51	*Amaranthus hybridus*	Red Amaranth	Herb	Exotic
52	*Amaranthus virdis*	Green Amaranth	Herb	Native
53	*Ammania baccifera*	Monarch Redstem	Herb	Native
54	*Amorphophallus paeoniifolius*	Elephant Foot Yam	Herb	Native
55	*Amorphophyllus commutatus*	Dragon Stalk Yam	Herb	Native
56	*Anacardium occidentale*	Cashew	Tree	Exotic
57	*Anisomeles heyneana*	Western Hill Catmint	Herb	Native
58	*Annona muricata*	Soursop	Shrub	Exotic
59	*Annona reticulata*	Bullock's Heart	Tree	Exotic
60	*Annona squamosa*	Custard Apple	Tree	Exotic
61	*Anogeissus latifolia*	Indian Axlewood	Tree	Native
62	*Antidesma ghaesembilla*	Black Current Tree	Tree	Native
63	*Antigonon leptopus*	Icecream Creeper	Climber	Exotic
64	*Aphanamixis polystachya*	Pithraj Tree	Tree	Native
65	*Apluda mutica*	Mauritian Grass	Grass	Native
66	*Aponogeton natans*	Floating Lace Plant	Herb	Native
67	*Araucaria columnaris*	Indian Christmas Tree	Tree	Exotic
68	*Areca catechu*	Betelnut	Tree	Exotic
69	*Argemone mexicana*	Mexican Poppy	Herb	Exotic
70	*Argyreia nervosa*	Elephant Creeper	Climber	Native
71	*Arthraxon lanceolatus*	Carpetgrass	Grass	Native
72	*Artocarpus heterophyllus*	Jackfruit	Tree	Native
73	*Artocarpus lakoocha*	Monkey Jack	Tree	Native
74	*Arundinella metzii*	-	Grass	Native
75	*Arundinella pumila*	-	Grass	Native
76	*Arundinella setosa*	Arundinella	Grass	Native
77	*Asparagus racemosus*	Asparagus	Climber	Native
78	*Asystasia nemorum*	Wood Asystasia	Herb	Exotic
79	*Averrhoa bilimbi*	Cucumber Tree	Tree	Native
80	*Averrhoa carambola*	Star Fruit	Tree	Exotic
81	*Avicennia marina*	Grey Mangrove	Tree	Native
82	*Avicennia officinalis*	Indian Mangrove	Tree	Native
83	*Azadirachta indica*	Neem	Tree	Native

SN	Scientific name	Common name	Habit	Origin
84	*Azanza lampas*	Common Mallow	Shrub	Native
85	*Bacopa monnieri*	Indian Pennywort	Herb	Native
86	*Baliospermum solanifolium*	Red Physic Nut	Herb	Native
87	*Bambusa bambos*	Bamboo	Grass	Native
88	*Barleria acanthophora*	-	Herb	Exotic
89	*Barleria cristata*	Philippine Violet	Shrub	Native
90	*Barringtonia acutangula*	Indian Oak	Tree	Native
91	*Barringtonia asiatica*	Sea Poison Tree	Tree	Native
92	*Bauhinia integrifolia*	Flame Vine Bauhinia	Climber	Exotic
93	*Bauhinia malabarica*	Malabar Bauhinia	Tree	Native
94	*Bauhinia purpurea*	Orchid Tree	Tree	Native
95	*Bauhinia racemosa*	Bidi Leaf Tree	Tree	Native
96	*Begonia crenata*	Common Begonia	Herb	Native
97	*Bidens biternata*	Yellow Flowered Blackjack	Herb	Native
98	*Biophytum sensitivum*	Sensitive Plant	Herb	Native
99	*Bixa orellana*	Lipstick Tree	Tree	Exotic
100	*Blainvillea acmella*	Para Cress Flower	Herb	Native
101	*Blepharis integrifolia*	Narrow-leaf Blepharis	Herb	Native
102	*Blepharis maderaspatensis*	Creeping Blepharis	Herb	Native
103	*Blumea belangeriana*	Belanger's Blumea	Herb	Native
104	*Blumea eriantha*	-	Herb	Native
105	*Blumea lacera*	Lettuce Leaf Blumea	Herb	Native
106	*Blumea obliqua*	-	Herb	Native
107	*Blumea oxyodonta*	Spiny Leaved Blumea	Herb	Native
108	*Boehmeria virgata subsp. macrophylla*	False Nettle	Herb	Native
109	*Bombax ceiba*	Red Silk Cotton	Tree	Native
110	*Bombax insigne*	Showy Silk Cotton Tree	Tree	Native
111	*Borassus flabellifer*	Toddy Palm	Tree	Native
112	*Bothriochloa pertusa*	-	Grass	Native
113	*Bougainvillea spectabilis*	Bougainvillea	Climber	Exotic
114	*Brachiaria ramosa*	Browntop Millet	Grass	Native
115	*Brassica juncea*	Mustard	Herb	Native
116	*Breynia retusa*	Cup Saucer Plant	Shrub	Native
117	*Bridelia montana*	Mountain Bridelia	Tree	Native
118	*Bridelia retusa*	Spinous Kino Tree	Tree	Native
119	*Bruguiera cylindrica*	White Burma Mangrove	Tree	Native
120	*Bruguiera gymnorhiza*	Burma Mangrove	Tree	Native
121	*Buchanania cochinchinensis*	Chironji Tree	Tree	Native
122	*Butea monosperma*	Flame of the Forest	Tree	Native
123	*Caesalpinia pulcherima*	Peacock Flower	Shrub	Native
124	*Caesulia axillaris*	Pink Node Flower	Herb	Native
125	*Cajanus cajan*	Pigeon Pea	Herb	Native
126	*Cajanus platycarpus*	-	Climber	Native

SN	Scientific name	Common name	Habit	Origin
127	*Cajanus scarabaeoides*	Showy Pigeon Pea	Climber	Native
128	*Calacanthus grandiflorus*	Large Flowered Calacanthus	Shrub	Native
129	*Callistemon citrinus*	Bottlebrush	Tree	Exotic
130	*Callophyllum inophyllum*	Sultan Champa	Tree	Native
131	*Calotropis gigantea*	Crown Flower	Shrub	Native
132	*Calotropis procera*	Rubber Flower	Shrub	Native
133	*Cananga odorata*	Ylang Ylang	Tree	Native
134	*Canavalia gladiata*	Sword Bean	Climber	Native
135	*Canna indica*	Indian Shot	Herb	Exotic
136	*Canscora diffusa*	Spreading Canscora	Herb	Native
137	*Capillipedium huegelii*	-	Grass	Native
138	*Capparis sepiaria*	Wild Caper Bush	Shrub	Native
139	*Capparis zeylanica*	Ceylon Caper	Shrub	Native
140	*Cardamine hirsuta*	Hairy Bitter Cress	Herb	Native
141	*Cardamine scutata*	-	Herb	Exotic
142	*Cardiospermum halicacabum*	Balloon Vine	Climber	Native
143	*Careya arborea*	Wild Guava	Tree	Native
144	*Carica papaya*	Papaya	Tree	Exotic
145	*Carissa carandas*	Karanda	Shrub	Native
146	*Carissa spinarum*	Wild Karanda	Shrub	Native
147	*Caryota urens*	Fishtail Palm	Tree	Native
148	*Cascabela thevetia*	Mexican Oleander	Tree	Exotic
149	*Casearia graveolens*	Chilla	Tree	Native
150	*Casearia tomentosa*	Toothed Leaf Chilla	Tree	Native
151	*Cassia fistula*	Golden Shower	Tree	Native
152	*Cassia grandis*	Coral Shower Tree	Tree	Exotic
153	*Cassia javanica*	Pink Shower	Tree	Exotic
154	*Cassia javanica* subsp. *nodosa*	Pink Cassia	Tree	Exotic
155	*Cassia renigera*	Burmese Pink Cassia	Tree	Exotic
156	*Cassytha filiformis*	Love-vine	Climber	Native
157	*Casuarina equisetifolia*	Whistling Pine	Tree	Native
158	*Catunaregam spinosa*	Wild Pomegranate	Tree	Native
159	*Ceiba pentandra*	White Silk Cotton	Tree	Exotic
160	*Celosia argentea*	Cock's Comb	Herb	Native
161	*Celosia argentea var. mumbaiana*	-	Herb	Native
162	*Centaurium centaurioides*	Pink Centaury	Herb	Native
163	*Centranthera indica*	Indian Spur-anther Flower	Herb	Native
164	*Ceratophyllum demersum*	Hornwort	Herb	Native
165	*Ceratophyllum submersum*	Tropical Hornwort	Herb	Native
166	*Ceriops tagal*	Spurred Mangrove	Tree	Native
167	*Chamaecrista kleinii*	-	Herb	Native
168	*Chamaecrista mimosoides*	Feather-leaved Cassia	Herb	Exotic
169	*Cheilocostus speciosus*	Crepe Ginger	Herb	Native

SN	Scientific name	Common name	Habit	Origin
170	*Chloris barbata*	Windmill Grass	Grass	Native
171	*Chloris montana*	Windmill Grass	Grass	Native
172	*Chloris quinquesetica*	-	Grass	Native
173	*Chlorophytum borivilianum*	Safed Musli	Herb	Native
174	*Chlorophytum indicum*	Indian Chlorophytum	Herb	Native
175	*Chlorophytum tuberosum*	Edible Chlorophytum	Herb	Native
176	*Chromolaena corymbosa*	-	shrub	Exotic
177	*Chromolaena odorata*	Siam Weed	Herb	Native
178	*Chrozophora plicata*	-	Herb	Native
179	*Chrozophora rottleri*	Rottler's Chrozophora	Herb	Native
180	*Chrysophyllum cainito*	Star Apple Tree	Tree	Exotic
181	*Cissampelos pareira*	Velvet Leaf	Climber	Native
182	*Cissus woodrowii*	Woodrow's Grape Tree	Shrub	Native
183	*Citrullus lanatus*	Watermelon	Climber	Native
184	*Citrus aurantiifolia*	Lime	Tree	Native
185	*Citrus grandis*	Pomelo	Tree	Native
186	*Citrus limon*	Lemon	Shrub	Native
187	*Citrus reticulata*	Orange	Shrub	Exotic
188	*Citrus sinensis*	Sweet Orange	Tree	Native
189	*Citrus x aurantium*	Sweet Orange	Tree	Native
190	*Cleome viscosa*	Asian Spider Flower	Herb	Native
191	*Clitoria annua*	Bombay Bean	Herb	Native
192	*Clitoria ternatea*	Butterfly Pea	Climber	Exotic
193	*Coccinia grandis*	Ivy Gourd	Climber	Native
194	*Cocculus hirsutus*	Broom Creeper	Climber	Native
195	*Cochlospermum religiosum*	Buttercup Tree	Tree	Native
196	*Cocos nucifera*	Coconut	Tree	Native
197	*Coix lacryma-jobi*	Adlay Millet	Grass	Native
198	*Colebrookea oppositifolia*	Squirrel Tail	Shrub	Native
199	*Colocasia antiquorum*	Taro	Herb	Native
200	*Colocasia esculenta*	Taro	Herb	Native
201	*Combretum albidum*	Rangoon Creeper	Climber	Native
202	*Combretum indicum*	Rangoon Creeper	Climber	Native
203	*Commelina benghalensis*	Bengal Dayflower	Herb	Native
204	*Commelina caroliniana*	Carolina Dayflower	Herb	Native
205	*Commelina diffusa*	Creeping Dayflower	Herb	Native
206	*Commelina suffruticosa*	Shrubby Dayflower	Herb	Native
207	*Convolvulus arvensis*	Field Bindweed	Climber	Native
208	*Corchorus aestuans*	East Indian Mallow	Herb	Native
209	*Corchorus capsularis*	White Jute	Herb	Native
210	*Corchorus olitorius*	Nalta Jute	Herb	Native
211	*Cordia dichotoma*	Indian Cherry	Tree	Native
212	*Cordia sebestina*	Scarlet Cordia	Tree	Exotic

SN	Scientific name	Common name	Habit	Origin
213	*Cordia sinensis*	Long-leaf Cordia	Tree	Native
214	*Cosmos sulphureus*	Sulphur Cosmos	Herb	Exotic
215	*Couroupita guianensis*	Cannonball Tree	Tree	Exotic
216	*Crataeva tapia*	Large Garlic Pear	Tree	Exotic
217	*Crinum brachynema*	Woodrow's Crinum Lily	Herb	Native
218	*Crinum latifolium*	Milk and Wine Lily	Herb	Native
219	*Crotalaria albida*	Mountain Rattlepod	Herb	Native
220	*Crotalaria filipes*	Creeping Hemp	Herb	Native
221	*Crotalaria hebecarpa*	Fuzzy Fruited Rattlepod	Herb	Native
222	*Crotalaria juncea*	Sun Hemp	Herb	Native
223	*Crotalaria leptostachya*	Slender Spiked Rattlepod	Herb	Native
224	*Crotalaria medicaginea*	Medick Rattlepod	Herb	Native
225	*Crotalaria montana*	Mountain Rattlepod	Herb	Native
226	*Crotalaria prostrata*	Prostrate Rattlepod	Herb	Native
227	*Crotalaria retusa*	Rattleweed	Herb	Native
228	*Croton bonplandianus*	-	Herb	Native
229	*Cryptolepis dubia*	Wax-leaved Climber	Climber	Native
230	*Cucumis melo*	Melon	Climber	Native
231	*Cullen corylifolium*	Scurfy Pea	Herb	Native
232	*Cupressus torulosa*	Himalayan Cypress	Tree	Native
233	*Curculigo orchioides*	Golden Eye Grass	Herb	Native
234	*Curcuma pseudomontana*	Hill Turmeric	Herb	Native
235	*Cuscuta reflexa*	Giant Dodder	Climber	Native
236	*Cyanotis axillaris*	Creeping Cradle Plant	Herb	Native
237	*Cyanotis cristata*	Crested Dew-grass	Herb	Native
238	*Cyanotis fasciculata*	Pussycat Ears	Herb	Native
239	*Cyanthillium cinereum*	Little Ironweed	Herb	Exotic
240	*Cyathocline purpurea*	Purple Bane	Herb	Native
241	*Cycas circinalis*	Cycas	Tree	Native
242	*Cyclea peltata*	Indian Moon Seed	Climber	Native
243	*Cynarospermum asperrimum*	Hill Blepharis	Herb	Native
244	*Cynodon dactylon*	Bermuda Grass	Grass	Native
245	*Cyperus difformis*	Variable Flatsedge	Herb	Exotic
246	*Cyphostemma auriculatum*	Eared Cyphostemma	Climber	Native
247	*Dactyloctenium aegyptium*	Crowfoot Grass	Grass	Exotic
248	*Dactyloctenium scindicum*	Sind Crowfoot Grass	Grass	Native
249	*Dalbergia lanceolaria*	-	Tree	Native
250	*Dalbergia latifolia*	Black Rosewood	Tree	Native
251	*Dalbergia sissoo*	Indian Rosewood	Tree	Native
252	*Datura innoxia*	Datura	Herb	Exotic
253	*Datura metel*	Devil's Trumpet	Herb	Native
254	*Datura stramonium*	Jimsonweed	Herb	Exotic
255	*Delonix regia*	Royal Poinciana	Tree	Exotic

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256	*Dendrobium ovatum*	Green Lipped Dendrobium	Orchid	Native
257	*Dendrophthoe falcata*	Honey Suckle Mistletoe	Shrub (Parasite)	Native
258	*Dentella repens*	Creeping Dentella	Herb	Exotic
259	*Derris scandens*	Jewel Vine	Climber	Native
260	*Derris trifoliata*	Common Derris	Climber	Native
261	*Desmodiastrum racemosum var. rotundifolium*	Ritchie's Desmodium	Herb	Native
262	*Desmodium dichotomum*	-	Herb	Native
263	*Desmodium gangeticum*	Sal Leaved Desmodium	Herb	Native
264	*Desmodium heterocarpon*	Asian Tick Trefoil	Herb	Native
265	*Desmodium laxiflorum*	Loose Flowered Desmodium	Herb	Native
266	*Desmodium scorpiurus*	Scorpion Tick Trefoil	Herb	Exotic
267	*Desmodium triangulare*	Triangular Horse Bush	Shrub	Native
268	*Desmodium triflorum*	Creeping Tick Trefoil	Herb	Native
269	*Desmodium triquetrum*	Trefle Gros	Herb	Native
270	*Desmostachya bipinnata*	Halfa Grass	Grass	Native
271	*Dichanthium annulatum*	Sheda Grass	Grass	Native
272	*Dichanthium caricosum*	Nadi Blue Grass	Grass	Native
273	*Dicliptera cuneata*	Wedge-leaved Foldwing	Herb	Native
274	*Dicliptera paniculata*	Panicled Foldwing	Herb	Native
275	*Dicliptera verticillata*	-	Herb	Exotic
276	*Digera muricata*	False Amaranth	Herb	Native
277	*Digitaria abludens*	Southern Crabgrass	Grass	Native
278	*Digitaria ciliaris*	Tropical Fingergrass	Grass	Native
279	*Digitaria longiflora*	Crabgrass	Grass	Exotic
280	*Digitaria radicosa*	-	Grass	Native
281	*Digitaria stricta*	-	Grass	Native
282	*Dillenia indica*	Elephant Apple	Tree	Native
283	*Dimeria stapfiana*	-	Grass	Native
284	*Dioscorea belophylla*	Spear-leaved Yam	Tree	Native
285	*Dioscorea bulbifera*	Air Yam	Climber	Native
286	*Dioscorea glabra*	Spear-leaved Yam	Climber	Native
287	*Dioscorea oppositifolia*	Cinnamon Vine	Climber	Native
288	*Dioscorea pentaphylla*	Five Leaf Yam	Climber	Native
289	*Diospyros malabarica*	Indian Persimmon	Tree	Native
290	*Diospyros melanoxylon*	Coromandel Ebony	Tree	Native
291	*Dipcadi concanense*	Konkan Dipcadi	Herb	Native
292	*Dipcadi montanum*	-	Tree	Native
293	*Dipcadi viride*	Dipcadi	Tree	Exotic
294	*Diplocyclos palmata*	Lollipop Climber	Tree	Native
295	*Dolichandrone spathacea*	Mangrove Trumpet Tree	Herb	Native
296	*Dopatrium junceum*	Rushlike Dopatrium	Herb	Native
297	*Dregea volubilis*	Green Wax Flower	Climber	Native

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298	*Drosera indica*	Indian Sundew	Herb	Native
299	*Echinochloa colona*	Jungle Rice	Grass	Native
300	*Echinochloa crus-galli*	Barnyard Grass	Grass	Native
301	*Eclipta prostrata*	False Daisy	Herb	Native
302	*Ehretia laevis*	Chamror	Tree	Native
303	*Eichhornia crassipes*	Water Hyacinth	Herb	Exotic
304	*Elaeagnus conferta*	Wild Olive	Shrub	Native
305	*Elaeocarpus serratus*	Ceylon Olive Tree	Tree	Native
306	*Elatostema cuneatum*	-	Herb	Exotic
307	*Elephantopus scaber*	Elephant Foot	Herb	Native
308	*Eleusine indica*	Indian Crowfoot Grass	Grass	Native
309	*Elytrophorus spicatus*	-	Grass	Native
310	*Enicostema axillare*	Indian Whitehead	Herb	Native
311	*Ensete superbum*	Wild Banana	Herb	Native
312	*Epaltes divaricata*	Narrow-leaf Epaltes	Herb	Native
313	*Eragrostis ciliaris*	Gophertail Lovegrass	Grass	Native
314	*Eragrostis nutans*	-	Grass	Native
315	*Eragrostis pilosa*	-	Grass	Exotic
316	*Eragrostis tenella*	Japanese Lovegrass	Grass	Native
317	*Eragrostis tremula*	-	Grass	Native
318	*Eragrostis unioloides*	Chinese Lovegrass	Grass	Native
319	*Eranthemum roseum*	Blue Sage	Herb	Native
320	*Erigeron sublyratus*	-	Herb	Native
321	*Eriocaulon heterolepis*	Buttonhead Pipewort	Herb	Native
322	*Eriochloa polystachya*	Caribbean Cupgrass	Grass	Exotic
323	*Eriochloa procera*	Tropical Cupgrass	Grass	Native
324	*Erythrina stricta*	Indian Coral Tree	Tree	Native
325	*Erythrina suberosa*	Indian Coral Tree	Tree	Native
326	*Erythrina variegata*	Indian Coral Tree	Tree	Native
327	*Eucalyptus globulus*	Eucalyptus	Tree	Exotic
328	*Eulalia fimbriata*	-	Grass	Native
329	*Euphorbia heterophylla*	Wild Poinsettia	Herb	Exotic
330	*Euphorbia clarkeana*	Clark's Spurge	Herb	Native
331	*Euphorbia erythroclada*	Red-branch Spurge	Herb	Native
332	*Euphorbia hirta*	Asthma Weed	Herb	Native
333	*Euphorbia lacei*	-	Tree	Native
334	*Euphorbia neriifolia*	Indian Spurge Tree	Shrub	Native
335	*Euphorbia parviflora*	-	Herb	Native
336	*Euphorbia serpens*	Matted Sandmat	Herb	Exotic
337	*Euphorbia thymifolia*	Gulf Sandmat	Herb	Native
338	*Evolvulus nummularius*	Roundleaf Bindweed	Herb	Native
339	*Exacum bicolor*	Bicolor Persian Violet	Herb	Native
340	*Excoecaria agallocha*	Blinding Tree	Tree	Native

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341	*Fernandoa adenophylla*	Katsagon	Tree	Native
342	*Ficus amplissima*	Indian Bat Fig	Tree	Native
343	*Ficus arnottiana*	Indian Rock Fig	Tree	Native
344	*Ficus benghalensis*	Banyan Tree	Tree	Native
345	*Ficus benjamina*	Weeping Fig	Tree	Native
346	*Ficus elastica*	Rubber Fig	Tree	Native
347	*Ficus exasperata*	Forest Sandpaper Tree	Tree	Native
348	*Ficus hispida*	Hairy Fig	Tree	Native
349	*Ficus lacor*	-	Tree	Exotic
350	*Ficus longifolia*	Narrow Leaf Fig	Tree	Native
351	*Ficus racemosa*	Cluster Fig	Tree	Native
352	*Ficus religiosa*	Sacred Fig	Tree	Native
353	*Ficus tinctoria* subsp. *gibbosa*	Dye Fig	Tree	Native
354	*Ficus virens*	White Fig	Tree	Native
355	*Ficus carica*	Common Fig	Tree	Exotic
356	*Filicium decipiens*	Fern Tree	Tree	Native
357	*Firmania colorata*	Scarlet Sterculia	Tree	Native
358	*Flacourtia indica*	Governor's Plum	Tree	Native
359	*Flacourtia jangomas*	Coffee Plum	Tree	Native
360	*Flacourtia montana*	Mountain Sweet Thorn	Tree	Native
361	*Flemingia lineata*	-	Herb	Native
362	*Flemingia macrophylla*	Large-leaf Flemingia	Shrub	Native
363	*Flueggea leucopyrus*	Indian Snow Berry	Shrub	Native
364	*Flueggea virosa*	Common Bushweed	Shrub	Native
365	*Furcraea foetida*	Mauritius Hemp	Herb	Native
366	*Garcinia indica*	Mangosteen	Tree	Native
367	*Gardenia resinifera*	Brilliant Gardenia	Tree	Native
368	*Garuga pinnata*	Grey Downy Balsam	Tree	Native
369	*Geissaspis cristata*	Eyelashes Shell Beans	Herb	Native
370	*Getonia floribunda*	Paper Flower Climber	Climber	Native
371	*Glinus lotoides*	Lotus Sweetjuice	Herb	Native
372	*Glinus oppositifolia*	Jima	Herb	Native
373	*Gmelina arborea*	-	Tree	Native
374	*Gnaphalium polycephalum*	White Balsam	Herb	Exotic
375	*Gomphrena globosa*	Bachelor's Buttons	Herb	Exotic
376	*Grangea maderaspatana*	Madras Carpet	Herb	Native
377	*Grevillea robusta*	Silver Oak	Tree	Exotic
378	*Grewia asiatica*	Phalsa	Tree	Native
379	*Grewia nervosa*	Elm-leaf Grewia	Tree	Native
380	*Grewia tiliifolia*	Dhaman	Tree	Native
381	*Habenaria marginata*	Ground Yellow Habenaria	Orchid	Native
382	*Habenaria roxburghii*	Roxburgh's Habenaria	Orchid	Native
383	*Haldinia cordifolia*	Kaim	Tree	Native

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384	*Haplanthus nilgherrensis*	-	Herb	Native
385	*Helicteris isora*	East Indian Screw Tree	Tree	Native
386	*Hemidesmus indicus*	Indian Sarsaparilla	Climber	Native
387	*Hemigraphis latebrosa*	Shade-loving Hemigraphis	Herb	Native
388	*Heterophragma quadriloculare*	Waras	Tree	Native
389	*Heteropogon contortus*	Black Speargrass	Grass	Native
390	*Hibiscus rosa-sinensis*	Shoe Flower	Shrub	Native
391	*Hibiscus tiliaceus*	Sea Hibiscus	Tree	Native
392	*Holarrhena pubescens*	Indrajao	Tree	Native
393	*Holostemma ada-kodien*	Holostemma Creeper	Climber	Native
394	*Homonoia riparia*	Willow-leaved Water Croton	Shrub	Native
395	*Hydrolea zeylanica*	Ceylon Hydrolea	Herb	Native
396	*Hygrophila auriculata*	Marsh Barbel	Shrub	Native
397	*Hygrophila erecta*	Erect Hygrophila	Herb	Native
398	*Hygrophila polysperma*	Indian Swampweed	Herb	Native
399	*Hymenodictyon obovatum*	-	Tree	Native
400	*Hypoxis aurea*	Golden Star Grass	Herb	Native
401	*Hyptis suaveolens*	American Mint	Herb	Exotic
402	*Impatiens balsamina*	Balsam	Herb	Native
403	*Indigofera astragalina*	Silky Indigo	Herb	Native
404	*Indigofera cordifolia*	Heart-leaf Indigo	Herb	Native
405	*Indigofera linifolia*	Narrowleaf Indigo	Herb	Native
406	*Indigofera tinctoria*	True Indigo	shrub	Exotic
407	*Iphigenia indica*	Indian Grass Lily	Herb	Native
408	*Ipomoea aquatica*	Water Morning Glory	Herb	Native
409	*Ipomoea biflora*	-	Climber	Exotic
410	*Ipomoea cairica*	Railway Creeper	Climber	Native
411	*Ipomoea carnea*	Bush Morning Glory	Shrub	Exotic
412	*Ipomoea hederifolia*	Scarlet Morning Glory	Climber	Exotic
413	*Ipomoea marginata*	Purple Heart Glory	Climber	Native
414	*Ipomoea mauritiana*	Giant Potato	Climber	Exotic
415	*Ipomoea nil*	Blue Morning Glory	Climber	Native
416	*Ipomoea obscura*	Obscure Morning Glory	Climber	Native
417	*Ipomoea pes-capre*	Goat Foot Vine	Climber	Native
418	*Ipomoea pes-tigridis*	Tiger Foot Morning Glory	Climber	Native
419	*Ipomoea quamoclit*	Cypress Vine	Climber	Exotic
420	*Isachne globosa*	Swamp Millet	Grass	Native
421	*Ischaemum aristatum*	Toco Grass	Grass	Native
422	*Ischaemum santapaui*	-	Grass	Native
423	*Iseilema laxum*	-	Grass	Native
424	*Ixora brachiata*	-	Tree	Native
425	*Ixora coccinea*	Jungle Geranium	Shrub	Native
426	*Ixora parviflora*	Small flowered Ixora	Tree	Native

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427	*Ixora pavetta*	Torchwood Tree	Tree	Native
428	*Jacaranda mimosaefolia*	Blue Jacaranda	Shrub	Native
429	*Jasminum malabaricum*	Malabar Jasmine	Tree	Native
430	*Jatropha curcas*	Physic Nut	Tree	Exotic
431	*Justicia adhatoda*	Malabar Nut	Herb	Native
432	*Justicia japonica*	-	Tree	Native
433	*Justicia procumbens*	Water Willow	Herb	Native
434	*Kavalama urens*	Indian Gum	Tree	Native
435	*Khaya senegalensis*	African Mahogany	Tree	Exotic
436	*Kigelia africana*	Sausage Tree	Tree	Exotic
437	*Kleinhovia hospita*	Guest Tree	Tree	Exotic
438	*Lagascea mollis*	Silk Leaf	Herb	Exotic
439	*Lagerstroemia indica*	Common Crape Myrtle	Tree	Native
440	*Lagerstroemia parviflora*	Small flowered Crape Myrtle	Tree	Native
441	*Lagerstroemia speciosa*	Queen Crape Myrtle	Tree	Native
442	*Lagerstroemia thorelii*	Queen's Flower	Tree	Native
443	*Lannea coromandelica*	Indian Ash Tree	Tree	Native
444	*Lantana camara*	Lantana	shrub	Exotic
445	*Laportea interrupta*	Hen's Nettle	Tree	Native
446	*Launaea sarmentosa*	Beach Launaea	Herb	Native
447	*Lawsonia inermis*	Henna	Shrub	Exotic
448	*Ledebouria revoluta*	South Indian Squill	Tree	Native
449	*Leea asiatica*	Asiatic Leea	shrub	Native
450	*Leea macrophylla*	Large-leaf Leea	shrub	Native
451	*Leonotis nepetifolia*	Lion's Ear	Herb	Exotic
452	*Lepidagathis trinervia*	Frilly Lepidagathis	Herb	Native
453	*Leptochloa fusca*	-	Grass	Exotic
454	*Leucaena leucocephala*	White Babool	Tree	Exotic
455	*Leucas aspera*	Common Leucas	Herb	Exotic
456	*Limnophyton obtusifolia*	Blunt Arrowhead	Herb	Native
457	*Limonia acidissima*	Wood Apple	Tree	Native
458	*Lindernia anagallis*	Pimpernel Lindernia	Herb	Native
459	*Lindernia antipoda*	Sparrow Lindernia	Herb	Native
460	*Lindernia ciliata*	Fringed Lindernia	Herb	Native
461	*Lindernia crustacea*	Malaysian Lindernia	Herb	Native
462	*Lindernia dubia*	-	Herb	Exotic
463	*Lindernia parviflora*	Small flowered Lindernia	Herb	Native
464	*Litchi chinensis*	Leechee	Tree	Exotic
465	*Livistona chinensis*	Chinese Fan Palm	Tree	Exotic
466	*Ludwigia erecta*	Water Primrose	Herb	Native
467	*Ludwigia hyssopifolia*	Hyssop-leaved Water Primrose	Herb	Native
468	*Luffa acutangula*	Bitter Luffa	Climber	Native

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469	*Macaranga peltata*	Chandada	Tree	Native
470	*Madhuca longifolia var. latifolia*	Mahua	Tree	Native
471	*Magnolia champaca*	Golden Champa	Tree	Native
472	*Malachra capitata*	Brazil Jute	Herb	Exotic
473	*Mallotus philippensis*	Dyer's Rottlera	Tree	Native
474	*Mallotus repandus*	Triangular-leaf Mallotus	Climber	Native
475	*Malvaviscus penduliflorus*	Pendulous Sleeping Hibiscus	Shrub	Exotic
476	*Mammea longifolia*	Surangi	Tree	Native
477	*Mangifera indica*	Mango	Tree	Native
478	*Manilkara hexandra*	Ceylon Ironwood	Tree	Native
479	*Manilkara zapota*	Chikoo	Tree	Exotic
480	*Markhamia lutea*	Markhamia	Tree	Exotic
481	*Martynia annua*	Devil's Claw	Herb	Native
482	*Melanocenchris jacquemontii*	Desert Black Millet	Grass	Native
483	*Melia azadirach*	Persian Lilac	Tree	Exotic
484	*Melochia corchorifolia*	Chocolate Weed	Herb	Native
485	*Memecylon umbellatum*	Ironwood Tree	Tree	Native
486	*Merremia vitifolia*	Grape-leaf Wood Rose	Climber	Native
487	*Mesua ferrea*	Cobra Saffron	Tree	Native
488	*Meyna laxiflora*	Muyna	shrub	Native
489	*Meyna spinosa*	Muyna	shrub	Native
490	*Millingtonia hortensis*	Sky Jasmine	Tree	Native
491	*Mimosa pudica*	Touch-me-not	Herb	Native
492	*Mimusops elengi*	Spanish Cherry	Tree	Native
493	*Mitragyna parvifolia*	True Kadamb	Tree	Native
494	*Mnesithea laevis*	-	Grass	Native
495	*Mollugo pentaphylla*	Five-leaved Carpetweed	Herb	Native
496	*Momordica dioica*	Bittergourd	Climber	Native
497	*Morinda citrifolia*	Great Morinda	Tree	Native
498	*Morinda pubesence*	Morinda Tree	Tree	Native
499	*Moringa oleifera*	Drumstick Tree	Tree	Native
500	*Morus alba*	Mulberry	Tree	Native
501	*Mucuna pruriens*	Velvet Bean	Climber	Native
502	*Mukia maderaspatana*	Madras Pea Pumpkin	Climber	Native
503	*Muntingia calabura*	Singapore Cherry	Tree	Exotic
504	*Murdannia nudiflora*	Doveweed	Herb	Native
505	*Murdannia semiteres*	Panicled Dewflower	Herb	Native
506	*Murdannia spirata*	Asiatic Dewflower	Herb	Native
507	*Murraya paniculata*	Orange Jasmine	Tree	Native
508	*Musa × paradisiaca*	Banana	Herb	Native
509	*Mussaenda erythrophylla*	Red Flag Bush	Shrub	Exotic
510	*Myristica fragrans*	Nutmeg	Tree	Native
511	*Neolamarkiana cadamba*	Burflower Tree	Tree	Native

SN	Scientific name	Common name	Habit	Origin
512	*Neuracanthus sphaerostachyus*	Pin Cushion Plant	Herb	Native
513	*Neuracanthus trinervius*	-	Herb	Native
514	*Nothosaerva brachiata*	Minute Amaranth	Herb	Native
515	*Nyctanthus arbor-tristis*	Coral Jasmine	Tree	Native
516	*Nymphaea nouchali*	Blue Water Lily	Herb	Native
517	*Nymphea pubescence*	Water Lily	Herb	Native
518	*Nymphoides hydrophylla*	Crested Floatingheart	Herb	Native
519	*Ocimum americanum*	Wild Basil	Herb	Native
520	*Ocimum tenuiflorum*	Basil	Herb	Native
521	*Oldenlandia biflora*	Diamond Flower	Herb	Native
522	*Oldenlandia corymbosa*	Diamond Flower	Herb	Native
523	*Oldenlandia galioides*	Starviolet	Herb	Native
524	*Operculina turpethum*	White Day Glory	Climber	Native
525	*Oplismenus burmanni*	Wavy-leaf Basketgrass	Grass	Native
526	*Oplismenus compositus*	Running Mountain Grass	Grass	Native
527	*Oroxylum indicum*	Indian Trumpet Flower	Tree	Native
528	*Orthosiphon thymiflorus*	Thyme Java Tea	Herb	Native
529	*Oryza rufipogon*	Red Rice	Grass	Native
530	*Ottelia alismoides*	Duck Lettuce	Herb	Native
531	*Oxalis corniculata*	Creeping Wood Sorrel	Herb	Native
532	*Oxystelma esculenta*	Rosy Milkweed	Climber	Native
533	*Pancratium parvum*	Funnel Narcissus	Herb	Native
534	*Pancratium triflorum*	Forest Spider Lily	Herb	Native
535	*Panicum curviflorum*	-	Grass	Native
536	*Panicum sumatrense*	Little Millet	Grass	Native
537	*Paracalyx scariosus*	-	Climber	Native
538	*Parkia biglandulosa*	African Locust Tree	Tree	Exotic
539	*Parkinsonia aculeata*	Jerusalem Thorn	Tree	Exotic
540	*Parthenium hysterophorus*	Congress Grass	Shrub	Native
541	*Paspalidium flavidum*	Yellow Watercrown Grass	Grass	Native
542	*Paspalum scrobiculatum*	Kodo Millet	Grass	Exotic
543	*Passiflora foetida*	Stinking Passionflower	Climber	Exotic
544	*Peltophorum pterocarpum*	Copperpod Tree	Tree	Exotic
545	*Pennisetum glaucum*	Pearl Millet	Grass	Native
546	*Pennisetum setaceum*	African Fountain Grass	Grass	Exotic
547	*Peperomia pellucida*	Shiny Bush	Herb	Exotic
548	*Persicaria glabra*	Denseflower Knotweed	Herb	Native
549	*Phoenix sylvestris*	Date Palm	Tree	Native
550	*Phyla nodiflora*	Frog Fruit	Herb	Native
551	*Phylanthus rheedei*	Kozhikode Leaf-flower	Herb	Native
552	*Phyllanthus acidus*	Star Gooseberry	Tree	Exotic
553	*Phyllanthus amarus*	Carry Me Seed	Tree	Native
554	*Phyllanthus emblica*	Indian Gooseberry	Tree	Native

SN	Scientific name	Common name	Habit	Origin
555	*Phyllanthus maderaspatensis*	Madras Leaf-flower	Herb	Native
556	*Phyllanthus reticulatus*	Black Honey Shrub	Shrub	Native
557	*Phyllanthus urinaria*	Common Leaf-flower	Herb	Native
558	*Phyllanthus virgatus*	Virgate Leaf-flower	Tree	Native
559	*Phyllocephalum scabridum*	Purple Heads	Herb	Native
560	*Physalis angulata*	Cutleaf Ground Cherry	Herb	Exotic
561	*Physalis joe-diasii*	Joe Dias' Ground Cherry	Herb	Native
562	*Physalis minima*	Ground Cherry	Herb	Exotic
563	*Physalis peruviana*	Cape Gooseberry	Herb	Exotic
564	*Physalis pubescens*	Grey Ground Cherry	Herb	Exotic
565	*Pilea hirtella*	-	Herb	Exotic
566	*Pimpinella heyneana*	Hogweed	Herb	Native
567	*Pisonia umbellifera*	Lettuce Tree	Tree	Native
568	*Pithecelobium dulces*	Sweet Tamarind	Tree	Exotic
569	*Platycladus orientalis*	Oriental Thuja	Tree	Native
570	*Plumeria alba*	Pagoda Tree	Tree	Exotic
571	*Plumeria obtusa*	White Frangipani	Tree	Exotic
572	*Plumeria rubra*	Frangipani	Tree	Exotic
573	*Pogostemon benghalensis*	Bengal Pogostemon	Herb	Native
574	*Polyalthia longifolia*	Mast Tree	Tree	Native
575	*Polycarpon prostratum*	Manyseeds	Herb	Native
576	*Polygala chinensis*	Field Milkwort	Herb	Native
577	*Polygonum plebeium*	Small Knotweed	Herb	Native
578	*Polytrias indica*	-	Grass	Exotic
579	*Pongamia pinnata*	Pongam Tree	Tree	Native
580	*Portulaca oleracea*	Purslane	Herb	Native
581	*Pouzolzia zeylanica*	Graceful Pouzolz's Bush	Herb	Native
582	*Prosopis chilensis*	Chilean Mesquite	Tree	Exotic
583	*Prosopis juliflora*	Mesquite	Tree	Exotic
584	*Pseudanthistiria heteroclita*	-	Grass	Native
585	*Psidium guajava*	Guava	Tree	Exotic
586	*Pterocarpus indicus*	Rosewood	Tree	Exotic
587	*Pterocarpus marsupium*	Indian Kino Tree	Tree	Native
588	*Pterospermum acerifolium*	Maple-leaved Bayur Tree	Tree	Exotic
589	*Pterygota alata*	Buddha Coconut	Tree	Native
590	*Punica granatum*	Pomegranate	Tree	Native
591	*Putranjiva roxburghii*	Lucky Bean Tree	Tree	Native
592	*Radermachera xylocarpa*	Padri Tree	Tree	Native
593	*Rauwolfia serpentina*	Indian Snakeroot	Climber	Native
594	*Rhamphicarpa fistulosa*	-	Tree	Native
595	*Rhinacanthus nasutus*	Snake Jasmine	Shrub	Native
596	*Rhizophora mucronata*	Asiatic Mangrove	Herb	Native
597	*Rhynchostylis retusa*	Foxtail Orchid	Orchid	Native

SN	Scientific name	Common name	Habit	Origin
598	*Ricinus communis*	Castor	Tree	Native
599	*Rivea hypocrateriformis*	Midnapore Creeper	Climber	Native
600	*Rorippa indica*	Indian Field Cress	Herb	Native
601	*Rotala densiflora*	Dense-flowered Rotala	Herb	Native
602	*Rotala indica*	Indian Toothcup	Herb	Native
603	*Rotheca serrata*	Blue Fountain Bush	Shrub	Native
604	*Rotula aquatica*	Aquatic Rotula	Shrub	Native
605	*Roystonea regia*	Bottle Palm	Tree	Exotic
606	*Rungia pectinata*	Comb Rungia	Shrub	Native
607	*Rungia repens*	Creeping Rungia	Tree	Exotic
608	*Saccharum spontaneum*	Kans Grass	Grass	Native
609	*Sacciolepis interrupta*	Cupscale Grass	Grass	Native
610	*Salvadora persica*	Toothbrush Tree	Tree	Native
611	*Santalum album*	Sandalwood	Grass	Native
612	*Sapindus emarginatus*	Soapberry	Tree	Native
613	*Sapindus mukorossi*	North Indian Soapberry	Tree	Native
614	*Saraca asoca*	Seeta Ashoka	Tree	Native
615	*Schefflera actinophylla*	Octopus Tree	Tree	Native
616	*Schleichera oleosa*	Lac Tree	Tree	Native
617	*Scoparia dulcis*	Sweet Broom Weed	Herb	Exotic
618	*Semecarpus anacardium*	Marking Nut	Tree	Native
619	*Senecio scopolii*	-	Herb	Native
620	*Senna alata*	Candle Bush	Shrub	Exotic
621	*Senna siamea*	Siamese Cassia	Tree	Native
622	*Senna tora*	Stinking Cassia	Herb	Native
623	*Sesamum indicum*	Sesame	Herb	Native
624	*Sesamum radiatum*	Black Sesame	Herb	Exotic
625	*Sesbania bispinosa*	Prickly Sesban	Tree	Native
626	*Sesbania grandiflora*	Vegetable Hummingbird	Tree	Native
627	*Sesbania sesban*	Common Sesban	Tree	Native
628	*Sesuvium portulacastrum*	Sea Purselane	Herb	Native
629	*Setaria tomentosa*	-	Grass	Native
630	*Setaria verticillata*	Bristly Foxtail	Grass	Native
631	*Sida acuta*	Common Wireweed	Herb	Native
632	*Sida cordata*	Long-stalk Sida	Herb	Native
633	*Sida cordifolia*	Heart-leaf Sida	Herb	Native
634	*Sida rhombifolia*	Jelly Leaf	Herb	Native
635	*Smilax zeylanica*	Smilax	Climber	Native
636	*Smithia salsuginea*	Brackish Smithia	Herb	Native
637	*Smithia sensitiva*	Sensitive Smithia	Herb	Native
638	*Solanum americanum*	American Black Nightshade	Climber	Native
639	*Solanum nigrum*	Black Nightshade	Herb	Native
640	*Solanum pseudocapsicum*	Winter Cherry	Shrub	Exotic

SN	Scientific name	Common name	Habit	Origin
641	*Solanum torvum*	Turkey Berry	Shrub	Native
642	*Solanum violaceum*	Indian Nightshade	Shrub	Native
643	*Solanum virginianum*	Thorny Nightshade	Herb	Native
644	*Solena amplexicaulis*	Creeping Cucumber	Climber	Native
645	*Sonneratia apetala*	Sonneratia Mangrove	Tree	Native
646	*Sopubia delphinifolia*	Common Sopubia	Herb	Native
647	*Sorghum halepense*	Johnson Grass	Grass	Native
648	*Spathodia campanulata*	African Tulip	Tree	Exotic
649	*Spermacoce articularis*	Jointed Buttonweed	Herb	Native
650	*Spermacoce pusilla*	Tiny False Buttonweed	Herb	Native
651	*Sphaeranthus africanus*	African Globe Thistle	Herb	Native
652	*Sphaeranthus indicus*	Globe Thistle	Herb	Native
653	*Spinifex littoreus*	Ravan's Moustache	Herb	Native
654	*Spondias pinnata*	Wild Mango	Tree	Native
655	*Sporobolus capillaris*	Sacaton Grass	Grass	Native
656	*Sporobolus ioclados*	Sacaton Grass	Grass	Native
657	*Stephania hernandiifolia*	Tape Vine	Climber	Native
658	*Sterculia foetida*	Java Olive	Tree	Exotic
659	*Sterculia urens*	Ghost Tree	Tree	Native
660	*Sterculia villosa*	Hairy Sterculia	Tree	Native
661	*Stereospermum chelonoides*	Fragrant Padri Tree	Tree	Native
662	*Streblus asper*	Sandpaper Tree	Tree	Native
663	*Striga asiatica*	Asiatic Witchweed	Herb	Native
664	*Strobilanthes callosa*	Karvy	Shrub	Native
665	*Strychnos nux- vomica*	Poison Nut	Tree	Native
666	*Swetinia macrophylla*	Big-leaf Mahogany	Tree	Exotic
667	*Swietenia mahogani*	Mahogany	Tree	Exotic
668	*Synedrella nodiflora*	Cinderella Weed	Herb	Exotic
669	*Syzygium cumini*	Java Plum	Tree	Native
670	*Syzygium jambos*	Rose Apple	Tree	Exotic
671	*Tabebuia aurea*	Caribbean Trumpet Tree	Tree	Exotic
672	*Tabebuia heterophylla*	Cuban Pink Trumpet Tree	Tree	Exotic
673	*Tabebuia rosea*	Pink Trumpet Tree	Tree	Exotic
674	*Tabernaemontana alternifolia*	-	Tree	Native
675	*Tabernaemontana divaricata*	Crape Jasmine	Tree	Native
676	*Tacca leontopetaloides*	Fiji Arrowroot	Herb	Native
677	*Tamarindus indica*	Tamarind	Tree	Native
678	*Tamilnadia uliginosa*	Divine Jasmine	Tree	Native
679	*Tarenna asiatica*	Asiatic Tarenna	Shrub	Native
680	*Tecoma stans*	Yellow Bells	Shrub	Exotic
681	*Tectona grandis*	Teak	Tree	Native
682	*Tephrosia purpurea*	Common Tephrosia	Herb	Native
683	*Tephrosia strigosa*	Bristly Tephrosia	Herb	Native

SN	Scientific name	Common name	Habit	Origin
684	*Teramnus labialis*	Blue Wiss	Climber	Native
685	*Teramnus repens subsp. gracilis*	-	Climber	Native
686	*Terminalia arjuna*	Arjun Tree	Tree	Native
687	*Terminalia bellirica*	Belleric Myrobalan	Tree	Native
688	*Terminalia catappa*	Indian Almond	Tree	Native
689	*Terminalia chebula*	Chebulic Myrobalan	Tree	Native
690	*Terminalia crenulata*	-	Tree	Native
691	*Terminalia paniculata*	Kindal Tree	Tree	Native
692	*Tetrameles nudiflora*	False Hemp Tree	Tree	Native
693	*Tetrataenium aquilegifolium*	-	Herb	Native
694	*Themeda quadrivalvis*	-	Grass	Native
695	*Themeda triandra*	Kangaroo Grass	Grass	Native
696	*Thespesia populnea*	Indian Tulip Tree	Tree	Native
697	*Thunbergia fragrans*	Sweet Clock Vine	Climber	Native
698	*Tinospora sinensis*	Chinese Tinospora	Climber	Native
699	*Tolypanthus lageniferus*	Indian Tolypanthus	Shrub (Parasite)	Native
700	*Toona ciliata*	Toon Tree	Tree	Native
701	*Torenia asiatica*	Asiatic Wishbone Flower	Herb	Native
702	*Trema orientalis*	Indian Charcoal Tree	Tree	Native
703	*Trianthema portulacastrum*	Desert Horse Purslane	Herb	Native
704	*Trichodesma indicum*	Indian Borage	Herb	Native
705	*Trichodesma zeylanicum*	Camel Bush	Herb	Native
706	*Tricholepis glaberrima*	-	Herb	Native
707	*Trichosanthes cucumerina*	Wild Snake Gourd	Climber	Native
708	*Trichosanthes tricuspidata*	-	Climber	Native
709	*Tridax procumbens*	Mexican Daisy	Herb	Exotic
710	*Triumfetta pentandra*	Fivestamen Burrbark	Herb	Native
711	*Triumfetta rhomboidea*	Burr Bush	Shrub	Native
712	*Typha angustata*	Indian Reed Mace	Herb	Native
713	*Urena lobata*	Caesarweed	Shrub	Exotic
714	*Urticularia striatula*	Striped Bladderwort	Herb	Native
715	*Utricularia stellaris*	-	Herb	Native
716	*Vahlia digyna*	Sticky Vahlia	Herb	Native
717	*Verbascum chinense*	Chinese Mullein	Herb	Native
718	*Vigna radiata*	Moong Bean	Climber	Native
719	*Vigna radiata var. sublobata*	Wild Moong	Climber	Native
720	*Vigna vexillata var. angustifolia*	Narrow-leaved Zombie Pea	Herb	Native
721	*Vitex negundo*	Chaste Tree	Tree	Native
722	*Volkameria inermis*	Glory Bower	Shrub	Native
723	*Wedelia urticaefolia*	Nettle Leaved Wedelia	Herb	Native
724	*Wodyetia bifurcata*	Foxtail Palm	Tree	Native
725	*Woodfordia fruticosa*	Fire Flame Bush	Shrub	Native

SN	Scientific name	Common name	Habit	Origin
726	*Wrightea antidysentrica*	Winter Cherry Tree	Tree	Native
727	*Wrightia arborea*	Woolly Dyeing Rosebay	Tree	Native
728	*Wrightia tinctoria*	Sweet Indrajao	Tree	Native
729	*Xanthium strumarium*	Common Cocklebur	Herb	Exotic
730	*Ziziphus jujuba*	Indian Jujube	Tree	Native
731	*Ziziphus oenoplia*	Jackal Jujube	Shrub	Native
732	*Ziziphus rugosa*	Wild Jujube	Tree	Native
733	*Ziziphus xylopyrus*	-	Shrub	Native
734	*Avicennia marina (Forsk.) Vierh.*	Tivar	Mangrove	Native
735	*Avicennia officinalis L*	Tivar	Mangrove	Native
736	*Aegiceras corniculatum (L.) Blanco*	Black Mangrove	Mangrove	Native
737	*Bruguiera cylindrica (L.) Blume*	Orange Mangrove	Mangrove	Native
738	*Rhizophora mucronata Lam.*	Red Mangrove	Mangrove	Native
739	*Ceriops tagal (Perr.) C.B.Rob.*	-	Mangrove	Native
740	*Sonneratia apetala Buch. – Ham.*	Mangrove Apple	Mangrove	Native
741	*Acanthus ilicifolius L.*	Sea Holly	Mangrove	Native
742	*Excoecaria agallocha L*	Milky Mangrove	Mangrove	Native
743	*Lumnitzera racemosa Willd.*	-	Mangrove	Native

Annexure 2: List of Fauna Species in MBMC

SN	Animal Type	Local Name	Scientific Name
1	Amphibian	Indian Bull Frog	*Hoplobatrachus tigerinus*
2	Amphibian	Common Indian Toad	*Duttaphrynus melanostictus*
3	Amphibian	Common Skittering Frog	*Euphlyctis cyanophlyctis*
4	Amphibian	Common Indian Tree Frog	*Polypedates maculatus*
5	Amphibian	Sahyadri Marbled Balloon Frog	*Uperodon mormorata*
6	Birds	House Crow	*Corvus splendens*
7	Birds	House Sparrow	*Passer domesticus*
8	Birds	Coppersmith Barbet	*Megalaima haemecephala*
9	Birds	Asian Koel	*Eudynamys scolopacea*
10	Birds	Oriental Magpie Robin	*Copsychus saularis*
11	Birds	Cattle Egret	*Bubulcus ibis*
12	Birds	Little Egret	*Egretta garzetta*
13	Birds	Indian Pond Heron	*Ardeola grayii*
14	Birds	Little Cormorant	*Phalacrocorax niger*
15	Birds	Indian Cormorant	*Phalacrocorax fuscicollis*
16	Birds	Purple Rumped Sunbird	*Nectarinia zeylonica*
17	Birds	White Throated Fantail Flycatcher	*Rhipidura albicollis*
18	Birds	White Browed Fantail Flycatcher	*Rhipidura aureola*
19	Birds	Grey Wagtail	*Motacilla cinerea*
20	Birds	Common Myna	*Acridotheres tristis*
21	Birds	Common Tailorbird	*Orthotomus sutorius*

SN	Animal Type	Local Name	Scientific Name
22	Birds	Red-Vented Bulbul	*Pycnonotus cafer*
23	Birds	Rose Ringed Parakeet	*Psittacula krameri*
24	Birds	Ashy Prinia	*Prinia socialis*
25	Birds	Asian Pied Starling	*Sturnus contra*
26	Birds	Tricoloured Munia	*lonchura Malacca*
27	Birds	Red Avadavat	*Amandava amandava*
28	Birds	Common Sandpiper	*Actitis hypoleucos*
29	Birds	Eurasian Golden Oriole	*Oriolus oriolus*
30	Birds	Rain Quail	*Coturnix coromandelica*
31	Birds	Small Buttonquail	*Turnix sylvatica*
32	Birds	Yellow-Legged Buttonquail	*Turnix tanki*
33	Birds	Barred Buttonquail	*Turnix suscitator*
34	Birds	Red Spurfowl	*Perdicula asiatica*
35	Birds	Grey Junglefowl	*Gallus sonneratii*
36	Birds	Indian Peafowl	*Pavo cristatus*
37	Birds	Lesser Whistling-Duck	*Dendrocygna javanica*
38	Birds	Bar Headed Goose	*Anser indicus*
39	Birds	Comb Duck	*Sarkidiornis melanotos*
40	Birds	Cotton Pygmy-Goose	*Nettapus coromandelianus*
41	Birds	Gadwall	*Mareca strepera*
42	Birds	Common Pochard	*Aythya ferina*
43	Birds	Indian Spot-Billed Duck	*Anas poecilorhyncha*
44	Birds	Common Teal	*Aythya crecca*
45	Birds	Garganey	*Anas querquedula*
46	Birds	Northern Pintail	*Anas acuta*
47	Birds	Northern Shoveller	*Anas clypeta*
48	Birds	Eurasian Wryneck	*Jynx torquilla*
49	Birds	Rufous Woodpecker	*Celeus brachyurus*
50	Birds	Heart-Spotted Woodpecker	*Hemicircus canente*
51	Birds	Pygmy-Woodpecker	*Dendrocopos nanus*
52	Birds	Yellow-Crowned Woodpecker	*Dendrocopos mahrattensis*
53	Birds	Black-Rumped Flameback	*Dinopium benghalense*
54	Birds	White-Naped Woodpecker	*Chrysocolaptes festivus*
55	Birds	Brown-Headed Barbet	*Megalaima zeylanica*
56	Birds	Coppersmith Barbet	*Megalaima haemacephala*
57	Birds	Indian Grey Hornbill	*Ocyceros birostris*
58	Birds	Hoopoe	*Upupa epops*
59	Birds	Indian Roller	*Coracias benghalensis*
60	Birds	Common Kingfisher	*Alcedo atthis*
61	Birds	Oriental Dwarf Kingfisher	*Ceyx erithacus*
62	Birds	White-Throated Kingfisher	*Halcyon smyrnensis*
63	Birds	Stork-Billed Kingfisher	*Pelargopsis capensis*
64	Birds	Black-Capped Kingfisher	*Halcyon pileata*

SN	Animal Type	Local Name	Scientific Name
65	Birds	Pied Kingfisher	*Ceryle rudis*
66	Birds	Green Bee-Eater	*Merops orientalis*
67	Birds	Blue-Tailed Bee-Eater	*Merops philippinus*
68	Birds	Pied Cuckoo	*Clamator jacobinus*
69	Birds	Common Hawk-Cuckoo	*Hierococcyx varius*
70	Birds	Indian Cuckoo	*Cuculus micropterus*
71	Birds	Greater Coucal	*Centropus sinensis*
72	Birds	Vernal Hanging-Parrot	*Loriculus vernalis*
73	Birds	Alexandrine Parakeet	*Psittacula eupatria*
74	Birds	Asian Palm-Swift	*Cypsiurus balasiensis*
75	Birds	Little Swift	*Apus affinis*
76	Birds	Alpine Swift	*Tachymarptis melba*
77	Birds	Barn Owl	*Tyto alba*
78	Birds	Rock Eagle-Owl (Indian Eagle-Owl)	*Bubo bengalensis*
79	Birds	Jungle Owlet	*Glaucidium radiatum*
80	Birds	Spotted Owlet	*Athene brama*
81	Birds	Brown Hawk-Owl	*Ninox scutulata*
82	Birds	Indian Nightjar	*Caprimulgus asiaticus*
83	Birds	Rock Pigeon	*Columba livia*
84	Birds	Laughing Dove (Little Brown Dove)	*Streptopelia senegalensis*
85	Birds	Red Collared-Dove (Red Turtle-Dove)	*Streptopelia tranquebarica*
86	Birds	Eurasian Collared-Dove	*Streptopelia decaocto*
87	Birds	Spotted Dove	*Streptopelia chinensis*
88	Birds	Yellow-Footed Green Pigeon	*Treron phoenicopterus*
89	Birds	White-Breasted Waterhen	*Amaurornis phoenicurus*
90	Birds	Slaty-Breasted Rail	*Lewinia striata*
91	Birds	Baillon'S Crake	*Porzana pusilla*
92	Birds	Watercock	*Gallicrex cinerea*
93	Birds	Grey-Headed Swamphen (Purple Swamphen)	*Porphyrio poliocephalus*
94	Birds	Common Coot	*Fulica atra*
95	Birds	Eurasian Curlew	*Numenius arquata*
96	Birds	Whimbrel	*Numenius phaeopus*
97	Birds	Common Redshank	*Tringa totanus*
98	Birds	Spotted Redshank	*Tringa erythropus*
99	Birds	Common Greenshank	*Tringa nebularia*
100	Birds	Green Sandpiper	*Tringa ochropus*
101	Birds	Common Sandpiper	*Actitis hypoleucos*
102	Birds	Wood Sandpiper	*Tringa glareola*
103	Birds	Marsh Sandpiper	*Tringa stagnatilis*
104	Birds	Little Stint	*Calidris minuta*
105	Birds	Ruff	*Calidris pugnax*
106	Birds	Pheasant-Tailed Jacana	*Hydrophasianus chirurgus*
107	Birds	Bronze-Winged Jacana	*Metopidius indicus*

SN	Animal Type	Local Name	Scientific Name
108	Birds	Black-Winged Stilt	*Himantopus himantopus*
109	Birds	Pied Avocet	*Recurvirostra avosetta*
110	Birds	Red-Wattled Lapwing	*Vanellus indicus*
111	Birds	Lesser Sand Plover	*Charadrius mongolus*
112	Birds	Little Ringed Plover	*Charadrius dubius*
113	Birds	Caspian Gull	*Larus cachinnans*
114	Birds	Black-Headed Gull	*Chroicocephalus ridibundus*
115	Birds	Brown-Headed Gull	*Chroicocephalus brunnicephalus*
116	Birds	Gull-Billed Tern	*Gelochelidon nilotica*
117	Birds	Caspian Tern	*Hydroprogne caspia*
118	Birds	Little Tern	*Sternula albifrons*
119	Birds	River Tern	*Sterna aurantia*
120	Birds	Black-Bellied Tern	*Sterna acuticauda*
121	Birds	Whiskered Tern	*Chlidonias hybrida*
122	Birds	Osprey	*Pandion haliaetus*
123	Birds	Oriental Honey-Buzzard (Crested Honey Buzzard)	*Pernis ptilorhyncus*
124	Birds	Black-Winged Kite (Black-Shouldered Kite)	*Elanus caeruleus*
125	Birds	Black Kite	*Milvus migrans*
126	Birds	Brahminy Kite	*Haliastur indus*
127	Birds	White-Bellied Sea Eagle	*Haliaeetus leucogaster*
128	Birds	Short-Toed Snake-Eagle	*Circaetus gallicus*
129	Birds	Crested Serpent-Eagle	*Spilornis cheela*
130	Birds	Eurasian Marsh Harrier	*Circus aeruginosus*
131	Birds	Shikra	*Acceipiter badius*
132	Birds	White-Eyed Buzzard	*Butastur teesa*
133	Birds	Black Eagle	*Ictinaetus malaiensis*
134	Birds	Tawny Eagle	*Aquila rapax*
135	Birds	Steppe Eagle	*Aquila nipalenses*
136	Birds	Bonelli'S Eagle	*Aquila fasciata*
137	Birds	Booted Eagle	*Hieraaetus pennatus*
138	Birds	Common Kestrel	*Falco tinnunculus*
139	Birds	Peregrine Falcon Falco	*Falco peregrinus*
140	Birds	Little Grebe	*Tachybaptus ruficollis*
141	Birds	Oriental Darter	*Anhinga melanogaster*
142	Birds	Little Cormorant	*Microcarbo niger*
143	Birds	Indian Cormorant (Indian Shag)	*Phalacrocorax fuscicollis*
144	Birds	Great Cormorant	*Phalacrocorax carbo*
145	Birds	Little Egret	*Egretta garzetta*
146	Birds	Western Reef-Heron (Western Reef-Egret)	*Egretta gularis*
147	Birds	Grey Heron	*Ardea cinerea*
148	Birds	Purple Heron	*Ardea purpurea*
149	Birds	Great Egret	*Ardea alba*

SN	Animal Type	Local Name	Scientific Name
150	Birds	Intermediate Egret	*Ardea intermedia*
151	Birds	Cattle Egret	*Bubulcus ibis*
152	Birds	Indian Pond-Heron	*Ardeola grayii*
153	Birds	Striated Heron (Little Heron)	*Butorides striata*
154	Birds	Black-Crowned Night-Heron	*Nycticorax nycticorax*
155	Birds	Glossy Ibis	*Plegadis falcinellus*
156	Birds	Black-Headed Ibis	*Threskiornis melanocephalus*
157	Birds	Painted Stork	*Mycteria leucocephala*
158	Birds	Asian Open-Billed Stork	*Anastomus oscitans*
159	Birds	Woolly-Necked Stork	*Ciconia episcopus*
160	Birds	Indian Pitta	*Pitta brachyuran*
161	Birds	Golden-Fronted Leafbird (Golden-Fronted Chloropsis)	*Chloropsis aurifrons*
162	Birds	Long-Tailed Shrike	*Lanius schach*
163	Birds	Rufous Treepie	*Dendrocitta vagabunda*
164	Birds	Large Billed Crow	*Corvus macrorhynchos*
165	Birds	Ashy Woodswallow	*Artamus fuscus*
166	Birds	Black-Hooded Oriole	*Oriolus xanthornus*
167	Birds	Small Minivet	*Pericrocotus cinnamomeus*
168	Birds	Black Drongo	*Dicrurus macrocercus*
169	Birds	Ashy Drongo	*Dicrurus leucophaeus*
170	Birds	Bronzed Drongo	*Dicrurus aeneus*
171	Birds	Indian Paradise-Flycatcher	*Terpsiphone paradisi*
172	Birds	Common Iora	*Aegithina tiphia*
173	Birds	Common Woodshrike	*Tephrodornis pondicerianus*
174	Birds	Malabar Whistling-Thrush	*Myophonus horsfieldii*
175	Birds	Orange-Headed Thrush	*Geokichla citrina*
176	Birds	Asian Brown Flycatcher	*Muscicapa dauurica*
177	Birds	Red-Breasted Flycatcher	*Ficedula parva*
178	Birds	Verditer Flycatcher	*Eumyias thalassinus*
179	Birds	Tickell'S Blue Flycatcher	*Cyornis tickelliae*
180	Birds	Grey-Headed Canary Flycatcher	*Culicicapa ceylonensis*
181	Birds	Bluethroat	*Luscinia svecica*
182	Birds	Oriental Magpie-Robin	*Copsychus saularis*
183	Birds	White-Rumped Shama	*Copsychus malabaricus*
184	Birds	Indian Robin	*Copsychus fulicatus*
185	Birds	Chestnut-Tailed Starling	*Sturnia malabarica*
186	Birds	Rosy Starling	*Pastor roseus*
187	Birds	Brahminy Starling	*Sturnia pagodarum*
188	Birds	Jungle Myna	*Acridotheres fuscus*
189	Birds	Dusky Crag Martin	*Hirundo concolor*
190	Birds	Barn Swallow	*Hirundo rustica*
191	Birds	Wire-Tailed Swallow	*Hirundo smithii*

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192	Birds	Red-Whiskered Bulbul	*Pycnonotus jocosus*
193	Birds	Red-Vented Bulbul	*Pycnonotus cafer*
194	Birds	White-Eared Bulbul	*Pycnonotus leucotis*
195	Birds	Zitting Cisticola	*Cisticola juncidis*
196	Birds	Grey-Breasted Prinia	*Prinia hodgsonii*
197	Birds	Ashy Prinia	*Prinia socialis*
198	Birds	Plain Prinia	*Prinia inornata*
199	Birds	Indian White-Eye (Oriental White-Eye)	*Zosterops palpebrosus*
200	Birds	Clamorous Reed Warbler (Indian Great Reed Warbler)	*Acrocephalus stentoreus*
201	Birds	Booted Warbler	*Iduna caligata*
202	Birds	Common Tailorbird	*Orthotomus sutorius*
203	Birds	Greenish Warbler	*Phylloscopus trochiloides*
204	Birds	Common Chiffchaff	*Phylloscopus collybita*
205	Birds	Western Crowned Warbler	*Phylloscopus occipitalis*
206	Birds	Puff-Throated Babbler	*Pellorneum ruficeps*
207	Birds	Yellow-Eyed Babbler	*Chrysomma sinense*
208	Birds	Brown-Cheeked Fulvetta	*Alcippe poioicephala*
209	Birds	Greater Short-Toed Lark	*Calandrella brachydactyla*
210	Birds	Oriental Skylark	*Alauda gulgula*
211	Birds	Ashy-Crowned Sparrow-Lark (Ashy-Crowned Finch-Lark)	*Eremopterix griseus*
212	Birds	Pale-Billed Flowerpecker	*Dicaeum erythrorynhos*
213	Birds	Thick-Billed Flowerpecker	*Dicaeum agile*
214	Birds	Crimson-Backed Sunbird (Small Sunbird)	*Nectarinia minima*
215	Birds	Baya Weaver	*Ploceus philippinus*
216	Birds	Black-Breasted Weaver (Bengal Weaver)	*Ploceus benghalensis*
217	Birds	Red Avadavat	*Amandava amandava*
218	Birds	Indian Silverbill (White-Throated Munia)	*Euodice malabarica*
219	Birds	Scaly-Breasted Munia	*Lonchura punctulata*
220	Birds	Black-Headed Munia	*Lonchura malacca*
221	Birds	Yellow-Throated Sparrow (Chestnut-Shouldered Petronia)	*Petronia xanthocollis*
222	Birds	Forest Wagtail	*Dendronanthus indicus*
223	Birds	White-Browed Wagtail	*Motacilla maderaspatensis*
224	Birds	Grey Wagtail	*Motacilla cinerea*
225	Birds	Paddyfield Pipit	*Anthus rufulus*
226	Birds	Common Rosefinch	*Carpodacus erythrinus*
227	Birds	Red-Headed Bunting	*Emberiza bruniceps*
228	Birds	Acacia Blue, Common	*Surendra quercetorum*
229	Butterflies	Albatross, Chocolate	*Appias lyncida*
230	Butterflies	Albatross, Common	*Appias albina*
231	Butterflies	Western Striped Albatross	*Appias libythea*
232	Butterflies	Golden Angle	*Caprona ransonnetti*

SN	Animal Type	Local Name	Scientific Name
233	Butterflies	Apefly	*Spalgis epius*
234	Butterflies	Brown Awl	*Badamia exclamationis*
235	Butterflies	Common Banded Awl	*Hasora chromus*
236	Butterflies	Common Awl	*Hasora badra*
237	Butterflies	Plain Banded Awl	*Hasora vitta*
238	Butterflies	Orange-Tailed Awl	*Bibasis sena*
239	Butterflies	African Babul Blue	*Azanus jesous*
240	Butterflies	Babul Blue, Bright	*Azanus ubaldus*
241	Butterflies	Bamboo Treebrown	*Lethe europa*
242	Butterflies	Baron	*Euthalia aconthea*
243	Butterflies	Baron, Gaudy	*Euthalia lubentina*
244	Butterflies	Baronet	*Euthalia nais*
245	Butterflies	Sahyadri Blue Oakleaf	*Kallima horsfieldi*
246	Butterflies	Common Bluebottle	*Graphium sarpedon*
247	Butterflies	Chestnut Bob	*Lambrix salsala*
248	Butterflies	Vindhyan Bob	*Arnetta vindhiana*
249	Butterflies	Dark-Branded Bushbrown	*Mycalesis mineus*
250	Butterflies	Common Bushbrown	*Mycalesis perseus*
251	Butterflies	Long-Branded Bushbrown	*Mycalesis visala*
252	Butterflies	Angled Castor	*Ariadne ariadne*
253	Butterflies	Common Castor	*Ariadne merione*
254	Butterflies	Common Cerulean	*Jamides celeno*
255	Butterflies	Dark Cerulean	*Jamides bochus*
256	Butterflies	Commander	*Moduza procris*
257	Butterflies	Cornelian	*Deudorix epijarbas*
258	Butterflies	Common Crow	*Euploea core*
259	Butterflies	Double-Branded Crow	*Euploea Sylvester*
260	Butterflies	Danaid Eggfly	*Hypolimnas misippus*
261	Butterflies	Great Eggfly	*Hypolimnas bolina*
262	Butterflies	Lemon Emigrant	*Catopsilia pomona*
263	Butterflies	Mottled Emigrant	*Catopsilia pyranthe*
264	Butterflies	Common Evening Brown	*Melanitis leda*
265	Butterflies	Common Five-Ring	*Ypthima baldus*
266	Butterflies	Four Ring, Common	*Ypthima huebneri*
267	Butterflies	Common Red Flash	*Rapala iarbus*
268	Butterflies	Forget Me Not	*Catochrysops strabo*
269	Butterflies	Oriental Gram Blue	*Euchrysops cnejus*
270	Butterflies	Dark Grass Blue	*Zizeeria karsandra*
271	Butterflies	Lesser Grass Blue	*Zizina otis*
272	Butterflies	Oriental Common Grass Yellow	*Eurema hecabe*
273	Butterflies	Small Grass Yellow	*Eurema brigitta*
274	Butterflies	Spotless Grass Yellow	*Eurema laeta*
275	Butterflies	Three-Spot Grass Yellow	*Eurema blanda*

SN	Animal Type	Local Name	Scientific Name
276	Butterflies	Common Guava Blue	*Virachola isocrates*
277	Butterflies	Common Gull	*Cepora nerissa*
278	Butterflies	Common Hedge Blue	*Acytolepis puspa*
279	Butterflies	Oriental Palm Bob	*Suastus gremius*
280	Butterflies	Common Jay	*Graphium doson*
281	Butterflies	Indian Jezebel	*Delias eucharis*
282	Butterflies	Leaf Blue	*Amblypodia anita*
283	Butterflies	Common Leopard	*Phalanta phalantha*
284	Butterflies	Lime Blue	*Chilades lajus*
285	Butterflies	Lime Butterfly	*Papilio demoleus*
286	Butterflies	Bispot Banded Ace	*Halpe porus*
287	Butterflies	Blue Mormon	*Papilio polymnestor*
288	Butterflies	Mormon, Common	*Papilio polytes*
289	Butterflies	Anomalous Nawab	*Charaxes agrarius*
290	Butterflies	Common Orange Awlet	*Burara jaina*
291	Butterflies	Great Orange-Tip	*Hebomoia glaucippe*
292	Butterflies	Common Palmfly	*Elymnias hypermnestra*
293	Butterflies	Oriental Chocolate Pansy	*Junonia iphita*
294	Butterflies	Chinese Lemon Pansy	*Junonia lemonias*
295	Butterflies	Blue Pansy	*Junonia orithya*
296	Butterflies	Oriental Grey Pansy	*Junonia atlites*
297	Butterflies	Peacock Pansy	*Junonia almana*
298	Butterflies	Yellow Pansy	*Junonia hierta*
299	Butterflies	Pea Blue	*Lampides boeticus*
300	Butterflies	Angled Pierrot	*Caleta decidia*
301	Butterflies	Common Pierrot	*Castalius rosimon*
302	Butterflies	Striped Pierrot	*Tarucus nara*
303	Butterflies	Red Pierrot	*Talicada nyseus*
304	Butterflies	Indian Pioneer	*Belenois aurota aurota*
305	Butterflies	Plum Judy	*Abisara echerius*
306	Butterflies	Psyche	*Leptosia nina*
307	Butterflies	Black Rajah	*Charaxes solon*
308	Butterflies	Tawny Rajah	*Charaxes bernardus*
309	Butterflies	Redspot	*Zesius chrysomallus Hübner*
310	Butterflies	Common Rose	*Arhrophaneura aristolochiae*
311	Butterflies	Crimson Rose	*Athrophaneura hector*
312	Butterflies	Peacock Royal	*Tajuria cippus*
313	Butterflies	Common Sailor	*Neptis hylas*
314	Butterflies	Small Salmon Arab	*Colotis amata*
315	Butterflies	Swift, Rice	*Borbo cinnara*
316	Butterflies	Tailed Jay	*Graphium Agamemnon*
317	Butterflies	Tawny Coster	*Acraea terpsicore*
318	Butterflies	Blue Tiger	*Tirumala limniace*

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319	Butterflies	Glassy Tiger	*Parantica aglea*
320	Butterflies	Tiger, Plain	*Danaus chrysippus*
321	Butterflies	Striped Tiger	*Danaus genutia*
322	Butterflies	Leopard	*Panthera pardus*
323	Crustacean	Raan Dukkar	*Sus scrofa*
324	Crustacean	Indian Hare	*Lepus nigricollis*
325	Crustacean	Jungle Cat	*Felis chaus*
326	Crustacean	Langur	*Semnopithecus sp.*
327	Fish	Five-Striped Palm Squirrel	*Funambulus pennantii*
328	Fish	Three-Striped Palm Squirrel	*Funambulus palmarum*
329	Fish	Grey Musk Shrew	*Suncus murinus*
330	Fish	Indian Flying Fox	*Pteropus giganteus*
331	Fish	Bonnet Macaque	*Macaca radiata*
332	Fish	Rhesus Macaque	*Macaca mulatta*
333	Fish	Common Palm Civet	*Paradoxurus hermaphroditus*
334	Fish	The Indian Grey Mongoose	*Herpestes edwardsii*
335	Fish	Spotted Deer	*Axis axis*
336	Fish	Black Rat	*Rattus rattus*
337	Fish	Russell'S Viper	*Daboia russelii*
338	Mammals	Oriental Rat Snake	*Ptyas mucosa*
339	Mammals	Striped Keelback	*Amphiesma stolatum*
340	Mammals	Checkered Keelback	*Xenochrophis piscator*
341	Mammals	Green Keelback	*Macropisthodon plumbicolor*
342	Mammals	Bengal Monitor Lizard	*Varanus bengalensis*
343	Mammals	Indian Chamaeleon	*Chamaeleo zeylanicus*
344	Mammals	Indian Rock Python	*Python molurus*
345	Mammals	Banded Kukri Snake	*Oligodon arnensis*
346	Mammals	Common Bronzeback Tree Snake	*Dendrelaphis tristis*
347	Mammals	Green Vine Snake	*Ahaetulla nasuta*
348	Mammals	Common Wolf Snake	*Lycodon aulicus*
349	Mammals	Bamboo Pit Viper	*Trimeresurus gramineus*
350	Mammals	Beddome'S Cat Snake	*Boiga beddomei*
351	Mammals	Indian Garden Lizard	*Calotes versicolor*
352	Mammals	Sahyadri Forest Lizard	*Calotes rouxii*
353	Mammals	Cattle - Cow/Bull	*Bos taurus*
354	Mammals	Cattle - Buffalow	Bubalus bubalis
355	Mammals	Goat	*Capra aegagrus hircus*
356	Mammals	Dog	*Canis lupus familiaris*
357	Mammals	Cat	*Felis catus*
358	Mammals	Stray Pigs	*Sus domesticus*
359	Molluscan	Cocks and Hens	*Gallus gallus domesticus*
360	Molluscan	Crab	*Scylla serrata*
361	Molluscan	Crab	*Litocheira sp.*

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362	Molluscan	Crab	*Uca sp.*
363	Molluscan	Crab	*Sesarmid* sp.
364	Molluscan	Gastropod	*Telescopium telescopium*
365	Molluscan	Gastropod	*Potamides cingulatus*
366	Platyhelminthes	Gastropod	*Cassidula nucleus*
367	Reptiles	Gastropod	*Nerita crepidularia*
368	Reptiles	Gastropod	*Melampus bidentatus*
369	Reptiles	Gastropod	*Littorina sp.*
370	Reptiles	Gastropod	*Onchidium sp.*
371	Reptiles	Worm	*Polyclad worm*
372	Reptiles	Wada	*Scatophagus argus*
373	Reptiles	Bombil	*Harpadon nehereus*
374	Reptiles	Mandeli	*Coilia dussumieri*
375	Reptiles	Wagti, Bala	*Lepturacanthus savala*
376	Reptiles	Nivti	*Periophthalmus sp.*
377	Reptiles	Paplet	*Pampus argenteus*
378	Reptiles	Bangda	*Rastrelliger kanagurta*
379	Reptiles	Surmai	*Scomberomorus guttatus*
380	Reptiles	Rawas	*Polynemus tetradactylus*
381	Reptiles	Halva	*Parastromateus niger*
382	Reptiles	Pakat	*Plesiobatis daviesi*
383	Reptiles	Kharfuticha saap	*Cerberus rynchops*

PROJECT DETAILS

Project Name

Local Biodiversity Strategy and Action Plan of Mira Bhaindar City

Prepared for	Prepared by
Mira Bhaindar Municipal Corporation	Terracon Ecotech Pvt. Ltd., Mumbai

Project Core Team

- Dr. Ramesh Madav – Project Guide
- Mr. Ashok Jain – Project Director
- Dr. Ninad Raut – Ecology and Biodiversity Expert
- Mr. Akshay Nachane – Project Coordinator and Biodiversity Expert
- Mr. Abhijeet Jagtap and Mr. Adwait Jadhav – Fauna Expert
- Ms. Sayee Girdhari and Ms. Sayantika Banerjee – Flora Expert
- Ms. Pratiksha Chalke – GIS Expert

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