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Morpho-ecology of Kaula chaur

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Abstract

The state of Bihar especially North Bihar is endowed with copious aquatic wealth in the form of chaur, swamps, ponds and rivers, which bear rich potential for inland fish production. Invariably cursed by one and all, the vast stretch of flood plain wetlands in Bihar can be turned into an agricultural gold mine, if it is managed effectively and put to appropriate use. The agricultural productivity of the state, which has declined considerably in the last few decades, is likely to increase manifold with the effective utilisation of wetlands.

Keywords: Chaur, swamps, ponds and rivers, geographically lying etc.

1. Introduction

The district Begusarai, an important district in the state of Bihar lies on the Northern banks of river Ganga, Geographically lying between latitude 25° 14'N & 25° 46' N and longitude 85°E & 86°45' E. It covers an area of 1889 sq.km. The Burhi Gandak, Kereha and Ganga are the important flood plains of this district. As the presence of several rivers a large portion of this district is flooded during rainy season. The flood plains of Burhi Gandak and Kereha are marked by the presence of oxbow lakes, paleochannel and relict stream *viz.* Kaula chaur and Bhagwanpur chaur.

1.1 Chaur (Wetlands): Wetlands are defined as lands transitional between terrestrial and aquatic eo-system, where the water table is usually at or near the surface or the land is covered by shallow water (Mitsch and Gosselink 1986) [2].

The wetlands in India support subsistence and live hood to thousands of people through fishing, collecting edible plants, agriculture, water transport, irrigation and commercial fisheries, besides rich biodiversity. However, wetlands are one of the most productive ecosystems, comparable to tropical evergreen forests in the biosphere and play a significant role in the ecological sustainability of a region.

1.2 Origin of Wetlands: The northern part of Indian wetlands are an integral component of the Ganga and the Brahmaputra and Barak river basins emerging from the central and eastern Himalayas, covering an area of 0.2 million hectares. They also exist in Manipur and Tripura as well as in foothills of Arunachal Pradesh and Meghalaya. These rivers carry heavy loads of silts and detritus from the Himalayas and overflow during the south-west monsoon season and submerging large areas of land every year. They can be form typical ox-bow lakes (*i.e.* cut off portions of rivers meander bends). Sloughs, meander, scroll depressions, back swamps, residual channels or tectonic depressions, though it is often difficult to establish their identity due to natural and man-made modifications to the environment.

1.3 Distribution of Wetlands: The area of wetlands in India (excluding rivers) is estimated at 58,286000 ha, or 18.4% of the country's surface area. Most of these are directly or indirectly linked to rivers of these wetlands associated with floodplains of rivers (floodplain wetlands) cover an estimated area of 200000 ha. and area a common feature of the Indian landscape, especially along the Ganga and Brahmaputra river systems. The eastern and northeastern India is conspicuous in having vast stretches of floodplain wetlands extending over 202213 ha.

The state of Bihar had three major physiographic regions, *viz.* north Bihar plain, south Bihar plain and Chhota Nagpur plateau. In North Bihar plains waterlogged (seasonal) is most predominant wetland types followed by ox-bow lakes and marshes. In south Bihar plains, lakes, reservoirs and oxbow lakes are main wetland types.

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In Chhota Nagpur region, reservoir, ash pond, abandoned quarries and tanks are most predominant. There are 759 wetlands in Bihar occupying 177683.00 ha areas.

1.4 Distribution of wetlands in India

	Natural (No.s)	Area (Ha.)	Artificial (No.s)	Area (ha.) Bihar
	224788	33	48607	62
Total in India	2167	1458580	65251	2587965
Including union territories	2,170	1460113	65,254	2589266

The Burhi Gandak the second most important river and one of the tributaries of river Ganga, in its upper reaches, enters the district Begusarai near Parihara about 10 km, it drains in Ganga near Khagaria district. The railway track passing through the district marks the prominent divider line for Ganga flood plains and Burhi Gandak flood plain. The floodplains of Burhi Gandak are marked by the presence of paleo – levees, ox-bow lakes, paleo-channel, relict streams and chaur *viz.* Kaula chaur and Bhagwanpur chaur. Arraia is one of the water logging area of Kaula chaur, which is 14 km North-east from Begusarai headquarter. The total water logging area during monsoon is about 40-50 acres. These chaur serve as excellent fertile land during rain and retain water for more than six months.

1.5 Classification: Wetlands are classified as various ways depending upon the morphometry, water-retentivity, depth, size, shape and so on.

A. Classification Based on Morphometry

- Ox-bow lakes:-** They represent the cut-off portion of meander bends of a river. These are usually serpentine or horse-shoe shaped.
- Lake-like wetlands:** - These are wide and shallow with irregular contours. They may be connected to the river through channels or receive water from it during floods.
- True tectonic depression:-** These are created by tectonic activities like earthquakes and usually resemble natural lakes with regular contour.
- Meteorite lake:-** These are created by the impact of fall of a meteorite on earth.

B. Classification Based on Water Retentivity

- Seasonal Beels:-** These are shallow floodplain wetlands which periodically get inundated by monsoon rains and floods but completely dry up during summer months.
- Perennial Beels:** - Deeper and permanent beels which retain water round the year.

C. Classification Based on Depth

- Shallow Beels:-** Beels having maximum depth up to 5 meters.
- Medium deep Beels:-** Beels which have maximum water in the range of 5-10 meters.
- Deep Beels:-** Beels having maximum depth of over 10 meters.

D. Classification Based on Size

- Small Beels:-** Effective areas less than 100 hectares.
- Medium Beels:-** Effective area 100 to 500 hectares.
- Large Beels:-** Effective area more than 500 hectares.

E. Classification Based on Shape

- Ox-bow shaped
- Crescent shaped
- C) Serpentine
- Oval
- Irregular braided channel

F. Classification Based on Riverine Connection

- Open Beels:-** These beels retain continuity with the parent river either for the whole year or at least during the rainy season.
- Closed Beels:-** These beels are completely cut – off from the nearby rivers and receive water mostly from their catchment areas following monsoon rains or during high flood.

1.6 Importance of Chaur: Wetlands are one of the most productive ecosystems comparable to tropical evergreen forests in the biosphere and play a significant role in the ecological sustainability of a region. They are an essential part of human civilization meeting many crucial needs for life on earth such as drinking water, Protein production, water purification, energy, fodder, biodiversity, flood storage, transport, recreation, research-education, sinks and climate stabilizers. The value of wetlands though overlapping like the cultural, economic and ecological factors, are inseparable.

1.7 Functions of Wetlands : The various beneficial functions of wetlands like sustaining life processes, water storage (domestic, agricultural and industrial usage) protection from storms and floods, recharge of ground water, water purification, storehouse for nutrients, erosion control and stabilization of local climate (such as temperature and rainfall) help maintain the ecological balance.

- Flood Storage:** In their natural condition, most wetlands store floodwaters temporarily, protecting downstream areas from flooding. By checking the floods they maintain a constant flow regime downstream, preserve water quality and increase the biological productivity of the aquatic communities.
- Ground Water Recharge:** Wetlands are very effective in storing rain water and have innate capacity to recharge the ground water. Ground water recharge occurs through mineral soils found primarily around the edges of wetlands.

1.8 Wetland Products: Wetland products include fish, timber, housing materials, such as reeds, medicinal plants, the provision of fertile land for agriculture (sediments) water supply for domestic, arable pastoral or industrial purpose, energy resource (fuel, wood etc.) transport, recreation, tourism etc. By supporting diverse human activities, large wetlands play a particularly important role in the substance and development of thousands of people.

In economic terms, these could be categorized into direct and indirect benefits:-

- Direct economic benefits** include water supply fisheries, agriculture, energy resource, wild life resource, transport, recreation and tourism, supporting a vast diversity of flora, fauna and cultural heritage.
- Indirect benefits** are improved water quality (including drinking water) by intercepting surface runoff and removing or retaining its nutrients processing organic

wastes, reducing sediment before it reaches open water and cultural aspects.

1.9 Global Scenario of Wetland: Two-thirds of the earth is surrounded by water lakes and rivers, the most important fresh water resources account for 2.53% of the total water found on earth. Total water in the hydrosphere is estimated nearly 4×10^8 cubic km of which 97.5% is deposited in the oceans that cover 71% of the earth's surface. Wetlands are estimated to occupy nearly 6.4% of the earth's surface, 30% of which is made up of bogs, 26% fens, 20% swamps, about 15% flood plains etc. (IUCN, 1999) of the earth's freshwater 69.6% is locked up in the continental ice, 30% in underground aquifers, 0.26% in rivers and lakes. Lakes in particular occupy less than 0.007% of the world's fresh water.

1.10 Distribution of Wetlands by Continents

Continents	Wetlands
Africa	341000
Asia	925000
Australia	4000
North America	180000
South America	1232000

1.11 Indian Scenario of Wetlands: India has extensive flood plain wetlands. These wetlands are an integral component of the Ganga and the Brahmaputra river basins.

2. Wetlands in India

Extent of inland wetlands: 1:250,000 Scale. The area of wetlands in India (excluding rivers) is estimated at 58,286,000 ha, or 18.4% of the country's surface area. Most of these are directly or indirectly linked to rivers of these wetlands associated with floodplains of rivers (floodplain wetlands) cover an estimated area of 200000 ha, and are a common feature of the Indian landscape, especially along the Ganga and Brahmaputra river systems. The eastern and north eastern India is conspicuous in having vast stretches of flood plain wetlands extending over 202213 ha. The state of West Bengal has more than 150 beels covering an effective area of 42,500 ha, which is about 22% of the total freshwater area of the state. The state of Assam has 1392 beels spread over 100000 ha. This includes 322 beels along the river Barak. Floodplain wetlands in Bihar locally called are spread over 40000 ha along the Gandak and Kosi river basins on the northern part of the state. There are 16 chauras in Bihar ranging in area from 4 ha to 600 ha as reported by Sinha & Jha (1997) and Jha and Chandra (1977). Arunachal Pradesh cover an area of 2500 ha, Manipur 16500 ha, Meghalaya 213 ha and Tripura 500 ha.

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