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# Current scenario of wetlands ecosystem

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**Abstract**
In India, wetland ecosystems showing some diverse and unique habitats with respect to high level of plant and animal diversity. These wetland system display numerous ecological goods and services and revealed the importance in terms of human welfare and natural resource management. In other words, wetlands act as a transitional zone between land and water and also provide extreme protection against floods. In view of this, wetlands are considered as threatened part of our natural ecosystem. In this regards, there is continuous declining in area and quality of wetlands showing serious consequences on wild life. In this regard, immediate steps are taken for restoring and sustaining the existing wetland area. In this review article, we focused on different wetland types and also mentioning or existing wetland area in India.

**Keywords:** wetland, land, water, ecosystem

## Introduction

A wetland is a permanently, semi-permanently, or seasonally flooded area of land with a distinct ecosystem based on hydrology, hydric soils, and vegetation adapted for life in water saturated soils [1-3]. In other words, Wetlands are considered to be a critical part of our natural environment and it will protect our shores from wave action and tried to reduce the impacts or influence of floods, absorb pollutants and also improve some water quality as well. In addition, wetlands provide habitat for animals along with plants and also contained a wide diversity of biological life which supports various plants and animals that are found nowhere else [1-3].

One of the Asian countries i.e. India is rich in water resources especially in the form of numerous rivers and streams. In India, wetland systems may directly or indirectly associated with various river systems i.e. Ganges, Brahmaputra, Narmada, Tapti, Godavari, Krishna and Cauvery. As per its geographical position along with climatic zones, it will sustain rich diversity of inland and coastal wetlands. In addition, it also shared several wetlands with Sunderbans deltas of Bangladesh. In short, these wetlands are widely dispersed from Trans-Himalayan cold arid zone to Himalayan foothills (wet Terai regions); Gangetic plains extend to the floodplains of Brahmaputra; swamps of north eastern India etc. Now a day, wetlands have been drained and transformed in India through various anthropogenic activities e.g. industrial sites; road construction; resource extraction etc. These anthropogenic activities are involved and accelerated the rate of soil erosion which increased the sedimentation rate and finally resulting in shrinkage of area under wetlands [4-7]. In view of this, most important threatening factors are involved for influencing wetland destruction [1-7] in India and these are-

- Hydrologic alteration
- Agricultural activities
- Pollution
- Deforestation
- Degradation of water quality and global climate change effect
- Depletion of ground water

In short, these wetlands [1-7] are being lost due to various factors

- Anthropogenic stress.
- Population explosion
- Growing economy is due to unplanned urban development which exerts greater pressure on the land resources.
- Lack of governmental commitment
- Financial constraints
- Lacking of infrastructure and required expertise
- toxic contamination by heavy metals, pesticides and organic compounds
- Eutrophication and invasion of exotic species

As per the literature, wetland directly as well as indirectly supports millions of people in terms of food, fibre, raw materials etc. As per the report of National wetland inventory and assessment prepared by the Space Applications Centre, Ahmedabad [7-8] and found that Gujarat is one of the leading states in terms of ecological richness with respect to largest amount of its landmass identified as wetlands of different kinds. In Gujarat state, geographic area (17.56%) has been shown and identified wetland (34.74 lakh hectares) area, Space Application Centre. In comparison with other states in terms of wetlands, Gujarat is followed by Andhra Pradesh, Uttar Pradesh, West Bengal and Maharashtra in that order. In view of this, geographical area of coastal Union territories i.e. Diu and Daman (18.46%) identified as wetland, next only to Lakshadweep (96.12%). In comparison with Gujarat wetland area (34.74 hectares), Lakshadweep along with and Diu and Daman, respectively, are smaller in size. As per the total wetland area is concerned with respect to Indian states as shown in Table 1.

**Table 1:** Total wetland area (state wise) in India

| S.No. | States (India) | Total wetlands | Wetland category | Average area in hectares |
|---|---|---|---|---|
| 1 | Jammu and Kashmir | 3651 | Natural (Inland) | 145.1 |
| 2 | Punjab | 6430 | Man made | 27.6 |
| 3 | Himachal Pradesh | 641 | | |
| 4 | Uttarakhand | 994 | Natural (Coastal) | 363 |
| 5 | Haryana | 11970 | Man made | 154.2 |
| 6 | Uttar Pradesh | 121242 | | |
| 7 | Madhya Pradesh | 62618 | | POST/PRE MONSOON (Average water spread area in hectares/wetland) |
| 8 | Rajasthan | 46748 | Natural (Inland) | 90/68 |
| 9 | Gujarat | 23891 | Man made | 23/12 |
| 10 | Andhra Pradesh | 38514 | | |
| 11 | Maharashtra | 44714 | Natural (Coastal) | 91/74 |
| 12 | Kerala | 4354 | Man made | 107/99 |
| 13 | Tamil Nadu | 42978 | In India, Wetlands occupied 4.7% of the total geographical area of the country. The major reason for wetland loss i.e. pollution, urbanization etc. | |
| 14 | Goa | 550 | | |
| 15 | Chhattisgarh | 35534 | | |
| 16 | Karnataka | 25276 | | |
| 17 | Orissa | 78440 | | |
| 18 | Jharkhand | 15690 | | |
| 19 | West Bengal | 147826 | | |
| 20 | Bihar | 21998 | | |
| 21 | Meghalaya | 426 | | |
| 22 | Tripura | 3415 | | |
| 23 | Nagaland | 421 | | |
| 24 | Mizoram | 234 | | |
| 25 | Manipur | 708 | | |
| 26 | Arunachal Pradesh | 2653 | | |
| 27 | Sikkim | 553 | | |
| 28 | Assam | 11178 | | |

The existence of water in wetlands can be still or flowing in the form of fresh, salty or brackish. In addition, Inland rivers along with coastal or marine areas with water up to 6 meters deep at low tide are also mentioned as wetlands [9-11]. So, existence of wetlands is actually available in the form of natural, artificial or a mixture of both e.g. farm dam as wetland. In general, lot of variability is reported within or between two or more wetlands. In other words, No two wetlands of region, state or country are actually the same [9-12]. So, classification of wetlands may also depend on the region and landscape where the wetland is located. As per the literature, four main kinds of wetlands are reported i.e.

- **Marshes** (pH neutral; nutrients plentiful; abundance of plant and animal life) - One of the types of wetland and these are available in the form of freshwater, brackish (somewhat salty) and saline (salty). In general, marshes are characterized into two primary categories: non-tidal and tidal [13-15].

Out of these, non-tidal is the most ubiquitous and most widely scattered wetland especially seen in North America whereas tidal e.g. United States especially on the eastern coast from Maine to Florida and continuing on to Louisiana and Texas along the Gulf of Mexico. In addition, familiar examples of non-tidal marshes are wet meadows, Prairie potholes, vernal pools and Playa lakes (Table 2). In general, non-tidal marshes are mostly freshwater marshes although some of them are brackish or alkaline in nature [15-18]. They are frequently reported in poorly drained depressions of streams and also found in shallow water (reported in boundaries of lakes, ponds and rivers). The most notable feature is reported in wetlands i.e. water levels in these wetlands may vary from few inches to 2/3 feet and some of these marshes e.g. prairie potholes, may periodically dry out completely [15-19].

**Table 2:** Non tidal marshes and its importance

| Non-tidal | Occurrence | Importance |
|---|---|---|
| Wet meadows | Poorly drained/discharge areas i.e. shallow lake basins, low-lying farmland and land between superficial marshes and upland areas. | Provides vital food along with habitat for insects, amphibians, reptiles, birds, mammals etc. |
| Prairie potholes | Depressional wetlands (primarily fresh water marshes); pattern of concentric circles develops; some of them are temporary and few of them are permanent. Submerged aquatic plants take over the deeper water in the middle of the pothole while bulrushes and cattails grow closer to shore. | Absorb efflux of rain, snow unfreeze and floodwaters thereby diminish the risk and extremity of downstream flooding. |
| Vernal pools | Seasonal depressional wetlands | Essential breeding habitat for certain species of wildlife, including salamanders and frogs (amphibians). |
| Playa lakes | Dry lakebeds located in arid basins/valleys; shallow, circular-shaped wetlands that are primarily filled by rainfall, although some playas found in cropland settings may also receive water from irrigation runoff. | Unpredictable cycling will occur e.g. during wet, enormous production of annual plants i.e. smartweeds and millets whereas during dry, havens for birds and other wildlife throughout the year. |

Tidal marshes may contribute for providing vital food and also furnished habitat especially for crabs and juvenile fish. In contrast, these tidal marshes also providing shelter along with nesting sites for several species of migratory waterfowl. In this regard, special laws are there pertaining to protect most of these tidal marshes, but much diligence is also needed in order to assure that these protective measures are actively enforced [15-19].

**Swamps** (wetland; slow moving streams; low lying areas) characterized by rivers or isolated type of low areas with more open and deeper water as compared to marshes [20-22]. In addition, plants, birds, fish and invertebrates require habitats that are provided by swamps. In swamps, most of the animals survive in low-oxygen water e.g. fish, crayfish, shrimp, tadpoles, insect larvae, etc.; surface of the water e.g. alligators, caiman, nutria, etc.; above the water e.g. birds, insects, frogs, etc. and also reported other animals live in the spongy areas of land. Apart from these, numerous plants are also reported i.e. Common bur -weed, Duckweed and Arrow-arum growing in Pymatuning Marsh of eastern Ohio. In the literature, swamps divided into two major classes [22, 23], depending on the type of vegetation present i.e. shrub swamps and forested swamps.

a) **Shrub swamps** (scrub/ buttonbush swamps), characterized as freshwater wetland ecosystem i.e. occurring in areas too wet to convert into swamps but too dry/shallow converted into marshes.
b) **Forested swamps**-commonly found near rivers or lakes and reported some mineral soil which drains very slowly. In contrast, trees and bushes are also reported.

In other words, these swamps often drained worldwide and also provide habitat for flora and fauna, aid groundwater recharge as well as discharge along with water purification which ultimately add to the human wonder of nature. In addition, these swamps looked as useless wasteland and now finally converted into residential, industrial, or agricultural uses.

**Bogs and fens**

Bogs characterized as nutrient-poor peatlands; acidic and saturated peat; prevalence of sphagnum mosses and ericaceous shrubs and is generally found as a floating mat on the margins of lakes and ponds. In short, bogs are included as one of the type of freshwater wetland. The most familiar example i.e. Histosol, bog soil, is generally made up of largely decaying plant matter and reported poorly in oxygen, nutrient and biodiversity as compared to other wetland ecosystems [24, 25].

On the other hand, fens are very similar to bogs, but there is richness in nutrient content and more plant life. The major difference between bogs and fens with respect to water content i.e. water in bogs comes from snow and rain; fens through groundwater. In this regard, fens are less acidic and contained higher nutrients content. In general, most of the times fens converted into bogs only if fresh water stops flowing in and so there is accumulation of decaying plant matter and also declined in nutrient content [24-27].

**Status of wetland**

As per the literature, it's not a good sign related to wetland status, more than 64 percent of our wetlands have disappeared. In short, there is enormous loss of mangroves, swamps and marshes areas in the world. These losses could be due to increase in temperature and causing polar ice to melt and sea levels to rise. In India, around 26 wetlands defined by the Ramsar Convention for the conservation and sustainable utilization of wetlands and giving them international importance. In addition, Dal Lake, Wular Lake, Harike Lake, Sunderban and Chika Lake are a few threatened wetlands in India. In short, wetland destruction is of great concern because it is one of the most productive habitats on the planet and support huge population of animals e.g. mammals, birds, fish and invertebrates and also serve as nurseries for many of these species.

**Summary**

Recently, wetlands are considered to be one of the hot topic in terms of ecological richness. Numerous efforts were taken related to wetland loss or degradation should be taken. Without these wetlands, cities along with villages have to spend lot of money pertaining to treat water for their citizens, floods are more devastating to nearby communities. In this regard, government agencies and other organizations have also pursued some efforts to conserve and protect wetlands for more than 40 years through Ramsar Convention. In view of this, more than 100,000 acres of wetland have been protected through this treaty, saving them and also provided services for future generations.

**Authors Contribution**

This work was carried out in collaboration i.e. Dr Amit Gupta anchored the field study where as Moin F Memon, Brijesh D Savani, Riddhi K Bhadja, Dhruvit A Miyani, students of B.Sc. Environmental Science managed the literature searches. Finally, all these authors finalized the final draft of this manuscript.

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