CITY BIODIVERSITY INDEX

RAJKOT MUNICIPAL CORPORATION

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SECTION A: ABOUT CITY BIODIVERSITY INDEX

The City Biodiversity Index (CBI) or the Singapore Index was developed in 2008, when it was acknowledged in the Ninth Biodiversity Conference of Parties (COP) that cites and local bodies can support the implementation of a country's National Biodiversity Strategy and Action Plan (NBSAP). The index consolidates the available biodiversity-related indicators locally, which can help cities evaluate and benchmark their biodiversity conservation efforts.

CBI scoring is quantitative in nature. A total of 23 indicators constitutes the index, measuring a city's native biodiversity, the ecosystem services provided and biodiversity governance. Scores range between zero to four points for each indicator, with a maximum overall score of 92. The first year is considered the baseline against which cities can then chart their subsequent evolution.

According to the Secretariat for the Convention on Biological Diversity (SCBD)[1], some of the benefits that cities derived from the application of the index include "a) the process facilitated capacity-building in biodiversity conservation, b) the indicators also function as biodiversity conservation guidelines and c) assistance in setting priorities for conservation actions and budget allocation through quantitative scoring".

The City Biodiversity Index of Rajkot was developed by ICLEI- Local Governments for Sustainability, South Asia as part of the CapaCITIES project.

Summary of the Scores

The City Biodiversity Index of Rajkot, 2021 has been prepared based on the SCBD endorsed user's manual for CBI updated in 2014 [1]. The 23 indicators that make up the index are grouped into three main components viz. Native Biodiversity, Ecosystem Services provided by biodiversity and Governance and Management of biodiversity.

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

The first section on "Native Biodiversity in the City", contributed to a score of 12 out of 20 as only 5 indicators were taken into consideration. This is a robust score and contributes significantly to the overall score. The city maintains a heterogenous mix of natural and modified ecosystems within the city such as natural scrub areas, gardens, urban green spaces, and riverine areas. This helps to support the wide diversity of floral and faunal species in the city.

Indicators 11-14 which relate to "Ecosystem Services Provided by Biodiversity in the City" scored 3 out of 16 points. Despite having a mosaic of green and blue infrastructure, the city did not score well in the second component, which focusses on ecosystem services. It seems that flourishing urbanisation is impacting the ecosystem services of the city.

Indicators 15-23 which correspond to "Governance and Management of Biodiversity in the City" contributed to a score of 19 out of 36 points. The score of this section shows that Rajkot city needs to strengthen its governance mechanisms that will lead to the conservation and management of

[1] https://www.cbd.int/subnational/partners-and-initiatives/city-biodiversity-index Accessed online on 20 October 2021

its biodiversity. Though the Rajkot Municipal Corporation works in close association with NGOs, stronger and a greater number of partnerships (with other departments at the district and state levels, as well as with academic institutions in the city) will improve the score further.

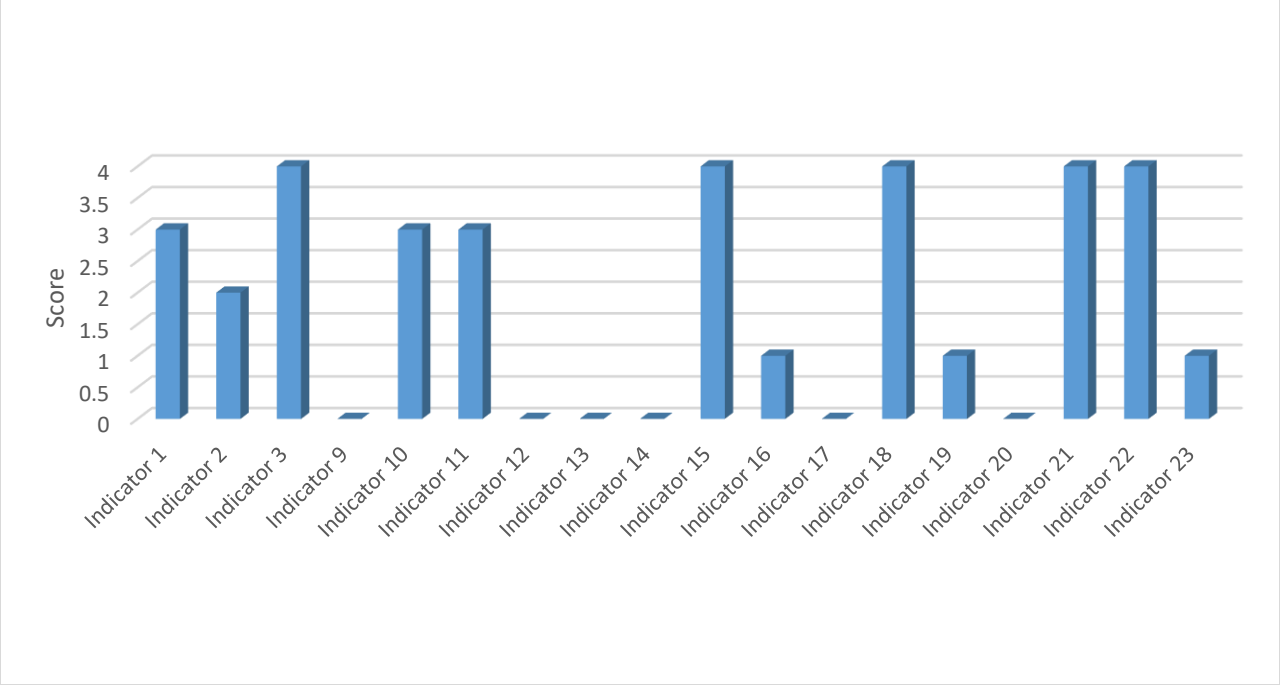

Figure 1 Rajkot City Biodiversity Index 2021 at a Glance

SECTION B: CITY BIODIVERSITY INDEX OF RAJKOT

Part A: City Profile

Location

The city of Rajkot is located in Kathiawar peninsular region of the state of Gujarat in western India. The city is situated at an elevation of 138 m above mean sea level [2]. Rajkot lies between the coordinates of 20º18´ N latitude and 70º51´ E longitude. The administrative area of the city covers about 161 km^2. Rajkot city is the administrative headquarters of the district of Rajkot [3]. Rajkot district is further surrounded by Kutch in the north, Bhavnagar and Surendranagar in the east, Junagadh and Amreli in the south and Jamnagar in the west. The city of Rajkot exhibits a hot and dry type of climate. Summer season starts from March and lasts up to the month of June. Rainy season is from July to September whereas winter spans from November to February. Temperature during the summer months ranges between 24°C and 42°C and in the winter months between 10°C and 22°C [4]. Mean annual precipitation received in the city is 276 mm.

Geophysical Characteristics

The city of Rajkot is centrally located in Saurashtra region in the Aji basin [5]. Rajkot is located on both the banks of Aji River as the river flows across the city. Rajkot Urban Development Area (RUDA) has been constituted out of Rajkot district and five talukas namely, Rajkot, Padadhari, Iodika, Kotdasangani and Tankara, as well as adjoining villages [5]. Being a major industrial and commercial center in the region, the city of Rajkot is well connected to neighbouring cities within the state of Gujarat and other cities in adjoining states of Rajasthan, Maharashtra and Madhya Pradesh by road and rail.

The two major rivers- Aji and Nyari form the important water bodies in the city of Rajkot [5]. River Aji runs from south to north whereas River Nyari and its tributaries flow across the western part of Rajkot. A number of other water bodies such as lakes and ponds are also found within the city region. In addition, the wastelands found in the region under RUDA is about 26 per cent of the total area [5]. The wastelands are mainly comprised of scrub vegetation. Major soil type found in RUDA region is shallow to medium deep black cotton and sandy loam soils. In terms of topography, most of the area under RUDA is categorized under very gentle slope from south-east to north-west direction.

Demography

The total population of the city of Rajkot administered under Rajkot Municipal Corporation (RMC) is 1.79 million [5]. The decadal population growth rate (2001-2011) of RMC is 28 percent. The total population density per hectare, calculated for the city of Rajkot is 122.74. Some areas of the city constituted within RMC show an increasing trend in population which can be largely attributed to high rate of urbanization in the region. According to Census 2011, the gender ratio in Rajkot city is 905 females per 1000 males while the literacy rate of the city of Rajkot is 79.72 percent [5], which is comparatively higher than the national literacy rate.

About 90 percent of the total population practices Hinduism in the city of Rajkot [6]. Additionally, Muslims constitute approximately 7.6 percent, Jains (1.9 percent), Christians (0.27 percent), Sikhs (0.07 percent) and Buddhists (0.07 percent) out of the remaining population of the city of Rajkot.

Economy

Rajkot is a major economic and commercial center of the entire Saurashtra region [5]. The city is largely renowned for the presence of automobiles and metal-based industries. There are more than a hundred foundries and forging units found in the city region, thus establishing Rajkot as a thriving hub for trade and manufacturing. Based on their distance from the natural environment, the city's economy can be segregated into three sectors namely, primary, secondary and tertiary. Primary sector includes economic activities that are directly associated with nature, for example, agriculture and mining. The sector employs only a small percent of total workers i.e. 1 percent [5]. Secondary sector covers the activities related to manufacturing of raw materials into finished products, for example, metal works, automobiles and textile, chemical, engineering, construction and shipbuilding. About 4 percent of the total workers in the city of Rajkot are employed under the secondary sector. Tertiary sector includes economic activities linked to the distribution of finished goods to the market and other commercial spaces, for example, retail, entertainment, clerical services, media and tourism. Due to fast pace of urbanization, this sector has seen an increase in the total working population.

The city of Rajkot has rich cultural heritage and is a popular tourist destination in the region [5]. Some of the important heritage structure in the city are Raiya Naka Gate and Tower, Old notified town of Rajkot, Lang Library, Jubilee Garden, Hatkesh Temple, Darbargadh, Connaught Hall and Watson Museum. Other heritage building present in Rajkot are Traditional Dela Type Houses in Kadiwad, Thosa Gali and Sir Lakhaji Raj Vegetable Market. In addition, the city is also known for its folk art, local traditions including movable arte-facts, handicrafts, festive events, myths and legends.

Biodiversity

Despite being the largest city in the Saurashtra region, Rajkot has scope for increasing the green cover [7]. However, in the form of natural assets, the city hosts a few lakes [8]. A tree inventory has also been developed. Nevertheless, a complete biodiversity profile comprising of a detailed account of plants and animals found in Rajkot is still absent. A brief description of flora and fauna existing in the city region, as compiled through a literature survey is given below.

Flora: The tree cover in the city of Rajkot is not very high [7]. As assessed by the State Forest Department, there are a total of 140 tree species observed in the city. *Azadirachta indica* (Neem) and *Alstonia scholaris* (Saptaparni) are the dominant tree species found in the city of Rajkot. A number of Neem trees can also be spotted in the old college and school campuses of the city. Other main tree species encountered in Rajkot include, *Polyalthia longifolia* (Asopalav), *Peltophorum pterocarpum* (Peltoform), *Pongamia pinnata* (Karanj), *Delonix regia* (Gulmohar), *Cassia siamea* (Kasid) and *Leucaena leucocephala* (Subaval).

Extensive tree plantations in Saurashtra University campus has been carried out [9]. The predominant vegetation layer in the university campus includes tree species such as *Lawsonia inermis*, *Aegle marmelos*, *Ficus benghalensis*, *Ficus religiosa*, *Cassia auriculata*, *Emblica officinalis*, *Tamarindus indica*, *Jatropha karkas*, *Cassia roxburghii*, *C. fistula*, *Albizia lebbeck* and *Pongamia pinnata*. The shrub layer in the campus includes *Ocimum tenuiflorum*, *Caesalpinia pulcherrima*, *Calotropis procera* and *Ziziphus nummularia*. Other ornamental plants include *Tecoma stans*, *Thevetia peruviana*, *Duranta repens*, *Bougainvillea spectabilis* and *Catharanthus roseus*.

Rajkot Zoological Park comprises of different species of trees, shrubs and herbs [8].

Fauna: In a study conducted at the Saurashtra University Campus [9] on avifauna, a total of 82 species of birds, belonging to 67 genera, 40 families and 16 orders were observed. During the study, it was also noted that the population of terrestrial bird species was higher than the population of aquatic bird species. Some of the bird species recorded in the campus include *Dendrocygna javanica* (Lesser Whistling-duck), *Anas poecilorhyncha* (Indian Spot-billed duck), *Columba livia* (Rock Pigeon), *Streptopelia decaocta* (Eurasian Collared Dove), *Streptopelia senegalensis* (Laughing Dove), *Centropus sinensis* (Greater Coucal), *Eudynamys scolopaceus* (Asian Koel), *Himantopus himantopus* (Black-winged Stilt), *Charadrius dubius* (Little Ringed Plover), *Vanellus malabaricus* (Yellow-wattled Lapwing) and *Vanellus indicus* (Red-wattled Lapwing).

In a preliminary survey of amphibians and reptiles of Rajkot city and adjoining areas [10], out of 385 samples, a total of 18 amphibian species belonging to 6 genera and 3 families were recorded. In addition, out of 160 samples, a total of 19 species of reptiles belonging to 15 genera and 8 families were recorded [10]. A number of amphibian species found include *Euphlyctis*

cyanophlyctis (Skipper Frog), *Fejervarya limnocharis* (Indian Cricket Frog), *Hoplobatrachus tigerinus* (Indian Bull Frog) and *Duttaphrynus scaber* (Ferguson's toad). A number of reptilian species found abundantly in the city of Rajkot include *Calotes versicolor* (Oriental Garden Lizard) and *Hemidactylus brookii* (Brook's House Gecko). Other species include *Hemidactylus flaviridis* (Northern House Gecko) and *Sitana spinaecephalus* (Spiny-headed Fan-Throated Lizard).

Free ranging faunal diversity found in the Rajkot Zoological Park comprises of more than a hundred of species of birds, six species of mammals and 12 species of reptiles [8].

Natural Asset Map: The natural asset map of Rajkot city has been developed by ICLEI South Asia (Figure 2). Table 1 provides details of each land class.

Table 1 Area of Natural Assets within the RMC boundary

S. No.	Land class	Area (in sq.km)
1	River / Drainage	2.60
2	Riverine Vegetation	2.34
3	Open Scrub	13.32
4	Lake/Pond/ Reservoir	3.89
5	Sparse Vegetation	2.44
6	Open Green Spaces	1.93
7	Tree Patch	1.42
8	Play Ground	1.01
9	Quarry Pond	0.11
10	Wetland Cultivation (Paddy / wheat)	35.02
11	Mixed cultivation	10.31
	Total	74.39

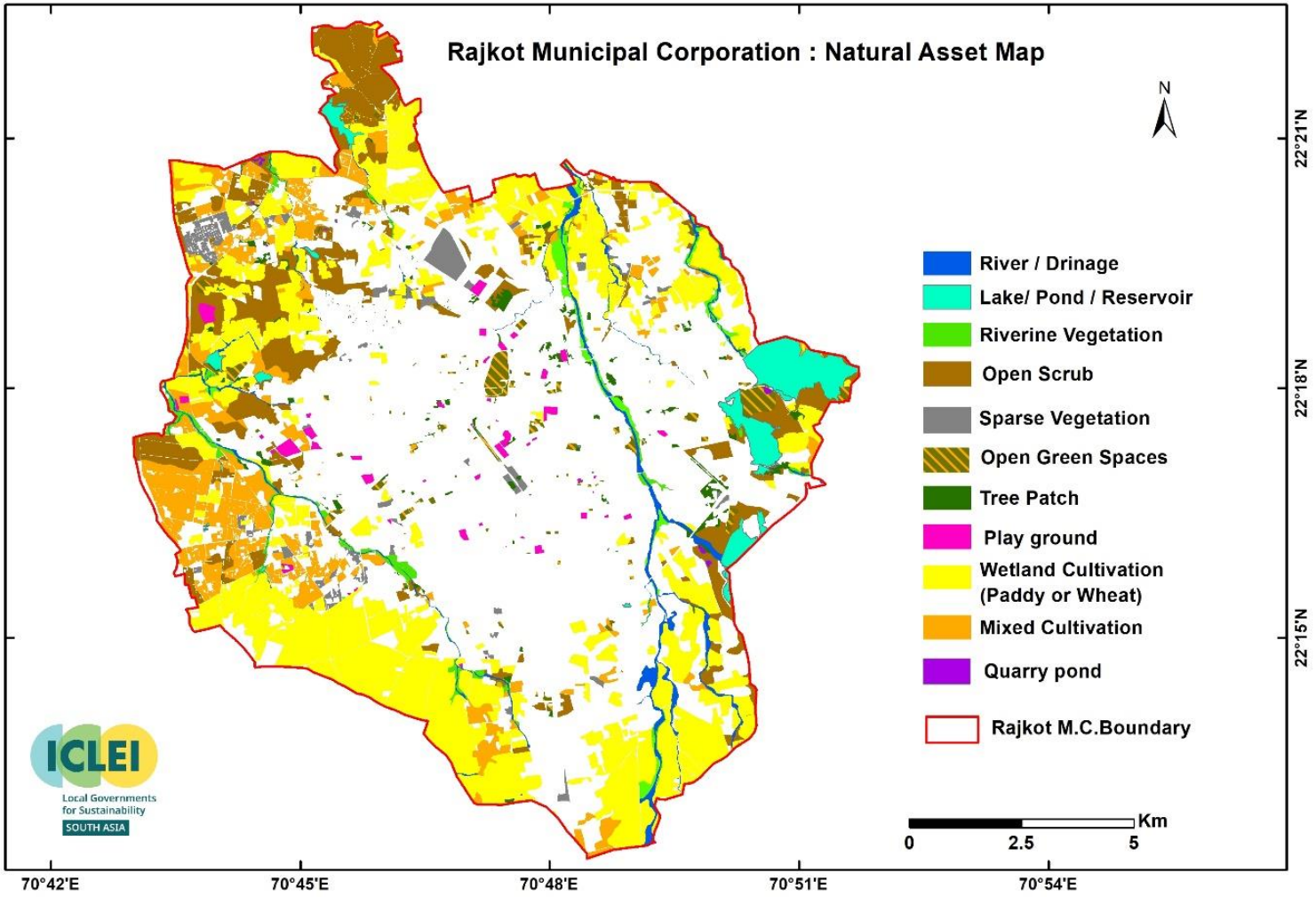

Figure 2 Natural Asset Map of Rajkot City

Administration of Biodiversity

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

Gujarat Forest Department: This Department headed by the Principal Chief Conservator of Forests (PCCF) deals with the protection, management and conservation of forests in the state of Gujarat. In addition, the forest department aims to incorporate urban forestry programmes in different cities of Gujarat including Rajkot. For more information, please visit: https://forests.gujarat.gov.in/index.htm

Gujarat State Biodiversity Board: The Board is mandated to ensure conservation of biodiversity in the State of Gujarat, including the city of Rajkot. The Board is also responsible for promotion of sustainable use of biological resources as well as fair and equitable sharing of benefits derived from the use of bio-resources. The vision of the State Biodiversity Board is to enhance the understanding of the importance of biodiversity amongst the people of Gujarat. For more information, please visit: https://gsbb.gujarat.gov.in/

Biodiversity Management Committee (BMC): Rajkot BMC has been formed under Section 41(1) of Biological Diversity Act 2002 and Rule 22 of Biological Diversity Rules 2004. The tenure of the BMC is five years. The BMC is responsible for monitoring, conservation and sustainable utilization of biological resources within the city of Rajkot, so as to achieve healthy and resilient ecosystems. Details of the BMC members of Rajkot are given in Table 2. For more information, please visit: https://gsbb.gujarat.gov.in/

Table 2 Members of BMC of Rajkot

S.No.	Name	Position
1	Shri Dr Praipbhai Rambhai Dav	Chairperson
2	Shrimati Bhanuben Manoharbhai Babriya	Female member
3	Shrimati Anitaben Gautamgiri Goswami	Female member
4	Shri Hardikbhai Prahladbhai Gohil	SC / ST member
5	Shri Ashwinbhai Meghjibhai Pambhar	Member
6	Shri Ketanbhai Dahyabhai Patel	Member
7	Shri Dr Ranchodbhai K Hirpara	Secretary

Rajkot Municipal Corporation (RMC): RMC is responsible for providing basic infrastructure facilities including sewerage and drainage, housing, parks and playgrounds, etc. RMC has also initiated green campaigns such as urban forest programme and has constituted the Biodiversity Management Committee. For more information, please visit: https://www.rmc.gov.in/Home

Rajkot Urban Development Authority (RUDA): RUDA is responsible for carrying out developmental activities in and around the city of Rajkot. The Authority is responsible for formulating a vision and development plan for the area in order to manage the effects of rapid urbanization and environmental degradation as well as to transform Rajkot into a world-class city. For more information, please visit: http://www.rajkotuda.com/index.html

Rajkot Smart City Limited (RSCL): The vision of RSCL is development of Rajkot as a smart, energy-efficient and livable city with inclusive economic growth and sustainable development.

This city agency also aims to uplift the art, local tradition and cultural heritage of the city as well as empower its citizens. For more information, please visit: http://smartcityrajkot.in/home

PART II: Indicators of the Index on Cities' Biodiversity

Indicator 1: Proportion of Natural Areas in the City

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

Methodology

As per the CBI user manual

Principle for calculation of the indicator
(Total area of natural, restored and naturalised areas) ÷ (Total area of city) × 100%

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

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

To calculate the proportion of natural areas in the city, a natural asset map (Figure 1) of Rajkot was prepared and referred to. Table 3 shows the various natural classes that have been identified in the natural asset map of Rajkot that apply to the calculation of this indicator. Anthropogenically created land classes such as Open Green Spaces, Tree Patches, Playground, Quarry-pond, Wetland Cultivation, Mixed Cultivation were not considered.

Table 3 Land classes that conform to natural area definition used in the calculation of indicator 1

S.No.	Land class	Area (in sq.km)
1	River / Drainage	2.60
2	Riverine vegetation	2.34
3	Open Scrub	13.32
4	Lake/Pond/ Reservoir	3.89
5	Sparse vegetation	2.44

Total Natural Area = 24.58 sq. km.

Total Area = 161.86 sq.km.

RESULT: 15.19 %

SCORE: 3 points

Recommendations to Improve Score

Rajkot can maintain the high score on this indicator by developing a Local Biodiversity Strategy and Action Plan which will help to protect, improve and monitor these natural areas. The city can also look into declaring the urban forests being developed by RMC as protected natural areas. The BMC can also look into developing Biodiversity Heritage Sites.

Indicator 2: Connectivity Measures or Ecological Networks to Counter Fragmentation

Methodology

As per the CBI user manual

Principle for calculation of the indicator

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

Where:

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

This measures effective mesh size of the natural areas in the city. A1 to An may consist of areas that are the sum of two or more smaller patches which are connected. In general, patches are considered as connected if they are less than 100m apart.

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

The patches associated with the land classes used to calculate indicator 1 i.e., River, Riverine vegetation, Open Scrub, Lake/Pond/ Reservoir and Sparse vegetation have been considered in this calculation. In reality, manmade landscapes represented in Rajkot by the land classes- agricultural areas, tree patches and open green spaces also form a part of the ecological network to counter fragmentation for several species. However, these have not been considered following the guidelines of the CBI manual.

236 natural assets polygons (patches) of the western part and 126 polygons of the central part, 72 polygons of the eastern part and 42 polygons of the northern part were merged with the river or waterbodies and considered as four patch units, Patch - A_1, Patch A_2, Patch A_3 and Patch A_4 respectively as per the 100 m proximity rule. Therefore, the total area of these big patches - A_1 to A_4 were determined as 870.28 ha, 523.29 ha,438.76 ha, and 343.48 ha respectively (Annexure 1, Table 5).

There were 86 polygons (patches) which were outside the 100m buffer of these four big patches. As per the 100m proximity rule, these 86 patches were inter-merged into 51 patches (A_5 – A_{56}). The total number of patches is as shown in Annexure 1 (Table 5).

A_{total} = 2457.81 ha

As per the final calculation,

1/2457.81 ha x (1347356.24 ha^2) = 548.19 ha

RESULT: 548.19

SCORE: 2

Recommendations to Improve Score

The city can work towards the improvement of this score by supporting ecological restoration around natural areas and providing them with some form of protection. Developing these corridors will ensure contiguity between patches, improving movement of invertebrates, birds, reptiles, amphibians and small mammals. The city can also look into actively partnering with research and academic organisations, based in Rajkot. This will also help to improve scores in subsequent applications of the CBI.

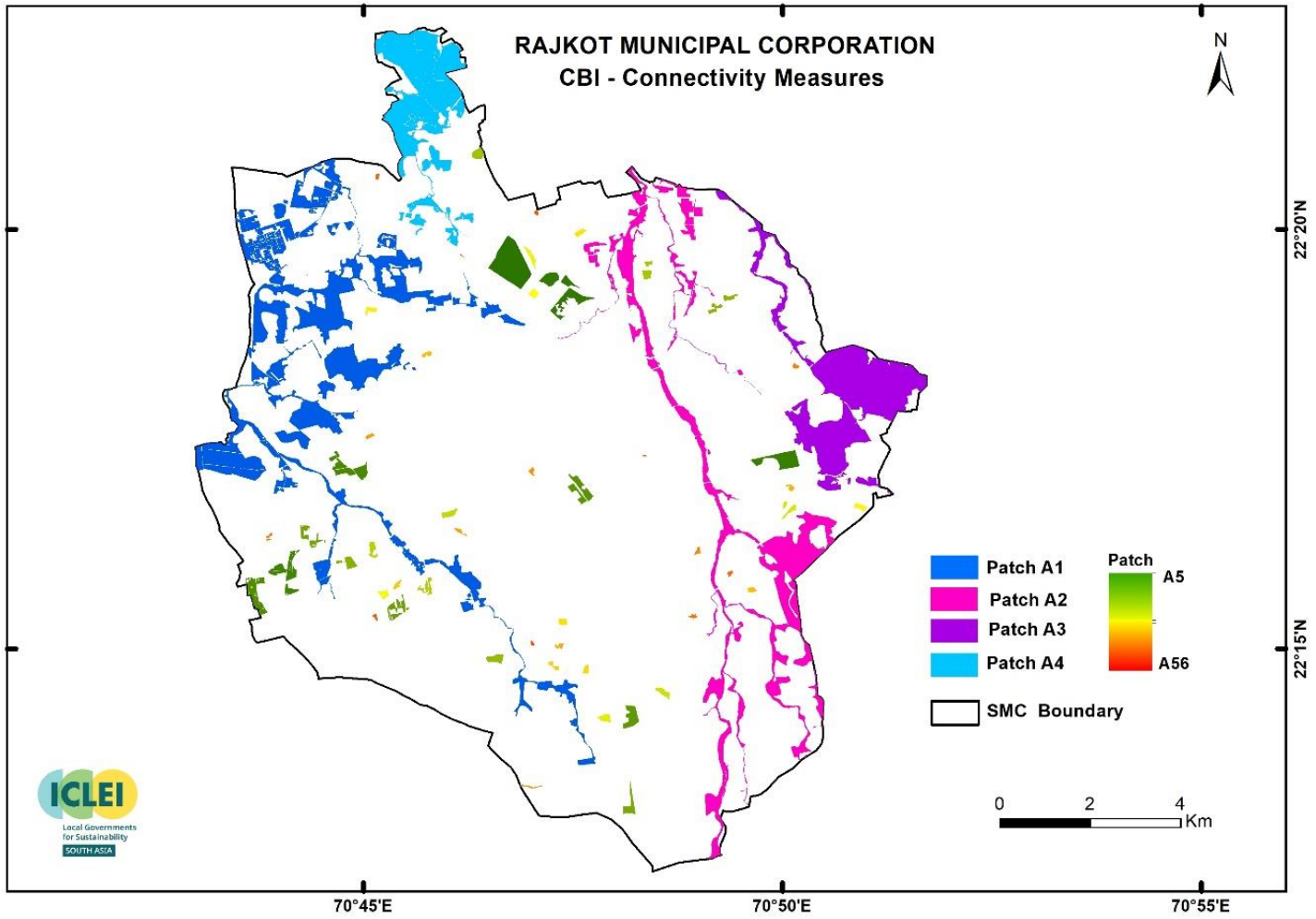

Figure 3 Connectivity patches of natural areas within the boundary of RMC

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

Methodology

How to calculate indicator

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

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

Secondary data available on citizen science platforms such as eBird (2021), developed by Cornell Lab of Ornithology, and scientific publications [9] were referred to for this indicator. Birds sighted within the municipal corporation limits were considered. Sightings from natural areas considered in indicator 1, were excluded, which is possible using eBird's mapping tool.

Of the 262 bird species that were recorded from the city, 148 species are resident species of which 95 occur within anthropogenically altered spaces of the city. The native bird diversity within the city is high because of mosaic of ecosystems in the city. The list of the birds considered for calculation of this indicator is provided in Annexure 2, Table 6.

RESULT: 95

SCORE: 4

Recommendations to Maintain Score

The native bird diversity within the city is high because of mosaic of ecosystems in the city. The city of Rajkot can maintain this high score by protecting the heterogenous mix of natural and modified ecosystems within the city such as natural scrub areas, gardens, urban green spaces, and riverine areas. The health of these ecosystems must be ensured so that they can support a wide diversity of floral and faunal species.

Indicator 4 - 8: Change in Number of Native Species

Methodology

How to calculate indicator

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

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

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

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

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

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

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

Scoring Range: (based on the CBI user manual)

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

City Data

For the indicators 4-8, information was sourced from scientific publications, government reports, white papers, and citizen science platforms like eBird[2]and iNaturalist[3]. Taxa experts were consulted with at the final stage of the list development.

Indicator 4 i.e. the list of vascular plants was compiled from Trivedi and Vaghela (2020) [9] and information obtained from the Rajkot Municipal Corporation. In the case of Indicator 5, the list of birds was sourced from eBird (2021) and a scientific publication [9]. Indicator 6 i.e. the list of butterflies was compiled using online citizen science platform, iNaturalist (2021).

[2] eBird. 2021. The Cornell Lab of Ornithology. https://ebird.org/region/IN-GJ-RA/hotspots?yr=all&m= Accessed on 2 December 2021

[3] https://www.inaturalist.org/places/rajkot. Accessed on 1 December 2021.

For Indicators 7 and 8, two additional taxonomic groups of Amphibians and Reptiles, respectively were chosen. Both Indicators 7 and 8 were compiled from Parmar and Trivedi (2018) [10]. Since this is the first application of the City Biodiversity Index, these indicators will not be scored. These lists for the different taxa will however, form the baseline for comparison when the index is revisited by the city, every three years. Annexure 2 (Tables 7,8, 9 and 10) provide details of the species lists that have been considered for Indicators 4-8.

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

Indicator 9: Proportion of Protected Natural Areas

Methodology

How to calculate indicator
(Area of protected or secured natural areas) ÷ (Total area of the city) × 100%

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

Rajkot has no protected areas within its administrative boundary.

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

Total area of the city = 161.86 sq.km

Proportion of Protected Natural Area = 0÷ 161.86 × 100% = 0%

RESULT: 0

SCORE: 0

Recommendations to Improve Score

Rajkot Municipal Corporation needs to demonstrate its commitment of biodiversity protection by developing mechanisms to confer protection on its natural areas. This can be done by activating its BMC, and notifying Biodiversity Heritage sites within the city. The administration can also explore other protection mechanisms such as Other Effective area-based Conservation Measures (OECM) with the Forest Department, community and other stakeholders.

Indicator 10: Proportion of Invasive Alien Species

Methodology

How to calculate indicator
(Number of invasive alien species) ÷ (Number of native species) × 100%

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

The taxa for which information on alien species is most easily available is terrestrial plants. Solanki [11] through a review of various published literature and databases recorded 80 invasive species in Gujarat. Local level invasive species assessments are absent, hence the aforementioned review was consulted.

A total of 3 invasive alien terrestrial plant species were identified in the city. The total number of native vascular plant species in the city is 79.

Total Number of Invasive Alien Species = 3

Total Number of Native Species = 79 (Annexure 2, Table 7)

Proportion of Invasive Alien Species = (3÷79) × 100= 3.7%

RESULT: 3.7%

SCORE: 3

Recommendations to Improve Score

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

Indicator 11: Regulation of Quantity of Water

Methodology

How to calculate indicator
(Total permeable area) ÷ (Total terrestrial area of the city) × 100%

Scoring Range: (based on the CBI user manual)
0 point: < 33.1%
1 point: 33.1% - 39.7%
2 points: 39.8% - 64.2%
3 points: 64.3% - 75.0%
4 points: > 75.0%

City Data and Calculations

At the city-level, data on permeable/non-permeable spaces is absent, and hence a permeability map (Figure 3) was prepared by ICLEI South Asia for the purpose of calculating this indicator. Sentinel 2A data was extracted from the Copernicus program of the European Space Agency for the analysis of the RMC Area. Land use classes of Water Body, River bank, Bare Land, Open Scrub, Paddy, Tree patches, Cropland, and Urban built-ups were utilized for the classification. After the LULC classification, the respective land classes were merged and permeability map was prepared.

Table 4: Permeability results for RMC

Item	Area in sq.km	Area Percentage
Permeable surfaces	103.30	63.82
Water body	8.53	5.27
Impermeable surfaces	50.03	30.91

Permeable + Water body = 111.83 sq.km.

Total Terrestrial area = 153.33 sq.km.

Indicator 11 = (Total permeable area) ÷ (Total terrestrial area of the city) × 100%

= 111.83/153.33 *100 = 72.94%

RESULT: 72.94%

SCORE: 3

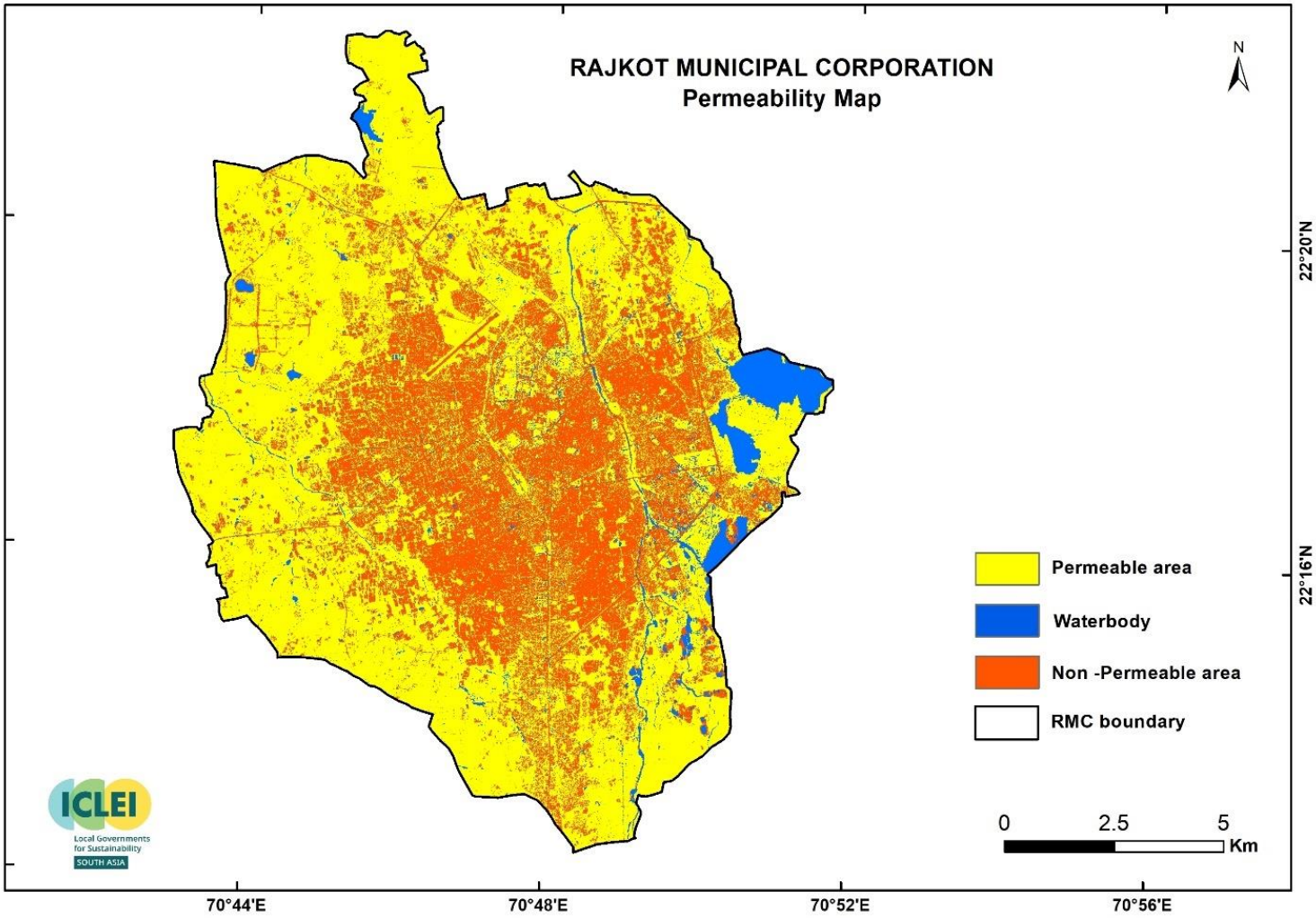

Figure 4: Permeability Map of RMC

Recommendations to Improve Score

The city has scored high in this indicator. The health of the natural green and blue spaces in the city needs to be maintained. In addition, newer areas that are being brought under plantation, through the urban forest programme will also help to improve the score further. Areas like Ishwariya Park, which are being planned to be developed as a public access open green space will also contribute to improving the score of the city on this indicator.

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

Methodology

How to calculate indicator
(Tree canopy cover) ÷ (Total terrestrial area of the city) × 100%

Scoring Range: (based on the CBI user manual)
0 point: < 10.5%
1 point: 10.5% - 19.1%
2 points: 19.2% - 29.0%
3 points: 29.1% - 59.7%
4 points: > 59.7%

City Data and Calculations

In order to calculate indicator 12, a tree cover map (Figure 4) was developed using Sentinel satellite imagery (10 m resolution). The data was extracted from the Copernicus program of the European Space Agency for the analysis of the RMC Area. Area. Sentinel-2 Level 2 products with a cloud cover < 5% comprising the study region (Tile Number - T42QXK) acquired on 01 November 2021 were downloaded from USGIS Earth Explorer. Red (R), Green (G), Blue (B), and Near Infrared (NIR) bands with 10m spatial resolution were pre-processed and used in the supervised classification process based on the standard methodology [12], [13]. Land use classes of Water Body, River bank, Bare Land, Open Scrub, Tree patches, Cropland, and Urban built-ups were utilized for the classification. For each LULC class, at least 15 samples were collected and used as training samples for the classification of images in ERDAS software. After the LULC classification, the respective land classes were merged and tree cover map was prepared.

Item	Area in sq.km.
Tree cover	15.89
Water body	8.53
Total terrestrial area	153.33

Tree cover = 15.89/153.33 *100 = 10.36 %

RESULT: 10.36 %

SCORE: 0

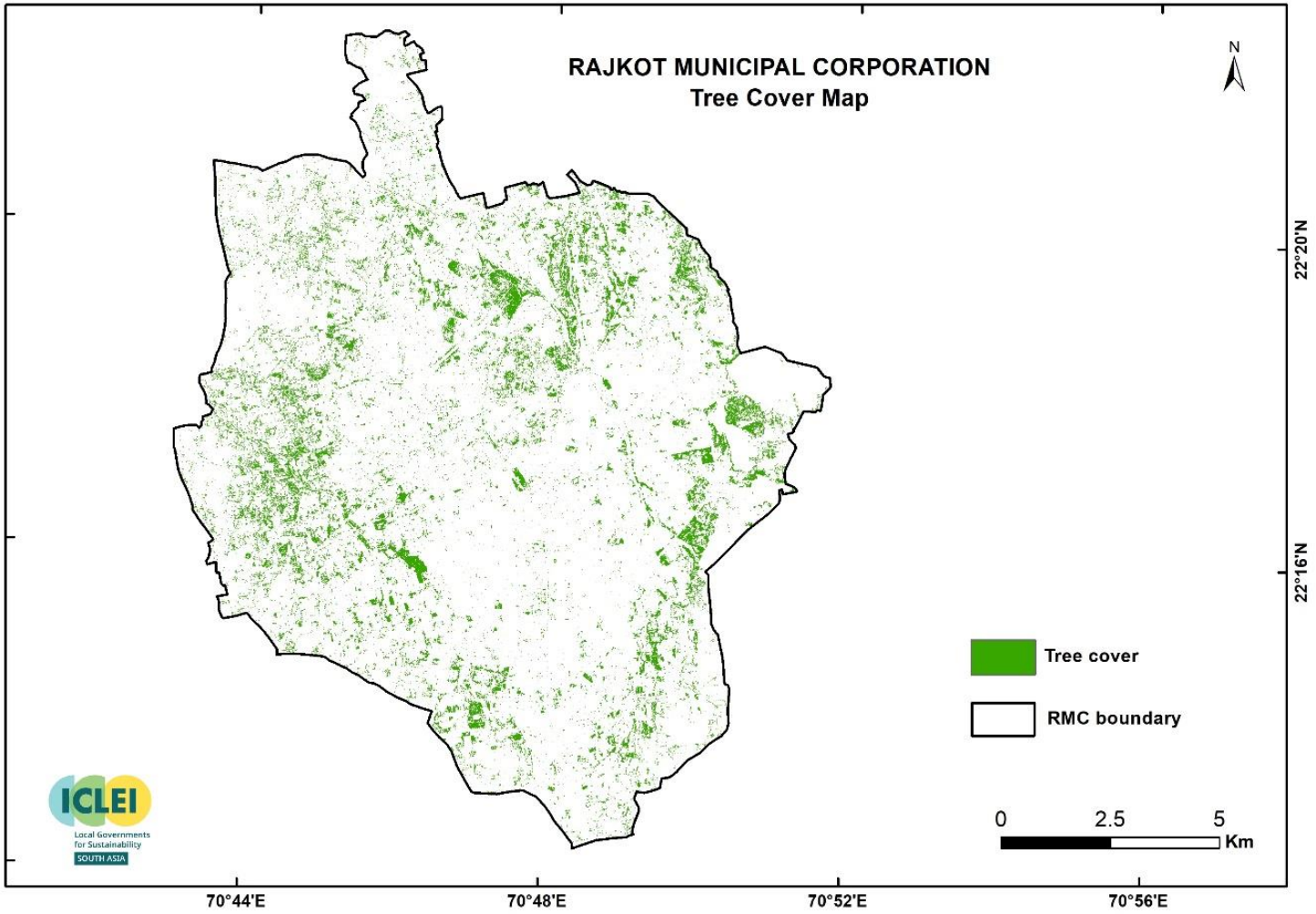

Figure 5: Tree cover of RMC

Recommendations to Improve Score

To improve this indicator, the city should look into developing native tree green belts along roadsides and wastelands. The BMC, in collaboration with RMC, and other NGOs can play a significant role in the same. Trees like *Azadirachta indica; Ficus amplissima; Ficus benghalensis; Ficus benjamina; Ficus elastica; Ficus racemosa; Ficus religiosa; Ficus virens; Morus alba; Syzygium cumini,* among others should be planted instead of scrub species which have small canopies.

Indicator 13: Recreational Services

Methodology

How to calculate indicator
(Area of parks with natural areas and protected or secured natural areas)/1000 persons

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

The main agency that manages and develops parks in the city is the Garden Department of RMC. RMC manages a total of 155 parks which make up a total of 64.69 ha (Annexure 3).

Total area of parks with natural areas = 64.69 ha

(Area of parks with natural areas) / 1000 persons = 64.69/ 1000 = 0.064 ha

RESULT: 0.064 ha/person

SCORE: 0

Recommendations to Improve Score

Rajkot only has 64.69 ha of recreational green space which is 505.31 ha less than the minimum standard of 570 ha as provided in the Urban and Regional Development Plans Formulation and Implementation (URDPFI, Vol. I) Guidelines, 2015 [14]. According to Kumari and Joshi (2015) [15], Rajkot's prominence as the largest city in Saurashtra has attracted several investors from within and outside the state leading to a steady decrease in the open land area. To remain liveable and viable, the city must invest in improving green recreational areas within and around built-up areas. Funds for the same can also be sourced through Corporate Social Responsibility, as the city has a high presence of investors and corporates.

Indicator 14: Educational Services

Methodology

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

Scoring Range: (based on the CBI user manual)

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

City Data

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

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

RESULT: 0 Formal visits

SCORE: 0

Recommendations to Improve Score

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

Indicator 15: Budget Allocated to Biodiversity

Methodology

How to calculate indicator
(Amount spent on biodiversity related administration) ÷ (Total budget of city) × 100%

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

The following budget allocations in the municipal budget for the financial year 2021-22 contribute to biodiversity conservation.

1. Construction of theme-based gardens for children and women = 335 million INR
2. Construction of 8 new gardens = 600 million INR
3. Installation of plantations at road dividers for 15 km and at road sides of nearly 60,000 trees = 100 million INR
4. Development of urban forest = 1500 million INR
5. Development of Aji Forest Park and other Garden works = 132 million INR
6. Construction of green space based on Miyawaki methods = Public Private Partnership mode
7. Botanical garden development = 38.8 million INR
8. Development of Aquarium = Public Private Partnership mode

Total Budget of Rajkot Municipal Corporation = 22912.4 million INR

Total Budget Allocated for Biodiversity = (2705.8) ÷ (22912.4) x 100

RESULT: 11.8 %

SCORE: 4

Recommendations to Maintain Score

The city of Rajkot has been regularly allocating finances for activities related to biodiversity conservation. The same is reflected from the high score that the city has scored under this indicator. In addition to the activities being carried out presently, the city should also look at allocating funds for documentation of the existing biodiversity in the city. The support from research institutions in the city can be taken for carrying out the work. Citizen's science applications can also be funded by the city corporation for the same.

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

Methodology

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

In addition to submitting the total number of projects and programmes carried out, cities are encouraged to provide a listing of the projects and to categorise the list into projects that are:
1. Biodiversity related
2. Ecosystems services related

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

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

1) **Park Development:** RMC's Garden Department is constructing and maintaining several types of gardens in the city such as theme-based gardens for children and women, apart from establishing new gardens
2) **Tree Plantation**: RMC's Garden Department has been carrying out plantation of nearly 60,000 plants in the city including at road dividers and at road sides. The city is also partnering with 21 NGOs and CSOs to green the city through plantation drives.
3) Development of Urban Forest
4) Development of Aji Forest Park and other Garden Works
5) Development of Green Spaces based on Miyawaki methods
6) **Botanical Garden:** The Zoo Department of RMC is developing a Botanical Garden in Pradyuman Park.
7) **Development of an Aquarium**: The Zoo Department is developing an aquarium to improve public awareness and education on aquatic life
8) **City Biodiversity Index:** The City Biodiversity Index is being prepared by ICLEI – Local Governments for Sustainability, South Asia, which will then help the city to evaluate and benchmark their biodiversity conservation efforts.
9) **Local Biodiversity Strategy and Action Plan:** ICLEI – Local Governments for Sustainability, South Asia is developing the Local Biodiversity Strategy and Action Plan for the city, which will provide guidance and direction to the city to sustainably manage and conserve its biodiversity.
10) **Stray Dog Sterilization:** This is being carried out in coordination with Goal Foundation.
11) **Lake Development:** Under the Smart city project three lakes around the city are being developed.

12) **Beautification of the road dividers/Roadside plantations:** The transport department is taking up beautification of road dividers on the main roads through plantations.

RESULT: 12- 21 programmes/projects	SCORE: 1

Recommendations to Improve Score

The city should develop its LBSAP where it can identify suitable partnerships and take up activities identified therein and thus improve on the score under this indicator.

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

Methodology

How to calculate indicator
Status of LBSAP (or any equivalent plan); number of associated CBD initiatives.

Scoring Range: (based on the CBI user manual)

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

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

City Data and Calculations

The LBSAP of Rajkot city is presently being developed under the Capacity Building for Low Carbon and Climate Resilient City Development project (CapaCITIES) Project in conjunction with ICLEI- Local Governments for Sustainability, South Asia.

RESULT: No LBSAP

SCORE: 0

Recommendations to Improve Score

The city has already initiated the development of the LBSAP. The LBSAP must incorporate elements of the NBSAP, and include four or more CBD initiatives in order to get a high score in subsequent applications of the index. Once the same is ratified by the city council, measures identified in the LBSAP should be implemented through incorporation in the annual municipal budget.

Indicator 18: Institutional Capacity - Essential Biodiversity Related Functions

Methodology

How to calculate indicator
Number of essential biodiversity related functions* that the city uses.

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

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

Rajkot city is in the process of developing a Botanical Garden and an Aquarium. The essential biodiversity related functions which are available presently include

1. Pradyuman Park (Zoo)
2. Science Centre (in construction, near Ishwariya Park just outside city limit)
3. Botanical garden in HNHB Kotal Science College
4. Botanical garden in Saurashtra University
5. A space with kitchen garden and medicinal plants in a garden at Bajrangwadi in Ward 2

RESULT: 55

SCORE: 4

Recommendations to Maintain Score

Rajkot is presently developing an aquarium and a botanical garden within its jurisdiction which will help to maintain this high score. The city can also look into partnerships with local academic institutions such as Saurashtra University to develop science-themed museums which will be open to the citizens.

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

Methodology

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

Scoring Range: (based on the CBI user manual)

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

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

City Data and Calculations

Biodiversity issues are cross-sectorial and, require inter-agency efforts. Rajkot Municipal Corporation has three departments that work on various aspects of that impact the city's biodiversity i.e. Garden Department, Zoo Department, and Solid Waste Management Department. Given below are various local government agencies that are involved in matters related to biodiversity conservation in the city.

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

RESULT: 3 agencies

SCORE: 1

Recommendations to Improve Score

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

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

Methodology

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

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

As per the information provided, no formal and informal consultations pertaining to biodiversity related matters is held.

RESULT: No Routine Formal or Informal Processes

SCORE: 0

Recommendations to Improve Score

The city needs to incorporate a formal public consultation process not just in biodiversity related matters, but also other sectors which have impacts on the biodiversity of the city, especially sanitation and solid waste management. This will improve public participation, public ownership and transparency. The BMC can spearhead this process of public consultation.

Indicators 21: Participation and Partnership - Institutional Partnership

Methodology

How to calculate indicator

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

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

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

Rajkot Municipal Corporation already partners with 21 NGOs to conduct plantation drives in the city. The list of the NGOs partnering with RMC is provided in Annexure 4. In addition, the Municipal Corporation is partnering with Swiss Agency for Development and Cooperation for the implementation of the Capacity Building for Low-carbon and Climate Resilient City Development (CapaCITIES) project. As part of the activities of this project, the City Biodiversity Index and the Local Biodiversity Strategy and Action Plan for Rajkot is being developed by ICLEI- Local Governments for Sustainability, South Asia.

RESULT: In partnership with 20 or more agencies

SCORE: 4

Recommendations to Maintain Score

The city has scored high under this indicator. In order to maintain this high score, the city should continue with these partnerships. In addition, the city should look into partnering with the academic institutions in the city to implement some research projects on biodiversity. This will help to develop the future coarse of action for biodiversity conservation. The LBSAP can also help identify areas for collaborative work for integrating biodiversity conservation into urban planning.

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

Methodology

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

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

The schools within the city follow the curriculum of various boards such as the Gujarat Secondary and Higher Secondary Education Board (GSHSEB), Central Board of Secondary Education (CBSE) and Indian Certificate of Secondary Education (ICSE). All these boards have included biodiversity and nature awareness in various subjects like Biology, Geography and Environmental Sciences. Therefore, biodiversity or elements of it are included in the school curriculum.

RESULT: Biodiversity Elements are included in the school curriculum

SCORE: 4

Recommendations to Maintain Score

This high score should be taken with a caution. his indicator measures the theoretical aspects of biodiversity education, receives the highest score possible whereas indicator 14 which measures practical aspects of biodiversity education received the lowest score possible. This is a common issue throughout the entire country. There is thus a need to develop a balance between these two aspects of biodiversity education. In order to address the same, the city administration can give a directive to all schools to include visits to parks and biodiversity facilities (listed in indicator 18) in their curriculum. The city administration should send a request in this regard to all the school boards, through the state government.

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

Methodology

How to calculate indicator
Number of outreach or public awareness events held in the city per year.

Scoring Range: (based on the CBI user manual)

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

City Data and Calculations

There are a number of public outreach and awareness events organized by the RMC in the city annually. These include:

1. World Environment Day – 1 event per year
2. Van Mahotsav – 1 event per year
3. Flower show – 1 event per year
4. Tree plantation drives on religious or national leader's birthday – Approximately 20 events per year at various locations in the city
5. Tree plantation on birth anniversary on freedom fighters – Approximately 10 events per year at various locations in the city
6. Cleanliness drives and maintenance of water bodies under Swachh Bharat Mission – Approximately 8 drives have been taken up in 2021-22
7. Cleanliness drives near Nyari Dam- One every month, in collaboration with a local group of volunteers

RESULT: 1 - 59

SCORE: 1

Recommendations to Improve Score

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

Table 4 Rajkot's score indicator-wise for the CBI

Components	Indicators	Maximum Score	Rajkot City's score
Native Biodiversity in the City	1. Proportion of Natural Areas in the City	4 points	3 points
	2. Connectivity Measures	4 points	2 points
	3. Native Biodiversity in Built Up Areas (Bird Species)	4 points	4 points
	4. Change in Number of Vascular Plant Species	4 points	N/A as baseline year
	5. Change in Number of Bird Species	4 points	N/A as baseline year
	6. Change in Number of Mammal Species	4 points	N/A as baseline year
	7. Change in Number of Moth Species	4 points	N/A as baseline year
	8. Change in Number of Fish Species	4 points	N/A as baseline year
	9. Proportion of Protected Natural Areas	4 points	0 points
	10. Proportion of Invasive Alien Species	4 points	3 points
Ecosystem Services provided by Biodiversity	11. Regulation of Quantity of Water	4 points	3 points
	12. Climate Regulation: Carbon Storage and Cooling Effect of Vegetation	4 points	0 points
	13. Recreation and Education: Area of Parks with Natural Areas	4 points	0 points
	14. Recreation and Education: Number of Formal Education Visits per Child Below 16 Years to Parks with Natural Areas per Year	4 points	0 points
	15. Budget Allocated to Biodiversity	4 points	4 points

Components	Indicators	Maximum Score	Rajkot City's score
Governance and Management of Biodiversity	16. Number of Biodiversity Projects Implemented by the City Annually	4 points	1 point
	17. Existence of Local Biodiversity Strategy and Action Plan	4 points	0 points
	18. Institutional Capacity: Number of Biodiversity Related Function	4 points	4 points
	19. Institutional Capacity: Number of City or Local Government Agencies Involved in Inter-agency Cooperation Pertaining to Biodiversity Matters	4 points	1 point
	20. Participation and Partnership: Existence of Formal or Informal Public Consultation Process	4 points	0 points
	21. Participation and Partnership: Number of Agencies/Private Companies/NGOs/Academic Institutions/International Organisations with which the City is Partnering in Biodiversity Activities, Projects and Programmes	4 points	4 points
	22. Education and Awareness: Is Biodiversity or Nature Awareness Included in the School Curriculum	4 points	4 points
	23. Education and Awareness: Number of Outreach or Public Awareness Events Held in the City per Year	4 points	1 point
Native Biodiversity in the City (Sub-total for indicators 1-10)			12/20*
Ecosystem Services provided by Biodiversity (Sub-total for indicators 11-14)			3/16
Governance and Management of Biodiversity (Sub-total for indicators 15-23)			19/36
Total			34/72

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

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Annexure 1

Table 5 Calculation of Indicator 2

Patch ID	Area (ha)	Area*Area (ha^2)
A1	870.28	757386.03
A2	523.30	273839.63
A3	438.84	192578.76
A4	343.48	117977.46
A5	54.87	3010.39
A6	26.79	717.69
A7	19.24	370.00
A8	17.07	291.36
A9	16.88	284.78
A10	15.12	228.47
A11	12.24	149.83
A12	9.88	97.53
A13	7.94	63.02
A14	6.90	47.67
A15	6.18	38.22
A16	5.19	26.96
A17	5.17	26.78
A18	4.82	23.22
A19	4.56	20.79
A20	4.54	20.63
A21	4.21	17.73
A22	3.74	14.00
A23	3.55	12.58
A24	3.38	11.45
A25	3.37	11.35
A26	3.34	11.15
A27	3.22	10.36
A28	2.64	6.95
A29	2.51	6.29
A30	2.46	6.04
A31	2.37	5.60
A32	2.31	5.34
A33	2.16	4.67
A34	1.81	3.26
A35	1.79	3.22
A36	1.67	2.79

Patch ID	Area (ha)	Area*Area (ha^2)
A37	1.64	2.68
A38	1.62	2.64
A39	1.48	2.20
A40	1.42	2.02
A41	1.41	1.99
A42	1.27	1.60
A43	1.25	1.55
A44	1.24	1.55
A45	1.24	1.55
A46	1.15	1.33
A47	1.04	1.08
A48	1.03	1.05
A49	0.96	0.92
A50	0.83	0.69
A51	0.78	0.61
A52	0.64	0.41
A53	0.50	0.25
A54	0.28	0.08
A55	0.21	0.04
A56	0.01	0.00
Total	2457.81	1347356.24

Annexure 2: Species Lists

Table 6 Species list used in the calculation of Indicators 3 and 5

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
		Waterfowl			
1	Anatidae	Lesser Whistling-Duck	Dendrocygna javanica	Resident	No
2	Anatidae	Bar-headed Goose	Anser indicus	Migrant	
3	Anatidae	Graylag Goose	Anser anser	Migrant	
4	Anatidae	Knob-billed Duck	Sarkidiornis melanotos	Resident	No
5	Anatidae	Ruddy Shelduck	Tadorna ferruginea	Migrant	
6	Anatidae	Cotton Pygmy-Goose	Nettapus coromandelianus	Resident	No
7	Anatidae	Garganey	Spatula querquedula	Migrant	
8	Anatidae	Northern Shoveler	Spatula clypeata	Migrant	
9	Anatidae	Gadwall	Mareca strepera	Migrant	
10	Anatidae	Eurasian Wigeon	Mareca penelope	Migrant	
11	Anatidae	Indian Spot-billed Duck	Anas poecilorhyncha	Resident	No
12	Anatidae	Mallard	Anas platyrhynchos	Migrant	
13	Anatidae	Northern Pintail	Anas acuta	Migrant	
14	Anatidae	Green-winged Teal	Anas carolinensis	Migrant	
15	Anatidae	Common Pochard	Aythya ferina	Migrant	
16	Anatidae	Ferruginous Duck	Aythya nyroca	Migrant	
17	Anatidae	Tufted Duck	Aythya fuligula	Migrant	
18	Anatidae	Red-crested Pochard	Netta rufina	Migrant	
		Grouse, Quail, and Allies			
19	Phasianidae	Indian Peafowl	Pavo cristatus	Resident	Yes
20	Phasianidae	Gray Francolin	Ortygornis pondicerianus	Resident	Yes

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
21	Phasianidae	Painted Francolin	Francolinus pictus	Resident	No
22	Phasianidae	Rain Quail	Coturnix coromandelica	Resident	No
23	Phasianidae	Rock Bush-Quail	Perdicula argoondah	Resident	No
		Flamingos			
24	Phoenicopteridae	Greater Flamingo	Phoenicopterus roseus	Resident	No
25	Phoenicopteridae	Lesser Flamingo	Phoeniconaias minor	Resident	No
		Grebes			
26	Podicipedidae	Little Grebe	Tachybaptus ruficollis	Resident	Yes
27	Podicipedidae	Great Crested Grebe	Podiceps cristatus	Migrant	
		Pigeons and Doves			
28	Columbidae	Rock Pigeon	Columba livia	Resident	Yes
29	Columbidae	Eurasian Collared-Dove	Streptopelia decaocto	Resident	Yes
30	Columbidae	Red Collared-Dove	Streptopelia tranquebarica	Resident	Yes
31	Columbidae	Laughing Dove	Spilopelia senegalensis	Resident	Yes
32	Columbidae	Yellow-footed Green-Pigeon	Treron phoenicoptera	Resident	Yes
		Sandgrouse			
33	Pteroclidae	Chestnut-bellied Sandgrouse	Pterocles exustus	Resident	No
		Cuckoos			
34	Cuculidae	Greater Coucal	Centropus sinensis	Resident	Yes
35	Cuculidae	Pied Cuckoo	Clamator jacobinus	Migrant	
36	Cuculidae	Sirkeer Malkoha	Taccocua leschenaultii	Resident	No

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
37	Cuculidae	Asian Koel	Eudynamys scolopaceus	Resident	Yes
38	Cuculidae	Common Hawk-Cuckoo	Hierococcyx varius	Resident	Yes
39	Cuculidae	Common Cuckoo	Cuculus canorus	Migrant	
		Nightjars			
40	Caprimulgidae	Indian Nightjar	Caprimulgus asiaticus	Resident	No
41	Caprimulgidae	Savanna Nightjar	Caprimulgus affinis	Resident	No
		Swifts			
42	Apodidae	Little Swift	Apus affinis	Resident	Yes
43	Apodidae	Asian Palm-Swift	Cypsiurus balasiensis	Resident	Yes
		Rails, Gallinules, and Allies			
44	Rallidae	Spotted Crake	Porzana porzana	Migrant	
45	Rallidae	Eurasian Moorhen	Gallinula chloropus	Resident	Yes
46	Rallidae	Eurasian Coot	Fulica atra	Resident	Yes
47	Rallidae	Gray-headed Swamphen	Porphyrio poliocephalus	Resident	Yes
48	Rallidae	White-breasted Waterhen	Amaurornis phoenicurus	Resident	Yes
49	Rallidae	Ruddy-breasted Crake	Porzana fusca	Resident	No
50	Rallidae	Brown Crake	Zapornia akool	Resident	No
51	Rallidae	Baillon's Crake	Zapornia pusilla	Resident	No
52	Rallidae	Watercock	Gallicrex cinerea	Resident	No
		Cranes			
53	Gruidae	Demoiselle Crane	Grus virgo	Migrant	
54	Gruidae	Common Crane	Grus grus	Migrant	
		Shorebirds			
55	Burhinidae	Indian Thick-knee	Burhinus indicus	Resident	Yes

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
56	Burhinidae	Great Thick-knee	Esacus recurvirostris	Resident	No
57	Recurvirostridae	Black-winged Stilt	Himantopus himantopus	Resident/Migrant	Yes
58	Recurvirostridae	Pied Avocet	Recurvirostra avosetta	Migrant	
59	Charadriidae	Pacific Golden-Plover	Pluvialis fulva	Migrant	
60	Charadriidae	Yellow-wattled Lapwing	Vanellus malabaricus	Resident	Yes
61	Charadriidae	Red-wattled Lapwing	Vanellus indicus	Resident	Yes
62	Charadriidae	White-tailed Lapwing	Vanellus leucurus	Migrant	
63	Charadriidae	Kentish Plover	Charadrius alexandrinus	Migrant	
64	Charadriidae	Little Ringed Plover	Charadrius dubius	Resident	No
65	Rostratulidae	Greater Painted-Snipe	Rostratula benghalensis	Resident	No
66	Jacanidae	Pheasant-tailed Jacana	Hydrophasianus chirurgus	Resident	No
67	Jacanidae	Bronze-winged Jacana	Metopidius indicus	Resident	No
68	Scolopacidae	Black-tailed Godwit	Limosa limosa	Migrant	
69	Scolopacidae	Ruff	Calidris pugnax	Migrant	
70	Scolopacidae	Temminck's Stint	Calidris temminckii	Migrant	
71	Scolopacidae	Little Stint	Calidris minuta	Migrant	
72	Scolopacidae	Common Snipe	Gallinago gallinago	Migrant	
73	Scolopacidae	Common Sandpiper	Actitis hypoleucos	Migrant	
74	Scolopacidae	Green Sandpiper	Tringa ochropus	Migrant	
75	Scolopacidae	Common Greenshank	Tringa nebularia	Migrant	
76	Scolopacidae	Marsh Sandpiper	Tringa stagnatilis	Migrant	
77	Scolopacidae	Spotted Redshank	Tringa erythropus	Migrant	
78	Scolopacidae	Common Redshank	Tringa totanus	Migrant	

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
79	Glareolidae	Collared Pratincole	Glareola pratincola	Migrant	
80	Glareolidae	Indian courser	Cursorius coromandelicus	Resident	Yes
81	Scolopacidae	Wood Sandpiper	Tringa glareola	Migrant	
82	Turnicidae	Barred Buttonquail	Turnix suscitator	Migrant	
83	Glareolidae	Small Pratincole	Glareola lactea	Resident	No
		Gulls, Terns, and Skimmers			
84	Laridae	Black-headed Gull	Chroicocephalus ridibundus	Migrant	
85	Laridae	Brown-headed Gull	Chroicocephalus brunnicephalus	Migrant	
86	Laridae	Pallas's Gull	Ichthyaetus ichthyaetus	Migrant	
87	Laridae	Lesser Black-backed Gull	Larus fuscus	Migrant	
88	Laridae	Little Tern	Sternula albifrons	Migrant	
89	Laridae	Gull-billed Tern	Gelochelidon nilotica	Migrant	
90	Laridae	Slender-billed Gull	Chroicocephalus genei	Migrant	
91	Laridae	Caspian Tern	Hydroprogne caspia	Migrant	
92	Laridae	White-winged Tern	Chlidonias leucopterus	Migrant	
93	Laridae	Whiskered Tern	Chlidonias hybrida	Migrant	
94	Laridae	River Tern	Sterna aurantia	Resident	No
95	Laridae	Indian Skimmer	Rynchops albicollis	Resident	No
		Storks			
96	Ciconiidae	Asian Openbill	Anastomus oscitans	Resident	Yes
97	Ciconiidae	Woolly-necked Stork	Ciconia episcopus	Resident	Yes

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
98	Ciconiidae	Painted Stork	Mycteria leucocephala	Resident	No
		Cormorants and Anhingas			
99	Anhingidae	Oriental Darter	Anhinga melanogaster	Resident	No
100	Phalacrocoracidae	Little Cormorant	Microcarbo niger	Resident	Yes
101	Phalacrocoracidae	Great Cormorant	Phalacrocorax carbo	Resident	No
102	Phalacrocoracidae	Indian Cormorant	Phalacrocorax fuscicollis	Resident	No
		Pelicans			
103	Pelecanidae	Great White Pelican	Pelecanus onocrotalus	Migrant	
104	Pelecanidae	Dalmatian Pelican	Pelecanus crispus	Migrant	
		Herons, Ibis, and Allies			
105	Ardeidae	Yellow Bittern	Ixobrychus sinensis	Resident	No
106	Ardeidae	Cinnamon Bittern	Ixobrychus cinnamomeus	Resident	No
107	Ardeidae	Black Bittern	Ixobrychus flavicollis	Migrant	
108	Ardeidae	Gray Heron	Ardea cinerea	Resident	No
109	Ardeidae	Purple Heron	Ardea purpurea	Resident	No
110	Ardeidae	Great Egret	Ardea alba	Resident	No
111	Ardeidae	Intermediate Egret	Ardea intermedia	Resident	Yes
112	Ardeidae	Little Egret	Egretta garzetta	Resident	Yes
113	Ardeidae	Western Reef-Heron	Egretta gularis	Resident	No
114	Ardeidae	Cattle Egret	Bubulcus ibis	Migrant	
115	Ardeidae	Indian Pond-Heron	Ardeola grayii	Resident	Yes
116	Ardeidae	Striated Heron	Butorides striata	Resident	Yes

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
117	Ardeidae	Black-crowned Night-Heron	Nycticorax nycticorax	Resident	Yes
118	Threskiornithidae	Glossy Ibis	Plegadis falcinellus	Resident	Yes
119	Threskiornithidae	Black-headed Ibis	Threskiornis melanocephalus	Resident	Yes
120	Threskiornithidae	Red-naped Ibis	Pseudibis papillosa	Resident	Yes
121	Threskiornithidae	Eurasian Spoonbill	Platalea leucorodia	Migrant	
		Vultures, Hawks, and Allies			
122	Pandionidae	Osprey	Pandion haliaetus	Migrant	
123	Accipitridae	Black-winged Kite	Elanus caeruleus	Resident	Yes
124	Accipitridae	Oriental Honey-buzzard	Pernis ptilorhynchus	Resident	Yes
125	Accipitridae	Short-toed Snake-Eagle	Circaetus gallicus	Resident	Yes
126	Accipitridae	Eurasian Marsh-Harrier	Circus aeruginosus	Migrant	
127	Accipitridae	Pallid Harrier	Circus macrourus	Migrant	
128	Accipitridae	Montagu's Harrier	Circus pygargus	Migrant	
129	Accipitridae	White-rumped Vulture	Gyps bengalensis	Resident	No
130	Accipitridae	Indian Vulture	Gyps indicus	Resident	No
131	Accipitridae	Greater Spotted Eagle	Clanga clanga	Migrant	
132	Accipitridae	Long-legged Buzzard	Buteo rufinus	Migrant	
133	Accipitridae	Shikra	Accipiter badius	Resident	Yes
134	Accipitridae	Eurasian Sparrowhawk	Accipiter nisus	Migrant	
135	Accipitridae	Black Kite	Milvus migrans	Resident	Yes
136	Accipitridae	Brahminy Kite	Haliastur indus	Resident	Yes
		Owls			
137	Strigidae	Spotted Owlet	Athene brama	Resident	Yes
138	Tytonidae	Barn Owl	Tyto alba	Resident	Yes
139	Strigidae	Eurasian Scops-Owl	Otus scops	Resident	No

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
140	Strigidae	Pallid Scops-Owl	Otus brucei	Migrant	
141	Strigidae	Short-eared Owl	Asio flammeus	Migrant	
		Hoopoes			
142	Upupidae	Eurasian Hoopoe	Upupa epops	Resident	Yes
		Kingfishers			
143	Alcedinidae	Common Kingfisher	Alcedo atthis	Resident	Yes
144	Alcedinidae	White-throated Kingfisher	Halcyon smyrnensis	Resident	Yes
145	Alcedinidae	Pied Kingfisher	Ceryle rudis	Resident	No
		Bee-eaters, Rollers, and Allies			
146	Meropidae	Green Bee-eater	Merops orientalis	Resident	Yes
147	Meropidae	Blue-cheeked Bee-eater	Merops persicus	Migrant	
148	Coraciidae	European Roller	Coracias garrulus	Migrant	
149	Coraciidae	Indian Roller	Coracias benghalensis	Resident	Yes
		Barbets and Toucans			
150	Megalaimidae	Coppersmith Barbet	Psilopogon haemacephalus	Resident	Yes
		Woodpeckers			
151	Picidae	Eurasian Wryneck	Jynx torquilla	Migrant	
152	Picidae	Yellow-crowned Woodpecker	Leiopicus mahrattensis	Resident	No
		Falcons and Caracaras			
153	Falconidae	Eurasian Kestrel	Falco tinnunculus	Migrant	
154	Falconidae	Peregrine Falcon	Falco peregrinus	Migrant	
155	Falconidae	Red-necked Falcon	Falco chicquera	Resident	No
156	Falconidae	Eurasian Hobby	Falco subbuteo	Migrant	
157	Falconidae	Amur Falcon	Falco amurensis	Migrant	

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
		Parrots, Parakeets, and Allies			
158	Psittaculidae	Alexandrine Parakeet	Psittacula eupatria	Resident	Yes
159	Psittaculidae	Rose-ringed Parakeet	Psittacula krameri	Resident	Yes
160	Psittaculidae	Plum-headed Parakeet	Psittacula cyanocephala	Resident	Yes
		Old World Pittas			
161	Pittidae	Indian Pitta	Pitta brachyura	Migrant	
		Cuckooshrikes			
162	Campephagidae	Black-headed Cuckooshrike	Coracina melanoptera	Resident	No
163	Campephagidae	White-bellied Minivet	Pericrocotus erythropygius	Resident	No
164	Campephagidae	Small Minivet	Pericrocotus cinnamomeus	Resident	Yes
		Old World Orioles			
165	Oriolidae	Indian Golden Oriole	Oriolus kundoo	Resident	Yes
		Vangas, Helmetshrikes, and Allies			
166	Vangidae	Common Woodshrike	Tephrodornis pondicerianus	Resident	Yes
		Ioras			
167	Aegithinidae	Common Iora	Aegithina tiphia	Resident	Yes
168	Aegithinidae	White-tailed Iora	Aegithina nigrolutea	Resident	No
		Fantails			
169	Rhipiduridae	White-browed Fantail	Rhipidura aureola	Resident	Yes
		Drongos			
170	Dicruridae	Black Drongo	Dicrurus macrocercus	Resident	Yes
171	Dicruridae	Ashy Drongo	Dicrurus leucophaeus	Migrant	

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
172	Dicruridae	White-bellied Drongo	Dicrurus caerulescens	Resident	Yes
		Monarch Flycatchers			
173	Monarchidae	Indian Paradise-Flycatcher	Terpsiphone paradisi	Migrant	
174	Monarchidae	Black-naped Monarch	Hypothymis azurea	Resident	No
		Shrikes			
175	Laniidae	Isabelline Shrike	Lanius isabellinus	Migrant	
176	Laniidae	Bay-backed Shrike	Lanius vittatus	Resident	Yes
177	Laniidae	Great Gray Shrike	Lanius excubitor	Resident	Yes
178	Laniidae	Long-tailed Shrike	Lanius schach	Resident	Yes
		Jays, Magpies, Crows, and Ravens			
179	Corvidae	Rufous Treepie	Dendrocitta vagabunda	Resident	Yes
180	Corvidae	Large-billed Crow	Corvus macrorhynchos	Resident	Yes
181	Corvidae	House Crow	Corvus splendens	Resident	Yes
		Fairy Flycatchers			
182	Stenostiridae	Gray-headed Canary-Flycatcher	Culicicapa ceylonensis	Migrant	
		Larks			
183	Alaudidae	Rufous-tailed Lark	Ammomanes phoenicura	Resident	Yes
184	Alaudidae	Ashy-crowned Sparrow-Lark	Eremopterix griseus	Resident	Yes
185	Alaudidae	Singing Bushlark	Mirafra cantillans	Resident	No
186	Alaudidae	Indian Bushlark	Mirafra erythroptera	Resident	Yes
187	Alaudidae	Greater Short-toed Lark	Calandrella brachydactyla	Migrant	
188	Alaudidae	Crested Lark	Galerida cristata	Resident	No

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
189	Alaudidae	Tawny Lark	Galerida deva	Resident	Yes
		Cisticolas and Allies			
190	Cisticolidae	Common Tailorbird	Orthotomus sutorius	Resident	Yes
191	Cisticolidae	Rufous-fronted Prinia	Prinia buchanani	Resident	No
192	Cisticolidae	Gray-breasted Prinia	Prinia hodgsonii	Resident	Yes
193	Cisticolidae	Jungle Prinia	Prinia sylvatica	Resident	No
194	Cisticolidae	Ashy Prinia	Prinia socialis	Resident	Yes
195	Cisticolidae	Plain Prinia	Prinia inornata	Resident	Yes
196	Cisticolidae	Zitting Cisticola	Cisticola juncidis	Resident	Yes
		Reed Warblers and Allies			
197	Acrocephalidae	Booted Warbler	Iduna caligata	Migrant	
198	Acrocephalidae	Sykes's Warbler	Iduna rama	Migrant	
199	Acrocephalidae	Paddyfield Warbler	Acrocephalus agricola	Migrant	
200	Acrocephalidae	Blyth's Reed Warbler	Acrocephalus dumetorum	Migrant	
201	Acrocephalidae	Clamorous Reed Warbler	Acrocephalus stentoreus	Migrant	
		Martins and Swallows			
202	Hirundinidae	Dusky Crag-Martin	Ptyonoprogne concolor	Resident	Yes
203	Hirundinidae	Barn Swallow	Hirundo rustica	Migrant	
204	Hirundinidae	Wire-tailed Swallow	Hirundo smithii	Resident	Yes
205	Hirundinidae	Red-rumped Swallow	Cecropis daurica	Resident	Yes
206	Hirundinidae	Streak-throated Swallow	Petrochelidon fluvicola	Resident	Yes
		Bulbuls			
207	Psycnonotidae	Red-vented Bulbul	Pycnonotus cafer	Resident	Yes
		Leaf Warblers			

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
208	Phylloscopidae	Hume's Warbler	Phylloscopus humei	Migrant	
209	Phylloscopidae	Sulphur-bellied Warbler	Phylloscopus griseolus	Migrant	
210	Phylloscopidae	Common Chiffchaff	Phylloscopus collybita	Migrant	
211	Phylloscopidae	Greenish Warbler	Phylloscopus trochiloides	Migrant	
212	Phylloscopidae	Green Warbler	Phylloscopus nitidus	Migrant	
		Sylviid Warblers			
213	Sylviidae	Lesser Whitethroat	Curruca curruca	Migrant	
214	Sylviidae	Eastern Orphean Warbler	Curruca crassirostris	Migrant	
215	Sylviidae	Yellow-eyed babbler	Chrysomma sinense	Resident	No
		White-eyes, Yuhinas, and Allies			
216	Zosteropidae	Indian White-eye	Zosterops palpebrosus	Resident	Yes
		Laughingthrushes and Allies			
218	Leiothrichidae	Large Gray Babbler	Argya malcolmi	Resident	Yes
219	Leiothrichidae	Jungle Babbler	Turdoides striata	Resident	Yes
220	Leiothrichidae	Common Babbler	Argya caudata	Resident	Yes
		Starlings and Mynas			
235	Sturnidae	Rosy Starling	Pastor roseus	Migrant	
236	Sturnidae	Brahminy Starling	Sturnia pagodarum	Resident	Yes
237	Sturnidae	Common Myna	Acridotheres tristis	Resident	Yes
238	Sturnidae	Bank Myna	Acridotheres ginginianus	Resident	Yes
		Old World Flycatchers			

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
239	Muscicapidae	Spotted Flycatcher	Muscicapa striata	Migrant	
240	Muscicapidae	Indian Robin	Copsychus fulicatus	Resident	Yes
241	Muscicapidae	Oriental Magpie-Robin	Copsychus saularis	Resident	Yes
242	Muscicapidae	Tickell's Blue Flycatcher	Cyornis tickelliae	Resident	Yes
243	Muscicapidae	Bluethroat	Luscinia svecica	Migrant	
244	Muscicapidae	Brown-breasted Flycatcher	Muscicapa muttui	Migrant	
245	Muscicapidae	Blue Rock-Thrush	Monticola solitarius	Migrant	
246	Muscicapidae	Taiga Flycatcher	Ficedula albicilla	Migrant	
247	Muscicapidae	Red-breasted Flycatcher	Ficedula parva	Migrant	
248	Muscicapidae	Verditer Flycatcher	Eumyias thalassinus	Resident	No
249	Muscicapidae	Black Redstart	Phoenicurus ochruros	Migrant	
250	Muscicapidae	Siberian Stonechat	Saxicola maurus	Migrant	
251	Muscicapidae	Pied Bushchat	Saxicola caprata	Resident	Yes
252	Muscicapidae	Isabelline Wheatear	Oenanthe isabellina	Migrant	
253	Muscicapidae	Desert Wheatear	Oenanthe deserti	Migrant	
254	Muscicapidae	Variable Wheatear	Oenanthe picata	Migrant	
		Sunbirds and Spiderhunters			
255	Nectarinidae	Purple Sunbird	Cinnyris asiaticus	Resident	Yes
		Weavers and Allies			
256	Ploceidae	Baya Weaver	Ploceus philippinus	Resident	Yes
257	Ploceidae	Black-breasted Weaver	Ploceus benghalensis	Resident	No
		Estrildids			
258	Estrildidae	Indian Silverbill	Euodice malabarica	Resident	Yes

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
259	Estrildidae	Red Avadavat	Amandava amandava	Resident	Yes
		Old World Sparrows			
260	Passeridae	House Sparrow	Passer domesticus	Resident	Yes
261	Passeridae	Yellow-throated Sparrow	Gymnoris xanthocollis	Resident	No
262	Passeridae	Pale Rockfinch	Carpospiza brachydactyla	Migrant	
		Wagtails and Pipits			
263	Motacillidae	Gray Wagtail	Motacilla cinerea	Migrant	
264	Motacillidae	Western Yellow Wagtail	Motacilla flava	Migrant	
265	Motacillidae	Citrine Wagtail	Motacilla citreola	Migrant	
266	Motacillidae	White-browed Wagtail	Motacilla maderaspatensis	Resident	Yes
267	Motacillidae	White Wagtail	Motacilla alba	Migrant	
268	Motacillidae	Paddyfield Pipit	Anthus rufulus	Resident	Yes
269	Motacillidae	Blyth's Pipit	Anthus godlewskii	Migrant	
271	Motacillidae	Tawny Pipit	Anthus campestris	Migrant	
272	Motacillidae	Tree Pipit	Anthus trivialis	Migrant	
273	Motacillidae	Long-billed Pipit	Anthus similis	Migrant	
		Finches, Euphonias, and Allies			
274	Fringillidae	Common Rosefinch	Carpodacus erythrinus	Migrant	
		Old World Buntings			
275	Emberizidae	Black-headed Bunting	Emberiza melanocephala	Migrant	
276	Emberizidae	Red-headed Bunting	Emberiza bruniceps	Migrant	
277	Emberizidae	Gray-necked Bunting	Emberiza buchanani	Migrant	

S. No	Family	Common Name	Scientific Name	Migrant/resident	Urban
278	Emberizidae	Striolated Bunting	Emberiza striolata	Migrant	

Table 7 Species used in the calculation of Indicator 4 and 10

S. no.	Scientific name	Family	Nativity
1	Justicia adhatoda	Acanthaceae	Native
2	Anacardium occidentale	Anacardiaceae	Introduced
3	Lannea coromandelica	Anacardiaceae	Native
4	Mangifera indica	Anacardiaceae	Native
5	Spondias pinnata	Anacardiaceae	Native
6	Annona reticulata	Annonacae	Introduced
7	Annona squamosa	Annonacae	Introduced
8	Polyalthia cerasoides	Annonacae	Native
9	Polyalthia longifolia	Annonacae	Native
10	Alstonia scholaris	Apocynaceae	Native
11	Calotropis procera	Apocynaceae	Native
12	Catharanthus roseus	Apocynaceae	Introduced
13	Nerium oleander	Apocynaceae	Introduced
14	Plumeria obtusa	Apocynaceae	Introduced
15	Plumeria rubra	Apocynaceae	Introduced
16	Thevetia peruviana	Apocynaceae	Introduced
17	Wrightia tinctoria	Apocynaceae	Native
18	Jacaranda mimosifolia	Bignoniaceae	Introduced
19	Spathodea campanulata	Bignoniaceae	Introduced
20	Tecoma stans	Bignoniaceae	Introduced
21	Tecomella undulata	Bignoniaceae	Native
22	Bombax ceiba	Bombacaceae	Native
23	Ceiba pentandra	Bombacaceae	Introduced
24	Cordia gharaf	Boraginaceae	Native
25	Cordia perrottetii	Boraginaceae	Native

S. no.	Scientific name	Family	Nativity
26	Cordia sebastiana	Boraginaceae	Introduced
27	Boswellia serrata	Burseraceae	Native
28	Carica papaya	Caricaceae	Introduced
29	Casuarina equisetifolia	Casuarinaceae	Introduced
30	Gymnosporia emarginata	Celastraceae	Native
31	Terminalia arjuna	Combretaceae	Native
32	Terminalia bellirica	Combretaceae	Native
33	Terminalia catappa	Combretaceae	Native
34	Terminalia chebula	Combretaceae	Native
35	Diospyros melanoxylon	Ebenaceae	Native
36	Muntingia calabura	Elaeocarpaceae	Introduced
37	Excoecaria agallocha	Euphorbiaceae	Native
38	Jatropha curcas	Euphorbiaceae	Introduced
39	Putranjiva roxburghii	Euphorbiaceae	Native
40	Senegalia chundra	Fabaceae	Native
41	Acacia nilotica	Fabaceae	Native
42	Senegalia senegal	Fabaceae	Native
43	Albizia lebbeck	Fabaceae	Native
44	Bauhinia purpurea	Fabaceae	Native
45	Bauhinia racemosa	Fabaceae	Native
46	Bauhinia variegata	Fabaceae	Native
47	Butea monosperma	Fabaceae	Native
48	Caesalpinia pulcherrima	Fabaceae	Introduced
49	Calliandra haematocephala	Fabaceae	Introduced
50	Cassia fistula	Fabaceae	Native
51	Cassia javanica	Fabaceae	Introduced

S. no.	Scientific name	Family	Nativity
52	Cassia roxburghii	Fabaceae	Native
53	Dalbergia sissoo	Fabaceae	Native
54	Delonix elata	Fabaceae	Introduced
55	Delonix regia	Fabaceae	Introduced
56	Hardwickia binata	Fabaceae	Native
57	Leucaena leucocephala	Fabaceae	Invasive
58	Millettia speciosa	Fabaceae	Introduced
59	Parkinsonia aculeata	Fabaceae	Introduced
60	Peltophorum pterocarpum	Fabaceae	Introduced
61	Pithecellobium dulce	Fabaceae	Introduced
62	Pongamia pinnata	Fabaceae	Native
63	Prosopis cineraria	Fabaceae	Native
64	Prosopis juliflora	Fabaceae	Invasive
65	Saraca asoca	Fabaceae	Native
66	Senna auriculata	Fabaceae	Native
67	Senna siamea	Fabaceae	Introduced
68	Tamarindus indica	Fabaceae	Introduced
69	Ocimum tenuiflorum	Lamiaceae	Native
70	Lagerstroemia speciosa	Lythraceae	Native
71	Lawsonia inermis	Lythraceae	Native
72	Magnolia champaca	Magnoliaceae	Native
73	Dombeya acutangula	Malvaceae	Introduced
74	Sterculia urens	Malvaceae	Native
75	Thespesia populnea	Malvaceae	Native
76	Azadirachta indica	Meliaceae	Native

S. no.	Scientific name	Family	Nativity
77	Melia azedarach	Meliaceae	Native
78	Swietenia mahagoni	Meliaceae	Introduced
79	Ficus amplissima	Moraceae	Native
80	Ficus benghalensis	Moraceae	Native
81	Ficus benjamina	Moraceae	Native
82	Ficus elastica	Moraceae	Locally introduced
83	Ficus mysorensis	Moraceae	Native
84	Ficus racemosa	Moraceae	Native
85	Ficus religiosa	Moraceae	Native
86	Ficus virens	Moraceae	Native
87	Morus alba	Moraceae	Introduced
88	Moringa concanensis	Moringaceae	Native
89	Moringa oleifera	Moringaceae	Native
90	Melaleuca citrina	Myrtaceae	Introduced
91	Eucalyptus citriodora	Myrtaceae	Introduced
92	Eucalyptus globulus	Myrtaceae	Invasive
93	Psidium gujava	Myrtaceae	Introduced
94	Syzygium cumini	Myrtaceae	Native
95	Bougainvillea spectabilis	Nyctaginaceae	Introduced
96	Nyctanthes arbor-tristis	Oleaceae	Native
97	Borassus flabellifer	Palmae	Native
98	Caryota urens	Palmae	Native
99	Cocos nucifera	Palmae	Introduced
100	Corypha umbraculifera	Palmae	Native
101	Dypsis lutescens	Palmae	Introduced
102	Livistona chinensis	Palmae	Introduced

S. no.	Scientific name	Family	Nativity
103	Phoenix sylvestris	Palmae	Native
104	Roystonea regia	Palmae	Introduced
105	Emblica officinalis	Phyllanthaceae	Native
106	Bambusa vulgaris	Poaceae	Native
107	Grevillea robusta	Proteaceae	Introduced
108	Punica granatum	Punicaceae	Introduced
109	Ziziphus glabrata	Rhamnaceae	Native
110	Ziziphus mauritiana	Rhamnaceae	Native
111	Ziziphus nummularia	Rhamnaceae	Native
112	Neolamarckia cadamba	Rubiaceae	Native
113	Aegle marmelos	Rutaceae	Native
114	Citrus aurantifolia	Rutaceae	Introduced
115	Citrus medica	Rutaceae	Native
116	Salvadora oleoides	Salvadoraceae	Native
117	Sapindus emarginatus	Sapindaceae	Native
118	Madhuca indica	Sapotaceae	Native
119	Manilkara hexandra	Sapotaceae	Native
120	Manilkara zapota	Sapotaceae	Introduced
121	Mimusops elengi	Sapotaceae	Native
122	Ailanthus excelsa	Simaroubaceae	Native
123	Grewia tenax	Tiliaceae	Native
124	Holoptelea integrifolia	Ulmaceae	Native
125	Duranta erecta	Verbenaceae	Introduced
126	Gmelina arborea	Verbenaceae	Native
127	Tectona grandis	Verbenaceae	Native

Table 8 Butterfly List identified for Indicator 6

S. No.	Family	Scientific Name	Common Name
1	Papilionidae	Papilio polytes	Common Mormon Swallowtail
2	Papilionidae	Papilio demoleus	Lime Swallowtail
3	Nymphalidae	Junonia lemonias	Lemon Pansy
4	Nymphalidae	Hypolimnas misippus	Danaid Eggfly
5	Nymphalidae	Acraea terpsicore	Tawny Coster
6	Lycanidae	Euchrysops cnejus	Gram Blue
7	Lycanidae	Zizeeria karsandra	Dark Grass Blue
8	Lycanidae	Leptotes plinius	Zebra Blue
9	Lycanidae	Freyeria putli	Jewelled Grass-Blue

Table 9 Reptile list identified for Indicator 7

S. No	Family	Common Name	Scientific Name
1	Geoemydidae	Indian pond turtle	Melanochelys trijuga
2	Testudinidae	Star tortoise	Geochelone elegans
3	Trionychidae	Indian flapshell turtle	Lissemys punctata
4	Agamidae	Oriental garden lizard	Calotes versicolor
5	Agamidae	Fan-Throated lizard	Sitana ponticeriana
6	Varanidae	Monitor lizard	Varanus komodoensis
7	Agamidae	Garden lizard	Calotes versicolor
8	Agamidae	Fan-Throated lizard	Sitana spinaecephalus
9	Scincidae	Bronze brown skink	Asymblepharus sikimmensis
10	Scincidae	Brahmini skink	Eutropis carinata
11	Scincidae	Bronze grass skink	Eutropis macularia
12	Scincidae	Snake skink	Lygosoma punctata
13	Gekkonidae	Northern house gecko	Hemidactylus flaviviridis

S. No	Family	Common Name	Scientific Name
14	Gekkonidae	Brook's house gecko	Hemidactylus brookii
15	Lacertidae	Jerdon's snake-eye	Ophisops jerdonii
16	Lacertidae	Leschunault's snake-eye	Ophisops leschenaulti
17	Varanidae	Common indian monitor	Varanus bengalensis
18	Colubridae	Common trinket	Coelognathus helena
19	Colubridae	Common wolf snake	Lycodon aulicus
20	Colubridae	Common kukri snake	Oligodon arnesis
21	Colubridae	Checkered keelback	Xenochrophis piscator
22	Elapidae	Indian cobra	Naja naja
23	Elapidae	Common krait	Bungarus caeruleus
24	Boidae	Common sand boa	Eryx conicus
25	Colubridae	Rat snake	Pantherophis obsoletus
26	Viperidae	Saw scaled viper	Echis carinatus

Table 10 Amphibian List identified for Indicator 8

S. No.	Family	Common Name	Scientific name
1	Bufonidae	Common Indian toad	Duttaphrynus melanostictus
2	Bufonidae	Ferguson's toad	Duttaphrynus scaber
3	Bufonidae	Marbled toad	Duttaphrynus stomaticus
4	Dicroglossidae	Skipper frog	Euphlyctis cyanophlyctis
5	Dicroglossidae	Short webbed frog	Fejervarya brevipalmata
6	Dicroglossidae	Verrucose frog	Fejervarya keralensis
7	Dicroglossidae	Indian cricket frog	Fejervarya limnocharis
8	Dicroglossidae	Manoharan's burrowing frog	Fejervarya manoharani
9	Dicroglossidae	Nilgiri frog	Fejervarya nilagirica

S. No.	Family	Common Name	Scientific name
10	Dicroglossidae	Rufescent burrowing frog	Fejervarya rufescens
11	Dicroglossidae	Chilapata rain-pool frog	Fejervarya chilapata
12	Dicroglossidae	Jerdon's bull frog	Hoplobatrachus crassus
13	Dicroglossidae	Indian bull frog	Hoplobatrachus tigerinus
14	Dicroglossidae	Indian burrowing frog	Sphaerotheca breviceps
15	Dicroglossidae	Dobson's burrowing frog	Sphaerotheca dobsonii
16	Dicroglossidae	Western burrowing frog	Sphaerotheca pashchima
17	Dicroglossidae	Jerdon's burrowing frog	Sphaerotheca pluvialis
18	Microhylidae	Ornate narrow-mouthed frog	Microhyla ornata

Annexure 3: List of Parks found in Rajkot City

S. No	Garden	Area (Approx sq.m)	Ward
1	Garden and playground near Gandhigram School no. 20	1530.00	1
2	Garden and children's playground near Gandhigram street no. 8	1150.00	1
3	Children's playground in Gautam Nagar, Gandhigram	631.00	1
4	Garden next to Gandhinagar street no. 8, Gandhigram	2576.00	1
5	Beautification strip built in the racecourse complex (next to football & hockey ground)	10000.00	2
6	Garden and Nursery, near Racecourse swimming pool	10000.00	2
7	Racecourse main garden	5146.32	2
8	Garden near Racecourse Pavilion	23952.00	2
9	Racecourse extension garden	24776.00	2
10	Racecourse step garden	12552.00	2
11	Racecourse energy park garden	4600.00	2

S. No	Garden	Area (Approx sq.m)	Ward
12	Racecourse football ground	10730.00	2
13	Racecourse, Kalpana Chawla memorial garden	10755.00	2
14	Racecourse Ringroad, the garden around the mayor's bungalow	1500.00	2
15	Shardabagh and children's playground	1500.00	2
16	Garden attached to the airport wall, Jamnagar Road	2877.00	2
17	Tatia Tope Garden (Applicable to Vandan Vatika Soc., Airport Road)	9627.00	2
18	Garden and playground adjacent to Yogeshwar Park, Airport Road	670.00	2
19	Devotee poet Narasimha Mehta Udyan	3532.00	2
20	Playground near to Bajrangwadi Main Road	313.56	2
21	Garden near Nehru Nagar Street 1, Raiya Road	852.00	2
22	Theme park and children's playground in Bajrangwadi area	12526.00	2
23	Sivananda Udyan on Airport Road	846.18	2
24	Children's playground in Rameshwar Chowk	215.63	2
25	Garden near street no. 8 Maruti Nagar street	500.00	2
26	Jubilee Garden Part-A and Nursery	10292.00	3
27	Jubilee garden part-b	12008.00	3
28	Mahavijay Padma Kunwarba Garden and Kindergarten	1225.07	3
29	Ward no 3, Popatpara, TP 24, Plot no 3	8400.00	3
30	Ward no 3, Popatpara, TP 23 & 24, Plot no 5 and 39	7527.00	3
31	Ward No. 6, Sadhuvaswani Kunj Road, Garden near Shivalika Apartment	5110.00	3
32	Madhuvan Garden, TP 12, Plot no. 96	4750.00	4
33	Gurudev Park Society Gardens and Kindergarten	6450.00	4
34	Shyamji Krishna Park and Kindergarten	5265.00	5
35	Swami vivekananda swimming pool garden	515.00	5

S. No	Garden	Area (Approx sq.m)	Ward
36	Garden and playground near Greenland Square	4040.00	5
37	Parul Smritivan and Balkridangan	2665.00	5
38	Kanak Nagar society	1740.00	6
39	Jalgangawali street. Garden	933.00	6
40	Shakti society garden	1284.00	6
41	Brahmaniapara street no. 2/3	1528.00	6
42	Pradhumanpark circles	1966.00	6
43	Around the Pradhumanpark-Zoo office	2224.00	6
44	Garden and playground around Pradhumanpark Pramila Circle	1908.00	6
45	Garden in front of Pradhumanpark deer enclosure	3030.00	6
46	Garden in front of Pradhumanpark Bear Enclosure	1433.00	6
47	TP 7, finl plot 130, Pujit Purani trust road	1650.00	6
48	Pradhumanpark lake view-point	886.00	6
49	Pradhumanpark City View Point and Kindergarten	4300.00	6
50	Garden around the Central Zone Office	800.00	7
51	Garden around Rani Jhansi Circle	2000.00	7
52	Shivaji Park (Mahavir Swami Chowk) and Kindergarten	2235.00	7
53	Ramakrishnanagar Garden and Kindergarten	1080.00	7
54	Bhaktinagar Senior Citizen Park next to GIDC Impul Steel	1364.00	7
55	Gondal Road, a children's playground near Udyog Nagar Colony	350.00	7
56	Housing board sh. No. 2/3 garden-1, kalawad road	3046.00	8
57	Housing board sh. No. 8, garden-2, amin road	2976.00	8
58	Kindergarten on the Panchavati road	908.00	8
59	Purn kutir society (astron sosa) senior citizen park	1124.00	8
60	Garden around the Westzone office	800.00	8
61	Lal Bahadur Shastri Udyan and Kindergarten	2554.00	8

S. No	Garden	Area (Approx sq.m)	Ward
62	Jagannath Sosa. Children's playground in front of Block no 65, 66 and 67	655.00	8
63	Narayanagar sosa. Garden	2840.00	8
64	Brahmakunj Sosa. Garden and kindergarten	3595.00	8
65	Garden in front of Mangal Pandey Garden	6200.00	8
66	Kindergarten in the plot on Natraj Nagar Main Road	573.00	9
67	Bhidbhanjan Sosa. Main Road, Kindergarten opposite Gorvadhan Dairy	892.00	9
68	Nilkanthnagar street no. 2, children's playground	1420.00	9
69	Children's playground near Nilkanthnagar Yogeshwar apartment	1700.00	9
70	Senior Citizen Park in Krid-wai nagar	2095.00	9
71	Traffic Island-II located in Panchayat Chowk	600.00	9
72	New Balamankund Sosa. Garden and kindergarten	7956.00	9
73	Garden and children's playground near Mira Nagar Sosa-1	1020.00	9
74	Triangle against Suncity	770.00	9
75	Children's playground near Mangalam Park	1460.00	9
76	Children's playground near Satellite Park	3500.00	9
77	Bombay Housing Soc. Children's playground	800.00	9
78	Senior Citizen Park near Chandramayaleshwar Mahadev Temple	1053.00	9
79	Mireshwar Mahadev Garden (Miranagar Street No. 4) and Kindergarten	1050.00	9
80	Kindergarten in front of Gyanganga School	131.00	9
81	Senior Citizen Park near Yaksharaj Apartment	2000.00	9
82	Chandanpark Garden and Kindergarten	1386.00	9
83	Gangotri park sosa. Kindergarten	800.00	9
84	Garden and kindergarten near to Deepak Soc.	1630.00	9

S. No	Garden	Area (Approx sq.m)	Ward
85	Jayotinagar chowk triangle children's playground	592.00	10
86	Ravi park sosa. Garden	1800.00	10
87	Children's playground next to the housing near Ravi Park	263.00	10
88	Shahidveer Bhagat Singh Garden and Kindergarten	7545.00	10
89	Garden around Swami Dayanand Saraswati swimming pool	3043.00	10
90	Shri Chandrasekhar Azad Udhan and Balkridangan	11030.00	10
91	Rudanagar-1 Sosa. Garden and kindergarten	1120.00	10
92	Amrita sosa. Garden and Kindergarten	1600.00	10
93	Rudanagar-R Sosa. Garden and kindergarten	3715.00	10
94	Garden near Vrajvatika apartment	1015.00	10
95	Sadgurunagar sosa. Garden	987.00	10
96	Shaligram Apa. Garden and Kindergarten	1128.00	10
97	Children's playground opposite Vimalnagar Sosa.	2925.00	10
98	Vishnuvihar Sosa. Children's playground	3600.00	10
99	Royal Hall, University road Kindergarten	650.00	10
100	Rawalnagar Sosa. Children's playground	700.00	10
101	Shardanagar P. & T. Children's playground near the well	515.00	10
102	Amrita Sosa. Kindergarten in front of Atmiya School	170.00	10
103	Children playground behind SNK, Sharda Nagar	432.00	10
104	Vridavan Sosa. Garden and kindergarten	1521.00	10
105	Pandit umakant udyognagar garden-1	3595.61	13
106	Pandit umakant udyognagar garden-2	679.19	13
107	Garden on Gondal Road (Near ST Workshop)	1819.74	13
108	Garden near Alka Sosa.	1800.00	13
109	Alka Sosa. Plantation plot	1350.00	13
110	Malviya Nagar Garden and Kindergarten	2240.00	13

S. No	Garden	Area (Approx sq.m)	Ward
111	Garden and Kindergarten near Krishnanagar Street No. 4, 6 and 7	2460.00	13
112	Garden and kindergarten on Main Road of gita nagar	2600.00	13
113	Samrat Ind area, Senior Citizen Park next to Rani Oil mill	1799.42	13
114	Senior Citizen Park near Malviya Nagar Alka Sosa	725.81	13
115	Senior Citizen Park near Vishwanagar Street No. 10	950.97	13
116	Kindergarten near Guruprasad Chowk Triveni Nagar	335.21	13
117	Children's playground in a triangular plot next to Gunatit Nagar near doshi hospital	213.80	13
118	Kindergarten and Senior Citizen Park near 15 Silver Park on Navalnagar Street	175.35	13
119	District Garden and Kindergarten	24500.00	14
120	Sorathiyawadi chowk	627.00	14
121	Women's Garden and Kindergarten (Near Master Soc. Street No. 4)	1906.00	14
122	Senior Citizen Park applicable to 13th and 14th of Bapunagar Street	1080.00	14
123	Laxmiwadi, children's playground in front of Khodiyar well	958.93	14
124	Senior Citizen Park applicable to 7 and 8 of Bapunagar Street	1036.00	14
125	Senior Citizen Park (Plot with Wadala) applicable to Master Society Street 9	14269.50	14
126	Garden and Kindergarten applicable to Master Society (next to Kotharia Colony)	3389.00	14
127	Sorathiyawadi Chowk garden and children's playground	6200.00	14
128	Garden near the wooden bridge of Kotharia Colony	1380.00	14
129	Garden near Shri Sardar Vallabhbhai Patel Swimming Pool	6303.00	14
130	Shri Ravishankar Maharaj Udyan (80 feet road)	1628.00	14
131	Bhaktinagar sosa. Garden, kindergarten	3060.00	14
132	Garden and playground between Ajidem Fish House to Lion Conservation Center	4635.00	15

S. No	Garden	Area (Approx sq.m)	Ward
133	Ajidem main garden and children's playground	3200.00	15
134	Garden and playground in front of Ajidem Old Deer Park	6600.00	15
135	Garden in front of Ajidem bird house	9041.00	15
136	Garden and playground near Ajidem bird house	3623.00	15
137	Ajidem crocodile park	1800.00	15
138	Garden near Ajidem Filterplat	2400.00	15
139	Ajidem Hill Garden and Kindergarten	9950.00	15
140	Garden Around the Eastzone office	800.00	15
141	Garden in the space between Smriti and Ajidem Hill Garden	80000.00	15
142	Landscaping & Gardening work on land acquired from Government next to Urban Forest, Ajidem Area	Work in progress	15
143	Development of "Urban Forest - Cultural Forest" and "Ram Forest" in Ajidem area	Work in progress	15
144	Garden at 80 'Road Cemetery	2180.00	16
145	Garden and children's playground near Jungleshwar Dargah	3630.00	16
146	Garden and children's playground adjacent to Diptinagar	6180.00	16
147	Anandnagar Society's garden and children's playground	2468.00	17
148	Shri dhebarbhai housing colony garden, dhebarbhai road	3930.00	17
149	Subhashnagar garden (haridhwa main road)	1150.00	17
150	Gardens in the Attica area (Kitch Garden)	6500.00	17
151	Khodiyar sosa. Garden (cooperative soc. Main road)	3000.00	17
152	Garden near Shri Ram Park Sosa.	1048.00	17
153	Garden and children's playground near to Shraddha Society	4341.00	18
154	Garden near Hapaliya Park, Kotharia Road and Kindergarten	2000.00	18
155	Kalavad Road / Vagudad of Nyari Dam-1	49200.00	

Annexure 4: List of NGOs partnering with RMC

S.No.	Name of the programme	Name of organisation implementing the same
1	Go green Program	Manav Seva Trust
2	Plantation Drives	Sadbhavna Trust
3	Plantation Drives	Swami Vivekanand Mandal
4	Plantation Drives	Lifecare social foundation
5	Plantation Drives	Rajkot Chamber of Commercial Association
6	Plantation Drives	Shree group Rajkot
7	Plantation Drives	Shreeji Gaushala
8	Plantation Drives	Rashtriya Swayam Sevak Sangh (RSS)
9	Plantation Drives	Purusharth yuva mandle
10	Plantation Drives	Shree Umiya Seva Pragati Mandal Trust
11	Plantation Drives	Shree Saibaba Cheritable Trust
12	Plantation Drives	Purusharth Yuvak Mandal Art of Living
13	Plantation Drives	Indian Medical Association
14	Plantation Drives	Khodaldham Trust
15	Plantation Drives	Shree Sarthi Lok Seva Trust
16	Plantation Drives	Greater Rajkot Chamber of Industries
17	Plantation Drives	Manav Kalyan Mandal
18	Plantation Drives	Vivekanand Mahila Mandal
19	Plantation Drives	Rajkot Builders and Development Association
20	Plantation Drives	Shree Bolbala Trust
21	Plantation Drives	Prajapati Brahmakumari Vishwa Vidyalaya
22	Plantation Drives	Patanjali Yog Samiti