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## Study on biological methods for conservation of the wetland flora of Madhepura district

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**Abstract-** Wetlands are one of the important repositories of aquatic biodiversity in India, it covers an area of around 58.2 million hectares. Wetlands or fens, marshes, swamps, and bogs, are the link between water and land. Wetlands provide a plenitude of essential ecosystem services which includes, flood mitigation, storm protection and water storage. Water purification through retention of nutrients, sediments, and pollutants, Groundwater recharge, Essential habitat for many animals and plants. Destruction of wetlands is caused mostly by anthropological activities. This study deals with the distribution and status wetlands and consequences for its loss as well as its preservation strategies. The current study provides an action plan along with methodology for conservation of wetlands through biological activities. The most important element of this study is the awareness program of forestation launched by the global leaders but not adopted by the citizens. A wide range of fieldwork has been done to generate ample amount of information on biodiversity preservation. Habitat information is also collected for the conservation of wetlands network throughout the nation.

**Key words:** Wetlands, forestation, preservation, conservation

### INTRODUCTION

Wetlands are area in between water and land. Wetlands are defined as areas of marsh, water or peatland whether artificial or natural, temporary or permanent with water that is flowing or static, brackish or fresh salt. The term wetland refers to those 'areas that are saturated or inundated by ground water or surface water at a frequency sufficient to support ubiquity of vegetation. Wetlands generally include swamps, bogs, and similar areas. The most accepted and frequently used definition of wetland as adopted by the wetland scientists is: wetlands are link between terrestrial and aquatic systems.

Wetland is defined as land that has a predominance of hydric soils. A wetland is an area of transformation between a water-based ecosystem and land-based ecosystem. Types of wetlands include swamps, marshes, fens, and bogs.

Some ecosystem functions performed by wetlands include fish and wildlife habitat, primary production, waste assimilation, and global carbon and nutrient cycling.<sup>1</sup>

Wetlands can provide a medium through which we can conserve our future. If used sustainably wetlands can provide food, water as well as balance in the nature. It reduces the risks of many disasters by acting as buffer or sinks.<sup>2</sup> It can also act as a natural filter by purifying water from harmful waste water. It absorbs fertilisers, pesticides,

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heavy metals etc. Most of the products and services produced on Earth are subsidized, frequently without the consumer's knowledge. The fact that the fruit producer using chemical fertilizers does not have to pay the cost of water treatment needed to take out the excess of nitrates caused by his use of fertilizers to provide clean drinking water does not reflect the real price of the product.<sup>3</sup> The fact that the farmer who intensively irrigates his field does not have to pay for the damage (erosion, pollution) caused by the running of the water he is using on watershed slopes and finally increasing river water turbidity does not reflect the real price of the cubic meter of water he is using. In these cases, both chemical fertilizers and water are being heavily subsidized. This kind of subsidy leads to little consideration being given to environmental protection. Important crops such as rice, jute are grown in wetlands. It is also home to a wide diversity of species found in freshwater.<sup>4</sup> Wetlands provide breeding grounds to migrating birds. They act as sponges, as they absorb flood water which can be used during drought, they can also absorb carbon and other greenhouse gases.<sup>5</sup> For people living near such wetlands, it provides livelihood in form of fish, medicinal plants, weaving products, cereals. Wetlands can sustain climate change by absorbing excessive pollutants in form of carbon, heavy metals.<sup>6,7</sup>

Wetlands provide an abundance of essential ecosystem services, including:

1. Water storage, storm protection, and flood mitigation
2. Water purification through retention of nutrients, sediments, and pollutants
3. Groundwater recharge
4. Essential habitat for many plants and animals.
5. Shoreline stabilization and erosion control.

Destruction of wetlands is caused mostly by anthropological activities such as :

### **1. Unsustainable development**

Over the last few centuries ,we have lost more than 85% of the wetlands. The wetlands were drained to provide land for building homes, or were converted into agricultural fields. This loss of wetlands is directly corelated with habitat loss. Wetlands have their own unique habitats, which is ultimately killed.

### **2. Pollution**

Pollution in any form to any natural entity is harmful. Wastewater is often released into wetlands that to without

any treatment. Though wetlands act as natural filter, pollution is beyond its filtering capacity. Fertilisers, pesticides, heavy metals,oil spills, etc damage the wetlands beyond repair.

### **3. Invasive species**

Such species usually outnumber the naturally occurring species by creating competition for food and resources.

Water provides easy pathways for invasive species to spread and grow, making the native wetland species more vulnerable. A common example is water hyacinth, which is native to Japan, but has become invasive in India. It grows rapidly on the surface of the water, cutting oxygen supply for the fishes below, and cutting sunlight for the submerged aquatic plants, thereby restricting photosynthesis.

### **4. Climate change**

Wetlands and climate change share a complex relationship. Wetlands can dry out due tochanges in rainfall and temperature. Climate change has severe adverse effects on the wetland flora and fauna.

Wetlands act as carbon sinks, as well as sink for many greenhouse gases. Destruction of wetlands also destroys these sinks, contributing to greenhouse effect and global warming.

## **METHODS**

The first step of biodiversity conservation is to assess and identify the natural resources present in the diversity which are most irreplaceable and important. Second step is awareness of the unique nature of biodiversity. The hydrogeomorphic approach is a biological method for conservation of wetlands and to assess the functional condition of a specific wetland referenced to data collected from wetlands across a range of physical conditions. It utilizes a wetland classification system based on geomorphic position and hydrological characteristics to group wetlands into 7 different wetland classes as defined by Brinson (1993)<sup>8</sup>. The 7 classes are:

1. Depressional
2. Mineral flats
3. Organic flats
4. Riverine
5. Tidal fringe
6. Lacustrine fringe
7. Slopes

The hydrogeomorphic approach includes data collected from reference wetlands to scale mathematical models and provide an index from 0.0 to 0.1 to represent the level of wetland condition in each function. Hydrogeomorphic at subclass level can be used to assess current wetland condition, mitigation ratios, post project impacts, restoration success etc.

## DISCUSSION

Three properties which are taken into consideration when we classify a wetland:

### 1. Geomorphic setting -

It is divided into 3 categories;

- a) depressional geographical setting- they can be open or closed to surface flows. They are either loosely or tightly attached with ground water flow.
- b) riverine geographical setting- they are associated with floodplains. They are usually attached with steep to low gradient stream
- c) fringe geographical setting- they are either controlled in sea level of lake level

### 2. Water source -

The three water sources are:-

- a) precipitation, refers to recondensation of evaporated water
- b) lateral flows from upstream or upslope, - it allows sediment deposition.
- c) ground water-it is rich in minerals. Under water logged or stressful condition, groundwater flushing counterbalances the condition

### 3. Hydrodynamics-

There are 3 types of flow with varying velocities

- a) Primarily vertical- this type of flow is due to evapotranspiration and precipitation. This flow type is seen in wetlands with low hydraulic energy, with peat accumulation.
- b) Primarily unidirectional and horizontal- such movements are down slope movements which occur in floodplains and seeps. Wetlands found here are both erosive (in streams) and depositional (in floodplains).
- c) Primarily bidirectional and horizontal -they are wind driven or astronomic tides. Such movements create flooding which is predictable and long hydroperiods.

Bihar receives an annual rainfall of 1000 mm per year. The district generally has almost humid type of climate. The winter season begins from the month of November and lasts till the month of February and January is the coldest month. The summer season starts from the month of March and lasts till the month of June.

## RESULTS

Wetlands are not described under any specific administrative jurisdiction. The primary responsibility is of Ministry of Environment and Forests for the management and conservation of these ecosystems. Although some of the wetlands are protected after the implementation of the Wildlife Protection Act, the others are still in grave danger of extinction.

Apart from the regulations of government, evolution of better methods is needed to increase the knowledge of the biological, chemical and physical characteristics of wetland resources and from this knowledge, we indeed to gain, a better understanding of wetland controlling processes and their dynamics. Bihar should conserve its mega wetland biodiversity being one of the nations ecological character we also need to conserve the flora and fauna present in these ecosystems.

Bhorangihil is located in close proximity of river Ganga, making it a riverine wetland. Pachhela Jhil is also a riverine wetland. It needs conservation.

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