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AN OVERVIEW OF APPROACH AND INITIATIVES OF WETLANDS CONSERVATION AND MANAGEMENT IN INDIA

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ABSTRACT

Wetlands are immensely important societal assets and are prominently referred as 'cradles of human civilisation' and 'kidneys of landscape'. These are the areas of critical and crucial ecological importance as they are cradles of biodiversity and nurture a wide variety of flora and fauna. They are one of the most productive ecosystems and their significance has immensely increased in the 21st Century. Their complexity, that makes them quite difficult to assess with reference to any scale or levels along with the importance of the many ecosystem services they amply provide, highlights the dire need of developing programmes to take more cognizance of these rich and invaluable ecosystems. A well designed and timely wetland monitoring and assessment activities are critical but dire essential for their better management and protection. Wetlands are crucial for ecological balance and human well-being. Nevertheless, they are of late, facing immensely increasing threats from human activities. Instantaneous conservation efforts are needed to protect these ecosystems and the services they provide for future generations. The paper amply appraises approaches, initiatives of wetlands conservation and management in India.

Key Words: Wetlands, Conservation, Management, Approaches and Incentives in India

INTRODUCTION

Wetlands are one of Earth's most productive and diverse ecosystems, acting as crucial links between land and water. These areas, where water saturates the land either permanently or seasonally, play a vital role in supporting biodiversity, improving water quality, regulating climate, and providing economic resources to millions of people globally. India, with its varying topography and climatic regimes, supports diverse and unique wetland habitats[1]. Wetlands are among the most productive ecosystems comparable to rain forests and coral reefs. They also serve as a source of substantial biodiversity in supporting numerous species from all of the major groups of organisms – from microbes to mammals. Physical and chemical features such as climate, topography (landscape shape), geology, nutrients and hydrology (the quantity and movement of water) help to determine the plants and animals which inhabit various wetlands. Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They occur where the water table is at or near the surface of the land or where the land is covered by water.

Wetlands are defined as lands transitional between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water. The Ramsar Convention, an intergovernmental treaty 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 tides does not exceed six meters.'[2] India, owing to the extremes of climatic, geological and topographic diversity, is endowed with a rich diversity of wetlands ranging from high-altitude lakes in the Himalayas, marshes and swamps in the Terai, floodplains and ox-bows in the Gangetic-Brahmaputra alluvial plains, saline flats in the great Indian Desert, tanks and reservoirs in the Deccan region and extensive mangrove marshes and coral reef areas interspersed along the country's over 8,000 km long coastline. These ecosystems range from small village ponds to large lagoons such as Chilika and Vembanad backwaters over a thousand square kilometres. India has around 16 million ha under wetlands accounting for nearly 4.86 per cent of her geographical area.[3]

TYPES OF WETLANDS

There are different types of wetlands and classified basing on the nature of their presence and characteristics.

Coastal Wetlands

Coastal wetlands are found in the areas between land and open sea which are not influenced by rivers such as shorelines, beaches, mangroves and coral reefs. A good instance is the mangrove swamps found in sheltered tropical coastal areas.

Shallow lakes and ponds

These wetlands are areas of permanent or semi-permanent water with little flow. They include vernal ponds, spring pools, salt lakes and volcanic crater lakes.

Marshes

These are periodically saturated, flooded or ponded with water and characterized by herbaceous (non-woody) vegetation adapted to wet soil conditions. Marshes are further characterized as tidal marshes and non-tidal marshes.

Swamps

These are fed primarily by surface water inputs and are dominated prominently by trees and shrubs. Swamps occur in either freshwater or saltwater floodplains.

Bogs

Bogs are waterlogged peat lands in old lake basins or depressions in the landscape. Almost all water in bogs comes only from rainfall.

Estuaries

The area where rivers meet the sea can offer an extremely rich mix of biodiversity. These wetlands include deltas, tidal mudflats and salt marshes.

IMPORTANCE OF WETLANDS

Wetlands are vital ecosystems which provide numerous ecological and economic benefits, including acting as natural water purifiers, flood buffers, and carbon sinks. They are also supporting rich biodiversity and offering opportunities for recreation and sustenance. They serve as critical habitats and nurseries for fish, shellfish, and migratory birds, stabilize coastlines, and improve water quality by filtering pollutants and excess nutrients.

Ecological Importance

Water Purification

Wetlands act as natural filters, removing pollutants, sediments, nutrients like nitrogen and phosphorus and harmful microbes from water.

Flood Control

They absorb excess rainfall and snowmelt, releasing water slowly to mitigate floods and acting as sponges to reduce flood intensity.

Storm Protection

Coastal wetlands like mangroves buffer shorelines from storm surges and tidal waves, protecting inland areas.

Carbon Sequestration

Wetlands store large amounts of carbon in their soils and vegetation which help mitigate climate change.

Groundwater Recharge

Wetlands help to replenish groundwater supplies by absorbing water. Increased groundwater pumping for agriculture in eastern India may have had adverse impacts on wetlands, as they receive inflows from shallow aquifers. This could have a significant impact on poor families who depend on these water bodies for domestic water supplies, irrigation, and fisheries[4].

Biodiversity and Habitat

The wetlands are crucial habitats for migratory birds, particularly those travelling along the Central Asian Flyway. The wetlands serve as vital stopover sites where birds can rest and refuel during their long migrations. Maintaining the health of these wetlands is essential for conserving the bird populations which depend on them.

Rich Habitats

Wetlands provide shelter, breeding and nesting grounds for diverse species of plants and animals.

Nursery Areas

They serve as crucial nursery grounds for commercially and recreationally important species, including fish and shellfish.

Wildlife Support

Wetlands host a significant portion of the world's bird populations, including many migratory species.

Economic and Social Benefits

Natural Products

Wetlands also provide edible resources like fish, shellfish and also raw materials harnessed for various industries.

Recreation

They offer lot more opportunities for activities such as fishing, hunting, bird watching and other forms of nature tourism.

Cultural Value

Wetlands hold cultural and spiritual significance for many communities and support local economies.

DISTRIBUTION OF WETLANDS IN INDIA

India has over 75,000 identified wetlands with a total area of over 15 million hectares, with the state of Gujarat having the largest total wetland area. As of July 2025, India also has 81 Ramsar Sites and, Tamil Nadu leads in the number of Ramsar sites with 18, followed by Uttar Pradesh with 10 and Madhya Pradesh with 8, while Andhra Pradesh leads in the number of reservoirs. India is home to a rich diversity of wetlands, many of which hold cultural and religious significance. With the continuously increasing focus on sustainability, India has significantly expanded its network of Ramsar Sites to 85 (as of 14th August 2024), making it the country with the largest number of such sites in South Asia. Between 1982 and 2013, India added 26 sites to its list of Ramsar sites. However, from 2014 to 2024, the country has significantly increased its commitment to wetland conservation by adding 59 new Ramsar sites. Earlier in 2024, India added new Ramsar Sites including Ankasamudra Bird Conservation Reserve, Aghanashini Estuary and Magadi Kere Conservation Reserve located in Karnataka whereas two, Karaivetti Bird Sanctuary and Longwood Shola Reserve Forest in Tamil Nadu. Two bird sanctuaries from Bihar, Nagi and Nakti were also included in this list.[5]

According to NWIA (National Wetland Inventory and Assessment) the total area under wetland in the country is estimated as 15.260 MHa, 2011 accounting for 4.63 per cent of the geographical area. Excluding rivers and streams the total wetland area is estimated as 10 MHa. State-wise distribution of wetlands showed that Lakshadweep has 96.12 per cent of geographic area under wetlands followed by Andaman and Nicobar Islands (18.52%), Daman and Diu (18.46%) and Gujarat (17.56%), have the highest extent of wetlands. Puducherry (12.88%), West Bengal (12.48%), Assam (9.74%), Tamil Nadu (6.92%), Goa (5.76%), Andhra Pradesh (5.26%) and Uttar Pradesh (5.16%) are wetland-rich states. The least extents(less than 1.5 % of the state geographic area) have been observed in Mizoram (0.66%) followed by Haryana (0.86%), Delhi (0.93%), Sikkim (1.05%), Nagaland (1.30%) and Meghalaya (1.34%).[6]

Inland – Natural Wetlands

Tamil Nadu has highest number of lakes (4369) followed by Uttar Pradesh (3684) and West Bengal (1327). Ox-bow lakes/Cut-off meanders are observed in Uttar Pradesh, West Bengal, Bihar, Assam and Orissa. Large number of riverine wetlands exists in Uttar Pradesh, West Bengal, Bihar, Assam and Jammu & Kashmir.

Inland – Man-made Wetlands

Andhra Pradesh has highest number of reservoirs (4527) followed by Madhya Pradesh (2005), Uttar Pradesh (1608), Orissa (1379) and Gujarat (1213). Details are summarized below. Large number of Tanks/ponds exists in Tamilnadu, Maharashtra, Madhya Pradesh, Andhra Pradesh, Rajasthan and Karnataka.

Small wetlands (less than 2.25 ha)

There are 555557 small wetlands exists in the country. West Bengal has highest number of small wetlands (138707), followed by Uttar Pradesh, Orissa, Madhya Pradesh and Rajasthan. [6]

World Wetlands Day is celebrated every year on 2nd February. This day marks the date of the adoption of the Convention on Wetlands on 2 February 1971 in Ramsar, Iran.

THREATS TO WETLANDS

Most of the wetlands in India are under threat due to rapid urbanization, industrialization and agricultural intensification. This is manifested by shrinkage in their areal extent as well as a decline in the hydrological, economic, and ecological functions they perform[7].The wetlands are threatened by human activities such as pollution, development and resource extraction, making their conservation essential for human and environmental health.

Urbanization

Wetlands near urban centres are under simmering pressure for residential, industrial and commercial facilities. The urban wetlands are essential for preserving public water supplies.

Agriculture

Vast stretches of wetlands have been converted to paddy fields. Construction of a large number of reservoirs, canals and dams provides water for irrigation.

Pollution

Wetlands act as natural water filters and can clean up the fertilizers and pesticides from agricultural runoff and other types of pollution. There is copious concern about the effect of industrial pollution on drinking water supplies and the biological diversity of wetlands.

Climate Change

Increased air temperature, shifts in precipitation, increased frequency of storms, droughts, floods, increased atmospheric carbon dioxide and sea level rise also affect wetlands.

Dredging

The removal of material is a natural from a wetland or river bed. Dredging of streams lowers the surrounding water table and dries up adjacent wetlands.

Draining

Water is drained from wetlands by cutting ditches into the ground which collect and transport water out of the wetland. This lowers the water table and dries out the wetland.

Introduced Species

Indian wetlands are threatened by exotic introduced plant species such as water hyacinth and salvinia. They clog waterways and compete with native vegetation.

Salinization

Over exploitation of ground water leads to very high salinisation.

WETLANDS CONSERVATION

Wetlands have been identified as components of 'freshwater resources' and the recommended policy actions for wetlands conservation include integration in developmental planning, management based on the prudent use strategies, promotion of ecotourism, and implementation of a regulatory framework. Lack of conformity among government policies in the areas of economics, environment, nature conservation, and development planning is one of the major reasons for the neglect of these important habitats[8].

Montreux Record

It is maintained as part of the Ramsar List and is a register of wetland sites on the List of Wetlands of International Importance where changes in ecological character have occurred, are occurring, or are likely to occur as a result of technological developments, pollution or other human interference. The two wetlands of India are in Montreux Record are Keoladeo National Park (Rajasthan) and Loktak Lake (Manipur).

Regulations of Wetlands in India

Wetlands are regulated under the Wetlands (Conservation and Management) Rules 2017. The 2010 version of the rules provided for a Central Wetland Regulatory Authority, but new Rules of 2017 replaced it with state-level bodies and created a National Wetland Committee, which functions in an advisory role. The newer regulations removed some items from the definition of "wetlands" including backwaters, lagoons, creeks, and estuaries. Under the 2017 regulations, the process to identify the wetlands has been delegated to the States.

Ramsar Convention

The Convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. As a contracting party, India is committed to the three pillars: I. designating wetlands to the List of Wetlands of International Importance; II. working towards the wise use of wetlands and III.cooperating internationally on transboundary wetlands, shared wetlands and shared species. The Ministry is working in partnership with bilateral and multilateral organizations to improve wetlands management.

Ministry of Environment, Forest, and Climate Change (MoEF&CC)

To strengthen the role of citizens in wetlands conservation and management, the MoEF & CC launched the Save Wetlands Campaign in 2023. The campaign aims to sensitise people about the values of wetlands, increase the coverage of wetland mitras and build citizen partnerships for wetland conservation. Through the Save Wetlands Campaign, the Ministry envisages making wetland conservation a people's movement and inspire, infuse pride and ownership amongst stakeholders to adopt sustainable lifestyles for healthy wetlands and promote wise use of wetlands, aligning with Mission Lifestyle for Environment (LiFE) for wetlands. The three-year initiative, through its four components, namely Species and Habitat Conservation, Wetlands Livelihoods, Nature Tourism and Wetlands Carbon, aims to create, demonstrate, replicate and upscale the effect on wetlands of national and international importance.[9]

The Ministry of Environment, Forest, and Climate Change (MoEF&CC) also champions privatesector partnerships in wetlands conservation. A Memorandum of Cooperation has been signed between the Indian Business and Biodiversity Initiative (established by the MoEF&CC and the Confederation of Indian Industries to enable Indian Businesses to make commitments for biodiversity conservation and sustainable use) and the MoEF&CC to foster participation of corporates in wetlands management and conservation efforts. The India Wetland Coalition (IWC) was launched in 2022 to enable business partnerships for Wetlands Conservation, addressing the risk of nature loss and building resilience to climate change.[10]

RECENT DEVELOPMENTS IN WETLAND CONSERVATION IN INDIA

1. **Wetlands of India Portal**: Launched on October 2, 2021, by the Ministry of Environment, Forest and Climate Change (MoEFCC), this portal provides comprehensive information on India's wetlands. It includes capacity-building materials, data repositories, and dashboards for each state and union territory.
2. **National Wetland Decadal Change Atlas**: Prepared by the Space Applications Centre (SAC), Ahmedabad, it atlas highlights the changes in wetlands across the India.
3. **Centre for Wetland Conservation and Management (CWCM)**: Established on World Wetland Day 2021, it focuses on addressing research needs and knowledge gaps in wetland conservation.
4. **Wetlands Rejuvenation Programme**: Initiated by MoEFCC in 2020, this program aims to rejuvenate over 500 wetlands across India. It includes developing baseline information, rapid assessments, stakeholder engagement, and management planning.
5. **Integration with River Basin Management**: The Namami Gange program integrates wetland conservation with river basin management a model framework in India.
6. **National Plan for Conservation of Aquatic Ecosystems:** In 2013, the National Wetlands Conservation Programme and the National Lake Conservation Plan were combined to create the National Plan for Conservation of Aquatic Ecosystems. This comprehensive plan reflects a holistic g approach to protecting vital aquatic ecosystems.
7. **Amrit Dharohar Scheme:** Launched with the Union Budget 2023-24, it is a key initiative aimed at optimizing wetland utilization over the next three years. Its goals include enhancing biodiversity, increasing carbon stock, boosting eco-tourism, and generating income for local communities, in line with the government's sustainable development vision.

8. **MoEFCC's Wetlands Rejuvenation Programme**: Launched in 2020, the Ministry of Environment, Forest & Climate Change (MoEFCC) initiated the Wetlands Rejuvenation Programme. This multifaceted approach includes developing baseline data, assessing wetland health, establishing stakeholder platforms, and creating comprehensive management plans and it program covers over 500 wetlands.

9. **National Wildlife Action Plan**: The National Wildlife Action Plan (2017-2031) emphasizes the conservation of inland aquatic ecosystems, including wetlands and advocates for a national wetlands mission to preserve these habitats, recognizing their importance for biodiversity and ecosystem services.

10. **Integration with Namami Gange**: On World Wetlands Day 2021, the Ministry of Jal Shakti highlighted the integration of wetland conservation with the Namami Gange programme. The National Mission for Clean Ganga (NMCG) has pioneered initiatives which serve as models for wetland conservation nationwide.

WETLAND MANAGEMENT

Wetlands management in India is governed by the Wetlands (Conservation and Management) Rules, 2017, which designates State Wetland Authorities (SWAs) for preparing management action plans and monitor their execution.

Legal Framework

Wetlands (Conservation and Management) Rules, 2017

These rules establish a regulatory framework for wetland management, including the formation of State Wetland Authorities (SWAs) to oversee implementation and management of wetlands within their jurisdiction.

Ramsar Convention

India became a signatory to the Ramsar Convention in 1982 and has designated sites as Wetlands of International Importance to promote their wise use and management. Over the years, the number of designated Ramsar Sites has increased to 26.[11]

Institutional Mechanisms

State Wetland Authorities (SWAs)

Each State and UT government has an SWA, often headed by the State's Environment Minister, to implement wetland conservation efforts.

National Wetland Committee

This advisory body, established by the 2017 rules, provides policy guidance on wetland conservation.

Centre for Wetland Conservation and Management (CWCM)

Established in 2021, the CWCM serves as a knowledge hub, offering research support, training, and technical expertise to SWAs and other stakeholders.[12] Thereafter in 1985-86, the National Wetland Conservation Programme (NWCP) was launched. Initially only designated Ramsar Sites were identified for conservation and management under the programme.[13]

KEY PROGRAMMES AND INITIATIVES

India, designated Wetlands of International Importance (Ramsar Sites) for priority conservation. Key initiatives include the National Plan for Conservation of Aquatic Ecosystems (NPCA) and the establishment of the Centre for Wetland Conservation and Management (CWCM) to provide technical support and facilitate knowledge sharing.

However, despite the progress the initiatives have proved to be too little considering the extent of ecologically sensitive wetland ecosystems in the country and the fact that only a selected few wetlands were taken up for conservation and management.[14]

National Plan for Conservation of Aquatic Ecosystems (NPCA)

The scheme supporting the implementation of management action plans for wetlands across India through cost-sharing between the central and state governments.[15]

Wetlands Rejuvenation Programme

An initiative by the Ministry of Environment, Forest and Climate Change (MoEFCC) to rejuvenate over 500 wetlands through activities like baseline assessment, stakeholder engagement and management planning.

Collaboration with NGOs and Local Communities

Many successful initiatives involve collaboration between the government, NGOs and local communities to conserve wetlands and achieve management objectives.

Capacity Building and Knowledge Sharing

The CWCM programs focus on capacity building among wetland users, managers, researchers and policymakers.

Integration

Efforts are underway to integrate wetland conservation with river basin management, such as the Namami Gange programme to provide a holistic framework for management.

CONCLUSION

Wetlands are vital for maintaining ecosystem health, helping to minimize potential disaster impacts on various habitats and species. Wetlands are essential for managing the impacts of floods, droughts and cyclones. They serve as natural buffers by capturing excess rainfall and gradually releasing water during dry periods, thus mitigating extreme weather effects. Recognizing the crucial role wetlands play in supporting both human well-being and planetary health, the Government of India has initiated several efforts to protect and restore these vital ecosystems. Through various wetland initiatives, the Government seeks to ensure that the invaluable services provided by wetlands are preserved for future generations. To counter unplanned urbanization and a growing population, management of wetlands has to be an integrated approach in terms of planning, execution and monitoring. Effective collaborations among academicians and professionals, including ecologists, watershed management specialists, planners and decision makers for overall management of wetlands. Despite the promulgation of recent national legislation on wetland regulation, majority of India's wetlands continued to be ignored in the policy process. Spreading awareness by initiating awareness programs about the importance of wetlands and constant monitoring of wetlands for their water quality would provide vital inputs to safeguard the wetlands from further deterioration.

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