

# GEOGRAPHICAL STUDY OF WET LANDS: THREATS AND CONSERVATION

**Dr. SANJITA KUMARI**  
Department of Geography,  
B.R.A. Bihar University Muzaffarpur.

## **Abstract:**

There are three global convention on wetlands i.e. Ramsar Convention on Wetlands, The Convention on Migratory Species and the Convention on Biological Diversity, for development of models for sustainable management of wetlands particularly in the areas where the birds are harvested for traditional purposes, sport, hunting or where their habitat are threatened. Overexploitation of the wetlands resources, urbanization and other developmental activities have been threatening the wetlands and the wetlands ecosystem services they provide. Wetlands form an important resource for humans and its conservation is essential in maintaining the environmental security. It is now essential that man recognizes the importance of wetlands, protect and conserve them.

**Keywords:** Global, Ramsar Convention, Wetlands, Migratory Species, Ecosystem

## **OBJECTIVITY**

This article has highlighted on the classification of wetlands, role of Ramsar Convention and Mission for wetland conservation, Ramsar sites in India, Wetlands in Muzaffarpur bihar, threats to wetland, importance of wetland, floral and faunal diversity of wetland and initiative for wetland conservation.

## **INTRODUCTION**

Wetlands are defined as land transitional between terrestrial and aquatic ecosystem where the water table is usually at or near the surface or the land is covered by shallow water. We use the world wetland to refer to all areas with water covered periodically, seasonally, or permanently, such as, respectively, tidal flats, and flooded areas near rivers, rice paddies, swamps or lakes. Wetland performs numerous valuable function such as recycle nutrients, purify water, attenuate floods, recharge ground water and also serves in providing drinking water, fish, fodder, fuels, wildlife habitat, control rate of runoff in urban areas, buffer shorelines against erosion and recreation to society. They share characteristics of both environments yet cannot be classified unambiguously as either aquatic or terrestrial. The key is the presence of water for some significant period of time, which changes the soils, the microorganisms, the plant and animal communities, such that the land functions in a different way from either aquatic or dry habitats. Keeping in mind, the value of wetlands, some pragmatic approach is visible. Some 100 countries have adopted a definition by signing the Ramsar Convention on Wetlands of International Importance. The Convention adopts an extremely broad approach in determining the 'wetlands' which come under its aegis. In the text of the Convention, wetlands are defined 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 tide does not

exceed six meters". Wetlands have limits that are categorized as Upland and Aquatic limits of wetlands.

## DISCUSSION

The Convention on Wetlands (Ramsar 1971), commonly known as Ramsar Convention, is a crucial intergovernmental treaty, with mission "Conservation and wise use of all wetlands through local, regional and natural actions and international cooperation, as a contribution towards achieving sustainable development throughout the world." The convention on wetlands came into force for India on 1st February, 1982. There are total 26 Ramsar sites in India, while in Uttar Pradesh there are 20 wetlands that come under National Wetland Conservation Programme. India is blessed with innumerable wetlands that provide the society numerous and crucial ecological services. Wetlands are in fact the most species diverse habitats. They are aesthetically pleasing and attractive and enormously valuable to humanity, they provide water, food and timber, protect us from floods and droughts and offer recreation. However, wetlands are among the most threatened ecosystems, for overt or covert causes vanishing from the cityscapes as well as from other landscapes or falling in their habitat quality.

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Awareness and education are the keystones in the conservation of any particular environment and species. She has recommended various aspects to be considered in order to protect the declining wetlands and their vanishing faunal and floral diversity. Wetlands provided various services to human life routine so that can be very well protected in their natural environment if only the recommendations are implicated rightly. Hope this issue of Green will be successful in creating a clearer vision to the readers about the declining wetlands as well as various aspects such as their status, importance, biodiversity, threats and conservational requirements .

### UPLAND LIMITS OF WETLANDS

- i. The boundary between land with predominantly hydrophytic cover - and land with predominantly mesophytic or xerophytic cover.
- ii. The boundary between soil that is predominantly hydric - and soil that is predominantly non-hydric.
- iii. In the case of wetlands without vegetation or soil, the boundary between land that is flooded or saturated at some time each year - and land that is not.

### AQUATIC LIMITS OF WETLANDS

Boundary between wetland and deep water habitat.

In marine and estuarine ecosystems- 6 m during low tide. iii. In riverine, lacustrine and palustrine system- 2 m

Component of wetlands

In trying to categories the wide range of wetlands encompassed by the Ramsar definition, Scott (1989) defined 30 groups of natural wetlands and nine manmade ones. However, for illustrative purposes it is possible to identify five broad wetland systems: Estuaries - where rivers meet the sea and salinity is intermediate between salt and freshwater (e.g., deltas, mudflats, salt marshes). Marine - not influenced by river flows (e.g., shorelines and coral reefs).

Riverine - land periodically inundated by river overtopping (e.g., water meadows, flooded forests, oxbow lakes). Palustrine - where there is more or less permanent water (e.g., papyrus swamp, marshes, fen). Lacustrine - areas of permanent water with little flow (e.g., ponds, kettle lakes, volcanic crater lakes)

## ROLE OF RAMSAR CONVENTION AND MISSION FOR WETLANDS CONSERVATION

The Convention on Wetlands of International Importance especially as Waterfowl Habitat - commonly referred to as the Ramsar Convention from its place of adoption in Iran in 1971 - was the first of the modern global intergovernmental treaties on conservation and wise use of natural resources. The mission of the Ramsar Convention (Ramsar, 1996) is "the conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world". The Convention provides a framework for international cooperation and was established following concern in the 1960s about the serious decline in populations of waterfowl (mainly ducks). A list of sites were made where changes in ecological character have occurred, are occurring or are likely to occur, the consequent study of threats to the wetland, there commended solutions and resulting funds obtained from the Global Environment Facility (1990). The Ramsar Convention is thus vitally important in the conservation of the world's wetlands.

## WETLANDS LOSS AND DEGRADATION

Wetland loss is the loss of wetland area, due to the conversion of wetland to non-wetland areas, as a result of human activity (Reduction in wetland area). Agricultural conversion Reclamation for development Excessive siltation Climate change impact.

Wetland degradation" is the impairment of wetland functions as a result of human activity (Reduction in wetland functions). Reduced water quality Changes in the water regime Excessive biomass removal Loss of biodiversity Introduction of exotic species Climate change impacts

## WETLAND LOSS: UNDERLYING CAUSES

Information failures- Lack of awareness among people about the values of conserved wetlands. Market failures- The failure of markets to reflect the full or true cost of goods or services provided by conserved wetlands. Intervention failures- Absence of appropriate integrated resource management policies and inter- sectoral policy inconsistencies leads to wetland loss and degradation.

## PROCESS OF WETLAND LOSS

The wetland loss in India can be divided into two broad groups namely acute and chronic losses. The filling up of wet areas with soil constitutes acute loss whereas the gradual elimination of forest cover with subsequent erosion and sedimentation of the wetlands over many decades is termed as chronic loss. a) Acute wetland losses Agricultural conversion-In the Indian subcontinent due to rice culture, there has been a loss in the spatial extent of wetlands. Rice farming is a wetland dependent activity and is developed in riparian zones, river deltas and savannah areas. Due to captured precipitation for fishpond aquaculture in the catchment areas and rice-farms occupying areas that are not wetlands, water is deprived to the downstream natural wetlands. Around 1.6 million hectares of freshwater are covered by freshwater fish ponds in India. Rice-fields and fish ponds come under wetlands, but they rarely function like natural wetlands of the estimated 58.2 million hectares of wetlands in India, 40.9 million hectares are under rice cultivation (Anon. 1993). Direct deforestation in wetlands- Mangrove vegetation are flood and salt tolerant and grow along the coasts and are valued for fish and shellfish, livestock fodder, fuel wood, building materials, local medicine, honey,

beeswax and for extracting chemicals for tanning leather (Ahmad 1980). Alternative farming methods and fisheries production has replaced many mangrove areas and continues to pose threats. Eighty percent of India's 4240 km of mangrove forests occur in the Sunderbans and the Andaman and Nicobar Islands (Anon. 1991). But most of the coastal mangroves are under severe pressure due to the economic demand on shrimps. Important ecosystem functions such as buffer zones against storm surges, nursery grounds and escape cover for commercially important fishery are lost. The shrimp farms also caused excessive withdrawal of freshwater and increased pollution load on water like increased lime, organic wastes, pesticides, chemicals and disease causing organisms. The greatest impacts were on the people directly dependent on the mangroves for natural materials, fish proteins and revenue. The ability of wetlands to trap sediments and slow water is reduced. Hydrologic alteration- Alteration in the hydrology can change the character, functions, values and the appearance of wetlands. The changes in hydrology include either the removal of water from wetlands or raising the and-surface.

elevation, such that it no longer floods. Canal dredging operations have been conducted in India from 1800s due to 2 2 which 3044 km of irrigated land has increased to 4550 km in 1990 (Anon. 1994). Initial increase in the crop productivity has given way for reduced fertility and salt accumulations in soil due to irrigated farming of arid soils. India has 32,000 ha of peat-land remaining and drainage of these lands will lead to rapid subsidence of soil surface. Inundation by dammed reservoirs- Presently, there are more than 1550 large reservoirs covering more than 1.45 million ha and more than 100000 small and medium reservoirs covering 1.1 million ha in India (Gopal 1994). By impounding the water, the hydrology of an area is significantly altered and allows for harnessing moving water as a source of energy. While the benefits of energy are well recognized, it also alters the ecosystem.

b) Chronic Wetland Losses Alterations of upper watersheds- Watershed conditions influence the wetlands. The condition of the land where precipitation falls, collects and runs-off into the soil will influence the character and hydrologic regime of the downstream wetlands. When agriculture, deforestation or overgrazing removes the water-holding capacity of the soil then soil erosion becomes more pronounced. Large areas of India's watershed area are being physically stripped of their vegetation for human use. Degradation of water quality- Water quality is directly proportional to human population and its various activities. More than 50,000 small and large lakes are polluted to the point of being considered 'dead' (Chopra 1985). The major polluting factors are sewage, industrial pollution and agricultural runoff, which may contain pesticides, fertilizers and herbicides. Ground water depletion- Draining of wetlands has depleted the groundwater recharge. Recent estimate indicates that in rural India, about 6000 villages are without a source for drinking water due to the rapid depletion of ground water. Introduced species and extinction of native biota- Wetlands in India support around 2400 species and subspecies of birds. But losses in habitat have threatened the diversity of these ecosystems (Mitchell & Gopal 1990).

Introduction of exotic species like water hyacinth (*Eichornia crassipes*) and salvinia (*Salvinia molesta*) have threatened the wetlands and clogged the waterways competing with the native vegetation. In a recent attempt at prioritization of wetlands for conservation, Samant (1999) noted that as many as 700 potential wetlands do not have any data to prioritize. Many of these wetlands are threatened.

Urbanization-

wetlands near urban centers are under increasing developmental pressure for residential, industrial and commercial facilities. Urban wetlands are essential for preserving public waters supplies.

### Anthropogenic activities-

Due to unplanned urban and agricultural development, industries, road construction, impoundment, resource extraction and dredge disposal, wetlands have drained and transformed, causing substantial economic and ecological losses in the long term.

### Agricultural activities –

Following the green revolution of the 1970s, vast stretches of wetlands have been converted to paddy fields. Construction of large number of reservoirs, canals and dams to provide for irrigation significantly altered the hydrology of associated wetlands.

### Hydrological activities

Construction of canals and diversion of streams and rivers to transport water to lower arid regions for irrigation has altered the drainage pattern and significantly degraded the wetlands of the region.

### Deforestation –

Removal of vegetation in the catchments leads to soil erosion and siltation.

Pollution -Non-point source pollution from agricultural runoff, seepage from septic wastewater, and contaminated storm water can overwhelm the filtering capacity of wetlands; impacting downstream coastal waters. Unrestricted dumping of sewage and toxic chemicals from industries has polluted many freshwater wetlands.

### Salinization –

Over withdrawal of groundwater has led to salinization.

### Aquaculture –

Demands for shrimps and fishes have provided economic incentive to convert wetlands and mangroves forest to develop pisciculture and aquaculture ponds. Non-native predators.

Feral cats, mongooses, rodents, cattle egrets, and common barn owls eat native ground nesting birds and their chicks. Bullfrogs and cane toads eat fish eggs, native insects, and even young water birds. These predators can decimate native bird populations.

Non-native plants such as California grass and non-native pickle weed out-compete native plants, and can quickly create single species colonies in wetlands, reducing wetland plant diversity and ecological function for waterbirds.

### Hybridization.

The endangered, endemic koloa maoli duck, found only in Hawaii, is currently at risk of extinction due to cross-breeding with feral mallards. Climate Change. Increases in global temperatures contribute to sea level rise, which will impact coastal wetland systems. Future changes in local precipitation and higher temperatures will impact bogs at higher elevations, and ephemeral (seasonal) wetlands may dry up.

## IMPORTANCE OF WETLANDS

In terms of human development and land use, wetlands have often been viewed as wastelands or areas with limited development potential. Historically wetlands have been drained or filled-in so that the land area could be "used for beneficial human purposes". This view of wetlands does not reflect the values and benefits associated with them. It is estimated that wetlands covered 220 million acres of the lower 48 states prior to European settlement (Brown & Lant, 1999). By the mid-1980s wetland areas had been reduced to 103 million acres, representing a loss of about 54% of the nation's wetland areas. The importance of wetlands has changed with time. Back in the swampy environments of the Carboniferous Period, some 350 million years ago, wetlands produced and preserved many of the fossil fuels (coal and oil) upon which we depend today. More recently, wetlands along some of the major rivers of the world, including the Tigris, Euphrates, Niger, Nile, Indus and Mekong, nurtured the great

civilizations of history. These wetlands provided fish, drinking water, pasture land and transport and were part of the cultural history of early people, being a central element of mythology, art and religion. As scientific understanding of wetlands has increased, more subtle goods and services have become apparent. Wetlands have been described both as "the kidneys of the landscape", because of the functions they can perform in the hydrological and chemical cycles, and as "biological supermarkets" because of the extensive food webs and rich biodiversity they support (Mitsch & Gosselink,1993).Wetlands are among the Earth's most productive ecosystems.

The features of the system may be grouped into components, functions and attributes. The components of the system are the biotic and non-biotic features which include the soil, water, and plants and animals. The interactions between the components express themselves as functions, including nutrient cycling and exchange of water between the surface and the groundwater and the surface and the atmosphere. The system also has attributes, such as the diversity of species. Wetland systems directly support millions of people and provide goods and services to the world outside the wetland. People use wet land soils for agriculture, they catch wetland fish to eat, and they cut wetland trees for timber and fuel wood and wetland reeds to make mats and to thatch roofs. Direct use may also take the form of recreation, such as bird watching or sailing, or scientific study. For example, peat soils have preserved ancient remains of people and track ways which are of great interest to archaeologists. Apart from using the wetlands directly, people benefit from wetland functions or services. As flood water flows out over a flood plain wetland, the water is temporarily stored; this reduces the peak river level and delays the time of the peak, which can be a benefit to riparian dwellers downstream. Wetlands serve a number of important functions and provide benefits to humans and wildlife. The following benefits of wetlands are often overlooked: Erosion control - Wetlands support vegetation that acts as a flood buffer and reduces stream bank erosion during flooding events. Flood water storage -Wetlands store water during flooding events and then slowly release the water as flooding subsides. This can significantly reduce peak flood flows and resulting flood damage downstream. Wetlands also serve as a reservoir for runoff water during heavy rain periods. These wetland reservoirs can typically hold more water than it.

#### ECONOMIC VALUATION OF WETLANDS

For example, the storm protection and shoreline stabilization functions of a wetland may have indirect use value through reducing property damages, yet often coastal or riverine wetland systems are drained in order to build still more waterfront property. Mangrove systems are known to be breeding grounds and nurseries for shrimp and fish that are essential for coastal and marine fisheries, yet these important habitats are currently being converted rapidly in many regions for aquaculture, particularly shrimp ponds.

#### Wildlife habitat –

Many species are dependent upon wetlands for all or a portion of their life cycle. Wetlands provide habitat for fish, birds, mammals, reptiles, amphibians, and invertebrates. Wetlands are arguably one of the most important ecological structures in existence. Wetlands are depending on by countless animal and plant species. They serve as breeding grounds for migrating birds and resident amphibians, permanent homes for fish species, social interaction amongst mammals who congregate there for water, and an escape from the heat of the sun for countless reptiles, amphibians and mammals.

#### wetlands provide

Some vegetation species only are found amongst swamps and ephemeral ponds. Wetlands are seen as the cornerstone of wildlife populations. Diverse species of mammals, plants, insects,

amphibians, reptiles, birds and fish rely on wetlands for food, habitat or shelter. Wetlands are some of the most biologically productive natural ecosystems in the world, comparable to tropical rain forests or coral reefs in the number and variety of species they support. Although wetlands make up only about 5 percent of the land area of the lower 48 states, more than one third of threatened and endangered species live only in wetlands. An additional 20% of the country's threatened and endangered species use or inhabit wetlands at some time in their life. Some species must have a wetland in order to reproduce. Migrating waterfowl rely on wetlands for resting, eating and breeding areas, leading to increased populations. As noted, the appeal of wetlands and the diversity of plant and animal life they attract contribute to or support many businesses. **FLORA AND FAUNA FOUND IN WETLANDS** Wetlands and water birds are inseparable elements and support a rich array of water bird communities (Grimmett and Inskipp, 2007). Water birds are an important component of most of the wetland ecosystem as they occupy several trophic levels in the food web of wetland nutrient cycles. Activities of water birds are considered as indicator of quality of the wetland ecosystem and form the terminal links in many aquatic food chains, and as a result they reflect changes originating in several different ecosystem components. Except birds other faunal diversity e.g. Mollusks, Reptiles, Amphibians, Crustaceans also found in wetlands.

#### WETLANDS CONSERVATION

All local decision makers, whether elected or appointed officials, volunteer committee members, or staff, face difficult questions about how to meet community needs for housing, public infrastructure, and economic development while also protecting sensitive natural resources. Though wetlands were once perceived as wastelands, today the natural functions and public benefits of wetlands are well understood by both scientists and land managers. Wetlands now receive special protections under both state and federal law and public support for wetland preservation has increased tremendously in recent decades. Ramsar Convention into force in 1975 and currently has 100 Contracting Parties, which are obliged to undertake four main activities. These are: To designate wetlands for inclusion in the 'List of Wetlands of International Importance' and to maintain their ecological character. In develop national wetland policies, to include wetland conservation considerations within their national land-use planning, to develop integrated catchment management plans and, in particular, to adopt and apply the guidelines for implementation of the Wise Use Concept, which is the sustainable utilization of wetlands for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem. To promote the conservation of wetlands in their territory through establishment of nature reserves and to promote training in wetland research, management and wardening. To consult with other Contracting Parties about transfrontier wetlands, shared water systems, shared species and development aid for wetland projects. In this way the Convention plays an important role in helping to prevent detrimental changes to wetland sites in states that are party to the Convention. Technical support on wetland conservation is provided to the Convention from organizations such as IUCN-The World Conservation Union and Wetlands International (a new body formed from the International Waterfowl and Wetland Research Bureau, the Asian Wetland Bureau and Wetlands for the Americas). Notable successes include: Prevention of agricultural development of habitat for Spoonbill *Platalea leucorodia* in the Hortobagy Ramsar site.

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