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Ministry of Urban Development
Government of India
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Advisory on Conservation and Restoration of Water Bodies in Urban Areas






Central Public Health and Environmental Engineering Organization
(CPHEEO)

August 2013

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Secretary (UD)

FOREWORD

Foreword

Water is the most discussed and debated topic all over the world and a plethora of treaties and conventions have eulogized its sustainable uses. It has been around since time immemorial. While the quantity of freshwater has remained constant, continually recycled through the atmosphere and back in to use, the population has exploded. This means competition for a clean, copious supply of water for drinking, cooking, bathing, and sustaining life intensifies.

Water scarcity is an abstract concept to many and a stark reality for others. It is the result of myriad environmental, political, economic, and social forces. While nearly 70 percent of the world is covered by water, only 2.5 percent of it is fresh water. Only 0.007 percent of the planet's water is available to feed its 6.8 billion people. In the developing countries, clean water is either hard to come by or a commodity that requires laborious work or significant currency to obtain.

The human body contains 60 percent water. Ironically, humans continue to be inefficient water users. Hence the challenge: how to effectively conserve, manage, and distribute water. Therefore, it is essential to assess where freshwater resources exist, how they are used, and how climate, technology, policy, and people can play a role in finding solutions.

The Ministry of Urban Development (MoUD) has the mandate, inter alia, to conserve/restore urban lakes/water bodies, re-use and re-cycle waste water, etc. These are important factors, some oft forgotten, and have been summed up in the **"Advisory on conservation and restoration of water bodies in urban areas"** by CPHEEO for the use/guidance of State Governments/ ULBs with the hope that they shall improve it further and apply as per own needs. The initiative gains immense importance in the sense that urban lakes/ water bodies are first victims of urbanization and their conservation/restoration is sign of healthy and sustainable urban development.

Dr. Sudhir Krishna

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1. Introduction

Adequate availability of water is pre-requisite for survival and quality of human life. With about 1.2 billion people without access to drinking water and about 2.4 billion lacking basic sanitation, the symptoms of emerging global water crisis are too obvious. 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 that 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 most cities have become 'black holes' for water which is being brought from distant points to meet needs of growing urban population. The increasing supply is also generating bigger volumes of waste water mainly in the form of sewage and industrial effluents causing additional challenge to urban planning.

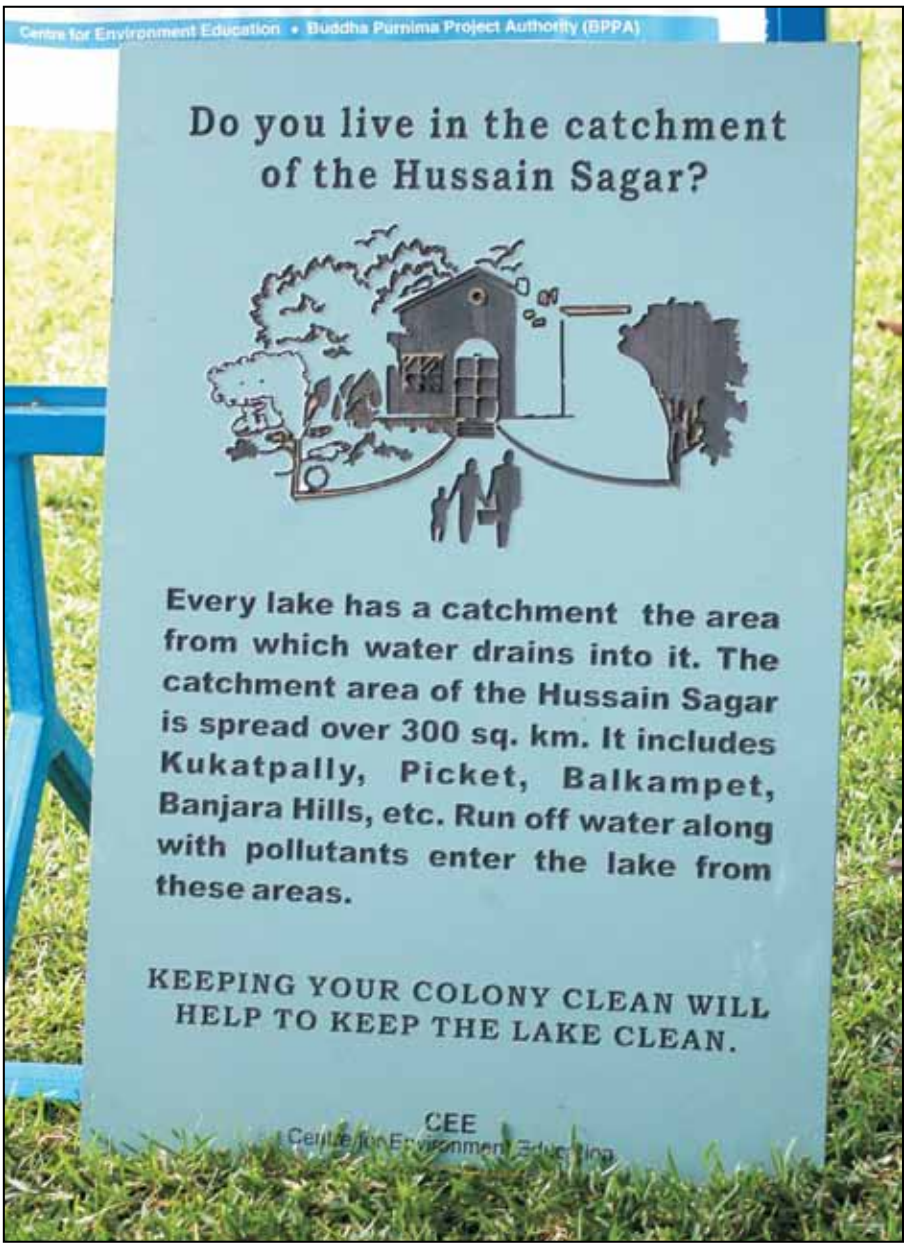
The landscape of India is dotted with large number of lakes, reservoirs and wetlands. Historically, the lakes have met water demands of the population for centuries and a community management system had sustained them for a long period of time.

Hyderabad lake is receiving some restoration initiatives.

2. Importance

Lakes are an intrinsic part of the eco system. A lake or pond is the Water Body which holds certain volume of water generally in all seasons of the year. Lakes have traditionally served the function of meeting water requirements of the people for drinking, household uses like washing, for agriculture, fishing and also for religious and cultural purposes. Apart from these functions, which involve direct use of the lake water, lakes are also known to recharge ground water, channelize water flow to prevent water logging and flooding. Lakes are also host to a wide variety of flora and fauna.

Urban Lakes or Water Bodies are very important feature in the landscape. They are vital in the hydrological severe conditions like drought and floods, they influence the micro-climate as well as enhance the aesthetic beauty of the landscape and offer various recreational opportunities. The Water Bodies in urban areas provide a diversity of values and uses ranging from ecological goods and services to direct production values. The stored water may be used for consumptive purpose as well as non-consumptive use like irrigation, fishing, eco-tourism, etc. These are also sites of artistic, religious and spiritual pursuits. These are essentially relevant social benefits. Therefore, the need to initiate efforts to restore, conserve, manage and maintain the lakes as an inseparable part of the whole eco system cannot be undermined.



A lake awareness example at Hyderabad.

3. Factors responsible for degradation of 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 one time drinking water source reservoirs like Upper Lake in Bhopal and Himayatsagar and Osmansager lakes in Hyderabad are now facing the crisis. In the last half of 20th Century the lakes underwent un-precedented environmental degradation on account of (a) population explosion, (b) large scale industrialization, (c) chemical intensive agriculture, and (d) water intensive lifestyles. The factors that lead to degradation of lakes include urbanization, pollution of water due to sewage, nutrient rich agricultural run-off and industrial toxic liquid waste and reclamation leading to siltation and loss of morphometry. The quality of water of lakes can be assessed with help of a checklist on designated best use, enclosed at Annexure-I.

Urbanization and/or industrialization of the lake catchments in particular has 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.

A city of about 3 million population is estimated to produce nearly 10 crore litres of waste water daily which can be re-cycled and re-used, to amply meet the local/non-potable needs.

Ramchandrapura Lake now extinct (south of Jaipur).

4. Impact of urbanization on lakes

Various problems are associated with urban Water Bodies like high influx of sediments from the lake catchment, disposal of untreated/partially treated sewage and industrial waste water, solid waste disposal into the water body, entry of diffused source nutrients from agricultural and forestry, improper management of storm water, abstraction of lake water, exploitation of lake for recreation, fishing, land reclamation purposes, etc. Increasing encroachment on the bank of the lake including shore line erosion, causes deterioration of water quality and upsets bio-diversity of the lake, all these cause an impact on climate change also.

Rapid urbanization has following impact on lakes:

- **Eutrophication:** Industrial effluents, run-off from agricultural fields, refuse and sewage, domestic wastes like food remnants, soaps, detergents and sewage are dumped into lakes which break down and release nutrients in the lake water. Microscopic organisms ingest these nutrients and survive on them. Following ingestion of carbonic elements, carbon dioxide is released, while some of the elements are converted into nitrates and phosphates. This is called oxidizing and uses up a lot of dissolved oxygen. The depleted levels of dissolved oxygen in water lead to a situation where other aquatic life-forms cannot survive. This process is called eutrophication.
- **Siltation:** Water flowing into a lake brings silt. Increased deforestation loosens the top soil, which finds its way into lakes. Some of the silt is washed out when the lake overflows. However, the outflow of silt does not always match the inflow and silt settles at the bottom of the lake.
- **Flooding:** Traditionally tanks were created as a chain of water bodies to have a cascading system so that the inter-connectivity would retain flowing water, maintain it round the year, leaving little room for water to be wasted. Such a system is impacted for past some decades.

A mix of aquatic vegetation, fish and avifauna at Kharda lake in Pali district.

5. Environmental and Social Impact of Lake Restoration

5.1 Environmental assessment

Effective, long-term lake conservation plan is a complex undertaking that must dwell upon sociology as well as biology. The decision to restore or protect a particular lake has to be based on a thorough study of the lake, its watershed, and the commitment of time and money necessary for long-term management. Each lake is unique, and each management process is as complex as the concerns it addresses. But the ecological, social, and economic benefits of a well-managed lake can span generations. For these reasons, the actual value of a lake conservation project cannot be calculated.

5.2 Economic Impact of lake conservation

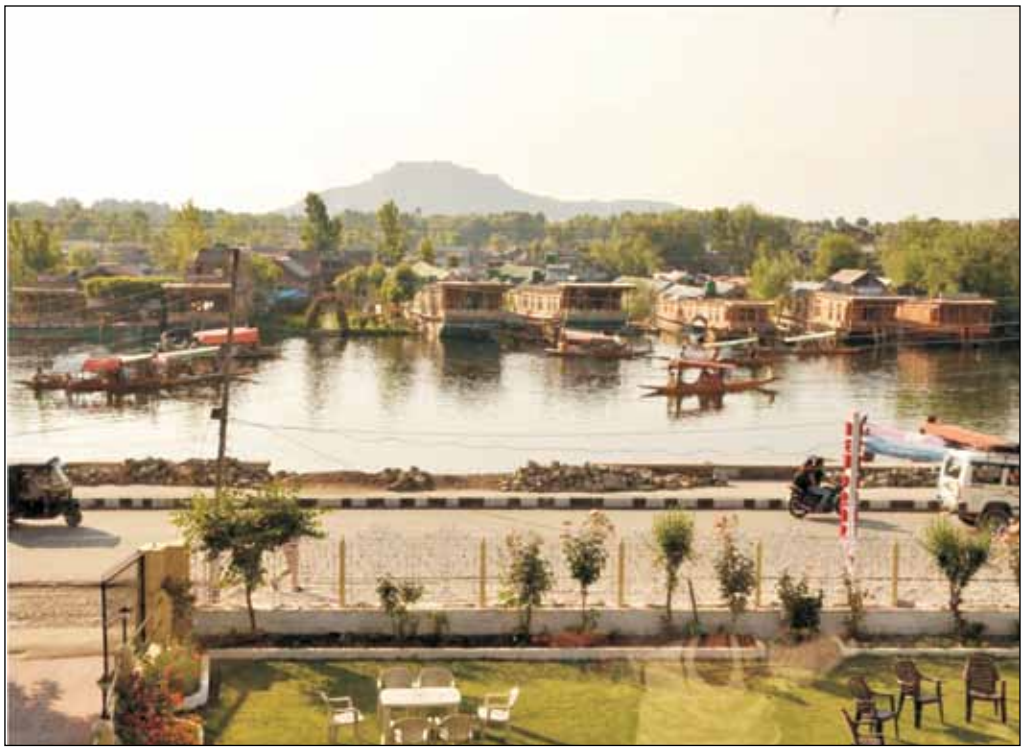
The visual quality of the communities built around the lake is highly dependent on the condition of the Water Body and the lake-shore. The natural beauty of the lake is part of the quality of life for lake-shore property owners and the entire community. The quality of a lake directly affects community property values and, therefore, the local tax base. A properly managed lake provides recreational opportunities for citizens and mode of revenue for the Government for maintaining

Shillong lake, an example in just use and intact watershed.

the lake.

5.3 Social impact of lake conservation

Lakes have been part of the historical as well as social landscape in cities for many centuries. Villages have clustered around many of these Water Bodies and depended on them for meeting all water related needs, from household uses to livelihood uses. Though this aspect of lakes has changed due to urbanization, there still exist many communities residing around lakes, who depend on them. Lakes continue to exist as Common Property Resources. The social impacts of lake conservation can be broadly categorized as under:



Dal lake in Srinagar.

5.3.1 Climate: Lakes are cooling agents and are essential to the urban microclimate. The cool air, if allowed to flow unrestricted into the surrounding urban development, creates a stress free soothing environment for citizens in adjacent localities.

5.3.2 Recreational facilities: Recreation activities along the urban lake-fronts, if promoted in well planned methods, can serve as a new revenue generating measure. The lakes can form a part of urban aesthetics and visual links can be established by avoiding barriers like walls and high bunds along the lake.

5.3.3 Encroachments: Some areas of the lake-front are inaccessible and get inhabited by slums and other unauthorized usage. Such activities can be avoided by giving free access to the public with well-landscaped spaces along the lakefront.

5.3.4 Rainwater harvesting and bio diversity: Lakes assist in rainwater harvesting and protection of biological resource, enhancement of water quality and watershed management. Further, lakes are home to many aquatic animals and plants.

Therefore, urban lakes have to be in the focus of urban planning and decision-making processes as these surface water sources, if protected and managed properly, will create tremendous potential to augment the water supply, if not immediately for drinking, but for other non-potable water requirements of ever increasing urban population.

6. World Lake Vision

The World Lake Vision has been developed by International Lake Environment Committee (ILEC), Japan, in collaboration with UNEP, aiming at illuminating the growing crisis in management of lake ecosystem, articulating principles to guide the transition towards managing lakes for their sustainable use and to provide a practical blueprint for ensuring long-term health of lakes and integrity of their survival and economic development.

The World Lake Vision has articulated the basic action plan for sustainable use of lakes and wetland resources in the form of seven basic principles, which, if implemented in letter and spirit, will have potential of transforming a water stressed society to an enlightened society that sustains itself without degrading its natural foundation. The Seven Principles of Sustainable Lake Management are:

1. A harmonious relationship between humans and nature is essential for the sustainable use of lakes.
2. A lake drainage basin is the logical starting point for planning and management actions for sustainable lake use.
3. A long-term, preventive approach directed to preventing the causes of lake degradation is essential.
4. Policy development and decision making for lake management should be based on sound science and best available information.
5. The management of lakes for their sustainable use requires the resolution of conflicts among competing users of lake resources taking into account the needs of present and future generations and of nature.
6. Citizens and other stakeholders should be encouraged to participate meaningfully in identifying and resolving critical lake problems.
7. Good governance, based on fairness, transparency and empowerment of all stakeholders, is essential for sustainable lake use.

Demoiselle Cranes and ducks at a wetland.

7. Suggested Steps in Lake Conservation

State Governments/ULBs, etc., are required to initiate following important steps:

1. Identification of lakes/ponds in the urban areas. The Water Bodies should be notified in the municipal land use records as the municipal assets - the Water Bodies for common objectives, mentioning their area and particular location.

2. Urban Water Bodies should also include other forms of water sources like storm water drains, step wells (*baoris*), trenches around old forts, wells as well as man made Water Bodies like ponds within temples, gurudwaras, mosques and other such public places which are together, commonly called as the "green architecture" of a city.

3. The shore-line of the Water Bodies should be properly fenced to protect it from encroachment. A well planned awareness campaign should be conducted in the localities to highlight benefits to be gained from them. If any encroachment exists on the bank, it needs to be re-settled/re-located in consultation with affected peoples.

4. The inlet and outlet of the Water Body should be identified and need to be monitored at a frequent interval. Any obstruction in the inlet and outlet should be recorded and be removed.

5. Any outfall of domestic/ industrial sewage into the Water Body should be prevented and only treated effluent, as per effluent standard of the State Pollution Control Board, may be allowed to dispose into the Water Bodies.

Pollution of Lake due to urban waste water at a central Indian Lake.

A treatment plant based on chemical-uses.

6. Measures like cleaning of Water Body involving de-silting, de-weeding, aeration, reduction of nutrient, removal of floating and other invasive aquatic plant-species or any successfully tested and technologically suitable to the local condition, may be taken up.

7. Catchment area treatment like afforestation, storm water drainage management, silt traps, etc., may be undertaken.

8. A comprehensive water front development at preferably vacant government land around the lake may be taken up keeping in view the eco system based approach for the aquatic body, conforming to prevalent environmental legislation and maintaining social and cultural sanctity of the place.

9. Land around the lake and at a certain distance from its shore-perimeter should be declared as eco-sensitive area and dumping of any solid waste into these areas should be made a punishable offence. For collection of solid waste, collection-bins need to be placed around the Water Body and regular cleaning of solid waste should be undertaken.

10. The water quality of the Water Body needs to be monitored on weekly basis by the concerned ULB. If any parameters are found to be beyond the limit of designated use, proper action should be taken up to maintain the quality of lake water.

11. To create awareness among people, notice boards should be displayed in the surrounding areas of the lake, informing Do's and Don'ts, etc.

Reeds at a Constructed Wetland, the bio-treatment technique.

12. Any commercial use of the lake and its immediate surrounding areas should be properly assessed before conveying the permission.

13. A State Level Advisory Committee may be set up by drawing members from Irrigation, Water Resource, PWD, Health Departments, etc., of State Government, including experts in the field of lake conservation. The Committee will suggest the State Level Development Authorities to formulate appropriate steps at State level towards balanced conservation of urban Water Bodies.

14. Lake/ wetland protection authorities, particularly local Lake Development (or Conservation) Authorities should include experts such as lake water quality specialists, integrated water management professionals, groundwater experts and city planners. Inclusion of the representatives of all the stakeholders in such Bodies will be advantageous.

15. A holistic understanding and acknowledgement of a lake system should be an important part of lake management plan focusing on water quality and quantity. It will be a strong need for ecological orientation and development of an appreciation of ecosystem services among urban managers.

16. The urban Water Bodies should be designated as a separate land use classification that is legally tenable. It should be done in

parallel with the Protected Areas as defined under the Environment Protection Act and the Forest Protection Act to prevent their encroachment and destruction.

17. Urbanization has to take into account the delineation and protection of catchment areas, feeder channels and command areas of lakes, ponds, etc., and restore or protect them to the extent possible. Else, alternatives have to be devised and included in the city plans.

18. Urbanization should be planned and executed in such a manner that high priority is accorded to local water availability as well its appropriate uses. Adoption of water-centric approach in concurrent and future urbanization will result in a more balanced natural growth to cities.

19. Non-conventional approaches to sewer treatment may be integrated with the conventional treatment process based on local requirement. Available methods of non-conventional treatment should be integrated into any plan for lake restoration and revival.

20. Alternate sources of funds for lakes will be welcome. However, the adoption of PPP as an appropriate mechanism is to be so developed that the natural resources, like lakes/ponds, are not handed over, for ever, and in to to, into hands of private partners. A tripartite arrangement can be firmed up between (a) funding agency (private company or any other sources), (b) the government agency (city or State authority) and (c) implementing agency (a public trust

A mozaic of aquatic vegetation at Jaisalmer's Gajrup Sagar lake.

or registered society with an impeccable conservation track record and competence for lake restoration). It would be a PPPP (Public, Private Partnership Project) and would be much more transparent than the existing PPP model.

21. There is need to coin an appropriate definition of 'lake' that must consider all the qualities of a Water Body essentially including the climatic and ecological changes that would have occurred or would like to happen over the time.

22. A clear vision of lake regarding the level of rejuvenation of Water Bodies should be prepared by ULB. In order to make a productive use of limited available resources, it is important to determine an acceptable level of restoration of lakes.

23. The eco system services provided by a Water Body need to be evaluated by quantification of its benefits.

24. An integrated and time bound strategy be devised as part of lake and wetlands restoration and protection programmes, involving all the components that have an impact on the Water Body; the stakeholders be involved to effect better coordination.

25. Stakeholder participation and capacity building must be used as an important instrument for better management of urban Water Bodies.

26. It should be ensured that each urban complex develops its Water Plan and Water Budget (for drinking, other domestic uses, industrial uses and for all remaining uses like gardening, etc.)

Tortoises contribute to water quality.

Khecheperi lake in Sikkim, a holy example.

to enable it to become self-reliant in demand-supply of this natural resource.

27. Impose a ban on uses of 'potable water' for purposes other than drinking and introduce a new workable system to restrict use of potable water for drinking only. Uses of water for all other remaining purposes, to the extent feasible and not detrimental to human health and well being, has to be made available through re-cycling and re-use process and should be augmented in a big way to meet existing/growing needs of urban clusters.

28. Each urban complex should curb/shed the prevailing reliance of drawing water from nearby/ distant reservoirs/rivers, in order to reduce social-economic imbalance and reduce the impact on the eco system of those water retaining areas. Each urban complex should devise a strategic plan to (i) re-cycle and re-use the waste water generated by citizens daily (ii) it may be carried out by establishing mini/major Treatment Plants based on time tested and well proven treatment techniques. Bio-treatment techniques (models are available with NEERI, IITs and ICAR) may also be considered after properly ascertaining their performance and sustainability. This is expected to result in creating a new bouquet of benefits like: (i) saving the urban environment from increasing scourge of chemicals (used in ETPs/STPs as prevailing practices), (ii) reduce the capital cost of such plants to a great extent, (iii)

reduce time over-run in installation, (iv) save electricity, not required in bio-processes, etc. Such re-cycled water should necessarily meet the requirement of urban clusters for needs other than 'drinking purpose.'

29. Establish a Lake Conservation Authority at State level to devise a new mechanism to sustain lakes as finite natural resource and rejuvenate them at eco system based approach. Such an Authority should quantify Eco System Services offered by lakes, reservoirs, rivers, village ponds, etc., to be utilized as educational tools in schools, urban planning/development. Model Urban Cluster centric examples for urban lakes can be created and cited as iconic demonstration for water-re-cycle and re-use.

30. Ownership of each Lake should be decided, as most lakes face indefinite sustenance due to multiplicity of administrative control and/or lack of specific action by singular authority. The in-charge authority should treat Lakes as 'natural resources', to act as the potential catalysts to better civic health, provide recreation, improve tourism, possibly meet water-needs of local people, etc. Such gains shall be attained only after the Lakes are treated on eco system based approach.

31. Most Lakes receive storm-water during monsoon season to meet annual requirement of water in their bed; the first flush brings in incalculable organic load and silt in to the lake, which are most hazardous and alter their water chemistry beyond easy solutions. Such storm water loads must be arrested prior to entry points by using bio-approach like creation of a 'sedimentation basin' at space prior to entry-point, or at the entry-point or around.

Recreation helps appreciate lakes' qualities.

32. The Lakes should live with their inherent natural features to remain as healthy Water Bodies, e.g., fish, frogs, turtles, micro-organisms, zoo planktons, phyto planktons, including varieties of aquatic vegetation (rooted, submerged, floating, etc), all these are catalytic to improving water quality.

33. Surrounding areas around Urban Lakes should be presented as future business propositions with specific caps on use of space, as PPP Projects with distinct potential to transform the entire locale into a new eco-niche which will be to the ultimate welfare and recreation of citizens.

34. A Storm Water Management Plan of each city should be prepared and Water Bodies around should be taken into consideration to receive such storm water after it is appropriately tackled/ treated through various feasible techniques including those like sedimentation basin and/or Constructed Wetland (bio-treatment) approach etc.

The above suggestions are suggestive in nature and States/ULBs shall be free to take up programmes as to suit the local conditions.

8. GOI support for Lake Conservation

8.1 National Lake conservation Programme

The Ministry of Environment and Forests implements the National Lake Conservation Plan, a Centrally Sponsored Scheme, aiming at restoration of water quality and ecology of the lakes in the country. The scheme is under implementation since 2001 having funding pattern of 70:30 between Central and State Government (90:10 for North-Eastern States). The guidelines of NLCP may also be visited at the link <http://moef.nic.in/modules/recent-initiatives/nlcp/NLCP_guideline.pdf> for preparation of projects on conservation/ preservation of lakes.

8.1.1 Activities covered under NLCP

Prevention of pollution from point sources by intercepting, diverting and treating the pollution loads entering the lake. The interception and diversion works may include sewerage and sewage treatment for the entire lake catchment area like:

(i) In situ measures of lake cleaning such as de-silting, de-weeding, bioremediation, aeration, bio-manipulation, nutrient reduction, withdrawal of anoxic hypolimnion, constructed wetland approach or any other successfully tested eco-technologies, etc., depending upon the site conditions.

Jaipur's Man Sagar lake.

(ii) Catchment area treatment which may include afforestation, storm water drainage, silt traps, etc.

(iii) Strengthening of bund, lake fencing, shore line development, etc.

(iv) Lake front eco-development including public interface.

(v) Solid waste management and provision of dhobi ghats is generally not covered under NLCP.

(vi) Prevention of pollution from non-point sources by providing low cost sanitation.

(vii) Public awareness and public participation.

(viii) Capacity building, training and research in the area of lake conservation.

(ix) Any other activity depending upon location specific requirements.

8.1.2 National Wetland Conservation Programme

The Ramsar Convention on Wetlands defines wetlands as: "areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres".

Government of India operationalized wetland conservation programme in 1985-86 in close collaboration with concerned State Governments. During 10th Plan 94 wetlands, 39 mangrove ecosystems, 4 coral reefs were identified for management and conservation.

Heronries signify lake's qualities.

Water-shed of a lake in the Western Ghats.

The Cabinet Committee on Economic Affairs (CCEA) in its meeting held on 7th February, 2013, has approved the proposal for merger of National Lake Conservation Plan and National Wetlands Conservation Programme into a new scheme 'National Plan for Conservation of Aquatic Eco-systems' (NPCA). The merged scheme is to be operational during XII Plan Period at an estimated cost of Rs.900 crore and shall have a funding pattern of 70:30 cost sharing between Central Government and respective State Governments (90:10 for NE States).

The principal objectives of the new scheme are holistic conservation and restoration of lakes and wetlands for achieving desired water quality enhancement besides improvement in biodiversity and eco system through an integrated and multidisciplinary approach with a common regulatory framework. The scheme would contribute to reduction of pollution loads and improvement in biodiversity as also the goods and services provided by these water bodies to the stakeholders. Besides the implementation of comprehensive Management Action Plans, the new scheme on conservation and management of lakes and wetlands in the country shall also cover in its scope, the inventorization and information system on lakes and wetlands, national level directive on criteria for lakes and wetlands, regulatory framework (Revisiting the Wetlands Rules, 2010), capacity building at State Government and local body levels, evaluation, etc.

8.2 Jawaharlal Nehru National Urban Renewal Mission (JnNURM)/ Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT)

The Government of India launched the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in December 2005. The aim

of the mission is "to encourage reforms and fast track planned development of identified cities, focus is on efficiency in urban infrastructure and service delivery mechanisms, community participation and accountability of ULBs/ parastatal agencies towards citizens". It is designed to promote planned urbanization on the lines of City Development Plan (CDP).

8.2.1 Urban Infrastructure and Governance (UIG)

Under the programme, one of the sub-missions is 'Sub-Mission for Urban Infrastructure and Governance (UIG)'. The duration of the Scheme will be for seven years beginning from 2005-06. The scheme will apply to 65 cities/towns as per 2001 census, including the 35 Metro cities, State Capitals and other important pilgrim centres.

The scheme will cover the following areas:

i. Urban Renewal i.e. redevelopment of inner (old) city areas

ii. Water Supply (including desalination plants) and sanitation

iii. Sewerage and Solid Waste Management

iv. Construction and improvement of drains/ storm water drains

v. Construction/Upgradation of roads, highways/expressways

vi. Parking lots/spaces on Public Private Partnership basis

vii. Development of heritage areas

viii. Prevention and rehabilitation of soil erosion/

Invasive fish species adversely impact lakes' ecology.

Such broad-leaved aquatic vegetation is catalyst to lake-restoration.

land slides only in case of Special Category States where such problems are common and

ix. Conservation of water bodies.

8.2.2 Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT)

Likewise, another scheme namely, Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT), has also been launched which aims at improvement of urban infrastructure in the remaining 5096 towns and cities as per 2001 census (excepting cities/towns covered under Jawaharlal Nehru National Urban Renewal Mission (JNNURM)) in a planned manner. Details of programme are available at web link www.jnnurm.nic.in.

8.3 Ministry of Water Resources programme for Repair, Renovation & Restoration (RRR) of Water Bodies with Domestic/External Assistance

Water bodies having irrigation culturable command area up to 2000 Ha are eligible for funding under RRR. One of the objectives of RRR is increased availability of drinking water. The programme will identify water bodies with unique code.

The funding provision is 75:25 between Centre and State (90:10 for Special category of States). All public and community owned Water Bodies may be taken up. MoWR has also proposed to the Cabinet for extension of the RRR programme for 10% of lakes (2-10 ha) in urban areas.

9. Some Useful Links

Some of the related useful sites for consideration are as follows:

1. http://moef.nic.in/modules/recent-initiatives/nlcp/index.html
2. http://www.ramsar.org
3. http://epa.gov/greatlakes/
4. http://www.unep.org/roe/SavingLakeBaikal/tabid/54598/Default.aspx
5. http://www.unhabitat.org

Water-lily and Ipomoea are ingrediemts in lake's eco system.

N.B. : All photographs by Shri Harshvardhan.

Annexure-I

Designated Best Use Criteria for Surface Water		
Designated Bet Use	**Class of criteria**	**Criteria**
Drinking Water Source without conventional treatment but after disinfection	A	1. Total Coliforms Organism MPN/ 100ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6mg/l or more 4. Biochemical Oxygen Demand 5 days 20o C 2mg/l or less
Outdoor bathing (Organised)	B	1. Faecal Coliforms Organism MPN/100ml shall be 2500 (max permissible), or 1000 (desirable) 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5mg/l or more 4. Biochemical Oxygen Demand 5 days 20o C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/ 100ml shall be 5000 or less 2. pH between 6 to 9 3. Dissolved Oxygen 4mg/l or more 4. Biochemical Oxygen Demand 5 days 20 C 3 mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 to 8.5 2. Dissolved Oxygen 4mg/l or more 3. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1. pH between 6.0 to 8.5 2. Electrical Conductivity at 25o C micro mhos/ cm Max. 2250 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2mg/l
(Source: CPCB)		

Sambhar lake, a Ramsar Site, receives Flamingos annually.jpg

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