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Hari Prasad
College of Fisheries Science, Junagadh Agricultural University, Veraval, Gujarat, India

Ganesh S Temkar
College of Fisheries Science, Junagadh Agricultural University, Veraval, Gujarat, India

AY Desai
Principal and Dean
College of Fisheries, Junagadh Agricultural University, Veraval, Gujarat, India

Correspondence
Hari Prasad
College of Fisheries Science, Junagadh Agricultural University, Veraval, Gujarat, India

Wetland ecosystem: Their importance to biodiversity, services and conservation

Hari Prasad, Ganesh S Temkar and AY Desai

Abstract
Wetlands cover approximately 5-8% of the global land area. In India the wetland area is estimated up to 58.2 million hectares and they were important for aquatic biodiversity. Wetlands directly and indirectly support millions of people by providing ecological services. Presently human and manmade anthropogenic activities cause alterations of wetlands. Changes in wetland areas it may significantly affect ecosystem processes and ecological changes. Wetlands provide important and most diverse benefits to people around the world. It provide and contributing provisioning, regulating, habitat and cultural services. It also help most critical regulating services like improve water-quality, flood control, carbon recycle and provide habitat for many species of biodiversity.

Keywords: Wetland, Importance, Ramsar, Threat, Conservation.

1. Introduction
Wetlands are among the most productive ecosystems in the world, comparable to seaweeds and the coral reefs. They also are a source of substantial biodiversity in supporting numerous species from all of the major groups of organisms from microbes to mammals (Greeson *et al*, 1979) [8]. Wetlands are important part of the ecosystem and are among the most threatened of all environmental resources (Abraham, 2015) [1]. Banner and Mackenzie (2000) [2] stated that wetlands are important element of British Columbia's because they support large biological diversity and also plays an important role for many ecological and hydrological functions. Wetlands play an integral role in the hydrologic cycle and provide important ecosystem services that may include water quality improvement and enhancement, carbon storage, wildlife habitat and buffers during periods of floods (National Research Council, 1992) [12]. Wetlands are most productive ecosystems that interacts directly or indirectly to ecosystem and provide shelter and habitat to many organisms (Daigneault *et al.*, 2012) [6]. Presently, human activities started to causes, change in wetland area which significantly affect ecosystem processes. This causes changes in the size and quality of many of the world's wetland systems, which mainly happens due to an increasing number of wetlands are being converted to agricultural or urban uses or being affected by natural factors like drought. Land use changes such as increased urbanization play a key role in environmental and ecological changes of wetlands (Abraham, 2015) [1].

2. Wetlands
Wetland is a term that was used first in 1950s for the seasonally or perennially shallow-flooded habitats of waterfowl. These diverse habitats are known by common terms such as marsh, swamp, bog, fen, mire, moor *etc*. of local names in different countries and different languages also (Gopal, 2015) [7]. Wetlands are defined as areas of land that are either temporarily or permanently covered by water, which exhibit enormous diversity according to their genesis, geographical location, water regime and chemistry (Abraham, 2015) [1].
The Ramsar Convention on Wetlands of International Importance (1971) defines wetlands as:
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 six meters (Gopal, 2015) [7].
Every year on 2nd February is celebrated as World Wetlands Day because on this date the adoption of the Convention on Wetlands was ensued during the year 1971 at the Iranian city of Ramsar. This is an international date with to provide different theme and message on a relevant subject set each year by the Ramsar Secretariat.

3. State wise distribution of wetlands under national wetland conservation & management programme (table 1)

Table 1: State wise number and area of wetlands present in India.

State	Number of wetlands	Area (ha)
Andhra Pradesh	1	90100
Assam	2	4504
Bihar	3	11490
Chandigarh	1	148
Gujarat	8	1270875
Himanchal Pradesh	5	15736
Haryana	2	288
Jammu Kashmir	7	117325
Jharkhand	2	98965
Karnataka	7	4250
Kerala	5	213229
Madhya Pradesh	12	359814
Maharashtra	3	40298
Manipur	1	26600
Mizoram	2	285
Orissa	4	122580
Punjab	3	5648
Rajasthan	1	24000
Sikkim	6	164
Tamil Nadu	3	46283
Tripura	1	240
Uttar Pradesh	9	12083
Uttaranchal	1	800
West Bengal	5	553090

(Source: Choudhary, 2007b) [5].

4. Functions and benefits of Wetlands

Wetlands directly and indirectly support millions of people and providing services such as storm and flood control, clean water supply, food, fiber and raw materials, scenic beauty, educational and recreational benefits *etc*.

4.1. Functions (Choudhary, 2007b) [5]

4.1.1 Water storage
4.1.2 Shoreline stabilization
4.1.3 Ground water recharge and discharge
4.1.4 Water purification
4.1.5 Retention of sediments, nutrients and pollutants
4.1.6 Stabilization of local climate particularly temperature and rainfall
4.1.7 Life support systems
4.1.8 Winter resorts for a variety of birds for shelter and feeding
4.1.9 Suitable habitats for fish and other flora and fauna
4.1.10 Effective in flood control, waste water treatment, reducing sediment loads and recharging of aquifers
4.1.11 Valuable for their educational and scientific interest
4.1.12 Recreational benefits (swimming, diving, tourism).

4.2. Values

4.2.1. Water supply – maintenance of quantity and quality
4.2.2. Fisheries
4.2.3. Agriculture – through maintenance of water table
4.2.4. Grazing
4.2.5. Timber production

4.3. Importance (Tiner, 1984) [13]

4.3.1. Wetlands improve water quality
4.3.2. Wetlands reduce flood damage
4.3.3. Wetlands reduce erosion
4.3.4. Wetlands and groundwater recharge / discharge
4.3.5. Wetlands provide habitat
4.3.6. Wetlands and climate change
4.3.7. Recreation and tourism.

5. Ramsar sites in India

India became a contracting party to the Ramsar Convention in 1981. The Chilika lagoon in Orissa and the Keoladeo National Park in Rajasthan are the first two wetlands designated as Ramsar sites in 1981. Since then the total 26 wetlands in the country have been designated as Ramsar sites by 2012 (Fig. 1). Maximum number of sites were designated during 2002. The latest one in the series is the Nal Sarovar bird Sanctuary in Gujarat designated during 2012.

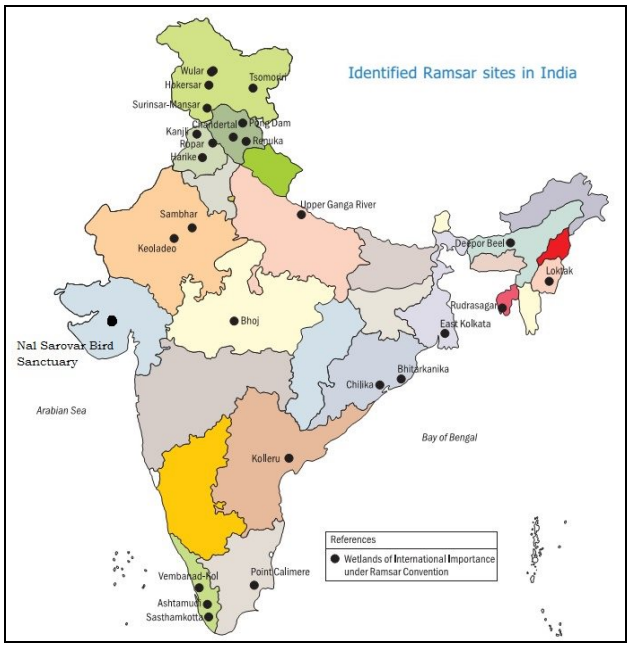

Fig 1: Ramsar Sites of India Internationally Important (Source: Choudhary, 2007b) [5].

6. What is biodiversity?

Over the past millions of years, living organisms have evolved and diversified into innumerable forms. A group of organisms they are interact and symbiosis relationships to each other both living and non-living organism are called biodiversity.

The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Gopal, 2015) [7].

7. What are ecosystem services?

Humans evolved as just another species of mammals from their Primate ancestors. The early hunter food gatherer humans gradually learned to grow food and reduced their dependence on the vagaries of nature. They take the advantage and more benefit from these ecosystem (Fig. 2 & 3).

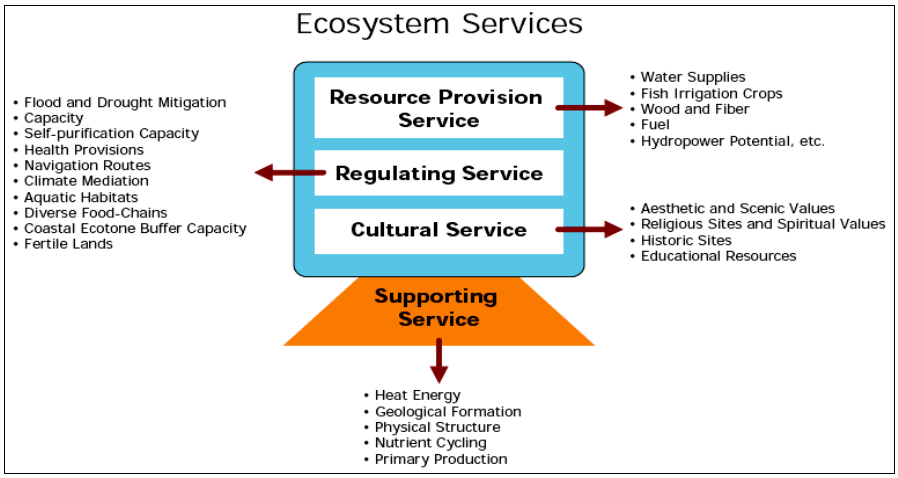

Fig 2: Ecosystem services provided by lakes and reservoirs (Murty, 2013) [13].

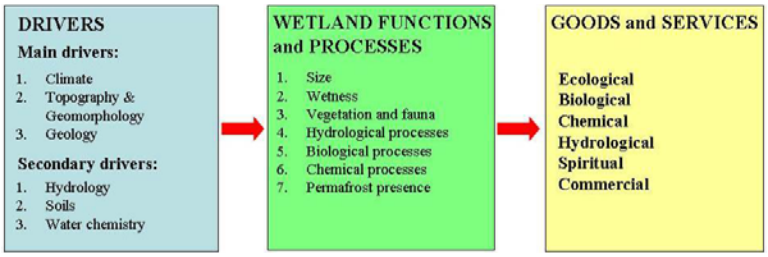

Fig 3: Drivers of wetland functions which in turn affect the ecosystem services.

8. Linkages between biodiversity and wetland ecosystem services (Fig 4)

The relationship between biodiversity and ecosystem functioning has been discussed by ecologists over decades and this is now interpreted in terms of ecosystem services. Biodiversity itself is not considered as an ecosystem service but providing habitats for various organisms is a supporting service that benefits humans by enriching the diversity of biota. Biodiversity controls directly or indirectly all ecosystem services. A macrophyte provide some goods to be used directly for by humans, will support other biota through the food chains, will sequester some carbon, oxygenate water and remove nutrients as well as pollutants, and may contribute to the aesthetics or some cultural as well as social benefit.

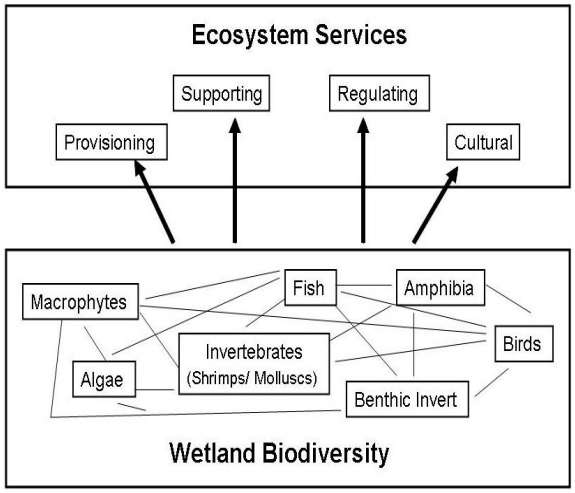

Fig 4: Linkages between Wetland biodiversity and Ecosystem Services.

9. Threat to Wetlands

Increasing human population causes increased the high demand for food, so it have put tremendous pressure on wetlands around the world. At the global level, human activities play an important role to threat of wetlands, resulting in either their loss or degradation (Bjerstedt, 2011) [3].

The main reason for Wetland Area Loss is due to conversion of wetlands to non-wetland areas by human activity, whereas wetland degradation is due to the damage of wetland functions as a result of human activities (Moser *et al*., 1996) [10]. Other threats to wetlands by natural activities like mass wasting, sea level rise, droughts, hurricanes *etc*. also impacted. However, all these natural processes and other activities were closely linked to man's activities on the planet. These threats to directly or indirectly effect to changes of ecological and socio-economic values and also ecological services of wetlands (Masese et al., 2012) [9]. The major causes of wetland loss and degradation in the world can be divided into three categories:

9.1 Biological alterations- In this alteration of the biological communities by large removal of wetland flora and fauna through introduction of alien non-native species.

9.2 Chemical alterations- It may occur through the release of pollutants and toxic chemicals into wetlands resulting in change in nutrient balance.

9.3 Physical degradation - This includes infilling, draining, dredging, stream channelization, peat mining, development, grazing, waste dumping and damming.

9.4 Other factors were (Masese et al., 2012) [9];

- Soil erosion and siltation caused by flooding
- Burning of wetlands
- Persistent and prolonged drought
- Wetland reclamation and encroachment
- Climate Change.

10. Current conservation and management approaches for Wetlands

10.1 To be managed as protected areas under the National Terrestrial Protected Area Network where management is strictly for protection not conducive to wetland management.

10.2 To be declared as RAMSAR sites or biosphere reserves where resource utilization is possible but only with community involvement.

10.3 In tune with any of the 8 categories of IUCN or a National Protected Area Category.

10.4 Indian Categories – National Park, Sanctuary, Conservation Reserves, Community Reserves under the Wildlife Protection Act 1972.

As a RAMSAR site, Biosphere Reserve, World Heritage site or any other category as per the international obligation of a country (Choudhary, 2007a) [4].

11. Conclusion

Wetlands were one of the first ecosystems to be recognized in the early 1970s for their most socioeconomic values and provide habitat for millions of the species and organisms with the maintenance of various ecological niches. In India it is considered as the most productive ecosystem. Because they provides water purification and storage of water so that it is useful for irrigation purpose to human. Now a days the human activities and anthropogenic activities causes threat to wetlands like water pollution, industrial run off, pollution load from agricultural runoff like pesticide and insecticide *etc*. So these sources degraded and reduce the land area and loss of water quality of the wetlands. In conservation point of view the development of RAMSAR site and creation of National park and Biosphere reserves becomes most important. It helps to reduce the threat to wetland and conserve the important species, which creates sustainable development of wetland biodiversity.

12. References

1. Abraham S. The relevance of wetland conservation in Kerala. International Journal of Fauna and Biological Studies. 2015; 2(3): 01-05.
2. Banner A, Mackenzie W. The ecology of wetland ecosystems. B.C. Ministry of Forests, Forest Science Program, Victoria. 2000; 45:12.
3. Bjerstedt TW. Impacting Factors and Cumulative Impacts by Midcentury on Wetlands in the Louisiana Coastal Area. Journal of Coastal Research. 2011; 27(6):1029-1051.
4. Choudhary BC. Keynote Presentation on Biodiversity and Conservation of Wetland on 29th October at the TAAL 2007, 12th World Lake Conference, Jaipur, India, 2007a.
5. Choudhary EMP. Conservation of Wetlands in India: A Profile (Approach and Guidelines). Conservation Division-I, Ministry of Environment & Forests, Government of India, New Delhi, 2007b, 42.
6. Daigneault CV, Nichols K, Hall M. The Importance of Wetlands in Ecosystem Services with Special Attention on Flood Attenuation, Carbon Sequestration, Hydrogeology, Water Quality, Biodiversity, and Social and Local Values. 2012; ERSC3160H-Wetltland, 1-55.
7. Gopal B. Guidelines for Rapid Assessment of Biodiversity and Ecosystem Services of Wetlands. Version 1.0, Asia-Pacific Network for Global Change Research (APN-GCR), Kobe, Japan, and National Institute of Ecology, New Delhi, 2015, 24.
8. Greeson PE, Clark JR, Clark JE. Wetland functions and values: the state of our understanding. American Water Resources Association, USA, 1979.
9. Masese FO, Raburu PO, Kwena F. Threats to the Nyando Wetland. Community Based Approach to the Management of Nyando Wetland, Lake Victoria Basin, Kenya, 2012, 68.
10. Moser M, Prentice C, Frazier S. A Global Overview of Wetland Loss and Degradation. Proceedings of Ramsar COP6 (Brisbane 1996), Technical Session B. 1996; 10(12):21.
11. Murthy TVR, Patel JG, Panigrahy S, Parihar JS. National Wetland Atlas: Wetlands of International Importance under Ramsar Convention, SAC/EPSA/ABHG/NWIA/ ATLAS/38/2013, Space Applications Centre (ISRO), Ahmedabad, India, 2013, 230.
12. National Research Council. Restoration of Aquatic Ecosystems. National Academy Press, Washington DC, 1992, https://doi.org/10.17226/1807
13. Tiner Jr. RW. Wetlands of the United States: current status and recent trends. United States Fish and Wildlife Service, U.S. Government Printing Office, Washington DC, 1984, 1-25. dx.doi.org/10.3996/092015-JFWM-085.S7