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WETLANDS, THE WATERLOGGED WEALTH – A REVIEW

[1]K.Madhavi, [2]Adnan Amin, [3]G.Vidya Sagar Reddy, [4]Devi Varaprasad Reddy A.
[1]Department of Aquatic Environment Management, College of Fishery Science, Muthukur, Andhra Pradesh, India - 524344.[2] Department of Aquatic Environment Management, College of Fisheries, Mangalore, Karnataka, India – 575 002.[3] Department of Fish Processing Technology, College of Fishery Science, Muthukur, Andhra Pradesh , India – 524344.[4] Department of Fisheries Microbiology, College of Fisheries, Mangalore, Karnataka, India – 575 002.

ABSTRACT

Wetlands are one of the most threatened habitats of the world. They have great significance for more than one reason, most notably because they charge aquifers, conserve moisture, act as pollution filters, and are habitat for biodiversity .'Wetland' is a generic term for water bodies of various types, and includes diverse hydrological entities, namely, lakes, marshes, swamps, estuaries, tidal flats, river flood plains and mangroves. They occur everywhere, from the tundra to the tropics. These are among the most productive ecosystems, besides being a rich repository of biodiversity and are known to play a significant role in carbon sequestration. They play key role in maintaining water balance, flood prevention, biodiversity and support food security and livelihoods. Wetlands Conservation has to be taken up as a crusade at district, State, national, regional, and global levels for the welfare of present and future generations. In this review paper brief idea about various Wetlands their importance, threats and management aspects has been enlightened.

KEYWORDS: Wetlands, Threat, Management, Ramsar Convention.

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Corresponding Author:adnanamin2011@gmail.com

INTRODUCTION

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 (Mitsch & Gosselink 1986). According to the Ramsar Convention, wetlands are 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 6 m.

The wetlands encompass diverse and heterogeneous assemblage of habitats ranging from lakes, estuaries, river flood plains, mangroves, coral reef and other related ecosystems. Abundance of water at least for a part of the year is the single dominant factor. 'Wetlands are lands, transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by the shallow water.' These are complex hydrological and biogeochemical systems and have been recognized as distinctly separate ecosystems between the terrestrial and aquatic ones. Wetlands are often described as "kidneys of the landscape" (Mitsch & Gosselink 1986) there by reducing eutrophication in adjacent water bodies.

Wetlands are broadly grouped into three categories: marine and coastal wetlands, inland wetlands and human-made wetlands. Wetlands are ecotones that buffer the interactions of terrestrial and aquatic ecosystems. Biological

productivity of wetlands can often exceed that of either terrestrial or aquatic ecosystems. Most of these ecosystems, because of their physical location between terrestrial and aquatic ecosystems, either function as potential sinks for solutes discharged from adjacent uplands or as potential sources of solutes to adjacent aquatic systems.

They are classified into different types based on their origin, vegetation, nutrient status, thermal characteristics, like glaciatic wetlands, tectonic wetlands, crater wetlands, oxbow wetlands, salt water wetlands, urban wetlands, ponds/tanks/manmade wetlands, reservoirs, lagoons, mangroves, coral reefs, creeks etc. They are among the most productive ecosystems of the world, although they account only about 4 per cent of the earth's ice-free land surface (Prigent, 2001).

Since the beginning of the 20th century more than half of the wetlands in the world may have disappeared (Barbier, 1991 and 1993; Micheli, 1992). While most of this loss has occurred in developed countries, wetland loss is on the rise in the developing world, especially in the tropics. Most of these wetland conversions are for agricultural lands, fishponds, and urban settlements (Farber and Constanza, 1987).

Significance of wetlands:
They are the cradles of biological diversity, providing the water and primary productivity upon which countless species of plants and animals depend for survival. They support huge numbers of birds, mammals, reptiles, amphibians, fish and invertebrate species. Wetlands are also important storehouses of plant genetic material. Wetlands provide important hydrological functions such as ground water recharge, water quality improvement and flood alleviation. These are effective in flood control, waste water treatment, reducing sediment loads and recharging of aquifers. They are also offering recreational benefits (swimming, diving, and tourism). Some wetland services such as flood protection and storm buffering could be of particular value to the poor, who have no access or means to otherwise protect themselves (FAO 2001).

Wetland vegetation plays an important role in improving water quality through extraction and/or filtering of pollutants (e.g., nitrates) and amelioration of pathogens including coliform bacteria and faecal streptococci (Ghermandy *et al*., 2007; Verhoeven *et al*. 2006; WWDR 2006). Mitsch and Gosselink (1986) considered the wetlands as amongst the most productive ecosystems on earth. According to Maltby, 1986, there are manifold values of wetlands viz. a) genetic conservation b) water treatment c) nutrient and heavy metal removing d) fresh water fisheries e) flood mitigation f) tourism g) wild life habitat h) energy and CO_2 storage release of O_2 etc.

Economic valuation
Economic valuation of ecosystems is a rapidly developing discipline, and there are now many different methods available for undertaking different aspects and purposes of wetland valuation. In terms of function, products, and attributes it offers a powerful tool for ensuring the "wise use" of wetlands. The science of wise use is by necessity an ongoing process of adaptive learning. Only in very few cases have decisions been informed by the total economic value and benefits of both marketed and non-marketed services provided by wetlands. Lack of understanding and recognition leads to ill-informed decisions on management and development, which contribute to the continued rapid loss, conversion and degradation of wetlands - despite the total economic value of unconverted wetlands often being greater than that of converted wetlands.Too often decision-makers and the general public are not aware of the economic value of wetlands and their ecological function. Quantifying and valuation of wetland ecosystem services in a way that makes them comparable with the returns derived from alternative uses can facilitate improved policy and decision making (Turner *et al*., 2000).

Increasingly, it is being shown that sustainable, multi-functional use of an ecosystem is usually not only ecologically sounder, but also economically more beneficial, both to local communities and to society as a whole (Balmford *et al.* 2002).

Threats to wetlands

Wetlands are one of the most threatened habitats of the world. Wetlands in India, as elsewhere are increasingly facing several anthropogenic pressures. Massive deforestation, unplanned urbanization and industrialization, public ignorance of wetland values, functions and fragility, and inadequate or conflicting management structures are the main causes of wetland degradation (Pradhan and Shrestha, 1994). Acute wetland losses results from agricultural conversion, direct deforestation, hydrological alteration, inundation by dammed reservoirs etc.

Wetlands are in intense threat due to

- Uncontrolled- discharge of waste water, siltation, weed infestation, dredging,
- encroachment
- habitat destruction
- tree felling for wood
- climate change

Climate change will impact wetlands in various ways. Small wetlands will dry up and disappear, resulting in a loss of carbon sinks. Permanent wetlands will become seasonal and be subject to greater variation in the water levels.

Conservation and Management

Wetland resources are global asset of enormous value to the present and future generations, bothecologically and socio-economically. They perform numerous vital functions and, thus, need to be looked after and used wisely. The major causes of decline and loss of wetland resources are due to fragmentation, modification of habitat, unsustainable use of water resources, siltation, over exploitation unplanned development and haphazard implementation of development activities, unregulated garbage and sewage disposal, eutrophication, introduction of exotic fish farming, and use of persistent organic pesticides (Joshi *et al*., 2003). The conservation and management of wetlands calls for a comprehensive strategy, ranging from legal framework and policy support to inventorization, institutional mechanism, capacity building, and community participation.

Participatory integrated wetland management has become the accepted approach for managing wetlands. Wetlands provide free goods and services to numerous rural and urban communities; hence local community should play a major role in maintaining these liquid assets. For the successful wetland conservation and management, the community should be able to give and receive information about the wetlands, in terms of valuation and existing biodiversity. Once the local people made aware, educated and trained on various aspects of wetlands, they will be able to understand their importance, threats and possible solutions for conservation and management of wetlands. Hence, it is imperative to educate the local communities about the value of wetlands (especially for the threatened Ramsar sites) and their wise use. According to Addun and Muzones (1997), the five basic principles that are required for community-based resource management are empowerment, equity, sustainability, and system orientation, gender-fair.

Traditional knowledge about resources has its own role to play in conservation to attain success. Local people often have an understanding of wetland ecology in their particular context that is far subtler, and sometimes superior to that of outside "experts". Traditional practices, such as voluntary restrictions on access and use, can be invaluable tools for wetland management. However, traditional practices do not necessarily result in environmental sustainability, and they must be assessed objectively in the light of changing population dynamics and pressures on the resource. Likewise, local explanations for environmental phenomena may need to be reviewed in light of scientific understanding. Rather than simply extracting local knowledge for the benefit ofWetlands science, it is critical that researchers working with local people ensure a two-way exchange of information, ensuring that local wisdom is incorporated into management strategies, and feeding back scientific knowledge and data to the communities. The participation of the wetland users is crucial for extenuating the problems related to wetland (Utsala Shrestha, 2011).

Wetlands are not delineated under any specific administrative jurisdiction. Effective coordination between the different ministries, energy, industry, fisheries revenue, agriculture, transport and water resources, is essential for the protection of these ecosystems.

Wetlands are the only single group of ecosystems to have their own international convention. The Ramsar Convention has been instrumental and highly successful in mobilizing most nations to pledge for wetland conservation.

Ramsar Convention:
The Convention on Wetlands, signed in Ramsar, Iran, on 2nd February 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources to achieve sustainable development throughout the world, which entered into force on December 21st 1975, upon acceptance by UNESCO. The Government of India became a contracting/member party of the Ramsar Convention on 1 February 1982, with six wetlands covering 192,973 ha area as internationally important. The Ministry of Environment and Forests (MoEF), Govt. of India is the administrative authority for implementation of the Convention in India.

Montreux Record is a list of wetland sites maintained by Ramsar Convention Secretariat where changes in ecological character have occurred or are likely to occur as a result of pollution and other anthropogenic activities. It is maintained as a part of Ramsar database. It highlights the action to be taken for management of these wetlands on priority basis.

In 1993, **National Lake Conservation Plan (NLCP)** was carved out of Wetland Conservation Programme to focus on lakes, particularly those located in urban areas which are subjected to anthropogenic pressures.

Wetlands (Management & Conservation) Rules, 2008:
The MoEF issued a draft notification on a regulatory framework for conservation of wetlands in July 2008, under the provisions of the Environment (Protection) Act (EPA), 1986, called the wetlands (Management & Conservation) Rules, 2008.

Indian wetlands
The Wetland ecosystem in India is spread over a wide range of varied climatic conditions, from the cold Jammu and Kashmir to hot and humid Peninsular India, there by exhibiting greatest diversity. Many of these wetlands are unique with respect to biodiversity, scenic beauty, shelter of migratory birds, resident avifauna, etc. India's wetlands are extraordinarily diverse-ranging from lakes and ponds to marshes, mangroves, backwaters and lagoons and play a vital role in maintaining water balance, flood prevention, biodiversity and support food security and livelihoods.

Total wetland area estimated is 9.70 m ha, which is around 6.94% of the geographic area. Total inland wetlands are 5.58 m ha and coastal wetlands are 4.12 m ha. The most dominant type of wetland is intertidal mudflats (2.39 m ha) occupying around 24.7% of total wetland area. Gujarat has a large area under inter-tidal mudflats (2,260,365 ha) followed by Tamil Nadu (33,164 ha) and Andhra Pradesh (31,767 ha). The other major coastal wetlands are mangroves (471,407 ha), aquaculture ponds (284,589 ha), lagoons (246,044 ha), creeks (206,698 ha), salt pans (148,913 ha) and coral reefs (142,003 ha). Though coral reef belongs to the minor category, it has significance in Lakshadweep, Andaman and Nicobar Islands, Gujarat and Tamil Nadu. It is estimated that freshwater wetlands alone support 20 per cent of the known range of biodiversity in India (Deepa & Ramachandra 1999).

Wetlands of International Importance in India under Ramsar Convention

S.No.	Name of Ramsar site	State/UT	Area (ha)	Type of wetland
1	Asthamudi wetland	Kerala	61,400	Coastal-Natural-Lagoon
2	Bhitarkanika mangroves	Orissa	65000	Coastal-Natural-Mangrove
3	Bhoj wetland	Madhya Pradesh	3201	Inland-Manmade-Reservoir/ Barrage
4	Chandertal wetland	Himachal Pradesh	49	Inland-Natural-High Altitude Wetland (Glaciatic wetland)
5	Chilka lake	Orissa	116500	Coastal-Natural-Lagoon
6	Deepor beel	Assam	4000	Inland-Natural-Lake (Oxbow wetland)
7	East Kolkata wetlands	West Bengal	12500	Inland-Manmade-Waterlogged
8	Harike lake	Punjab	4100	Inland-Manmade-Reservoir/ Barrage
9	Hokera wetland	Jammu & Kashmir	1375	Inland-Natural-Lake/Pond
10	Kanjli	Punjab	183	Inland-Manmade-Reservoir/Barrage
11	Keoladeo National park	Rajasthan	2873	Inland-Manmade-Waterlogged
12	Kolleru lake	Andhra Pradesh	90100	Coastal-Natural-Lake/Pond
13	Loktak lake	Manipur	26600	Inland-Natural-Lake/Pond (Oxbow wetland)
14	Nalsarovar Bird Sanctuary	Gujarat	12000	Inland-Natural-Lake/Pond
15	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu	38500	Coastal wetland complex
16	Pong Dam lake	Himachal Pradesh	15662	Inland-Manmade-Reservoir/ Barrage

Contd. from above

17	Renuka wetland	Himachal Pradesh	20	Inland-Natural-Lake/Pond
18	Ropar	Punjab	1365	Inland-Manmade-Reservoir/ Barrage
19	Rudrasagar lake	Tripura	240	Inland-Natural-Waterlogged
20	Sambar lake	Rajasthan	24000	Inland-Natural-Lake/Pond
21	Sasthamkotta lake	Kerala	373	Inland-Natural-Lake/Pond
22	Surinsar-Mansar lakes	Jammu & Kashmir	350	Inland-Natural-Lake/Pond
23	Tsomoriri	Jammu & Kashmir	12000	Inland-Natural-High Altitude Wetland (Glaciatic wetland)
24	Upper Ganga River (Brijghat to Narora stretch)	Uttar Pradesh	26590	Inland-Natural-River/Stream
25	Vembanad-Kol wetland	Kerala	151250	Coastal-Natural-Lagoon
26	Wular lake	Jammu & Kashmir	18900	Oxbow wetland

Source: National Wetland Atlas, MoEF, Govt. of India

A Ramsar site is a wetland of International importance listed under the Ramsar convention, named after the town in Iran where the convention was signed.

S.No.	Name of Ramsar site	State/UT	Significance
1	Asthamudi wetland	Kerala	The second largest backwater system of Kerala state.
2	Bhitarkanika mangroves	Orissa	Olive Ridley nesting ground, Habitat for salt water crocodiles, Diversified mangrove area.
3	Bhoj wetland	Madhya Pradesh	Supports vulnerable bird species.
4	Chandertal wetland	Himachal Pradesh	Is of special value for its endemic plant and animal species.
5	Chilka lake	Orissa	Chilika is the world's second largest lagoon situated on east coast of India in Orissa state.
6	Deepor beel	Assam	Formed in the abandoned channel of Brahmaputra River.

Contd. from above

7	East Kolkata wetlands	West Bengal	"One of the rare examples of environmental protection and development management".
8	Harike lake	Punjab	It is a shallow water reservoir with many islands.
9	Hokera wetland	Jammu & Kashmir	It supports a large number of waterfowls.
10	Kanjli	Punjab	The purpose was to create a water storage area for irrigation of crops. As it is associated with Shri Guru Nanak Dev, is of religious significance.
11	Keoladeo National park	Rajasthan	Popularly known as the Bharatpur Bird Sanctuary. The origin of this wetland is due to artificial flooding of a natural depression.
12	Kolleru lake	Andhra Pradesh	Habitat for grey Pelicans.
13	Loktak lake	Manipur	Known as the floating lake due to the floating *phumdis.*
14	Nalsarovar Bird Sanctuary	Gujarat	The wetland supports 306 recorded species of birds.
15	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu	Is a complex wetland composed of creek, forest, swamps, and intertidal mudflats. Pilgrimage centre (associated with Lord Rama).
16	Pong Dam lake	Himachal Pradesh	Built primarily for irrigation purpose, it became a significant habitat of migratory birds and declared as Wildlife Sanctuary in 1986.
17	Renuka wetland	Himachal Pradesh	It is known for its rich biodiversity besides being important religious place of worship.
18	Ropar	Punjab	It is an important staging ground for a number of migratory birds. Breeding place for smooth Indian Otter.
19	Rudrasagar lake	Tripura	Ideal habitat for the endangered Three- striped roof Turtle.
20	Sambar lake	Rajasthan	Saline inland lake, famous for salt production.
21	Sasthamkotta lake	Kerala	Unique fresh water lake, fed by underground springs Largest fresh water lake of Kerala.
22	Surinsar-Mansar lakes	Jammu & Kashmir	These lakes support two important species of turtles, viz: the Indian Flapshell Turtle and the Indian Soft- shell Turtle listed in IUCN Red List category.
23	Tsomoriri	Jammu & Kashmir	The lake is landlocked with no active outlet, thus the water is brackish. Breeding ground for Cranes.
24	Upper Ganga River (Brijghat to Narora stretch)	Utter Pradesh	The only Ramsar site falling in River/Stream wetland type in India. Natural habitat for Gangetic River Dolphin.
25	Vembanad-Kol wetland	Kerala	Largest brackish water wetland ecosystem of S-W coast of India.
26	Wular lake	Jammu & Kashmir	The largest fresh water lake in India.

World Wetlands Day: World Wetlands Day is an international day to celebrate all wetlands worldwide and is observed every year on 2nd February.It marks the date of the signing of the Convention on Wetlands on 2nd February 1971, in the Iranian city of Ramsar, on the shores of the Caspian Sea; therefore, this Convention came to be known as the Ramsar Convention (1971). World Wetlands Day (WWD) was celebrated for the first time in 1997, on the 16th anniversary of the Ramsar Convention. The theme of the day for 2013 is 'Wetlands take care of water' to link to the UN International year of water cooperation.

CONCLUSION

Wetlands play a vital role in maintaining the overall cultural, economic and ecological health ofthe ecosystem, their fast pace of disappearance from the landscape is of great concern. The dynamic nature of wetlands necessitates the widespread and consistent use of satellite based remote sensors and low cost, affordable GIS tools for effective management and monitoring. For a strategy of wise use to be sustainable, it cannot be based solely on a concept developed by government or international experts, but must ensure that it incorporates the priorities and the wisdom of local people. Besides protection laws and government initiatives, integration of traditional community knowledge into the restoration designs, their active and informed participation,no doubt would pave the way towards success in conservation and management of wetlands and is the strong need of the hour. Economic valuation of wetlands should receive priority attention in the future, as many development decisions are made on economic grounds.

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