

URBAN WETLANDS: PRESERVATION AND MANAGEMENT OF URBAN ECOSYSTEMS

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ABSTRACT

Hyderabad had around 400 lakes a century ago that played a significant role in the urban ecology. They were habitats for a variety of flora and fauna and acted as microclimate stabilizers. Most of them had social, cultural and historical significance. They were natural sources of ground water recharge and flood prevention. But, today only 104 of them exist.

Hyderabad has shortage of underground water, as it is located on the Deccan plateau formed of igneous rocks. Over the centuries, these water bodies served as flood cushions and rainwater storage tanks, assuring water for domestic use and agriculture for a period ranging between 6-8 months annually. But during the past 50 years, these wetlands have undergone tremendous deterioration due to over exploitation and improper management of lakeshore areas.

Reducing output of water from these water bodies have made them even more vulnerable. Introduction of sewage and pollutants has degraded the water quality for sustenance of aquatic life and also pollution of underground water has been affecting the health of the society considerably. Added to this, there has been the increasing lacuna of development agencies and the growing reliability of consumers on packaged water that the situation has gone beyond repair in many cases.

The seriousness of environmental deterioration and their implications were felt in the form of flash floods in 2000-2001, extreme underground water shortage, reduction in agricultural produce, spread of water borne diseases and loss of potential centers of tourism and recreation.

The scope of the paper is to detail out the methodology adopted by the development agencies to restore and conserve these urban wetlands and water bodies under the technical guidance of national and international bodies and experts. Aspects dealt in this respect are their present status and surrounding physical conditions, fund mobilization, community participation, maintenance, etc. thereby generating a self-sustainable and integrated management plan.

Key Words: Urban Wetlands, Urban Ecology, Water Shed Development, Water Demand, Water Cycle, Economy, Community Participation, Integrated Management Plan

1. INTRODUCTION

Although, in India the importance of preserving and maintaining the tree cover in urban areas has been recognized and significant progress has been made in improving the tree cover, not enough attention has yet been given to the preservation of lakes that exist

within metropolitan limits. Lakes often have cultural and religious significance for the local population. Festivals and religious ceremonies are also associated with these water bodies. Indian civilizations for centuries have either settled near existing water bodies or created artificial lakes and reservoirs

by damming streams and rivers and harvesting rainwater. These impounded water bodies primarily provided water during periods of scarcity and served to control floods. However, over the period of time the demand on lakes has increased, as they are also used for hydropower generation, sports and commercial fisheries and water-based recreation. The sedimentation and siltation process has been accelerated due to increased human interference in the catchments and shores of the lakes. Our lakes and tanks are dying, thanks to the uncontrolled urbanization. It is imperative that we make corrections by reviving and nurturing them, besides adopting rainwater harvesting, to prevent the desertification of urban areas. The major challenge before us being - Which comes first – ‘Saving’ what is left or ‘Restoring’ what is dead?

1.1 Global Watershed Treatment Policies and Strategies

Watershed treatment is an indispensable element of effective drinking water strategy. The solution for the problem is to develop a “Sustainable Water Resource Management Policy” based on the principles of:

- Holistic ecosystem based approach
- Understanding behavior of urban water bodies

- Private Sector involvement in maintenance
- People’s involvement

UNEP’s Global Perspective of Fresh Water Stress states, “Conservation and restoration requires a systematic and comprehensive plan to study selective and representative freshwater ecosystems.” Details of the study should include the status of lakes, their suitable use, management and conservation serving as a good resource for future use and formation of strategies for long term management in the urban areas.

The National Lake Conservation Policy, India carved out of the Wetland Program focuses on urban lakes that are subjected to anthropogenic pressures. Under this, the **Ministry of Environment and Forests** had identified 10 polluted urban lakes for conservation and management in 1994 and has already released a large number of proposals for funding. Out of these, Bhoj Lake from Madhya Pradesh is already getting assistance under funds provided by OECF, Japan. Approval has been given for Dal Lake Conservation Program (DLCP) in Jammu and Kashmir. Others like Nainital Lake, a number of lakes in Karnataka, Andhra Pradesh,

Maharashtra and Haryana are in the pipeline waiting to be taken up depending on the pollution status and availability of funds.

1.2 Facts about Urban Water Bodies

- Most urban lakes are manmade.
- Urban lakes are greener than non-urban lakes.
- Algal blooms or aquatic weeds? - they have a unique type of flora of weeds.
- Require high quality water treatment due to chemicals and oil.
- Higher turbidity levels.
- Diagnostic sediment signature varying from place to place.
- Each urban lake is unique.
- The best solution for most of them would be In-Lake Treatment.

1.3 What does the present situation demand?

The impact of watershed development on lake quality is so pervasive that it is worth treating urban water bodies as distinct group. A number of actions will be needed to restore a lake to a healthy state and then to ensure it stays in a good condition. Detailed surveys should be done to analyze the water quality and determine the fish and bird population.

An individual strategy will be needed for each lake, which sets out its uses, management objectives and actions. The restoration work needs to be phased over years, while maintenance actions will need to occur each year.

2. PROBLEM AREA

Hyderabad was created in 1591 by Mohd Quli Qutub Shah on the banks of River Musi. Within the city's radius of 35kms, there existed about 532 lakes.

The Kakatiya rulers who once ruled the region pioneered the construction of a chain system of lakes, which is today recognized as a monumental effort of human beings to moderate floods and put the impounded water to beneficial use. These lakes provided water and also fulfilled the religious and social needs of the people. Hyderabad with its twin partner Secunderabad combines to form an area of 1864 sq.kms. which is managed by the Hyderabad Urban Development Authority (HUDA).

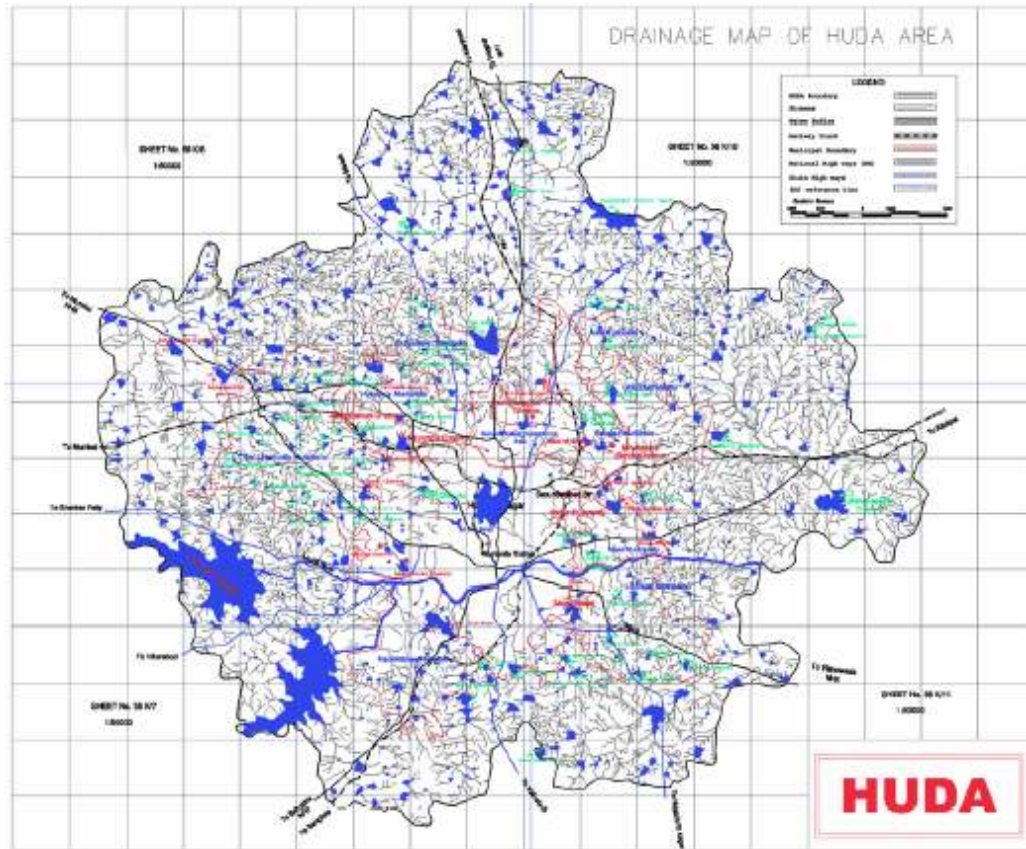


Fig 1. Drainage Map of Hyderabad Urban Development Area

2.1 Hydrology of Hyderabad Urban Development Area

Hyderabad Development Area is located on the ridge of two major river basins - the Godavari and the Krishna. The lakes within the basin form a chain connecting one with the other to store and harvest as much water as possible before draining into the rivers.

The lakes are facing many problems, but the major ones that have adverse effects on the society are:

- Contamination of ground water
- Reduction in water holding capacity

- Easy susceptibility to floods
- Increase in breeding of vectors like mosquitoes
- Garbage dumping resulting in eutrophication and foul odour
- Creation of cesspools due to discharge of industrial waste and sewage
- Encroachment of lakebeds by land filling – deficient land use planning

There are about 400 small and big lakes in Hyderabad Metropolitan Area of which 170 lakes have water spread area of 10 hectares (25 acres) or more. With

rapid urbanization, there has been over exploitation of groundwater resulting in fall of water table beyond the weathered portion of the strata, making bore wells function only seasonally. Historical water level data indicates that there is a decline of 6-8 m in the valley bottom and 12-15 m in recharge areas (uplands).

2.2 Let's Save Our Lakes – HUDA's Initiative

As part of the Green Hyderabad Environment Program (GHEP) about 170 major lakes in the metropolitan area have been notified and taken up for restoration since May 2000. The overall objective of the GHEP was "Sustainable Improvement of the Living Environment of the Urban Population in the Hyderabad Development Area". After the initial Lakes Notification being issued by HUDA, three lakes located at Safilguda, Saroor Nagar and Langar Houz were taken up as Pilot Projects for restoration.

2.3 Base Line Data

HUDA collected information on the 170 lakes out of which only 104 lakes were found to be of more than 10 hectares and intact with respect to the surrounding development. Out of these 104 lakes, for the first phase 85 lakes were taken up for restoration and collection of base line data was initiated.

Scientific study was conducted to assess the present water quality status of the lake water. Based on the study, the lakes were categorized into two categories:

- Category 1 (high risk) – 18 nos.
- Category 2 (low risk) – 67 nos.



Fig 2. Excessive eutrophication infestation



Fig 3. Disposal of garbage and industrial waste



Fig 4. Vehicle wash add non degradable chemicals



Fig 5. Disposal of untreated domestic sewage

Apart from HUDA's Urban Forestry and Engineering Wing, which is the nodal agency, following agencies were also actively involved in the project.

- Urban Forestry Wing of Municipal Corporation of Hyderabad (MCH)
- Hyderabad Metro Water Supply and Sewerage Board (HMWS&SB)
- Social Forestry and Territorial Divisions of Andhra Pradesh Forest Department
- Ten Municipalities and 105 Gram Panchayats (GPs)
- Residential Welfare Associations (RWAs)
- Non-Governmental Organizations (NGOs)
- Community Organizations including Women's Groups

3. AIMS

After the initial studies and collection of data a number of aims and objectives were framed as follows:

- To derive a methodology for a systematic study of Lake Ecology and its surroundings.
- To develop strategies for revitalizing water bodies to replenish ground water.
- To develop an integrated management plan for the execution of the whole process.

3.1 Objectives

- Delineation of the Project Area.
- Classification of lakes and wetlands with respect to various environmental parameters.
- Preparation of Guidelines and Policies for effective Lake Management Plan.

4. METHODOLOGY

The final methodology derived was based on the principle of DPSIR devised by UNEP. The major components of DPSIR framework being:

- **Driving Forces** – Social / Cultural / Economic and Environmental Consciousness
- **Pressures** – Stresses caused by the human activities on the environment.
- **State** – Present status of environment and assessment of causing factors and implications.
- **Impacts** – Effects of environmental degradation.

- **Responses** – Solutions with due consideration to all the above factors and feasibility for mutual coexistence of man and resources.

5. PILOT PROJECTS

Similar techniques were implemented in case of the three pilot projects, but the end results achieved were quite diverse in nature.

5.1 Langar Houz Lake

In case of the lake at Langar Houz, the surrounding area is agrarian with paddy fields and cattle sheds. As a result, the inflow of nutrients into the lake was high, resulting in rapid growth of water hyacinth which had become environmentally hazardous as eutrophication in the lake had reached its final stage.

5.2 Saroor Nagar Lake

In case of Saroor Nagar Lake, the surrounding area has high-density housing and major commercial areas. Added to this, the encroachment of lake area for housing, damaged inflow - outflow, surplus flow and earthen dams had shrunk the water spreads of the lake, as most of the land in foreshores was under private ownership.

It was thought that the net amount payable per individual for the operation of STP was quite low and easy to collect, but the major problem of pollution were the slums that had cropped up along one side of the lake boundary and it was impossible to make them pay for, as they were daily wagers and incapable to pay. Thereby a difference in payment structure was decided which was opposed by others and all stakeholders could not be convinced, as most of them felt that the lake was more of a menace than an advantage.

5.3 Safilguda Lake

The only lake where every stakeholder could be convinced and the project was a grand success happens to be the Safilguda Lake. Initially when HUDA initiated strengthening of main earthen dam around the lake, local residents were skeptical about its utility. There were also conflicting interests, especially between the foreshore and downstream residents of the lake in protecting the lake and their own interest. The removal of water hyacinth and dredging of the lake at Safilguda was not well received by the local people. They felt that the work was a publicity stunt.

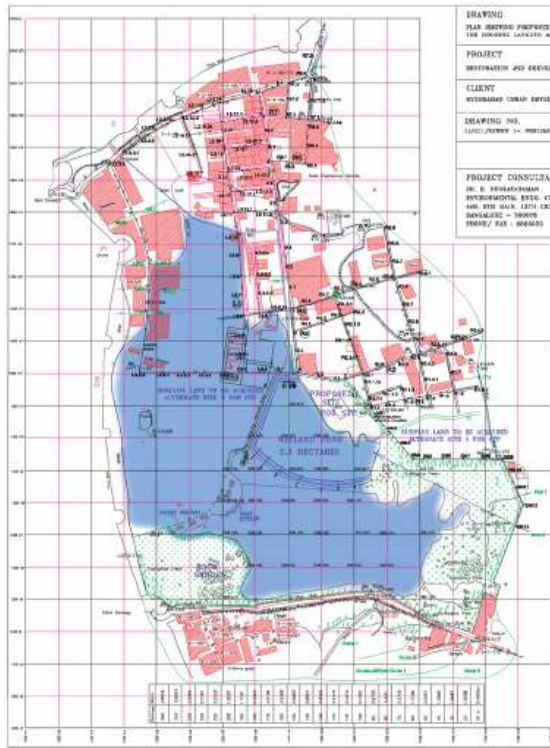


Fig 6. Survey Plan of Langar Houz Lake and its surrounding development

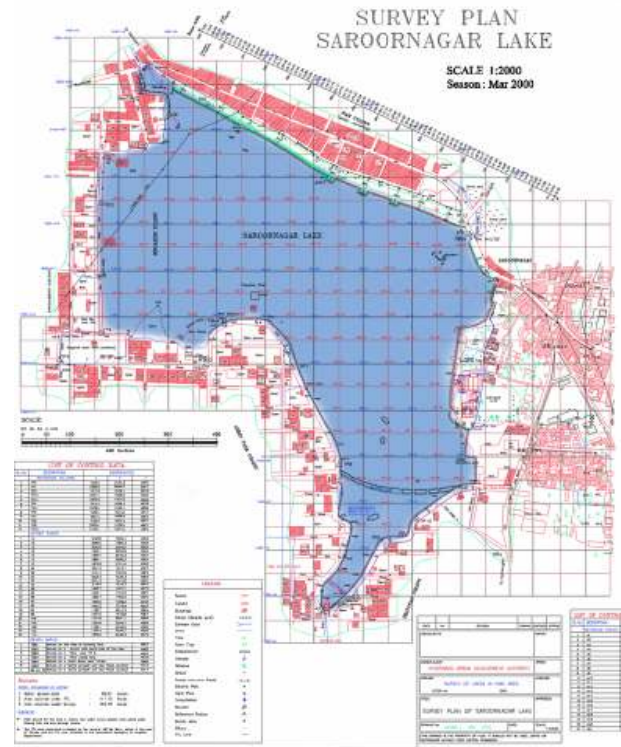


Fig 7. Survey Plan of Saroor Nagar Lake and its surrounding development

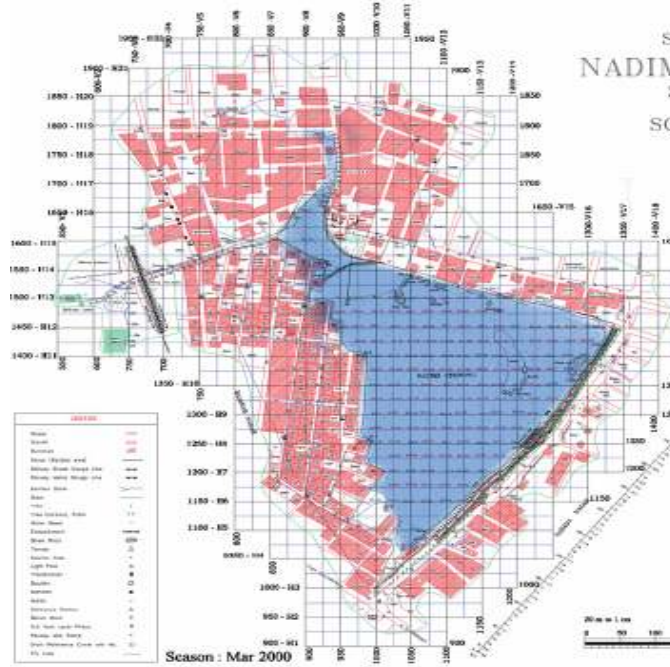


Fig 8. Survey Plan of Safilguda Lake and its surrounding development

They were also of the view that the siltation would continue, and in no time the water hyacinth would grow back again. This kind of public opinion changed when Hyderabad received unprecedented heavy rains in August 2000. The rain was catastrophic and several lakes in the vicinity of Hyderabad were breached leading to sudden flooding and submersion of major urban area.

The local residents then realized the importance of lake protection and revitalization measures. These experiences brought a dramatic transformation in the mindset of the people and they actively participated in the lake development project, thereafter. HUDA then took up measures to gain people's participation in the works in order to ensure sustainability of the various interventions. For this local resident based Lake Protection Committees referred to as 'Sarassu Samrakshana Samitis (SSS)' were created which contributed in laying the underground sewer lines.

With public confidence established, HUDA was able to complete the remaining activities of laying sewer lines, storm water drains, construction of STP, the inflow and

surplus over flow arrangement without any problem. The revenue departments had stopped further registration of land transfer in lake area and assisted in demarcation of the Full Tank Level (FTL) of the Lake.

The local municipalities had stopped giving permission for house construction in the FTL area. The local people took up patrolling of the lake surroundings to prevent land encroachment and anti-social activity. The local municipal authorities provided drainage connection to individual houses and prevented the sewage / sullage flow into the lake. They also provided door-to-door garbage collection facility to decrease garbage dumping into the lake.

6. RESULTS AND ANALYSIS

6.1 Environmental Impact Analysis

HUDA developed a beautiful park on the widened main bund of the Safilguda Lake, which is now a major local attraction. The local people now use the park for morning and evening walks and for recreation. Boating has also become a major attraction. Women, who were earlier mute spectators, have now become very supportive. They are showing interest in greenery and

nursery activities around the lakes. The public park, boating activities and the plant nursery etc. generate revenue, which is used for maintaining the lake and its environment.

The Safilguda Lake development experience brought together stakeholders from all walks of life to keep vigil on the lake environment. With this experience, HUDA redefined its responsibilities in Lake Protection. The citizens have now assumed their roles and responsibilities and modalities are being worked out for sustaining the lake and its environments.



Fig 9. Nursery along the lake being taken care by SSS members

6.2 Health Factor and Economic Analysis

It is found that there is a lot of change in the situation after the lake restoration work, as there is a reduction in the incidence of diseases. Prior to the lake restoration work in Safilguda, the

incidence of malaria was very high because of which 15 man-days, on an average, per earning member in a family per year were lost. At the rate of the minimum wage i.e., Rs.80/- per day, the wage opportunity was lost by at least Rs.1,200/- per family per year.

In addition, water borne diseases like diarrhea, jaundice etc., which were rampant in the lake neighborhood took another 10 days of work. Due to these illnesses, additional wage opportunity was lost at least by Rs.2,000/- per year per family. Apart from losing wages, the diseases also involved additional expenditure on health care. It was found that on an average a family spent about Rs.4,000/- per year on medical expenditure. In total, the sum of wage lost and additional expenditure, a family in Safilguda had to spend about Rs.7,200/- per year. But after the restoration work of the lake, there has been a significant improvement in the wage income and reduction on medical expenditure.

7. ILMP (INTEGRATED LAKE MANAGEMENT PLAN)

7.1 Lake Revitalization Measures

After completion of the three pilot projects, HUDA came to understand certain hard facts, which helped in

strengthening the process of lake revitalization measures:

- Urban lakes especially should be used sustainably, as they are a scarce resource and our own acts can have detrimental effects on them.
- All lakes have to be viewed through a social and cultural perspective, not only on their resource output.
- Making the lakes and wetlands equally accessible to all would ensure that every section of the society would be involved in the protection of these resources.
- Suitable institutions, which may be government bodies, NGOs or community-based groups should administer revitalization of the lakes.
- It is to be understood that a single technique may not be applicable for all types of lakes.
- At places where STPs may not be feasible the natural process of wetlands along with certain species of vegetation could be utilized to treat the water.
- Attempt should be made to cure the causes of problems and not just their symptoms.
- Development activities should take into view the interests of all the stakeholders, to avoid conflicts and create a mechanism that could

become a perfect example for others.

- Surrounding development activities, which can have detrimental effects, should be minimized and emphasis should be on Low Impact Development (LID) activities.
- Opportunities should be developed for the public to get actively engaged in lakes protection and restoration activities.



Fig 10. View of wetland

7.2 Lake Management Measures

Based on the study there is always a need for Lake Management Planning (LMP) program. The managing body has members from the local development agencies, citizen societies and NGO's. The body itself does not have regulatory authority, but makes recommendations to local development agencies to ensure that management

strategies are implemented. It tries to incorporate as many stakeholders as possible in the watershed planning process, either in an advisory or technical role. Technical communities are to be setup to provide expertise on scientific issues, while citizen advisory committees afford the public a chance to voice their opinions in the management process.

8. CONCLUSION

- Each Lake has its own ecological character and any kind of lake restoration measure should be specific to its character.
- Any form of Lake Restoration should start with the delineation of the Catchment Area and Lake Boundary so as to understand the behavior of the watershed.
- Lakes perform various important and indigenous functions in any urban area.
- Lakes die once it is put to act as a drainage basin as they lose the life sustenance factor within them thereby getting converted into stagnant cesspools.
- Lakes could be restored only if their utility value is being redefined properly aided with various planning interventions and community participation.

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