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Preservation of Water Bodies in Tamilnadu

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Abstract

To understand the need for preservation of water bodies in Tamilnadu, to study the challenges faced in preservation of water bodies, to know the level of implementation and governance issues.

1. INTRODUCTION:

" Water is the driving force of all nature" - Leonardo da vinci

"Thousands have lived without love, not one without water." - W. H. Auden

Tamilnadu is the state in India with the highest level of urbanisation,with 48.5% of its residents residing in cities, Tamilnadu is expected to have the largest percentage of urban population in the nation by 2030, with an estimated 67% of the people living in cities. The state is leading the way in offering its residents urban amenities despite the massive urbanisation that is occurring[1]. The current generation's water supply must be provided, and for the interest of future generations, the water source must be protected. In order to maintain this status. There is no denying that under this situation, water bodies are crucial in preventing soil erosion and collecting rainfall.

The majority of the state's gains were attributable to the restoration of surface water bodies, watershed development initiatives, and the provision of rural water supplies.[2] Lakes and ponds are vital parts of the ecology. A body of water that has the capacity to hold a certain volume of water all year round is called a lake or pond. Water for human usage, household chores like washing, farming, fishing, and religious and cultural events has long been provided by lakes and ponds. Apart from the direct applications, lakes and ponds are also utilised for channelizing water flow to prevent flooding and water logging.[3] Lakes are home to a wide variety of flora and fauna. Urban water features are integral to the city's general layout. In addition to lessening the severity of hydrological conditions like drought and floods, they have a substantial influence on the microclimate, enhance the aesthetic appeal of the surroundings, and offer a range of recreational opportunities[4].Urban water bodies provide a range of functions and objectives, providing ecological goods and services as well as directing production values. These are basically relevant societal benefits. Because lakes and ponds are such an important part of the entire ecosystem, it is necessary to take action to protect, manage, restore, and sustain them.[5] While containing 6% of the

[1]Government of India,Ministry of Home affairs,https://tn.census.gov.in.(Mar. 22,2024, 1:00 P.M)

[2]Centre for Science and Environment, Conserving water bodies, Water and Waste management(2024) https://www.cseindia.org/conserving-waterbodies-5299. (May. 22 , 2024, 11:00 A.M)

[3] T.R.Neelakandan, K.Ramakrishnan, Protection of Urban water body infrastructure-Policy requirements, IOP conference series: Earth and Environmental science(2017) 1,(May. 22, 2024, 11:45 A.M) https://iopscience.iop.org/article/10.1088/1755-1315/80/1/012068/pdf (May.18, 2024, 9:45 A.M)

[4] Gopal sagar, Roop Sagar, Deeg, Conservation of traditional water resources, Research square (2022)

[5] Ministry of Urban and Housing development, Advisory on conservation and restoration of water bodies in urban areas, Central Public health and environmental organization(2013)

country's total population and 4% of its land area, Tamilnadu only has 2.5 percent of the nation's water resources[6]. Tamilnadu's water demand is rising quickly as a result of rising population density as well as higher per capita demands brought on by economic expansion. However, the per capita availability of water resources is only 900 cubic metres, as opposed to the 2,200 cubic metres of the national average.

The industry that utilises the most water in the state is agriculture, which uses 75% of the water resources available. The state greatly depends on the monsoon rains. An average of 930 mm of rain falls there each year.[7] Water bodies, including rivers, lakes, ponds, and reservoirs, are vital natural resources that support various ecological, socio-economic, and cultural functions.In Tamil Nadu, a state well-known for its thriving ecosystems and rich cultural legacy, protecting water bodies has become increasingly important in the face of growing environmental issues and human demand. In order to shed light on the intricacies involved and offer viable solutions for their protection, this study attempts to explore the complex dynamics underlying the preservation of water bodies in Tamil Nadu.[8]

From the magnificent Kaveri River to the serene Ooty Lake, Tamil Nadu is home to a wide variety of water bodies, each of which is essential to the state's ecology and the way of life for its people. However, these water bodies face a myriad of threats, ranging from water bodies encroachment, industrial pollution, problem of eutrophication, governance issues, transboundary water conflicts etc. Understanding and addressing these challenges are imperative not only for safeguarding the ecological integrity of these water bodies but also for ensuring the well-being of communities dependent on them for various purposes, including agriculture, fisheries, drinking water, and recreation. At the heart of this study lies a recognition of the interconnection between environmental and governance factors shaping the fate of water bodies in Tamil Nadu. Environmental degradation, driven by factors such as industrial pollution, agricultural challenges, and other levels of challenges, poses significant risks to water bodies preservation and ecosystem at large. Meanwhile, governance inefficiencies, including weak regulatory enforcement and fragmented institutional frameworks, hinder effective management and preservation efforts. Against this backdrop, this study adopts a multidisciplinary approach, drawing on insights from environmental law, and governance studies to unravel the complexities of water body preservation in Tamil Nadu. By synthesizing existing knowledge, empirical data, and stakeholder perspectives, the study seeks to identify key challenges, assess current preservation initiatives, and propose evidence-based strategies for enhancing the resilience and sustainability of water bodies in the region.

Ultimately, the findings of this study aim to inform policy formulation, community engagement efforts, and institutional interventions aimed at promoting the preservation and equitable management of water bodies in Tamil Nadu. This study brings out the key challenges pursuant to the water bodies preservation in Tamilnadu so as to identify the lacuna that has to be bridged in preservation of water bodies to bind in par with the principles of sustainability.[9]

[6] Central Pollution Control Board, Ministry of forest, environment and climate change, https://spc.tn.gov.in/12plan_english/Urbanisation.(Mar. 28, 2024, 2:00 P.M)

[7] Press Information Bureau, Government of India, Ministry of Home Affairs(2011),https://archive.pib.gov.in/archive2/erelease.aspx. (Mar.18, 2024, 5:00 A.M)

[8] Vivek Gupta, Mongabay series: Climate Connections, (2023)https://india.mongabay.com/2023/05/documenting-indias-water-bodies-a-good-start-but-the-state-of-many-of-them-is-concerning-say-experts. (Mar. 23, 2024, 3:00 P.M)

[9] Siddhartha Koduru and Swati Dutta, Urban Ecosystems: Preservation and Management of Urban Water Bodies, DOI: 10.15415/cs.2013.11002, https://scholar.google.co.in/scholar (Mar. 19, 2024, 3:30 P.M)

The following are the key challenges in preservation of water bodies in Tamilnadu.

1. ENCROACHMENT OF WATER BODIES:

The challenges faced by rural tank ecosystems in Tamilnadu due to encroachments and unlawful activities, leading to water shortages and decreased efficiency of the tank systems. Encroachment at this level does not restrict the meaning as acquiring the space but the challenges at all level including affecting aquatic life, urbanisation etc. Rural tanks are integral to the natural ecosystem of rural environments, providing water for irrigation, supporting livelihoods, and sustaining local water bodies.Tanks often dry up during certain seasons, leading to their non-restoration. Encroachment of tank areas by local people or farmers for various purposes, such as agriculture, reduces the tank's water-holding capacity and disrupts its ecosystem.[10] Encroachers may illegally release tank water, causing further water shortages and conflicts between farmers and encroachers. Encroachments along supply and surplus channels limit the flow of runoff into tanks, reducing their storage capacity. Encroachments also lead to the deliberate breaking of surplus weirs or tank bunds to protect standing crops, further reducing water availability.[11]

Existing laws to evict encroachments are often ineffective and lengthy, hindering efforts to restore tank ecosystems. Government regulations prohibit encroachments on water bodies and restrict the use of such land for purposes other than conservation. Recent judgments by the Madras High Court and the Supreme Court have upheld these regulations, emphasizing the importance of protecting water bodies[12]. However, enforcement of these regulations remains inconsistent, allowing encroachments to persist in some cases. Rural tank ecosystems in India face significant challenges due to encroachments and unlawful activities, leading to water shortages and disruptions in the ecosystem.[13] Effective enforcement of existing regulations and measures to prevent encroachments are essential to safeguarding these vital water resources and ensuring their sustainability for rural communities[14]

Ambatur lake is under severe threat due to anthropogenic activities such as urbanization, industrialization, and sewage discharge. The case of Ambattur Lake in Chennai, Tamil Nadu, serves as a poignant example of how human actions have led to the degradation of water bodies and the ecosystem they support.[15] The case of Ambattur Lake highlights the detrimental impacts of human activities on water bodies and the urgent need for concerted action to protect and restore urban water ecosystems. Effective management strategies, coupled with robust regulatory frameworks and community involvement, are essential to safeguarding water resources for future generations. Ambattur Lake has undergone significant shrinkage, with approximately 40% of its area lost over the past few decades. This shrinkage is primarily attributed to encroachment by settlements and industries into the lake area. Rapid urbanization and industrial growth

[10] M.Tilagavathi , Rehabilitation of rural tanks towards sustainable rural development in cuddalore district, Tamilnadu, 1 Asia Pacific Journal of research, (2017)

[11] R.Kaaviya & Devadas, Water resilience mapping of Chennai, India using analytical hierarchy process,Ecological process, 10(2021)

[12] Manibarathi v. Union of India, W.P(MD)15586 of 2023(India)

[13] https://www.indiawaterportal.org/articles/encroachment-behind-chennai-floods-panel

[14]Mridula Ramesh, Chennai water crisis: How great teamwork, Muddy data, enabled poor management, engineered disaster(2019) https://www.firstpost.com/india/chennai-water-crisis-how-great-teamwork-muddy-data-enabled-poor-management-and-engineered-a-disaster-6925771.html

[15] Chandrasekar vasudevan, Impact of Urbanization on Megacities' Lakes Using Remote Sensing Technique: A Case Study of Water Quality Analysis in Ambattur Lake, Chennai, IndiaUrban Health Risk and Resilience in Asian Cities, 327-341(2020)

have led to the expansion of human habitation and infrastructure, resulting in the loss of natural water bodies.[16]

Part of the tank of the Ambattur lake was encroached upon by land reclaimers and other developers, which resulted in improper environmental management and residential construction. Until now, almost 75% of the reservoir area has been taken over and turned into various residential areas.[17] Finally, the surrounding area suffers from various environmental problems such as groundwater depletion, improper disposal of solid waste, floods, etc.Encroachment of the Villapuram Reservoir and consequent degradation of quantity and quality of ground water is the issue[18]. The situation at Ambattur Lake underscores the urgent need for mitigation measures to address water pollution and habitat degradation.[19]

SWP, 1994[20] emphasised the need to maximise the benefits from the available water resources by removal and prevention of encroachment in water courses and water bodies. GoTN instructed the Regional Chief Engineers of the WRD to take stringent action to evict encroachment of WRD land with the help of police authorities. An audit comment was made in the Report of C&AG (Civil Audit)[21], GoTN for the year 2005-06, on non-restoration of storage capacity of 525 irrigation tanks. It has been pointed out that 40 per cent of the test checked tanks were encroached, leading to floods in Cooum and Adyar River during November 2005.[22] The Public Accounts Committee (PAC) of Tamil Nadu Legislature had instructed[23] the GoTN to undertake effective action on restoration of storage capacity of the tanks. Again, in the Audit Report for the year ended March 2013, it has been pointed out that 43 per cent of the sampled tanks were encroached, indicating ineffective enforcement of the Act for eviction of encroachment. Field visit to Perungalathur Big Tank in Kancheepuram District and scrutiny of relevant records revealed that 279 encroachers had encroached 4.36 hectare of water spread area. WRD replied on October 2016 that efforts were being made for identification and removal of encroachment in coordination with line departments and agencies like Revenue Department, Police Department, Tamil Nadu Slum Clearance Board, etc.[24]

Thus, the encroachment in the rivers and canals had contributed to flooding in slums and also the adjoining areas of the test checked zones of Adyar, Alandur, Ambattur, Kodambakkam and Perungudi. The District Collector in the case of Encroachment in Buckingham Canal Encroachments in Chennai[25] stated that encroachment to an extent of 58.58 hectare in Adyar River at various reaches, which contributed to the floods of 2015, were identified subsequent to the floods and boundaries were fixed for 39.28 hectare,

[16] A.Kistan & others, Analysis of Ambattur Lake Water Quality with Reference to Physico – Chemical aspects at Chennai, Tamil Nadu, International Journal of Science and Research,IJSR(2013)

[17] Policy note of water resources department 2023-2024,https://www.tn.gov.in/department/44 Last accessed on 14th May, 2024, at 5.00 p.m

[18]Saravanan P and others, An assessment of environmental degradation: Case study of Avaniyapuram town panchayat, Madurai,1 International journal of Environmental sciences(2011).

[19]M.Tilagavathi , Rehabilitation of rural tanks towards sustainable rural development in cuddalore district, Tamilnadu, 1 Asia Pacific Journal of research, (2017)

[20] State Water Policy of Tamilnadu, 1994

[21]Report No. 4 of 2010 - Union Government, Ministry of Water Resources, https://cag.gov.in/mab/tamil-nadu/en/audit-report (Mar. 30 , 2024, 9:00 A.M)

[22] Executive summary, Integrated cooum river eco-restoration, Final report(2014)

[23]June 2014

[24]M.Tilagavathi , Rehabilitation of rural tanks towards sustainable rural development in cuddalore district, Tamilnadu, 1 Asia Pacific Journal of research, (2017)

[25]July 2016

leaving boundaries to be defined for 19.30 hectare. WRD stated[26] that 4,134 families encroaching the banks of Adyar River were evicted through a special drive after the floods of December 2015[27].

The number of families evicted was 43 per cent of the encroachments along Adyar River. But, only 397 families encroaching Cooum River were evicted through special drive after the floods, which was negligible in comparison with the total of 14,257 families encroaching the margins of Cooum River.[28] Chief Engineer, WRD[29], in the exit conference, expressed that the Department did not possess independent powers for eviction of encroachments in rivers as the Tamil Nadu Protection of Tanks and Eviction of Encroachment Act 2007 did not include rivers. The reply was not acceptable as the Department failed to comply with the instructions of the Government and efforts for demarcation of boundaries and eviction of encroachments could have been made in coordination with the Revenue Department. We recommend strict enforcement of the TN Land Encroachment Act, 1905 to prevent encroachment and to evict encroachments already taken place.[30]

Encroachments, a menace, in the path of flood mitigation works, had not been effectively handled by the Government. Though the city is well endowed with several natural lakes and manmade tanks and reservoirs, encroachments reduced their water storing capacity. Local bodies had themselves encroached upon tank beds for dumping of garbage and contributed to pollution and choking of water bodies. Even Government agencies encroached water bodies for developing public infrastructure, unmindful of the damage they caused to flood carrying capacity of water bodies. Encroachment on tank beds and river margins remained unchecked despite TN Land Encroachment Act, 1905 and TN Protection of Tanks and Eviction of Encroachment Act, 2007 are in place to tackle this menace.[31] Hence it can be said that there is a need for effective machinery exclusively dealing in the encroachments of water bodies, and only the penal provisions could be the remedy.

Picture depicting Satellite view of encroachment at Ambattur lake[32]

2. INDUSTRIAL POLLUTION

Water demand is rising for both households and industry. It is estimated that by 2025, the total amounts

[26] Aug 2016

[27] A.Kistan & others, Analysis of Ambattur Lake Water Quality with Reference to Physico – Chemical aspects at Chennai, Tamil Nadu, International Journal of Science and Research,IJSR(2013)

[28] Executive summary, Integrated cooum river eco-restoration, Final report(2014)

[29] Water Department resources, Government of Tamilnadu

[30] M.Tilagavathi , Rehabilitation of rural tanks towards sustainable rural development in cuddalore district, Tamilnadu, 1 Asia Pacific Journal of research, (2017)

[31] Chapter4, Encroachments of_Report No. 4 of 2017, https://cag.gov.in/uploads/download_audit_report

[32] https://researchgate.net

will have doubled from 2005 to 2025, and it will require an additional 11 and 8 percent of the water, respectively[33]. It is projected that over half of India's population would reside in urban areas by 2050. Urban water facilities would be essential to the semi-urban and urban population.[34] The majority of metropolitan areas should time their water from early separations, and many of the current water utilities are either financially insolvent or have severe transmission and conveyance losses, which can reach 50%.The demand for industrial water is expected to rise by 27% by 2050, from 1555 MCM in 2001 to 1985 MCM[35]. The largest percentage of water use is from thermal power plants. Chemicals, distilleries, oil refineries, steel, fertilisers, textile dyeing, medicines, petrochemicals, paper & pulp, sugar, electroplating, etc. are examples of other industries.

If an industry uses rivers or lakes for water, it usually pays a user fee to the government. Businesses that use municipal supplies are required to pay a water tariff to the relevant local government. Due to the restricted supply of water, numerous sectors have implemented recycling and conservation strategies. To meet demand, two firms in Chennai, CPCL and MFL, buy and process sewage from Metrowater. In order to respond to evolving requests, the urban water foundation and water administration quality will need to be modified. India's control system, which depends on hydroelectricity, atomic power, and coal offices that need water for cooling, powers a large number of water-dependent enterprises. Ambattur Lake's water quality has declined as a result of the discharge of sewage from homes and businesses. The introduction of pollutants has resulted in the growth of detrimental microbes, algae, and weeds, making the water unfit for human consumption and household usage. A major health danger is posed by microorganisms found in sewage-contaminated water, which can result in the spread of diseases like cholera, typhoid, and dysentery.

In the Avaniyapuram district, Villapuram Reservoir was thought to be a possible supply of water for agriculture and household use. The physio-chemical characteristics of water, such as pH, conductivity, turbidity, and dissolved oxygen levels, are changed when industrial effluents are released. Fish populations are among the aquatic flora and wildlife that are negatively impacted by these changes. Furthermore, humans and aquatic life are exposed to long-term health concerns from heavy metals found in industrial effluents. To stop further encroachment and pollution of water bodies, efforts should be directed towards regulating industrial discharge, upgrading sewage treatment facilities, and putting strong restrictions into place. Promoting ethical water management methods and protecting urban water resources also require community involvement and awareness raising.[36]

Picture of industrial pollution at Buckingham canal[37]

[33]Areej Arif, Water pollution and industries(2020)

[34]Sarwat Jahan, Causes and Impact of Industrial Effluents on Receiving Water Bodies: A Review, Malaysian Journal of Science and Advanced Technology.

[35]Chapter4, Encroachments of_Report No. 4 of 2017, https://cag.gov.in/uploads/download_audit_report

[36] Sarwat Jahan, Causes and Impact of Industrial Effluents on Receiving Water Bodies: A Review, Malaysian Journal of Science and Advanced Technology.

[37] Source: https://researchgate.in

3. URBANISATION:

Despite a slowdown in population growth, Tamil Nadu is fast becoming more urbanised. As a result, it is anticipated that the amount of water needed for residential use will rise by over 50% between 2001 and 2050, from 2222 MCM to 3460 MCM. In addition to naturally occurring phenomena, pollution from sewage, industrial effluents, and other sources is increasingly becoming a major worry for water quality. The Tamil Nadu government has stated that providing people with access to clean drinking water will be its top priority. This is known as water security. According to the most recent survey conducted in April 2002, the State has 80,421 rural habitations. A habitation is a collection of homes with a shared water source that is smaller than a village. When a habitation is completely covered, every member of the community has access to 40 litres of guaranteed safe drinking water each day. In plain places, the source should be 1.6 Water Resources km away from the settlement, while in mountainous areas, it should be 100 yards away. Potable water is available in partially covered habitations, however at levels lower than 40 Ipcd.

There is no potable supply available to habitations that are not covered. 28,623 habitations were totally covered, 51,294 moderately covered, and 504 habitations had no valid source under this coverage classification. The Tamil Nadu Water Supply and Drainage Board (TWAD)[38] has been working to fully cover the partially and non-covered habitations. Special attention is given to the habitations of the Scheduled Castes and Tribes (SC/ST).Tamil Nadu has inadequate sanitation. The percentage of homes with access to toilets is less than 15%. Just 27% of the land has drainage capabilities, with only 4% having covered drainage. The collection and disposal of solid trash is essentially nonexistent. The 'Restructured Central Rural Sanitation Programme' has been run by the Department of Rural Development since 1999. The building of individual restrooms, women's sanitary complexes, school sanitation, and rural sanitary marts are some of the components. Additionally, they have started the "Total Sanitation Campaign" in several Tamil Nadu districts piecemeal.

To raise awareness, TSC places a strong emphasis on initiatives related to information, education, and communication as well as human resource development and capacity building. Since silt deposits limit reservoir capacity and consequently lower the reservoirs usefulness for various purposes, the topic of siltation in reservoirs has become concerning.According to studies on sedimentation issues conducted in 33 reservoirs in Tamil Nadu, there is a capacity loss of more than 50% in two reservoirs-Kundha and Glenmorgan-and more than 30% in eight reservoirs. [39]

Natural pollution may be an unintended consequence of economic progress and continues unchecked in many water bodies due to the careless disposal of mechanical, household, and agricultural waste. In Tamilnadu, the main sources of contamination for the water bodies are non-point sources like horticulture and home segments, as well as point sources like businesses. While controlling and avoiding point sources of contamination is simple, avoiding non-point sources presents enormous obstacles.[40]Fertilizer, insecticides, bug spray, and salts are among the chemicals used in agriculture that migrate alongside seepage from the root zone to the basic water table. As groundwater seeps into streams, this advancement

[38] Statutory body corporate constituted under TWAD Board Act, 1970 on 14.04. 1971 TWAD Board is entrusted with the development of Water Supply and Sewerage Facilities in the State of Tamilnadu except Chennai Metropolition Development areas.

[39] https://environment.tn.gov.in/assets/soe/.pdf.(May. 18 , 2024, 1:00 P.M)

[40]Advisory on urban water bodies, Central Public health and environmental engineering organisation, Ministry of urban development, Government of India(2013)

causes surface water to become contaminated. "Emergent pollutants" are another significant cause of contamination in water bodies, with varying concentrations. These are synthetic, naturally occurring chemicals, or any microorganism that is not frequently observed in the environment but has the potential to do so and have detrimental effects on human and biological health. Pharmaceuticals (anti-microbials, analgesics, anti-inflammatory drugs, psychiatric drugs, etc.), steroids and hormones (prophylactic drugs), personal care products (fragrances, sunscreen experts, insect repellents, microbeads, and cleaning agents), pesticides and herbicides, surfactants and surfactant metabolites, fire retardants, mechanical additives, chemicals, plasticizers, and petrol additives are the categories with the highest concentrations of rising poisons found in wastewater. Seldom are emerging contaminants monitored or managed.

A slow accumulation of pollutants over many years in various streams has rendered them both chemically and naturally toxic, as well as aesthetically unpalatable. restoration of these streams to levels that are ecologically acceptable. Many nations have asked for sanctions to solve this issue, but the requirement becomes problematic when the polluters pass the charges back to the charge payers as increased expenses of their commercial goods. The decontamination problem is somewhat alleviated by the introduction of cutting edge waste water treatment techniques, such as layer development, reuse, recovering wasted water, etc. In the long run, it appears that the best course of action is to organise the water division such that all perspectives are taken into account and optimised within the framework of a unified ecosystem. Biodiversity and water resources are closely related.[41] Biodiversity supports water resources, particularly the cycling of nutrients in soil and plants.

Using this technique, water quality is controlled. Water resources also support biodiversity; when there is insufficient water, creatures suffer stress and biodiversity declines. Retaining biodiversity helps shield streams from nitrogen contamination. Actually, more species in a stream help to filter out excess nutrients from the water. The Sustainable Development Goals (Goal 6) for water and sanitation address the sustainable development of these habitats since lakes, wetlands, and forests are parts of the water ecosystem and support biodiversity.[42] The management of water resources is impacted by climate change. Although it is also a fundamental component of climate, water is not as much affected by climate change as it once was. The hydrological cycle includes processes like dissipation and precipitation, which are expected to change as a result of climate change. It can provide crucial insights into new water sources for drinking, rain-fed agriculture, groundwater supply, ranger services, biodiversity, and ocean level changes. The primary channel via which climate change affects the ecosystem on Earth and, consequently, the function and welfare of social orders is water. The most vulnerable group, the impoverished, are more likely to be negatively impacted. Global warming could have an impact on the hydrological cycle, which could lead to an increase in global and regional variations in precipitation and snowfall.[43]

The predicted effects of climate change and the resulting warmth in India will negatively affect the ground water's ability to respond to entirely new portions and quality along the coastal areas. Because of variations in precipitation and evapo-transpiration, climate change is anticipated to have an impact on ground water. While increased occurrence and severity of surges may affect groundwater quality in alluvial aquifers, rising ocean levels may cause wider saline interruption into coastal and island aquifers. Concentrated precipitation that is more widespread could result in increased runoff and potentially less energy. India's

[41] https://environment.tn.gov.in/assets/soe/.pdf.(May. 18 , 2024, 1:00 P.M)
[42] https://www.teriin.org. (Apr. 28, 2024, 8:00 A.M)
[43] Advisory on urban water bodies, Central Public health and environmental engineering organisation, Ministry of urban development, Government of India(2013)

economy is strongly linked on its shared resources and climate-sensitive industries, including as agro, water, and ranger services, and these could be under risk due to predicted climate change. Water plays an important role in sustainable improvement and in adapting to climate change. The main glacier-fed rivers in northern India, the Indus and the Brahmaputra, are expected to lose their stability and unwavering quality due to warming of 2.5°C, melting ice masses[44], and the unfortunate snow cover over the Himalayas. Because of the heavy annual precipitation that falls downstream during the rainy season, the Ganges will have less control over the water it dissolves. When the snows melt in the spring, it is expected that the Indus and Brahmaputra will witness larger torrents, with streams decreasing in this manner. As ice sheets melt, flash surges will occur more frequently and with greater intensity, while during drier seasons, there will be less water streaming.

Water capacity officials need to take action to monitor the source due to increased precipitation levels combined with fewer days and a dry spell in the next season. These include filling in traditional water infrastructure, increasing capacity in typical conduits, and adding to dams and lakes. Crops that need more water to withstand heat waves will be significantly impacted by rising temperatures brought on by climate change. Thus, the issue of urbanisation sets off a domino effect that results in a number of complications and is also the primary driver of climate change.[45]

4. EUTROPHICATION:

Preservation of water bodies in Tamilnadu also poses some practical difficulties, one such is the problem of Eutrophication. When the quality of the natural water asset starts deteriorating the process of restoration or preservation of water bodies becomes complicated thereby time consuming. In order to understand that it is necessary to understand the challenge of eutrophication. The task of Restoring lakes and reservoirs is a relatively new endeavour aimed at meeting international standards. While most lake restoration initiatives aim to improve some aspects of a lake's biological features, returning a lake to its original state has not been a stated objective. The majority of initiatives dubbed "lake restoration" are actually rehabilitation initiatives, and many more are only intended to control or lessen the negative effects of human disturbances[46].

Some water bodies can be restored to their original state by controlling external sources, but in many cases the changes in the lake have been so essential that significant changes in biota, habitat loss, physical changes in bottom sediments, and changes in lake hydrology, that simply stopping the loadings is insufficient to improve water quality and ecological framework, at least within a sufficient amount of time. Techniques for in-lake restoration must be used. The ability of an ecosystem to bounce back from disturbances or reach a new equilibrium state following a disruption is known as resilience. Verisimilitude is a wide attribute of the restored environment that reflects how comparable the ecosystem is overall to the standard comparison, which could be the ecosystem's previous conditions or the conditions of a reference system. The ability of the system to generate non-linear, distinct responses in response to the identical perturbation input within a confidence interval of possibilities is known as likelihood. Restoration programmes that employ adaptive management evaluate and survey metrics in a progressive manner in

[44] https://environment.tn.gov.in/assets/soe/.pdf.(May. 18 , 2024, 1:00 P.M)

[45]Siddhartha Koduru, Urban ecosystems: Preservation and Management of Urban water bodies(2013)https://www.researchgate.net/publication/275241999_Urban_Ecosystems_Preservation_and_Management_of_Urban_Water_Bodies(May. 20, 2024, 3:00 P.M)

[46] Mendiondo (2008)

tandem with the system's natural response to changes in location and time. For scientists and engineers, comprehending and assessing the natural processes in a watershed that result in impairments and issues is an ongoing task.

Mathematical simulations of these intricate processes are helpful analytical tools for comprehending the issues and determining the best ways to alter land usage. In addition to evaluating and choosing from various land-use and BMP scenarios, which can be implemented to help meet the standards and lessen the detrimental effects of storm water runoff on water bodies and the landscape, the models can aid in the development of total maximum daily load (TMDL) standards, which are mandated by the Clean Water Act[47]

Eutrophication from nutrient and organic matter loadings at local scales, which cause cumulative impacts at long-term and global dimensions, is a common stressor impacting lakes and reservoirs. The sources of chemical stresses are divided into three categories: point sources, such as wastewater from cities, which are usually the easiest to locate and manage; non-point or diffuse sources, such as runoff from nearby lakes and farms; and long-range atmospheric transport of contaminants, which is the hardest to quantify and manage. The weathering of minerals, soil erosion, anthropogenic sources, and wet and dry atmospheric deposition are the most significant nonpoint loads. Human activities such fertiliser application, dust and litter accumulation, soil material erosion from agricultural production, and animal feedlots are closely linked to the latter. Non-point source contamination is becoming one of the main causes of the deterioration of water quality.

The main cause of the export of sediment and nutrients that quickens the eutrophication process in surface waters is agriculture. Non-point source (NPS) pollution originates from numerous dispersed sources, as opposed to pollution from industrial and sewage treatment facilities. Rainfall or snowmelt passing over and through the ground is what causes NPS contamination. Pollutants from the natural and man-made world are carried by runoff and eventually deposited into ground water systems, wetlands, lakes, rivers, and coastal waters[48]. In order to minimise non-point source (NPS) pollution, evaluating the possible contributions of various land areas to diffuse nutrient export has become crucial. The variability of nutrient export across space and time makes it challenging to detect, evaluate, and manage NPS pollution. In many nations, programmes for water monitoring and restoration have made the prevention and mitigation of NPS pollution top priorities. An increasing amount of nutrients are entering the sewage system through pipes, or "point sources," after travelling through the food chain. Pesticides, fertilisers, and sediments are the main sources of NPS pollution that have been linked to agricultural activities. Agriculture is the main supply of sediment and nutrients to streams and rivers in the United States, despite the fact that there are numerous other potential sources of nonpoint source pollution, such as golf courses, urban expansion, and stream bank erosion. Nutrient transfer in agricultural runoff increases when specialised and intense farming systems import more nutrients in the form of feed and fertiliser than they produce in produce[49]. Several natural processes, including forest fires, rock weathering, soil erosion, and rainfall that causes movement, can raise the concentration of nutrients in waterways.

There are still some significant gaps in our understanding of eutrophication despite the body of research being extensive, particularly when it comes to thresholds, numerous stressors, and regime alterations. Furthermore, consideration must be given to climate change. A significant issue that requires attention is

[47] Saied Isalamain & Rockzerae Ziaie, Eutrophication: A Major Threat to water bodies, 1-10 (2013)
[48] EPA, 2003
[49] Heathwaite and Sharpley (1999)

the absence of political will necessary to put effective nutrient management plans into place. In relation to this, a secondary source data can be related to understand the presen condition of water bodies facing the challenge of eutrophication. Wetzel's plan[50] was used to measure the amount of eutrophication in the given study.

Details of study undertaken in three water bodies in relation to eutrophication analysis is as under which depicts the coverage of the area where the study was undergone:

1. Chandrambigai Eri Hosur - 209750 m3 123.48 hectare
2. Doddana Eri Hosur 11338 m3 6.7 hectare
3. Kelevarapalli Dam Hosur 481 Mcft 1080 acres

Water sample analysis results of these lakes is as under:

1. Soluble Orthophophate mg/L 0.95, 2.041, 1.473
2. Chemical Oxygen Demand, mg/L 102, 204, 86
3. Organic Nitrogen, mg/L 16.25, 29.69, 22.41
4. Free Ammonia, mg/L 8.91, 16.28, 12.29
5. Inorganic Nitrogen, mg/m3 17370, 34180, 27450
6. Total Phosphorus, mg/m3 154, 2735, 1690
7. Dissolved Oxygen, mg/L 6.89, 6.91, 6.78
8. Transparency, meters 0.15, 0.10, 0.35

According to the results and analyzes performed in this research, It can be inferred that the three lakes including Chandrakudi lake, Doddan lake and Kelavarapalli dam, are strongly contaminated. The amount of eutrophication in all the lakes is very high. This can be because of influx of waste from residential lineament of Hosur town, farming runoff and leakage of water from the surrounding irrigation operations. So, in these circumstances, the reconstruction of the lakes is necessary and it is praised in present situation. [51]

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Picture depicting Eutrophication at Muthukadu lagoon[53]

[50] Wetzel , Limnology lake and river ecosystems, New York(2001)

[51]Shyla Tamia, An investigation into value of Eutrophication in Hosur Lakes, Water and Environmental Sustainability(2021) https://www.journalwes.com/article_164733_f69a6430386e611fe023ac17773cd36b.pdf (May. 24, 2024, 10:00 A.M)

[52]Shyla Tamia, An investigation into value of Eutrophication in Hosur Lakes, Water and Environmental Sustainability(2021) https://www.journalwes.com/article_164733_f69a6430386e611fe023ac17773cd36b.pdf (May. 24, 2024, 10:00 A.M)

[53]The Indian Express,11 Sep 2019, 12:03 am

Muthukadu lagoon on East Coast Road is a ticking time bomb full of toxic substances that can kill both humans and aquatic life, causing a serious heath emergency. An algal bloom has caused the entire water body, which is a significant fishing area, to turn green. This discoloration-causing algae is not your typical kind. It is identified by marine biologists as cyanobacteria, or Microcystis aeruginosa, a photosynthesizing bacteria that is also referred to as blue-green algae. Cyanotoxins are poisons that can harm fish, shellfish, and people.It negatively affects the neurological system, liver, and skin. Specialists claim that the algal bloom is being caused by the unlawful release of untreated wastewater and bar mouth suffocation. Additionally, they can lead to the negative changes in water quality that are brought on by excessive biomass production, including decreased dissolved oxygen levels, fish population declines, and adverse changes in water quality. Fish death is already being reported by local fishermen. A week ago, thousands of dead fish washed up near the fishing community of Karikattukuppam, a sign of the lagoon's declining condition.

Recreational activities are also conducted around the body of water. At Muthukadu, the Tamil Nadu Tourism Development Corporation (TTDC) has a boathouse. Fisherman Sekhar from Kovalam stated that the discharge of home and industrial trash was the reason behind the sharp decline in fish harvest in the lagoon. A group of five scientists, under the direction of S. Vasudevan from the Annamalai University Centre of Advanced Study in Marine Biology, carried out a thorough investigation in 2015 and wrote a paper that was published in the prestigious international scientific journal “Science Inventions Today” about the annual reports of toxic algae blooms in the Muthukadu estuary. They suggested routine monitoring in order to preserve fisheries resources and safeguard public health. the crisis's underlying cause. The Central Marine Fisheries Research Institute's (CMFRI)[54] Joe K. Kizhakudan, officer-in-charge of the Kovalam Field Laboratory, told Express that the Muthukadu bar mouth choke was the primary source of the issue. The mouth has been closed for the past three months because of sand bar building. For survival of any estuary, there should be constant exchange of seawater[55].

Eutrophication occurs when this is stopped. What is going on in Muthukadu is quite concerning. Anthropogenic activities cause a high concentration of nutrients to enter the estuary, which causes the bloom. Algal growth will be boosted by sun radiation, phosphorus and nitrogen fertilisers, according to Kizhakudan. When an estuary is overgrown with minerals and nutrients, a process known as eutrophication occurs. This process causes an excessive amount of algae to bloom, which may eventually cause the water body to lose oxygen. The Director of Fisheries, GS Sameeran, informed Express that the bar mouth would be dredged right away. It will also take up the issue to illegal discharge of untreated industrial and domestic effluent into the estuary with the Tamil Nadu Pollution Control Board.”[56]

5. GOVERNANCE AND POLICY ISSUES:

Water governance is fragmented and, as a result, leads to inconsistent water policy between the central and state governments. This fragmentation makes the task of implementing a holistic policy faraway difficult. In India according to the Constitution, each of the twenty-eight states of the Union is responsible for dealing with their own water issues. However, the federal government has the constitutional mandate

[54] Established by Government of India on February 3rd 1947 under the Ministry of Agriculture and Farmers Welfare and later it joined the ICAR family in 1967

[55] OA : 231 of 2020 “A deadly bloom in Muttukadu Estuary”, https://greentribunal.gov.in/sites/default/files/news_updates/23120_2.pdf (May.20, 2024, 3:00 P.M)

[56] Times of India, June 2015

to resolve issues that arise out of the use of interstate rivers. This complexity of governance in water sector and all levels from the central government down to the field level officials who deal with farmers and industry have to recognize the water challenges and the need for coordinated action for proper implementation of Water policies in India. Several obstacles stand in the way of successful lake preservation and management due to the absence of precise and comprehensive information about lakes.[57] It is challenging to comprehend the biological, hydrological, and geological dynamics of lakes in the absence of comprehensive knowledge.

A targeted conservation strategy must take into account a number of aspects, including habitat variety, nitrogen levels, sedimentation rates, and water quality. To evaluate the different risks that lakes face, including pollution, habitat loss, invasive species, and the effects of climate change, comprehensive information is required. Prioritising conservation efforts and allocating resources effectively are difficult without this knowledge. Comprehensive data is used to track changes in lake ecosystems over time. It is hard to monitor trends, spot new problems, and assess how well conservation efforts are working without baseline data. Providing local communities, stakeholders, and decision-makers with accurate information about lakes is crucial to getting them involved in conservation efforts. Insufficient knowledge can cause misunderstandings, indifference, or divergent agendas among interested parties, impeding cooperative conservation efforts. In order to guide policy formulation, regulatory frameworks, and management strategies, comprehensive knowledge regarding lakes is required.

Policies might not be effective or in line with the demands of communities and lake ecosystems if there is a lack of reliable data. Exact data forms the basis for scientific investigations into lake ecosystems, encompassing analyses of biodiversity, water quality, ecosystem services, and the effects of climate change. Scientific knowledge and innovation in lake protection may be constrained in the absence of these data[58]. Planning ahead with comprehensive data facilitates the distribution of resources for lake management and conservation initiatives. Inaccurate information about the condition and hazards facing lakes could result in the misallocation of resources and wasteful or unsuccessful conservation efforts. Increasing public awareness and fostering environmental education need providing accurate information about lakes.[59]Insufficient knowledge may impede endeavours to involve the general public in lake preservation and maintenance, thereby restricting community backing for conservation programmes. Researchers, governmental organisations, non-governmental organisations, and other parties engaged in lake conservation can more easily share and collaborate on data when they have access to detailed information. Collaboration attempts may be hindered in the absence of thorough data, which could result in effort duplication and lost potential for synergy.

The non-availability of data collection regarding the lakes and other water bodies makes it difficult to frame strategies and other kinds of restoration mechanisms. The intricate ecological dynamics of lakes and other bodies of water are difficult to comprehend in the absence of enough data. In order to make well-informed management decisions, this comprises elements like habitat diversity, water quality, biodiversity, and ecosystem services. Insufficient information makes it difficult to accurately evaluate the risks that lakes and other bodies of water face, including pollution, habitat loss, invasive species, and the effects of climate change. This makes it challenging to properly allocate resources and set priorities for

[57] Nilangan Gosh, Revamping Water Governance in India:The pathway to new national water policy, Observer Researcher Foundation(2024)
[58] https://ebooks.inflibnet.ac.in/esp05/chapter/water-governance/ (Mar. 24, 2024, 7:00 A.M)
[59] From Scarcity to Sustainability: The evolution of Water Policy in India, Indian School of Public Policy

conservation efforts. Policymakers depend on data to create evidence-based policies and regulations for the management of water resources, which can be uncertain at times.

Lack of data breeds ambiguity and can lead to unsuitable or ineffective policies that don't take into account the demands of lakes. Monitoring changes in lake ecosystems over time and assessing the efficacy of conservation efforts require data.[60] Tracking trends, spotting new problems, and evaluating the effectiveness of conservation activities are challenging without baseline data and continuous monitoring. Study on lakes and other bodies of water is hampered by the lack of data, which narrows our knowledge of their resilience to environmental stresses and how they function. This limits the scope for developing sustainable management methods and for innovating. Insufficient data could make it more difficult to include stakeholders and local people in water resource management and conservation initiatives.

Building community is difficult in the absence of clear understanding about the significance of lakes and other water features. Information is necessary to determine which activities should be prioritised for managing and conserving water resources. Resources may be misallocated, resulting in inefficient or ineffective conservation initiatives, in the absence of precise data about the state and hazards facing lakes and other bodies of water. Decision-makers, resource managers, and other stakeholders are unable to make well-informed decisions regarding the management of water resources and conservation priorities when there is a lack of comprehensive data.[61] The landscape is frequently misrepresented because water features are either ignored or wrongly classified in land use planning frameworks. Inappropriate land use decisions may arise from this, such as the placement of development projects in high-risk locations for flooding or the encroachment of wetlands, lakes, or rivers. In the absence of acknowledgement as a separate land use category, water bodies might not obtain the necessary protection and conservation measures. This may result in deterioration, pollution, and the loss of vital ecological services that water bodies provide, like habitat provision, flood control, and water purification. It may be more difficult to incorporate water resource management concerns into more comprehensive planning decisions if water bodies are excluded from land use planning procedures.

As a result, land use and water quality and quantity may be managed in fragmented ways, failing to recognise the connections between the two. Ignoring water bodies as a land use category could lead to pollution and overdevelopment in watersheds, coastline areas, and riparian zones. As a result, towns may become more susceptible to flooding and other water-related risks, and the quality of the water may be negatively impacted, as well as aquatic habitats. Conservation initiatives aiming at preserving and repairing these ecosystems may be hampered by the legal lack of identification of water bodies in land use planning.[62] It could be challenging to create buffer zones, conservation easements, or protected lands around water bodies without explicit zoning laws and designations. Attempts to include hydrological data, water quality monitoring, and ecological evaluations into land use planning procedures may be hampered by the division of water bodies from land use categories. This makes it more difficult to make well-informed judgements that take the interaction between water resources and land use activities into account. Planning processes may become more difficult to involve local people and stakeholders if water bodies are excluded as a land use category. Communities that depend on. In land use planning, the legal

[60] https://ebooks.inflibnet.ac.in/esp05/chapter/water-governance/ (Mar. 24, 2024, 7:00 A.M)

[61] Nilangan Gosh, Revamping Water Governance in India:The pathway to new national water policy, Observer Researcher Foundation(2024)

[62] https://www.un.org/en/climatechange/science/climate-issues/water (May.17, 2023, 4:00 P.M)

identification of water bodies can lead to the lack of certain policies, rules, and zoning laws that are relevant to the management and conservation of these bodies of water. Land use activities and the objectives of protecting water resources may clash as a result, creating regulatory uncertainty and making enforcement difficult.[63]

The development, coordination, and harmonisation of the policy goals and objectives across the three sectors are the initial steps towards managing the nexus difficulties. The main purpose of harmonisation is to minimise trade-offs and cross-sectoral conflicts and maximise synergies among the three sectors in order to achieve the broader socioeconomic goals of ensuring food, energy, and water security. Due to the resource dependence of the water, energy, and food sectors, policies and goals in one area influence those in other areas by either establishing prerequisites for the achievement of goals in other areas or by placing restrictions or limitations on what can be accomplished in other areas. However, harmonising the policy goals of the WEF sector is a difficult undertaking that calls for the participation of important parties, comprehension of disparate viewpoints and priorities, and the creation of a common understanding of the goals that must be met. To encourage nexus-positive activities, market-based and regulatory tools must be coordinated.[64] Although it is not possible or even required to reach consensus on everything, it is conceivable to pursue a policy goal without compromising another. Improving irrigation's water and energy efficiency, for instance, can be a win-win solution for the WEF nexus.

For the policies to be mutually beneficial and not contradictory, the goals of the policies must be consistent, and the instruments must be coordinated. For instance, the quality of energy supplied to rural communities in numerous Indian States has been impacted by policy support for increasing food production through free or subsidized electricity, leading to unsustainable groundwater exploitation. Similar to this, increased food production in South Asian countries has been facilitated by the use of inorganic fertilizers, pesticides, insecticides, and other agrochemicals driven by government incentives through subsidies. However, this has also accelerated the use of agrochemicals in agriculture, increased energy demand, and polluted water, land, and ecosystems, with cascading negative effects on fish, drinking water, land, soil, the environment, and human health. The goals in one sector can also motivate activity towards goals in another. It is crucial to coordinate policy goals and tools across the WEF sectors in light of these interconnections and the ensuing trade-offs and synergies in order to reduce cross-sectoral externalities and trade-offs and maximise synergies for sustainable solutions. Harmonization of the policy objectives of the WEF sector, however, is a daunting task and requires the involvement of key stakeholders, the understanding of different perspectives and priorities and the development of a shared understanding of what needs to be achieved. Both regulatory and market-based instruments need to be aligned to stimulate nexus-positive activities.

While consensus on everything is not feasible or even necessary, it is possible to pursue one policy objective without undermining another.[65] For example, improving water and energy efficiency in irrigation can serve as a win-win solution for the WEF nexus. What is needed is for the policy objectives to be coherent and for the instruments to be coordinated so that the policies are mutually supportive and not counterproductive. This calls for a clear dialog on exactly what the organization wants to achieve; it

[63] Nilangan Gosh, Revamping Water Governance in India:The pathway to new national water policy, Observer Researcher Foundation(2024)
[64] https://www.undp.org/nature/our-work-areas/water-governance(May.4, 2024, 12.00A.M)
[65] Masood Ahmed, Water Governance in India: Evidence on Water Law, Policy, and Administration from Eight Indian States(2019)

involves engagement with relevant government agencies and other key stakeholders and reaching a societal agreement on common priorities reflecting the views of key stakeholders. There is therefore a need for an appropriate harmonization strategy to enable multiple objectives to be operationalized. Harmonization of policy objectives will lead to a shared understanding of policy objectives, agreed priorities, coordinated policy frameworks and improved coherence across the WEF sectors.

In addition to evaluating synergies, trade-offs and neutrality as outlined above, the following strategies can be used to harmonize policy objectives.[66] The interests, needs, and attitudes of various stakeholders must be recognised and evaluated in light of the fundamental standards mentioned above in order to foster consensus on policy objectives and preserve a common understanding. Regarding the water, energy, and food sectors, many stakeholders could have varying agendas and points of view. Building confidence between the three sectors' agencies, creating a cohesive policy framework, and establishing a nexus-oriented planning and decision-making process are all crucial. Employing the aforementioned criteria to analyze the various viewpoints could be helpful in creating a mutual understanding of conflicting goals and priorities, which could result in sectoral agencies and pertinent stakeholders supporting a common target. It calls for real participation, in-depth consultation, the involvement of important players from all three sectors, and their desire to create strategies and policies. Actors engaged in mapping may have a significant impact on the creation of shared goals and cross-sectoral initiatives.[67]

6. CONCLUSION:

In the end it can be concluded that though there are number of legislations and the judiciary actively playing a role on the preservation of water bodies, there is a need for effective mechanism to prevent the problems like encroachment especially. And also there is a need for the pollution control boards to check on the issues like encroachment so the action plan taken by Government to protect the water bodies are effectively and sustainably done. It is also to be understood that the awareness regarding the challenges in preserving the water bodies should reach the public at large. The union government and state government undertake several measures for public awareness, it is necessary to make strict regulations for problems like encroachment penal provisions may be the solution for the present challenges. As per the constitutional perspective too, the law aims not only the governmental bodies to safeguard the natural environment under Article 48A, rather the constitution insist on the citizens as well under Article 51A(g) where it is a fundamental duty of every citizen to protect the environment and forgo the practices that deterriorate the water bodies. The current enforcement mechanisms are sufficient but there is a need to bring out an action plan to make the mechanisms effectively work. In conclusion, there are numerous obstacles to the preservation of water bodies in Tamil Nadu, including those related to the environment, enforcement, and stakeholders. Threats to these bodies' ecological integrity and water quality include pollution, encroachment, and siltation.Disputed stakeholder interests and fragmented governance make conservation initiatives even less successful. Furthermore, a lack of public participation and awareness impedes the mobilisation of community support. A comprehensive strategy that incorporates environmental protection, more stakeholder participation, stronger governance, and strengthened enforcement is required to address these issues. Tamil Nadu can only guarantee the sustainable management and conservation of its priceless water resources for future generations by working together.

[66] https://www.un.org/en/climatechange/science/climate-issues/water (May.17, 2023, 4:00 P.M)
[67] Wymann von Dach and Fleiner (2019)

Nurturing and protecting Traditional Irrigation Tanks in Tamil Nadu should be the priority task of each one of us. Sustainable Development Goals cannot be realized without efficient and effective management of water resources. There is an emergent need for augmenting surface water potential and for reducing the exploitation of waterbody resources. Surface water potential of Tamil Nadu can be augmented by increasing the storage capacity of 39200 traditional water tanks. It is high time that the Government of Tamil Nadu gives top priority for protecting and nurturing the traditional irrigation tanks involving multiple partners, most importantly community at the grassroot level. The local communities need to be mobilized with rights perspective and sense of ownership for the cause of safeguarding the Traditional Irrigation Tanks with a long-term and sustainable vision. It is high time that all of us complement with each other for this cause. We do not need to break our heads for finding out solutions for the management and preservation of water bodies. It is enough if the present measures are implemented properly especially the public awareness regarding all the measures is the need of the hour. The challenges cannot sorted in a short span of time, but there is a dire need to add up more measures in regard to public awareness to the people. Finally to conclude, it is also important aspect that State should take measures regarding commercialisation and to take steps and make stringent laws before any kind of commercial constructions and to educate people about the consequences of erecting structures in and around water bodies.