

# Protection and Management of Urban Lakes in India



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*“It shall be the duty of every citizen of India, to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures”  
(Article 51A –Constitution of India).*

## **Introduction**

Lakes are important part of urban ecosystem. Though relatively small in size, lakes perform significant environmental, social and economic functions, ranging from being a source of drinking water, recharging groundwater, acting as sponges to control flooding, supporting biodiversity and providing livelihoods. Water in lakes is an easily available source of water for the needs of many sectors of economy such as agriculture, domestic and industrial. These water bodies, whether man-made or natural, fresh water or brackish play a very vital role in maintaining environmental sustainability particularly in urban environments especially in today’s context when the cities are facing the challenges of unplanned rapid urbanization.

At present, in India, lakes and wetlands are in extremely bad shape and are in varying degrees of environmental degradation. Despite knowing their environmental, social and economic significance, city planners have willfully neglected and destroyed these water bodies. Today these water bodies are encroached, full of sewage and garbage. Because of unplanned urbanization, much of the landscape around the lakes has been covered by impervious surfaces. As a result, instead of rainwater, it is the sewage and effluents that are filling up urban water bodies. Once the sponges of urban area, today urban lakes have turned into hazards that get choked even with low rainfall and overflow into the blocked canals during high rainfall causing floods in the city. It is the disappearance of these sponges of the city that has exacerbated floods and sharpened the pain of droughts (Churning Still Water, 2012). Considering the present bleak water scenario of Indian cities, today we need our urban lakes and wetlands more than ever.

Although, there is a plethora of policies and acts for the protection and restoration of urban lakes and wetlands, urban waterbodies are in extremely poor condition. There numbers are declining rapidly. For example at the beginning of 1960s Bangalore had 262 lake, now only 10 hold water. Similarly, in 2001, 137 lakes were listed in Ahmadabad city, and over 65 were reported being already built over (Excreta Matters, 2012). In Delhi in 2010-11 to check the changes in

waterbodies in last 10 years the status of 44 lakes was ascertained and it was found that 21 out of 44 lakes were gone dry due to rapid urbanization and falling water tables (Singh & Bhatnagar, 2012). Another example exhibiting this increasing loss of urban waterbodies is Hyderabad, within last 12 years, Hyderabad has lost 3245 ha. area of its water in the form of lakes and ponds (Times of India, 2012). There are endless examples in India that show such a devastating state of urban water bodies.

Considering this alarming situation of urban waterbodies, this paper discusses the present status of protection and management of urban lakes and the challenges/gaps in the current management and protection approach. The paper also highlights some positive examples of lake protection and management as learning lessons.

### **Defining Lakes**

Quite simply, lakes are bodies of water that occupy depressions on land surface.

There is no universal definition for 'lakes'. The International Glossary of Hydrology briefly defines a lake as an "inland body of water of considerable size (UNESCO and WMO 1992)". One of the most elaborated definitions of lakes has been provided by Kuusisto (1985) as "a depression or a group of depressions partly or fully filled by water, all parts of the water body have the same surface, excluding temporary variability, caused by wind or ice, the ratio between in-flow and volume is small enough to let most of the suspended, inflowing material to form bottom sediments, and the surface area exceeds a given minimum value."

In India, National Lake Conservation Programme under the Ministry of Environment and Forests (MoEF) defines lakes as "standing waterbodies which have a minimum water depth of 3m, generally cover a water spread of more than ten hectares and have no or very little aquatic vegetation (Ministry of Environment and Forests, 2010)". The purpose of any definition is to provide an entity an identity which plays an important part in its survival. However, unfortunately, it is this very definition of lakes that paves the way for their exploitation. This is because as due to various environmental and climatic conditions often there are fluctuations in the given three parameters of a lake used in MoEF definition to define a lake. This is the loophole that is often used to exploit these waterbodies to be used for other purposes.

## **Classification of Lakes in India**

As there is no specific classification of lakes in India, a general classification criteria is used to categories lakes which include lakes identified on the basis of:

Geographical location such as Himalayan lakes, Peninsular lakes, Coastal lakes etc.

Limnological criteria e.g. fresh water lakes, brackish water lakes etc.

Ephemeral lakes such as lakes of Ganga-Bramputra basin e.g. Beels and Jheels

Functional criteria such as lakes for irrigation, water supply and hydrology etc.

Management criteria such as lakes designated under NLCP (National Lake Conservation Plan), Ramsar Sites etc.

## **Threats to Urban Water Bodies**

For the last two decades, urban waterbodies have been a victim to unplanned urbanization in India, because of which they face several threats. These are pollution, encroachment, eutrophication, illegal mining activities, ungoverned tourist activities and cultural misuse.

**Pollution:** For the last two decades, there has been an explosive increase in the urban population without corresponding expansion of civic facilities such as adequate infrastructure for the disposal of waste. Hence, as more and more people are migrating to cities the urban civic services are becoming less adequate. As a result, almost all urban water bodies in India are suffering because of pollution and are used for disposing untreated local sewage and solid waste, and in many cases the water bodies have been ultimately turned into landfills.

**Encroachment:** Encroachment is another major threat to waterbodies particularly in urban areas. As more people are migrating to cities the availability of land is getting scarce. Today, even a small piece of land in urban areas has a high economic value. Hence, these urban water bodies are no more acknowledged for their ecosystem services but as real estate. Both for the government and the private builders these lakes are extremely valuable opportunities. Charkop lake in Maharashtra, Ousteri lake in Puducherry, Deepor beel in Guwahati are well known examples of encroachment. Another interesting example of encroachment and pollution, not by some private builder but the government itself is Pallikaranai marshland in Bangalore. The size of this city wetland is decreasing rabidly. Once a bird sanctuary, it is now the dumping yard of Chennai City. The dumping of solid waste, sewage discharge, and construction of new buildings such as a railway stations and a new road have shrunk this wetland to a great extend. Today,

Pallikaranai wetland is also one of Chennai's largest official dumping sites. Similarly, the case of government encroachment of Sola Beel in Guwahati where the state revenue department allotted lake-bed for construction in spite of Guwahati High Courts order to protect all wetlands in the state.

***Eutrofication:*** Primarily being lentic water systems, lakes are almost closed ecosystems. Hence, a large part of the substances that enter in the lakes become a permanent part of the system as only a part of that can be removed depending on the water exchange system. As a result, the entry of nutrients through raw sewage become the part of lake system and cause various destructive changes in the waterbody such as prolific growth of aquatic weeds in lakes and ponds that ultimately disturb and kill the ecology of the waterbody. Bheels of Assam is a well known example of high growth of hyacinth due to pollution.

***Illegal Mining Activities:*** Illegal mining for building material such as sand and stones both on the catchment and on the bed of the lake also have extremely damaging impact on the waterbody and one the reasons behind the destruction of many waterbodies in India. For example, the Basamand lake in Jodhpur, once the only source of drinking water for the city of Jodhpur, has been suffering from illegal mining for the last 20 years despite the court's order to stop mining in 1999. Surajkund lake in Haryana is another example of illegal mining activities that have destroyed the lake.

***Unplanned Tourism Activities:*** Unplanned tourism activities without systematic planning and regulation proved to be another major threat to urban water bodies. Disturbance of wildlife, pollution, changes in local lifestyles and loss of cultural heritage are some of the impacts of tourism on the local environment. In the absence of garbage disposal facilities, the practice of dumping garbage into nearby water bodies has become quite common in recent years and has contributed to the degradation of many water bodies especially at the high altitude lakes, for examples, Dal Lake in Srinagar, Tso Morari and Pongsho Lakes in Ladakh where the unplanned and unregulated tourism has posed long-term negative impacts both on biodiversity of the area and as well as on the local environment.

***Cultural Misuse:*** Adding to the sorry state of urban water bodies is also the misuse of these water bodies by local communities for their cultural or religious festivals such the immersion of idols . These activities are particularly a source of serious pollution in lakes.

## **Current Institutional Arrangements for the Protection of Lakes in India**

Traditionally, in India water was seen as a responsibility of citizens and hence the communities used to collectively took the responsibility of protecting and managing their water bodies. After independence, the government has taken control over the waterbodies and water supply. This shift of control from communities to formal governance structures imposed by city authorities has unbalanced the lake management approach that was managing and protecting our local water bodies for decades. This shift abruptly disengaged and alienated local communities whose lives were intertwined with these local water resources for generations. Further to this, especially in cities, under this formal governance structure, waterbodies came under the jurisdiction of landowning agencies which are unfortunately primarily interested in maximizing land availability not in protecting waterbodies. However, today, in India there are a number of government and non-government organizations that are involved in the protection and management of water bodies.

**Government Institutions:** Technically, in urban areas, water bodies are owned by land owning agencies. However, their survival and protection depend on the role of a number of other institutions /agencies such as Ministry of Water Resources, Ministry of Environment and Forests, Agriculture Ministry, Fisheries Ministry and other local authorities, i.e., Municipal Corporations, Development Authorities, Tourism Department, Water Supply Boards, etc. At the Central Government level, Ministry of Environment and Forests (MoEF) plays an important role in restoration of lakes in India under its initiative called National Lake Conservation Plan (NLCP) developed in 2001 specifically for the protection and management of lakes. The objective of NLCP is development of national level policies and actions with focus on urban lakes. In theory, MoEF envisages a comprehensive and holistic approach for lake conservation under the NLCP. However, it must be noted here that water being a State subject, the Centre has a limited authority when it comes to the management and protection of urban water bodies. In order to execute its agenda, MoEF have asked all States to constitute City Level Monitoring Committees (CLMCs) for all river and lake conservation projects and to aid coordination between the Centre, States and urban local bodies. MoEF shares 70% of the involve cost of the restoration projects under NLCP. So far, NLCP has spent Rs 352.19 crores for the restoration of more than 40 lakes in 14 states. Unfortunately the results are still far from satisfaction as in most cases the focus remained on short-term solutions only. For example, the majority of funds provided under the

government schemes such as NLCP projects have been spent on high cost technological solutions and beautification around a water body rather than on ecological restoration and improvements in water quality. There has been also a lack of stakeholder participation and capacity building in the projects under NLCP, which is one of the main objectives of NLCP.

***Special Purpose Vehicles:*** Special Purpose Vehicles (SPVs) for lake management and conservation have also been set up in many parts of the country, such as, Bhoj Wetland Authority for the restoration and management of Bhoj wetlands in Madhya Pradesh, Chilka Development Authority (CDA) in Orissa for the Chilka Lake, Loktak Development Authority (LDA) for Loktak lake in Manipur, Lake Development Authority Bangalore (Karnataka) for Bangalore lakes, J&K Lakes and Waterways Development Authority for Jammu and Kashmir Lakes, Hyderabad Urban Development Authority for Hyderabad lakes in Andhra Pradesh, East Kolkata Wetlands Management Authority for the conservation and management of a large number of waterbodies in district 24 Pargana in West Bengal and Jal Vikas Samiti in Udaipur (Rajasthan). These special Purpose Vehicle are playing an important role in the protection and management of waterbodies in India. As the legislation does not give the responsibility for management of waterbodies to a specific agency, these Special Purpose Vehicles are empowered to enforce provisions of the legislation. For example, Jammu and Kashmir Lake and Waterways Development Authority has the powers to grant or not to grant permissions for construction and has enforcement powers against illegal activities in the entire catchment area of Dal Lake.

***Non Government Organizations:*** Apart from government bodies, a number of national and international non-government organizations such as WWF, UNDP, UNEP, ADB, World Bank and many other small local organizations/Citizen Groups such as Neela Hauz Citizen Group in Delhi and Save Urban Lakes in Bangalore, are also involved in lake conservation and restoration. One of such examples of lake restoration involving local NGOs is restoration of Hamirsar Lake in Bhuj, where the local NGOs worked together with the municipality to restore the lake. These organizations primarily provide technical and financial assistance for the upkeep of lakes and wetlands. These organizations also act as catalyst in enhancing people's participation, Although, some positive outcomes have been achieved due to the efforts of these organizations, however, unfortunately there is a lack of coordination among the efforts between these agencies.. As a result, their efforts often get overlapped and produce limited results only.

Furthermore, the NGO projects basically depend on limited funding. Hence, once the funding is over they have to stop the project regardless the state of the waterbody.

***Judiciary and Legal Mechanisms:*** Although the Indian Constitution and courts acknowledge the importance of urban waterbodies and a mandamus can be sought under the current constitutional provision and legislation, however currently there is no legal instrument specifically aimed at the protection and conservation of lakes, wetlands or other aquatic ecosystems. Nevertheless, in the last few decades a number of Public Interest Litigations (PILs) have been filled by various citizen groups that have successfully sought mandamus for many highly polluted and environmentally degraded lakes. Some of these significant battles of lake protection include Powai and Charkop lakes in Mumbai against encroachment, destruction of mangroves and pollution due to dumping of garbage and debris, East Kolkata Wetlands against pollution from tanneries, Deepor Beel in Guwahati against garbage dumping and encroachment etc.

### **The Challenges/Gaps in the Lake Management Approaches in India**

Despite various acts, policies and organizations a number of urban water bodies are in a shame. This means there are definitely some gaps in our current lake protection system which must be addressed for an effective management of urban waterbodies. Some of these gaps/challenges include:

***Lack of a Clear and Detailed Definition of Lakes:*** One of the obstacles for an effective protection of urban lakes is lack of a clear definition of a 'lake'. The definition provided under the guideline of NLCP acknowledges only broad hydrological criteria to define a water body as a lake. According to NLCP, a waterbody should have a minimum water depth of 3m and should cover a water spread of more than ten hectares to be considered as a lake. This definition ignores the fact that the water depth and spread keep changing every year depending on the various environmental factors. Therefore, instead of providing any identity or protection to a lake, this limited criterion actually works in the favour of corrupt elements of the society for whom the only significance of a waterbody is its land value. This limited definition provides an opportunity both to private builders and the government to encroach urban lakes for their monetary interests. In fact, there are very few urban lakes that fit into this definition since most of them occupy a small area, are seasonal and shallow.



***Lack of Data/Information:*** India has a number of lakes, but data about their existence is extremely hazy as there is no orderly or scientific census of lakes. In many cases, we do not even have correct data on the number of waterbodies that exist in a particular area. For example, in 2001, on the order of High Court a joint survey committee assessed the number of natural waterbodies in Delhi and came up with a list of 508 waterbodies, which differed from a count of 794 submitted by TAPAS (a Delhi based NGO). The court asked for another survey and Delhi Development Authority (DDA) came up with a new count of 580 waterbodies in Delhi in 2004. To make the situation worse, there is also mismanagement of data by the concerned departments. For example, in many cases lakes have been given different names by various departments, hence it becomes difficult to locate and identify the lake itself at the first place. This situation underlines the fact that the urban water bodies will continue to be under stress, encroached and manipulated to be used for alternative uses.

***Lack of Acknowledgement of a Waterbody as a Land Use Category:*** Another major challenge that makes the conservation and management of urban lakes difficult is the absence of a specific land use category for urban waterbodies. As a result, the water bodies are often easily used for other purposes. For example, Somepeta thermal power plant in Andhra Pradesh and Nirma plant in Bhavnagar where the attempts were made to convert these waterbodies for commercial use. Fortunately, the quick action of central government saved these wetlands.

***Lack of Systematic Strategy and Coordination:*** One of the prime reasons behind the deteriorating situation of urban lakes is a complete lack of an effective institutional framework to manage waterbodies, which simply does not exist in our cities. Though, there are a number of government and non-government organizations working for the protection of waterbodies, there is no systematic strategy and coordination among them. Thus, the results are short-term and do not result in long-term improvements. For example, the JNNURM programme of MOUD. Under this initiative, a large amount of funds have been spent on various projects to fast track urban development. However, the way the proposed projects have been executed so far completely lacks a systematic planning and coordination among the project areas, agencies and stakeholders. As a result, where one area of urban development has been improved using these funds, the other area has been damaged immensely, that also includes, in many cases, the near by water waterbodies to the project area.

For example, the projects involving construction of roads. The focus of these projects is only to construct roads regardless the impact of these activities on the surrounding natural environment.

***Lack of an Ecosystem Approach:*** A number of lakes in India are disappearing due to mismanagement of its watersheds, catchments and shoreline. The lake restoration programmes and management plans often lack a ecosystem approach towards lake management. For example in many cases, the urban lakes are encompassed by a wall. The lakes without a well managed shoreline loss their natural ability to maintain their balance in various situations. A well managed shoreline plays an important role in protecting the waterbody e.g. by filtering pollutants before the storm water run off enters the lake.

***Lack of Participation and Capacity Building:*** Without making people aware of the environmental and economic importance of their local waterbodies and, harmful impacts of polluting and destroying these waterbodies, it is almost impossible to protect our waterbodies. If people can be made aware of all these then automatically they will contribute in protecting their local waterbodies and the law can be easily implemented in the society. However, unfortunately, government policies often lack the efforts to build bridges between people and their local waterbodies.

***Lack of Balance of Interests in Management Approaches:*** Another big challenge for the protection and management of urban lakes is to bring diverse groups of people together, getting them to talk to each other and solve common problems. Citizens' groups, resident welfare associations, local organisations, activist groups, green organisations, political organizations, educational institutions and government agencies all have a very different ideologies, agendas, issues and needs that they considered important and fight for their view point and interests. This lack of a strong sense of a community often makes protection and management of common resources difficult.

### **Some Initiatives for Way Forward**

Despite this situation, there is still hope as within last few years some initiatives have been taken by the citizens and concerned organizations that help fight this degradation of urban water bodies so some extent. In many instances, citizens and NGOs have filed Public Interest litigations (PILs) for the protection of the water bodies in many cities. Some new institutional and technological experiments are also being carried out recently. Although not all initiatives

lead to the desired and holistic results, they are still valuable in paving the way ahead not just in terms of highlighting the problem areas of conservation and restoration of urban lakes and wetlands but also what can be done institutionally as well as technically. Some of these examples include:

***Kaikondrahalli Lake: A Unique Community Based Initiative***

Kaikondrahalli lake in Bangalore is a unique example which was restored using a socially inclusive model that also balanced the interest of local stakeholders. A range of citizens including original inhabitants of villages around the lake and resident welfare associations from wealthier apartment complexes have worked with the municipal corporation to design an ecologically meaningful, socially sustainable lake-restoration programme. As a result, the lake that was once on the verge of extinction has been ultimately restored with clean water flowing in. Around 37 bird species, including migrant birds, have been spotted at the lake. Provision is also made for local residents to wash cattle. A play area and other facilities are planned in such a way that these can be used by visitors to the lake, as well as by schoolchildren at a nearby low-income government-aided school.

***Hauz Khas Lake: An Ecosystem Approach***

Half a decade ago, the Hauz Khas lake in Delhi was suffering from a low water table and was almost dry. Many years ago, the lake-bed was partly concretized with an intention to stop the tremendous percolation losses. To make the situation worse, the lake is located at a place where adjacent land use cannot be changed and no other source of surface water was available to retrieve the lake. The only source of water that was available was storm water and the wastewater from a nearby sewage treatment plant. With time, several trees were also grown up in the shallow mud pockets of the lake-bed and many more were planted by the local authorities along the 1km long edge of the lake. From the lake management point of view, this vegetation was a hazard for the waterbody as it multiplies the organic load. Although, there were three natural storm water channels on the catchments area however, the storm water alone was not enough to fill the lake. Hence, the treated effluent from the near by sewage treatment plant was diverted to the lake using pipes. In order to revive the water quality, bioremediation facultative anaerobic bacterial consortium was introduced in surface water to reduce Biological Oxygen Demand, Nitrogen and to improve the levels of dissolved oxygen. Fish species were also introduced in the lake to consume the planktons, which feed upon the organic load in water.

Today, eventually the lake has acquired the character of a natural ecosystem.

### ***Mansagar Lake: An Alternate Institutional Arrangement***

In recent years, new institutional arrangements are also being implemented particularly the public-private-partnerships (PPP). However, these forms of arrangements often face a strong resistance from civil society. The restoration of Mansagar Lake in Jaipur is an example of such an arrangement where the government decided to imply the PPP approach to restore the lake. Until few years back, Mansagar Lake, an artificial lake of 300 ha. in Rajasthan was suffering from serious problems of siltation and contamination, inflow of wastewater, eutrofication and loss of water due to the outflow for downstream irrigation during summer. During the past years, several attempts were made by government of Rajasthan to restore the lake but none of these attempts yielded any positive result particularly because of lack of funds. In 2002, the government decided to created public-private partnership of the state government and a private player called Jal Mahal Resorts Pvt. Ltd. (JMRPL). Under the agreed restoration plan, the lake-bed was dredged to enhance its holding capacity. The authorities implemented a scheme to discharge treated sewage in the lake to ensure that the water balance was maintained in spite of high evaporation losses. Three wetlands of total 40,000 sqm were constructed in the vicinity of the lake to facilitate fill up the Mansagar Lake with clean water. The sewage water is diverted into these wetlands before releasing into the lake. The lakefront was leased out to a hospitality group and the lake's health was tied to revenues from tourism to generate money for further investments on the restoration of the lake. The water quality of the lake has immensely improved over the past five years.

### **Recommendations**

Considering the threats and challenges of protecting urban waterbodies as discussed above, the following recommendations can be proposed to make the protection and management of lakes in India more effective:

- It is recommended that there is a need to develop a clear and elaborate definition of 'lake' that must consider all the aspects of a waterbody including the climatic and ecological changes over the time.

- A holistic understanding and acknowledgement of a lake system should be an important part of lake management plan. For example, under the lake restoration projects, the restoration of the catchments of a water body is often ignored or mismanaged and most of the money and the efforts are spent on the beautification and temporary improvements of water quality. As discussed earlier that without a healthy catchment a lake is no more than a tank and has no abilities to maintain its water balance by its own. As a result, the restoration projects produce short-term results only.
- A clear vision regarding the level of rejuvenation of water bodies is also recommended. In order to make a productive use of limited available resources, it is important to determine an acceptable level of restoration of lakes.
- There is also a strong need of ecological orientation and developing an appreciation of ecosystem services among urban managers.
- It is also suggested here that the ecosystem services provided by a waterbody must be valued in terms of quantification of its benefits.
- There is also a need to emphasis on developing a systematic strategy involving all the components that have an impact on the waterbody and the involved stakeholders along with a better coordination among the government agencies, as part of lake and wetlands restoration and protection programmes.
- It is also required to replace the fast track development programmes, such as JNNURM with well analyzed and environmentally sustainable programmes based on a holistic understanding of urban environment and its needs.
- As mentioned earlier that without making the citizens aware of the importance and benefits of lakes and wetlands in their lives, it is extremely difficult to implement laws effectively. Hence it is strongly recommended that stakeholder participation and capacity building must be used as an important instrument for better management of urban waterbodies.

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