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**TITLE :**       **Conservation of urban lakes as potential sources of freshwater**  
                  **- A need to integrate traditional wisdom with ever increasing**  
                  **urban water demands**

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**ABSTRACT**

Survival and quality of human life largely depends on adequate availability of clean and wholesome water basically for drinking and secondarily for other purposes. With 1.2 billion people without access to drinking water and 2.4 billion lacking basic sanitation, the symptoms of emerging global water crisis are obvious. Further, it is projected that the population under water stress will rise from 450 million at present to 2.7 billion by 2025 and Indian subcontinent is already being classified as the ‘Water Stressed’ meaning water needs exceed its availability.

Water crisis is particularly very severe in highly populated urban areas and it is going to be further aggravated with world becoming urban as pointed out by the World Commission Report on Environment and sustainability by 2020. Today cities and mega-cities have become ‘Black holes’ for water which is being brought from distant points to satisfy water needs of growing urban population. The increasing supply is also generating increasing volumes of waste water mainly in the form of sewage and industrial effluents.

In this background, urban lakes are in the focus of discussion as these freshwater sources, if protected and managed properly, have tremendous potential to augment the water supply, if not for drinking, for other non-potable water requirement of urban population. what are referred today as urban lakes are the water bodies that were impounded mainly for irrigation purpose and represent traditional wisdom of water resources management by communities inhabiting different agro-climatic zones of the country. Four factors, Urbanization, Industrialization, water intensive agriculture and modern life style, had accelerated the process of large scale extraction and utilization water. All these years while emphasis was placed on ‘Supply’ side, little attention was paid to waste water in the form of large volumes of sewage and industrial effluents. Even today, most of the sewage is let out into water courses, mostly rivers and lakes, without any treatment. The first victims of water pollution from sewage were the water bodies like ponds, lakes, impoundments and reservoirs so much so that even drinking water reservoirs like upper lake in Bhopal and Himayatsagar and Osmansagar lakes in Hyderabad are facing the crisis.

In the paper, a case study of lakes in and around Hyderabad will be presented with a plea to integrate traditional wisdom with modern water resources management practices. If implemented, the proposed lake conservation and management model has capacity to augment per capita availability of water for people of fast merging mega-city.

## 1. INTRODUCTION :

Survival and quality of human life largely depends on adequate availability of clean and wholesome water basically for drinking and secondarily for other purposes. With 1.2 billion people without access to drinking water and 2.4 billion lacking basic sanitation, the symptoms of emerging global water crisis are obvious. Further, it is projected that the population under water stress will rise from 450 million at present to 2.7 billion by 2025 and Indian subcontinent is already being classified as the 'Water Stressed' meaning water needs exceed its availability.

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On this background urban lakes are in the focus of discussion as these surface water sources, if protected and managed properly, have tremendous potential to augment the water supply, if not for drinking, for other non-potable water requirements of ever increasing urban population (Table 1).

**Table 1.2. Valuation of identified 170 Lakes in and around Hyderabad as a freshwater resources..**

1	Coverage	3000 hectares
2	Storage capacity	82,500 million liters
3	% run-off storage	11
4	Recharging capacity	228 mld
5	Per capita availability of ground water in Hyderabad	38 l/day
6	Present abstraction at 50 % level	20 l/day
7	Fall of water table	01 to 7 meters
8	Ground water pollution highest in industrial zones in Hyderabad	Pattancheru, Jeedimetla etc.
9	Classification of lakes (HUDA) :	
10	Category – I (Problematic lakes)	18
11	Category II (non-problematic lakes)	67
12	Royal Netherlands Govt. funded project for remediation of lakes	Sewage Treatment Plants (STP) Construction of artificial wetlands

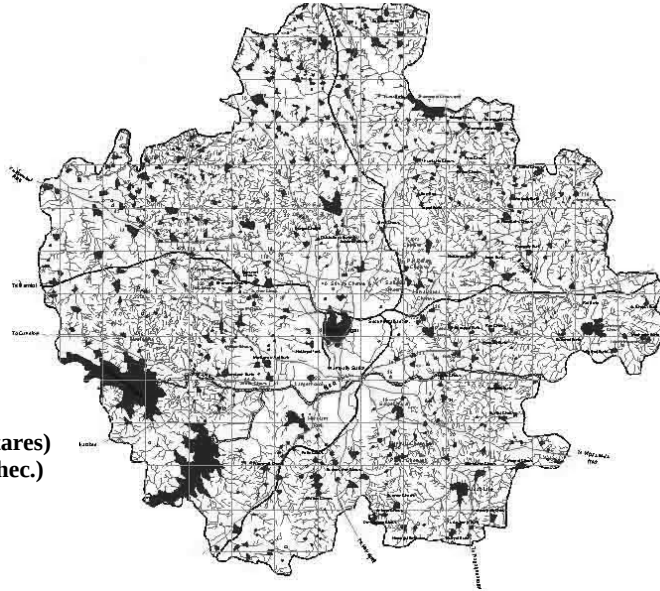
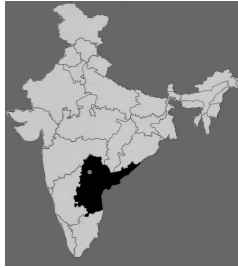
In the context of Peninsular India, what are referred to as urban lakes are the water bodies that were impounded taking advantage of topographical features of Deccan plateau, mainly for irrigation purpose and represent traditional wisdom of communities inhabiting this semi-arid region. Four factors; Urbanization, Industrialization, water intensive agriculture and modern life style had accelerated the process of large scale extraction and utilization water. Further, in all these years while emphasis was placed on 'Supply' side, little attention was paid to waste water in the form of large volumes of sewage and industrial effluents and its management. Even today, most of the urban sewage is let out without any treatment into water courses, mostly rivers and lakes. All over the world, the first victims of water pollution from sewage are the water bodies like ponds, lakes and reservoirs so much so that even drinking water reservoirs like upper lake in Bhopal and Himayatsagar and Osmansagar lakes in Hyderabad are facing the crisis.

## 2. LAKES IN AND AROUND HYDERABAD :

Hyderabad, the Historical city of lakes and gardens, often referred to as the limnological capital of India. In sheer number of major and minor water bodies in its metropolitan limits, the city occupies one of the top positions in the country (Map: 1 and Table: 1). Historically, these impoundments were mainly created to meet drinking and irrigational water needs and form a part of scientifically designed water conservation system in this semiarid region. At the turn of 20<sup>th</sup> century number of lakes was 532 which

was reduced to 400 at the time of independence and today 170 water bodies with > 10 hectares (25 acres) water spread area are identified for protection and conservation. There is also change in their water use

**Fig. 1. Hyderabad lakes – drainage map**



**169 lakes (more than 10 hectares)  
Area of water bodies (3000 hec.)**

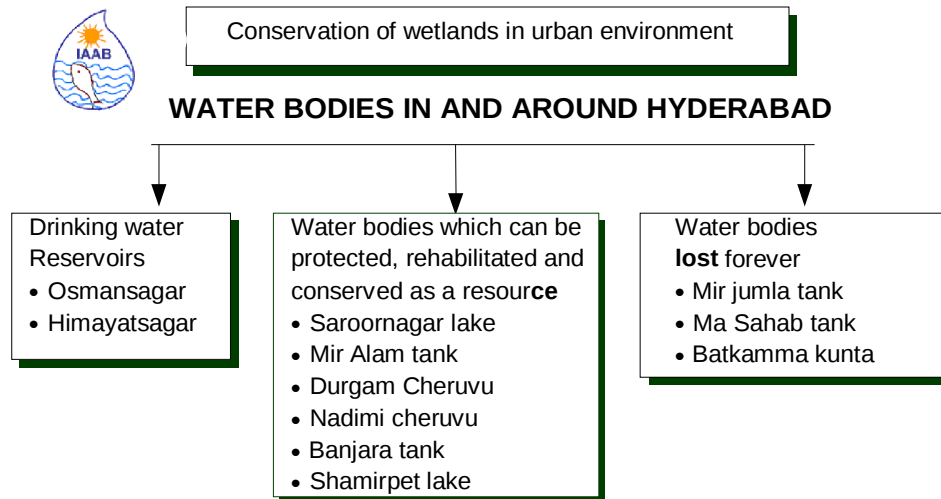
from drinking and irrigation to washing, bathing and recreational demands of ever growing urban population. Particularly after 1956 when the city of Hyderabad became the capital of state Andhra Pradesh, there was a steady increase in the population, trade and industry and with it followed the inevitable environmental degradation. Particularly urbanization and/or industrialization of the lake catchments had its extremely adverse impact as they have become dumping sites for untreated domestic sewage, industrial effluents and municipal solid waste. The case of small water bodies (Kuntas) is still pathetic; many of these are already reclaimed and the remaining are being systematically destroyed by dumping waste, garbage and silt. The total water spread and depth of all the major reservoirs is progressively reducing due to siltation from natural and man made factors.

Further, even in the case of two drinking water reservoirs, Osmansagar and Himayatsagar, are showing signs of eutropication due to nutrient enrichment from catchments runoff. Due to lack of an integrated lake basin management (ILBM) the lakes day by day are losing their importance.

The existing water bodies in and around Hyderabad can be classified into three categories;

1. Those totally reclaimed and lost forever (Mir Jumla Tank, Ma Sahab Tank, Batkamma Kunta);
2. Those in progressive stages of degradation and can be rehabilitated by taking corrective conservation measures (Saroornagar, Mir Alam, Nadimi, Hussainsagar etc.) and
3. Those as the source of drinking water and recreational potential (Osmansagar, Himayatsagar).

**Table 1. Reprehensive man-made Lakes in and around Hyderabad and their environmental status.**



### 3. SAVE THE LAKE CAMPAIGN :

Genesis of 'Save the lake campaign' in 1990 as a civil society initiative against wanton destruction of water bodies in and around Hyderabad was a remarkable event in the history of environmental protection in India. The struggle was duly supported by judicial interventions in response to Public Interest Litigation (PIL) filed for protection and conservation of 170 water bodies in and around Hyderabad.

As a result of conservation measures implemented under lake component of Green Hyderabad Environment Project (GHEP) funded by the Government of Netherlands, 18 highly polluted lakes were placed under Category-I and another 69 less polluted under category-II. In the first phase three lakes (Safilguda, Saroornagar and Langer House) were selected for comprehensive conservation measures. Today these once highly polluted lakes are transformed in to a recreational centers and lung spaces. In the second phase another five lakes (Durgam cheruvu, Mir Alam lake, Patel cheruvu, Pedda cheruvu and Nalla cheruvu) are conserved on the model developed by the Hyderabad Urban Development Authority.

Under lake component of GHEP, Apart from this lake other five water bodies (Mir alam, Hussainsagar, Langerhouz near Golkonda fort, Safilguda and Durgam cheruvu in Hightech city of Saibarabad) are also equally protected and conserved under the GHEP.

The lake conservation model developed by Hyderabad Urban Development Authority (HUDA) has following components :

1. Demarcation of the lake boundaries and clearance of illegal encroachments. Land acquisition and compensation payment.
2. Diversion of the Sewage drains and setting up sewage treatment plant (STP) and monitoring of lake water quality,
3. Prevention of dumping of garbage and building rubble thorough effective watch and ward.
4. De-silting of the lake bed and periphery after Ganesh immersion programme.
5. Restoration of western surplus weir and maintenance of FTL
6. Strengthening of the present lake-bund as it is serving as a communication link
7. Development of Green belt along the lake periphery
8. Setting up of Saroornagar lake Management Society (SLMS) and Metropolitan Lake Management Cell.
9. Development of water sport and tourism interest.
10. Development of fisheries and other economic activities.

Unfortunately, the GHEP project could cover only limited number of water bodies with most remaining out of conservation action plan. One of the reasons for this is the HUDA lake conservation model is finance intensive and has disproportionate emphasis on engineering and technological aspects and it's

long term sustainability will always be a question. Moreover, efforts were not made towards (a) Integration of cost effective eco-technologies for improvement of water quality, (b) Budgetary allocation of funds for maintenance of already protected and conserved water bodies, (c) Involvement of civil society in the conservation effort and by and large the lake programme remained captive to high cost technologies, engineering approach and limitations of multiple Governmental agencies.

#### **4. LESSONS LEARNT FROM GHEP :**

For effective conservation and management of lakes in urban as well as rural areas, following three areas of concern could be identified and addressed based on the GHEP experience in Hyderabad.

1. Siltation due to natural, cultural and other anthropogenic factors  
Nutrient enrichment and toxicity  
Socio-economic factors leading to alterations in hydrography and morphometry.

##### **A. Siltation :**

1. **Desilting of lakes in summer seasons to increase its water holding capacity:** The silt and sediment often rich in organic matter can be used as manure for neighborhood gardening or in agriculture. Licenses can be issues for free lifting of silt from lake beds in summer.
2. To prevent cultural siltation on account of idol immersion resulting into dumping of tons of slow dissolving materials like plaster of Paris, the artisans can be trained in use of natural clay for idol making. Use of natural biodegradable paints can be encouraged in place of synthetic ones which contain toxicants like heavy metals.
3. Awareness campaign highlighting negative impacts of cultural siltation involving Municipalities, NGO, GOs and voluntary groups.

##### **A. Organic enrichment (Eutrophication) :**

1. **Biomanipulation :** Controlled growth of biomass and its harvesting to reduce nutrient load.
2. **Composting of harvested biomass**
3. Treatment of sewage by intercepting drains and by establishing **Sewage Treatment Plants (STP)**
4. Shoreline treatment and rehabilitation as habitats
5. Re-stabilization of food chain/web by introducing fish and other aquatic species
6. Introducing herbivorous fish species to control excessive growth of vegetation
7. Fish culture.

##### **A. Morphometry and Hydrography :**

1. Demarking lake boundaries and laying of neck-less/garland roads to prevent further encroachment of the lake bed.
2. An Integrated Lake Basin Management (ILBM) through organic farming and greenery/afforestation of the catchment.
3. Establishment of bio-conservation zone around lakes
4. Lake interpretation/information centers to create awareness about benefits from lakes. Holding of annual lake fairs, 'melas', competitions, rallies etc.
5. Publication of awareness material/literature.
6. Establishment of Lake authorities at Central and state levels to co-ordinate inter-departmental activities and to enlist support of lake dependent stake holders and general public.
7. Enactment of laws to prevent degradation of lakse.

#### **5. FUTURE OF LAKE MANAGEMENT IN INDIA :**

Lakes including natural as well as man-made, hold a great promise as a source of freshwater demand of which will grow in time to come. Unfortunately these precious ecosystems are being neglected and destroyed in rural as well as urban areas. The main problem in their management is linked to management of their basins, water quality and water holding capacity. To achieve this there is a need of an Integrated Water Resources Management (IWRM) approach as advocated by Global Water Partnership (GWP). Further, 7 principles outlined in the World Lake Vision (WLV) can form the basis for implementing conservation and management programme at National level. To summarise for longterm sustainability, lakes should be protected and developed as community assets managed by stake holders including lake dependent communities and civil society with Governmental agencies mainly involved as facilitators.

## **6. ACKNOWLEDGEMENTS :**

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