

**TITLE:**

**ECOLOGICAL LANDSCAPES FOR RESTORATION OF WATER BODIES IN URBAN AREAS.**

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**ABSTRACT**

Water being the lifeline of communities and the prime determinant of the sustainability, settlements in the past were located in the proximity of easily accessible water resources. With the technological advancement in the field of centralized water supply systems, settlements are no longer confined to smaller clusters around water bodies. Hence over a period of time due to the demands of urbanisation, development has slowly crept up to the banks of these lakes thereby converting the once sprawling water bodies into mere water tanks which are prone to degradation through development pressure, eutrophication and solid waste disposal. Extensive research and documentation of the physiographic aspects as well as the environmental aspects for the city of Mumbai, Thane and Nagpur have been carried out. The paper has been based on these research findings particularly focusing on the ecological landscape designs for the restoration of water bodies and the formation of “Ecological Integrated Management programs for the lakes in the two cities”.

*Key words:*

*water conservation, urbanization, ecological restoration, detrimental impacts, integrated development, public private partnership, sustainability, urbanization.*

## **URBAN SETTLEMENTS AND LAKES**

### **THANE CITY: CITY OF LAKES**

Thane city historically known for the existence of the several shallow lakes is one of the most industrially advanced districts of the state of Maharashtra today. They are in existence earlier than 1881 and each one of them has a significant cultural and social significance associated with it. It has 35 lakes covering an estimated area of 6,70,000 sq. feet. These lakes vary in size and shape and are between 0.5 hectares to six hectares maximum in area. Most of the lakes are rain fed and are not used for supplying drinking water to city.

Thane district is a belt of land between the Sahyadri range and the Sea. Except in the northeast where much of it rises in large plateaus, the country is a series of flat low-lying rice tracts broken by well marked ranges of hills. Kanheri and Yeur hills together form the dense forest of Sanjay Gandhi National Park (S.N.G.P.) in the Mumbai suburbs. Parsik hill runs along the east coast of Thane creek from Mumbra to Belapur. The region is located in between these Yeur hills on the west and Parsik hills on the east. Ulhas River forms the northern boundary of the region. High hills on one side and submersible marsh along Thane creek and Ulhas riverbanks have peculiarly divided the terrain. River Ulhas flows east west and joins sea at Bassein creek forming northern boundary of the region. Thane creek connects Ulhas River from south separating Mumbai and Thane cities from the main land. Maximum height of the Yeur hills is around 450 meters whereas height of Parsik hill is restricted to 300 meters. Thane city is nestled between the Yeur hills on the west and creek on the east. Many lakes were formed in the areas due to this naturally undulating topography. Historically Thane is known as city of lakes. However they have significant ecological and economic features. Many of the lakes are not only major revenue generators for the city fisherman but are also the hub of economic activity, providing an indirect source of livelihood for many citizens.

Unfortunately over the years, most of these lakes have suffered gross neglect. Common problems in lakes in Thane city have been eutrophication, excessive growth of weeds, hycinths, siltation and sedimentation, breeding of mosquitoes, foul smell, odor etc. which in turn cause adverse water quality, making the lake unfit for drinking, bathing, washing or even recreational activity. The other major problem was the decline in the carrying capacity and the receding lake area due to heavy siltation and sedimentation resulting in meager one meter effective depth in some cases.

## **NAGPUR CITY :Major Water resources of the city: Lakes and rivers**

There are several natural water bodies within the city limits including 12 lakes, two rivers and five nallahs. The lakes (Gorewada, Futala, Ambazari, Sonegaon, Sakkardara, Gandhisagar, Lendi Talao, Naik Talao, Dob Talao, Pandrabodi, Sanjay Nagar Khadan and Pardi) cover an area of about 3.13 sq. km..

Very significant in Local History. Telankhedi Lake/Garden 'Telenkedi' is the most representative one of the old times. The tank was built by the Bhonsala king Raghuji II. The garden is extremely important from the point of Local history. Flora & fauna of this region is abundant in the Garden. Two major temples of local importance are also close to the garden. Ambazari is a witness to the history of Nagpur. Built by Bhonsala in 18th century. The lake was enlarged to supply water to the citizens in 1879. Sonegaon is a favourite sports ground of Bhonsalas and a dense forest south west of the city. It has a tank, temple and thick foliage today. Jumma Talao (Shukrawari Talao) was constructed by Gond king Chand Sultan on the eastern side of Nagpur.

Most of the lakes are polluted due to ingress of untreated sewage, direct disposal of waste water from adjoining development. Haphazard solid waste disposal in the lakes and the peripheral areas has led to severe environmental pollution.

Another unique feature of the city is the flow of two rivers, the Nag Nadi and the Pili Nadi, both within the city limits, flowing completely across the city, dividing it into three major watersheds. The Nag River, which is the main water source and a tributary of Kanhan, is a well demarcated drainage today. It flows west to east in a serpentine course significantly through the main city. The Nag River used to have a rich biodiversity all along its length. The city derives its name from this river. The Nag River has intense urban development along both banks and also unfortunately has become the chief drainage course of the city.

The other important river of the city is the Peoli River, which flows east-west through the northern part of the city. Though the river banks of this river are comparatively less developed through settlements, it still remains a polluted river today. The Nag and Pili Rivers are 15.73 km. and 12.11 km. in length, respectively.

**It is evident from the research conducted in both the cities that along with the intense and rapid urban development in the cities, they are witness to the environmental degradation. Not only the rich water resources but the entire natural landscape of the cities with the precious ecosystems are facing the brunt of this rapid urbanization.**

## **NEED FOR AN INTEGRATED MANAGEMENT PLAN FOR ALL THE LAKES OF THE CITIES**

Water is the lifeline of any city or a region on which its economy and life depends. In the past the success of a city was measured by the amount of water it would supply for the various uses. Successful cities have been those, which have been able to, ensure continuous water supply to its citizens. Cities are a mosaic of different land uses both agrarian and non-agrarian and biotic and abiotic components all of which are dependent on one basic resource called water for their survival.

Conservation and restoration of all our water resources requires an integrated development approach. The management of sewerage, storm water and solid waste management becomes primarily important for any integrated management planning undertaken for cities.

Ecologically-based landscaping guidelines and practices are needed to help solve urban environmental problems such as those related to storm water run-off, waste generation and disposal, air and water pollution and loss of beneficial biodiversity. Ecological Landscape Planning and Design engages ecological patterns and its associated processes across a range of spatial scales.

The master plan for the Rejuvenation of the rivers and lakes of Nagpur city and Thane involves an Ecologically Integrated Plan for the proposal and management of all the water resources. The proposal that takes into consideration the entire ecosystem, which forms the watershed for the catchments it contains and the rivers and streams that flow through them. **Since watersheds are ecologically sensitive and diverse areas, and are important components due to their water holding capacity, what is needed hence is to look at this region as one eco region and take immediate steps to assess its potential as a resource and conserve it.**

## **THE PREPARATION OF THE ECOLOGICALLY INTEGRATED LAKE DEVELOPMENT MANAGEMENT PLAN**

There was a need to understand the formation of the lakes in terms of their physiographic and geohydrological linkages in order to ensure their ecological sustainability. Architectural and Environmental Planning experts from educational institutes worked on the preparation of the ecologically integrated base map for the city. Recommendations were made on the basis of the research findings. Physiographic determinism was employed as a tool to evaluate the extent of the negative impact on the environment, by

superimposing the various physiographic features on the land use plans and simultaneously extracting and de-layering to establish the intrinsic suitability of land for various land uses. The study dealt with various issues of ecology on one hand and developmental issues on the other. Extensive use of a Geographical Information System (GIS) is made for the analysis and information envisioning like producing an ecological base map of the area. Since watersheds are ecologically sensitive and diverse areas, and are important components due to their water holding capacity, what is needed hence is to look at this region as one eco region and take immediate steps to assess its potential as a resource and conserve it.

Recommendations and development guidelines from this study report have helped in the overall understanding of the issues related to the city lakes and need for systematic and sustainable ways of ecological restoration of the lakes rather than concentrated efforts for mere beautification of the lake surroundings.

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## **LIMITATIONS OF THE PROGRAM AND NEED FOR FURTHER STRENGTHENING**

Though much has been achieved, the sustainability of the program would require sustained efforts from all the sectors of the society. Due to immense urbanisation and ever increasing population the lake environs are undeniable showing the negative impacts of such rapid development. In this case upgradation, restoration as well as beautification works need to be undertaken urgently by the local authorities. The dire condition of the lakes can only be improved once their ecology is restored. The lake conservation program initiated by TMC basically comprised of departmental efforts along with the involvement of local educational institute & other technology providers. This interaction was basically in the form of sharing know-how and managerial administrative practices between the two. This resulted in the enhancement of technical know-how among the staff of TMC. This interaction between TMC and the technology provider enriched the managerial & administrative capacity of staff of TMC

The success of the lake conservation program through partnerships has helped in creating significant environment awareness among the elected representatives and the public at large. This was manifested in the overwhelming response to the alternative idol immersion arrangement provided by TMC in the current year.

Thane Municipal Corporation has formulated Lake Management cell comprising Engineers from Public Works Department, Town Planning Dept & Scientists from pollution control Dept under the chairmanship of City Engineer of TMC.

The TMC now proposes to undertake the complete restoration of the lakes through three phases:

Phase 1: Restoration of the lake through ecological landscapes,

Phase 2: Beautification of the lake and its surroundings,

Phase 3: Provision of Lake Amenities with the first phase scheduled to commence 2009

This will be implemented through public private partnerships at all levels. With the implementation of the Lake conservation and management program the socio-cultural environment will get the much needed support and boost which in turn will revive our faith and spiritual connections with our precious environmental resources.

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