

# Wetlands and its Importance in Bangladesh

# Wetlands

Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil.

Wetlands include swamps, marshes, bogs and similar areas.

# DEFINITION...

- **Areas of Marsh, bog, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas marine water the depth of which at low tides does not exceed six meters.**
- **More than half of the country's landmass may be classified as wetlands according to this definition given by Ramsar Convention (IUCN 2005).**

# WETLANDS

- The total area of wetlands in Bangladesh is estimated to be 70000 to 80000 square km, i.e., about 50% of the total national land;
- These include rivers, estuaries, mangrove swamps, marsh (haor), oxbow lake (baor) and beels, water storage reservoirs, fish ponds, and some other lands, which suffer from seasonal inundation;
- The wetlands of Bangladesh have suffered drastically from the impacts of increasing human population;
- In the Ganges-Brahmaputra-Meghna floodplain alone approximately 2.1 million ha of wetlands have been lost to flood control, drainage, and irrigation development;



# Geographical location and physical characteristics

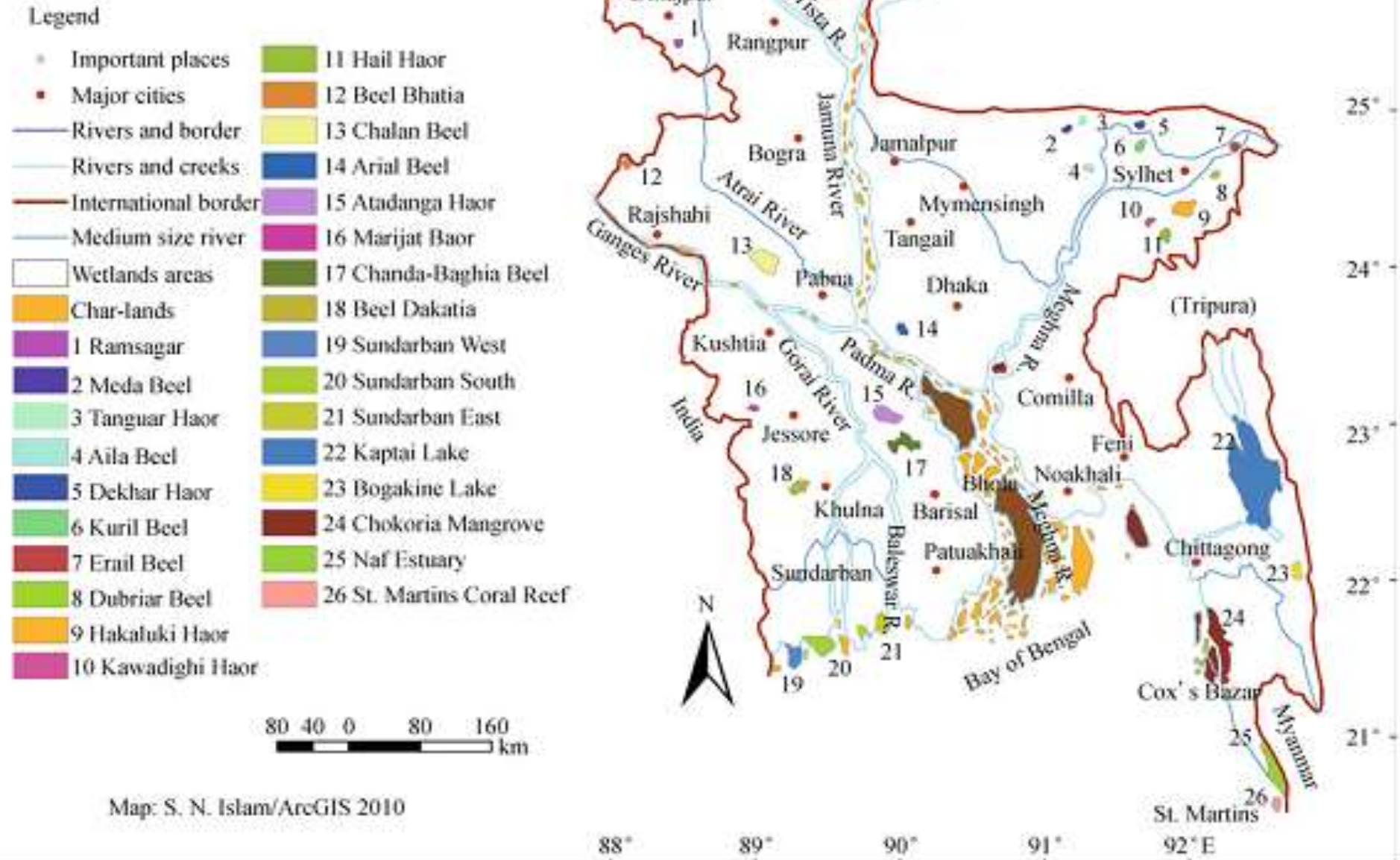
- Bangladesh consists mainly of floodplains, except terraces in the Madhupur, Barind tract, and hills in Sylhet and Chittagong hill tracts.
- Three major types of landscapes in Bangladesh:
  - Floodplains (80% of total land), Terraces (8%), and Hills (12%)
  -
- Except the eastern hilly region, the country mostly lies in the delta of the three active rivers, i.e., the Ganges, Brahmaputra, and Meghna.

# Wetland types in Bangladesh

- Wetlands are critically important in Bangladesh for human settlements, biodiversity, fisheries, agricultural diversity, navigation and communication, flood water management, water reservoir, ecotourism development, and indigenous cultural conservation.
- Wetlands can be divided into six major divisions, such as
  1. The Ganges-Brahmaputra-Meghna floodplain basins,
  2. The haor basin of north-east region,
  3. Lower Punarbhaba floodplain,
  4. Gopalganj-Khulna beels,
  5. Chalan beel, and
  6. Surma-Kushiyara floodplain;

# The area and locations of designated wetlands in Bangladesh

Major wetlands in Bangladesh



**Table 1** Wetlands of Bangladesh<sup>1)</sup> (Gopal and Wetzel, 1995)

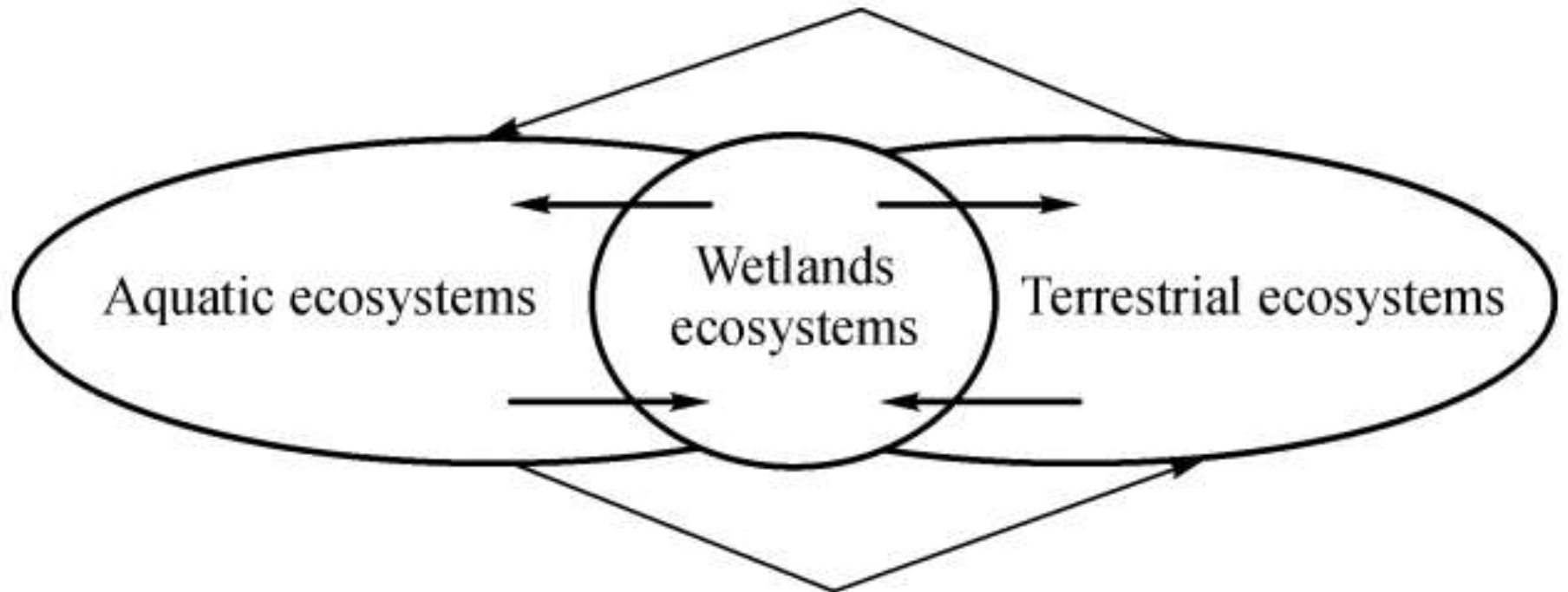
Wetland types	Area coverage/km <sup>2</sup>	Percentage of area/%
Rivers, canals and estuaries	10300.00	13.77
Natural depressions	1141.69	1.52
Ponds	1619.43	2.16
Ox-bow lakes	544.88	0.73
Reservoirs	688.00	0.92
Seasonal flood lands	28000.00	37.42
Brackish water farms	873.00	1.17
Mangrove wetlands	6100.00	8.15
Beel and haor	5000.00	6.68
Peat land	155.00	0.21
Swamp forest	20400.00	27.27
Total	74 822.00	100.00



# Wetlands value and wetland ecosystem services

- Wetlands ecosystem is playing a coordinating role between aquatic and terrestrial ecosystems. Aquatic and terrestrial ecosystems are dependent on wetlands and its ecosystem functions;
- The functions of wetlands have made a bridge between aquatic and terrestrial ecosystems.
- Wetlands also support a significant range of other activities, such as extraction of reed and harvesting of edible aquatic vegetation and their products, like medicinal herbs, shell, etc.

# Relationship between wetlands and aquatic terrestrial ecosystems



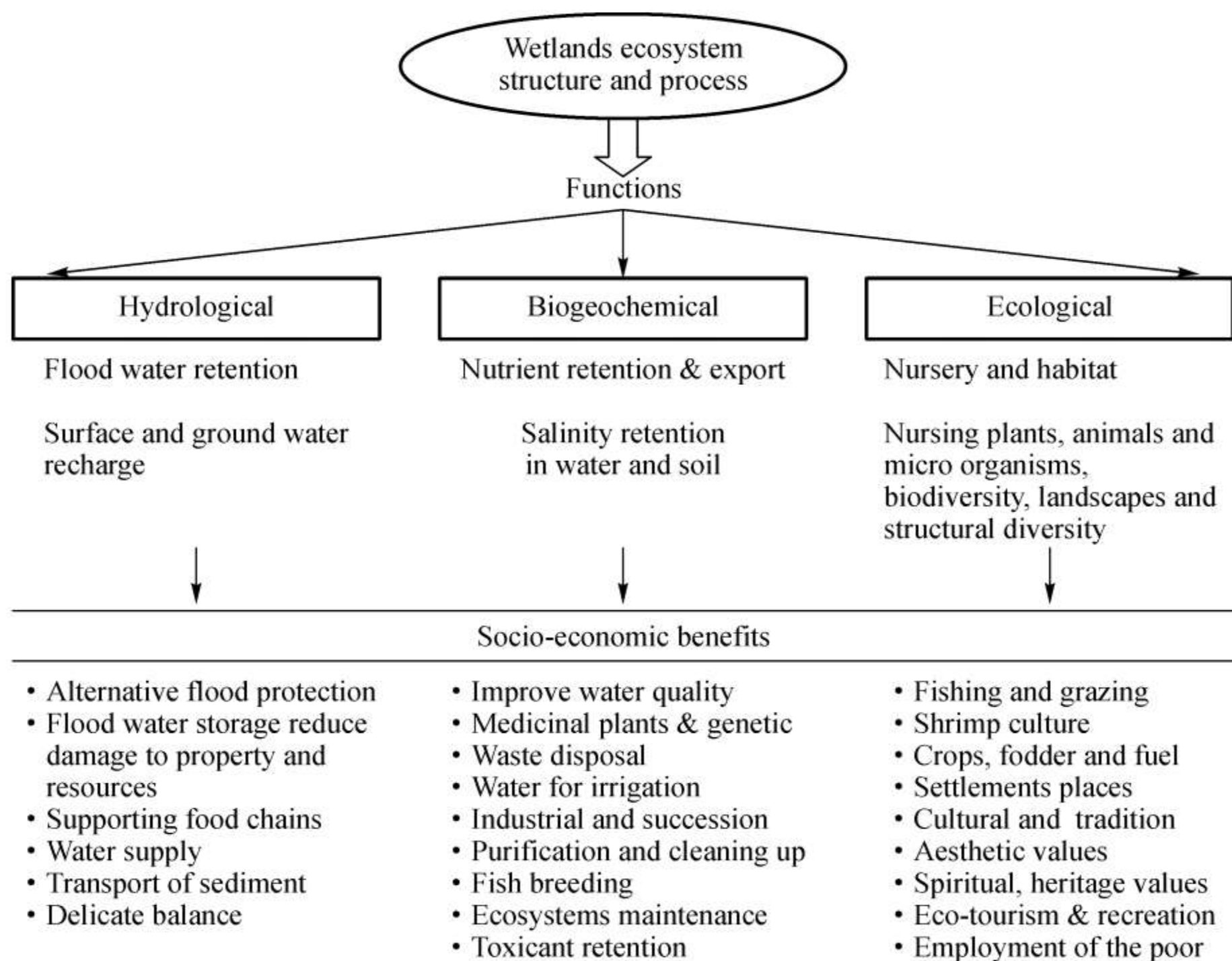
**Table 2** Wetlands value and wetland ecosystem services

Wetlands value	Wetlands ecosystem service
Environmental	Hydrological cycle maintenance, water storage and discharge, flood control and regulation, transport of sediments, reduce salinity intrusion, purification of water, reduce of erosion, soil formation, food chain and habitat maintaining, biodiversity protection, protect ecosystems, pollution control, maintenance of landscapes and balance of ecology, etc.
Economic	
Direct values	Agricultural production, forestry, hunting, fishing, production of wild food, grazing field for livestock, supply of fuel, fodder, honey, fruits and wood (mangrove), supply of raw materials, and field for primary economic activities.
Indirect values	Benefits from improvement of water quality, flood prevention, pollution control, provision for medicinal plants, land for industrial location, primary economic activities, etc.
Option values	Benefits from ensuring the option for a future use
Existence values	Benefits from conserving or willingness to forgo a part of ones income in order to conserve a resource especially natural amenities or species.
Bequest values	Benefits from ensuring that certain goods will be preserved for future generations.
Social	Navigation and social network, provision of settlement places for the indigenous community, extension of urbanization, inspiration place for education and research, employment opportunity for the poor, empowerment of the destitute groups, and social events.
Cultural	Ecological tourism and recreation, tangible and intangible cultural heritage, cultural values, natural heritage, aesthetic values, religion

# Wetland Benefits

- The wetland functions could be divided into three major divisions, such as hydrological function, biogeochemical function, and ecological function;
- Based on these three functions, socioeconomic benefits and services can be offered by wetlands ecosystem for the local community and stakeholders surrounding the wetlands;
- The wetlands of the country are diverse, and each has some special distinctive features in terms of physiography, seasonality, and use patterns;
- Wetlands of Bangladesh are one of the major sources of livelihoods particularly for cultivating food crops, vegetables, fishing, and pasture lands.





# Wetlands and climate change

- Wetlands perform two important functions in relation to climate change;
- They have mitigation effects through their ability to sink carbon, and adaptation effects through their ability to store and regulate water;
- They also are emitters of nitrous oxide, a major greenhouse gas.

# Wetland functions

- The main functions performed by wetlands are water filtration, water storage, biological productivity, and provide habitat for wildlife;

## Filtration

Wetlands aid in water filtration by removing excess nutrients, slowing the water allowing particulates to settle out of the water which can then be absorbed into plant roots.

Studies have shown that up to 92% of phosphorus and 95% of nitrogen can be removed from passing water through a wetland;

Some wetland plants have even been found with accumulations of heavy metals more than 100,000 times that of the surrounding waters' concentration.



## **Storage**

Wetlands can store approximately 1-1.5 million gallons of floodwater per acre;

## **Biological productivity**

Through wetlands ability to absorb nutrients, they are able to be highly biologically productive (able to biomass quickly).

Freshwater wetlands are even comparable to tropical rainforests in plant productivity. Their ability to efficiently create biomass may become important to the development of alternative energy sources.





## **Wildlife habitat**

- Wildlife Habitat is important not only for the conservation of species but also for a number of recreational opportunities;

## **Flood control**

The most significant social and economic benefit that wetlands provide is flood control.

## **Food supply**

- Rice is the staple diet of nearly 3 billion people - half the world's population. It is grown in wetlands across Asia and west Africa, and in the United States.

## **Shoreline and storm protection**

- The devastating effects of natural phenomena such as hurricanes, cyclones and tsunamis cannot be denied.
- Worldwide, an estimated 200 million people who live in low-lying coastal regions are at potential risk from catastrophic flooding.
- Coastal wetlands – such as reefs, mangroves and saltmarshes – act as frontline defences against potential devastation.



## **Cultural value**

Throughout history humans have gathered around wetlands and these areas have played an important part in human development and are of significant religious, historical or archeological value to many cultures around the world.

## **Materials and Medicines**

Wetlands yield fuelwood for cooking, thatch for roofing, fibres for textiles and paper making, and timber for building.

Medicines are extracted from their bark, leaves, and fruits, and they also provide tannins and dyes, used extensively in the treatment of leather.



## **Vital habitat**

It has been estimated that freshwater wetlands hold more than 40% of all the world's species and 12% of all animal species. Individual wetlands can be extremely important in supporting high numbers of endemic species.

Wetlands provide a nursery habitat for many commercially important fish species that are harvested outside the wetland.



**Table 2. Common Wetland Problems and Corrective Methods**

Wetland Damage	Reason for Damage	Suggested Correction	Considerations
<b>H Y D R O L O G Y</b>			
Water Quality Impairment	Excess sediment or nutrients in runoff from adjacent area	Work to change local land use practices; install vegetated buffers/swales/ constructed treatment wetlands; install sediment traps.	Sediment traps will need periodic cleaning; an expert may be needed to design buffers and swales.
Water Quality Impairment	Excess sediments from eroding slopes	Stabilize slopes with vegetation/ biodegradable structures.	Many corrective methods exist; look for most sustainable and effective methods.
Altered Hydrology (drained)	Ditching or tile drains	Fill or plug ditches or drains; break tiles.	Organic soil may have decomposed so that the elevation of the site is lower than it used to be.
Altered Hydrology (constrained)	Road crossing with undersized culvert	Replace with properly sized culvert or with a bridge.	Hydrologic expert needed to correct this.
Altered Hydrology (drained)	Former wetland diked off from its water sources	Remove/breach dikes or install water control structures.	Substrate elevation may not be correct for vegetation; add soil or control water level with low maintenance structures.

**Table 2. Common Wetland Problems and Corrective Methods - CONTINUED**

Wetland Damage	Reason for Damage	Suggested Correction	Considerations
<b>S O I L S</b>			
Raised Elevation	Soil dumping or fill	Remove material.	Fill may have compressed soil to lower than initial elevation; take steps to avoid erosion.
Subsidence	Soil removal; oxidation of organics; groundwater removal	Add fill; allow natural sedimentation.	Fill must support target wetland; test fill for toxic compounds.
Toxic Soils	By-product of on-site or off-site industrial process; dumping; leaching and concentration of natural compounds.	Treatment systems or methods appropriate to the soil / pollutants; remove material; cover with appropriate soil.	Work with experts to choose treatment methods that cause least amount of indirect damage; choose a different site to avoid serious toxin problems.
<b>B I O T A</b>			
Loss of Biodiversity	Change in original habitat	Restore native plant and animal community using natural processes.	Allow species to colonize naturally; import species as appropriate.
Loss of Native Plant Species	Invasive and/or non-native plants; change in hydrology; change in land use	Remove invasive, non-native plants (allow native plants to re-colonize); try to reverse changes in hydrology.	Pick lowest impact removal method; repeat removal as non-natives re-invade; alter conditions to discourage non-native species.