

# Inventory of Environmental Features in Greater Mumbai

## Water Courses, Large Urban Greens and Coastline Features

### Project Summary

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#### A. BACKGROUND

The 2005 floods in Mumbai focused attention squarely on the impacts of neglect towards the environmental features. It became clear that the natural drainage system of the city was adversely impacted over the years. It was imperative to take measures to improve and restore the system and wholistically integrate the natural features in the future growth and development process. One of the first initiatives was to implement the proposals of the BRIMSTOWAD report which has now led to the widening of many water courses and rivers. However, a more comprehensive view and approach towards the natural features was deemed necessary. The Mumbai Metropolitan Region – Environment Improvement Society (MMR-EIS) in 2007/8, decided to conduct a systematic comprehensive inventory of the environmental features, identify key problems and suggest interventions to protect as well as enhance some of the features within Greater Mumbai.

#### B. THE PROJECT

##### 1. Objectives

The objective of the project are to:

- To prepare a database of the open spaces, water bodies, water courses, coastline features and large urban green areas in Greater Mumbai
- To prepare an action plan for improvement of some of the features in Greater Mumbai

##### 2. Structure of Project

The entire project of identifying and making an inventory of the environmental features was divided into 5 tasks based on the above classification as follows:

No.	Tasks	Agency
1	Task 1 – Inventory of Water Courses of Rivers and Natural Drains	HCP DPM, Ahmedabad
2	Task 2a – Inventory of Open Spaces and Water Bodies in Island City	Adarkar Associates, Mumbai
3	Task 2b – Inventory of Open Spaces & Water Bodies in Western Suburbs	Adarkar Associates, Mumbai
4	Task 2c – Inventory of Open Spaces & Water Bodies in Eastern Suburbs	Adarkar Associates, Mumbai
5	Task 3 – Inventory of Large Urban Greens and Coastline Features	HCP DPM, Ahmedabad

##### 3. Stages of Work

The scope of work under each of the above tasks included the following:

1. Inception Report
2. Identification and Inventory of Environmental Features
3. Condition Documentation of Environmental Features
4. Grading and Preparation of Action Plans for Environmental Features

## C. OUTCOMES

The task was structured to generate two major outcomes – detailed inventory & condition assessment and action plans. Both tasks were huge in scale and required a very systematic approach. The methodology and outcomes of these are briefly described here:

### I Detailed Inventory and Condition Assessment

#### 1. Methodology

To start with, there was no digital map of Mumbai available that even approximately matched the ground situation which could be used to map the features. A functionally accurate base map was generated by overlaying the DP sheets on Google Earth images. This map was used for mapping all the environmental features, further documentation and analysis. A preliminary list of features was generated followed by detailed condition assessments which included recording all land uses in a 100m distance abutting the feature, building heights, important land marks, edge condition, outfalls, accessibility, visual assessments of water quality, encroachments and identification of site specific issues. Assessments were mapped, described in standard proformas and supported by extensive photo documentation.

#### 2. Issues

The major issues that emerged from the assessment were:

##### Encroachments

This is observed along all water courses – rivers and natural drains especially at locations where the edges are not defined resulting in reduced width and pollution. Same is also observed in case of large urban greens. Undefined edges have led to encroachments into the large urban greens resulting in damage to flora and fauna and pollution.

##### Unprotected Edges

Wherever the edges of the features are not defined, are the locations which are either encroached or are susceptible to encroachments. This is noticed along water courses and large urban greens.

##### Narrowing of Width

This is specifically relevant for water courses. Encroachment along and into the rivers at locations have reduced the width of the rivers resulting in reduced carrying capacity of the river especially during the monsoons.

##### Solid Waste Dumping

Major solid waste dumping and letting of sewerage is observed in the rivers, nalas and along coastal features, not just from the slums but also from various commercial and industrial activities along it. Dumping of solid waste reduce the carrying capacity of rivers and nalas and create unhygienic conditions, emanate foul odor not only along the water courses abut also along the coastline feature and are visually unpleasant .

##### Lack of Access to Features

This is especially in case of the water courses, where the encroachment is so dense that accessing the feature for cleaning or maintenance is impossible.

#### 3. Outcomes

In all, about 77 environmental features were identified – 5 rivers, 19 natural drains, 7 large urban greens and 46 coastline features. These were presented in following manner:

1. Key Map indicating all the 77 environmental features
2. A master list was generated to indicate the feature name, location, ward, length or area, salient features, issues and a photograph of the feature.

3. A Portfolio, where each feature is presented through a series of maps, a descriptive note (proforma) and photo plates.

## II ACTION PLANS

The action plan preparation has two distinct tasks:

- The first task is to evolve a methodology to identify critical features and categorize them into 3 categories
  - Features that need immediate attention
  - Features that need attention
  - Features that need maintenance
- The second task is to prepare a set of action plan for the feature that needs immediate attentions. This included review of existing regulatory frameworks for protection and identification of agencies that can coordinate /undertake such projects.

### 1. Methodology

Following the inventory and condition assessment, most vulnerable or critical features were identified. These were qualified as features that are in a precarious condition and are most likely to generate an adverse or disastrous impact, if left neglected or unimproved for long. A 'vulnerability index' was developed based on the physical attributes of the features, and based on its value, most critical or vulnerable features were identified. The outcomes were supported by visual assessments.

A diagnosis of the problems and threats facing the environmental features from the condition assessments revealed that these were 'generic' or common and widespread in nature – encroachments, unprotected edges, narrowing of widths, slums, solid waste dumping, lack of access, disposal of sewerage – albeit the degree of severity varied from feature to feature.

In view of this a standard menu of interventions is proposed – widening, edge defining & strengthening, one time cleaning, construction of access roads, creation of green space and promenades, removal of encroachments, slum improvements, provision of sewers, restoration of mangroves, afforestation and land use recommendations. Each intervention is numbered as separate project, indicated using standard templates and shown on maps of all critical features. Interventions are based on a comprehensive and an integrated approach. For example, if slum redevelopment is proposed then interventions for creating access roads, creating open spaces abutting the feature and connections with the main sewerage system are indicated as guidance. Cross references to interventions are indicated – if a slum redevelopment intervention involves creation of a road or a promenade, a cross reference is made in the road and promenade interventions.

The most crucial question that emerges is – who will implement the interventions? To answer this, all agencies involved in the maintenance and management of the environmental features were reviewed. What emerged was no surprise – there are a range of agencies involved created under several regulations and there is no coordination amongst them. Absence of a comprehensive city wide view of the environmental features is an inevitable result of a non-coordinated approach amongst multiple stakeholders.

## 2. Outcomes

### Critical Features

Out of a total of 77 environmental features, 15 were identified as most vulnerable and needed immediate attention. These include 3 rivers (Oshiwara, Mithi and Poisar), 6 natural drains (Vikhroli Nala, Mogra Nala, Tilaknagar Nala, Piramalnagar Nala, Irla Nala and Safed Pul Nala), 3 large urban greens (Sanjay Gandhi National Park, BARC/Mandala Hills and Aarey Milk Colony) and 3 coastline features (Cumballa-Malabar Hill Rocky Outcrops, Worli Sea Face Rocky Outcrops and Versova Beach).

### Proposals

A total of about 504 interventions are proposed. There are approximately 19 instances of widening, creation of 1.67 sqkm of open spaces, 87 kms of edge definition and strengthening, 29 kms of new sewer lines, 171 slum improvements covering 7 sqkm of area impacting 4 lakh households, creating 18 new access roads, cleaning of 14.30 km of stretch of water courses restoration of mangroves over an area of 0.73 sq km and afforestation of 4.41 sqkm.

### Implementation Strategy

It is proposed, as all the features fall under the MCGM Jurisdiction and it is also responsible for the maintenance of the features, it becomes the key or major stake holder. From this stand point MCGM would be the best placed to take ownership of the study and take it forward for further action and implementation. MMR-EIS can hand over the study to MCGM. The next step for MCGM is to identify the best fit department within itself which can undertake the activity of coordinating between various departments or create a special cell.

## **D. POTENTIAL IMPACTS OF PROJECTS AND INTERVENTIONS**

This exercise will result in improving the accessibility to the environmental features which will not only make them usable as recreational spaces but also help in improving maintenance. This will also help in generating an opportunity for adding several square meters of green space and creating environmental improvement opportunities in the course of slum improvements and provision of sewers.

More importantly, at this juncture when Mumbai's DP is in the process of being revised, it is proposed to incorporate this study as an input layer into the planning process. A comprehensive city wide database and status of the environmental features has been created for Mumbai which is an excellent starting point for integrating these in the city planning processes and taking a wholistic view of the a city's ecological systems and their important functions neglected thus far.