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Fish Diversity of Hasanpur Barahi Swamp (Chour) of Madhepura District of Bihar

Saurav Kumar, Dr. Arun Kumar

University Department of Zoology, B.N.M.U., Madhepura, Bihar, India

ABSTRACT

The Hasanpur Barahi swamp (locally known as "chour") in Madhepura district, Bihar, represents a unique freshwater ecosystem supporting a rich diversity of ichthyofauna. This study aims to document and assess the fish species inhabiting this wetland, analyzing their diversity and ecological significance. Monthly surveys were conducted over a year, employing both traditional and modern sampling techniques. A total of 34 fish species belonging to 7 orders and 14 families were recorded. Cyprinidae was the most dominant family, followed by Siluridae and Channidae. The study highlights the need for sustainable management and conservation efforts due to increasing anthropogenic pressures.

KEYWORDS: *Fish diversity, Hasanpur Barahi swamp, Chour, Madhepura, Cyprinidae, wetland ecology*

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1. INTRODUCTION

Wetlands are among the most productive ecosystems on Earth and serve as critical habitats for a wide range of flora and fauna, particularly freshwater fish (Mitsch & Gosselink, 2015). In India, wetlands cover approximately 4.63% of the geographical area and support essential ecological services such as nutrient cycling, groundwater recharge, and climate regulation (MoEFCC, 2019). Bihar, located in the eastern Indo-Gangetic plain, is endowed with numerous wetlands, locally known as chaurs, taals, and mauns, which serve as hotspots of freshwater biodiversity. These wetland ecosystems also play a pivotal role in supporting the rural economy, providing livelihoods through fisheries and agriculture.

The fish diversity of these wetlands, however, remains under-documented, particularly in less explored districts such as Madhepura. The Hasanpur Barahi swamp is a seasonal wetland, locally known as a “chour,” characterized by its monsoonal flooding and dry season water retention. It provides an ideal breeding and nursery habitat for various fish species, particularly during the pre- and post-monsoon periods. Despite its ecological and economic importance, systematic scientific documentation of fish species in this region is scarce.

Freshwater fish diversity is not only crucial for maintaining the ecological balance of aquatic systems but also acts as an indicator of water quality and ecosystem health (Dudgeon et al., 2006). The degradation of aquatic ecosystems due to overfishing, pollution, invasive species, and climate change poses significant threats to freshwater biodiversity (Reid et al., 2019). Therefore, assessing and documenting fish diversity is a key step toward wetland conservation and sustainable resource management.

Several studies have been conducted on fish diversity in the wetlands of North Bihar, such as the Koshi and Gandak basins (Das et al., 2021; Kumar & Singh, 2019), but the Hasanpur Barahi swamp remains largely unassessed. This study aims to bridge this knowledge gap by conducting a year-long survey to document the ichthyofaunal diversity of the Hasanpur Barahi swamp, analyze species composition, and evaluate seasonal diversity trends. The findings are expected to provide a baseline for biodiversity

conservation and guide future ecological management efforts in the region.

2. Study Area

Hasanpur Barahi swamp lies in the southern part of the Madhepura district, Bihar (approximate coordinates: 25.910° N, 86.790° E). It is a seasonal floodplain wetland, receiving water during monsoons and retaining it until early summer. The swamp supports fisheries, paddy cultivation, and livestock grazing. Local fishermen rely heavily on the swamp for subsistence.

3. Methodology

3.1. Sampling Techniques

Monthly fish sampling was conducted from January to December 2024 using a combination of cast nets, drag nets, gill nets, and hand nets. Traditional fishing methods employed by local fishermen were also recorded. Fish were identified using standard taxonomic keys (Jayaram, 2010; Talwar & Jhingran, 1991).

3.2. Data Analysis

Diversity indices such as Shannon-Wiener (H'), Simpson's dominance index, and species richness (Margalef index) were calculated to assess biodiversity. Seasonal variation in fish availability and abundance was also documented.

4. Results

4.1. Species Composition

A total of 34 species were identified, representing 7 orders and 14 families. The dominant orders were:

- **Cypriniformes** (15 species, 44%)
- **Siluriformes** (7 species, 21%)
- **Perciformes** (5 species, 15%)
- **Ophiocephaliformes**, **Beloniformes**, **Synbranchiformes**, and **Clupeiformes** made up the remaining 20%.

Prominent species included *Labeo rohita*, *Catla catla*, *Channa punctata*, *Clarias batrachus*, *Puntius sophore*, and *Mystus tengara*.

4.2. Diversity Indices

- Shannon-Wiener Index (H'): 2.93
- Simpson's Index (1-D): 0.87
- Margalef Richness Index: 4.76

These values suggest a moderately high level of species diversity and evenness.

4.3. Seasonal Variation

Fish abundance was highest during the post-monsoon season (September to November) due to nutrient influx and habitat expansion. Summer showed reduced diversity due to drying and increased fishing pressure.

5. Discussion

The diversity observed aligns with earlier studies from similar wetlands in Bihar (Jha et al., 2013; Singh & Kumar, 2016). The dominance of Cyprinidae is typical for Indian floodplain ecosystems. However, declining populations of air-breathing fish like *Heteropneustes fossilis* and *Channa striata* signal environmental stress.

Key threats include:

- Overfishing during the breeding season
- Water pollution from agricultural runoff
- Habitat loss due to encroachment and siltation

Sustainable fishery management and habitat conservation are essential for the swamp's ecological health and local livelihoods.

The present study identified a rich ichthyofaunal composition in the Hasanpur Barahi swamp, with 38 species recorded across seven orders and fourteen families. This diversity underscores the ecological significance of this wetland system in supporting freshwater biodiversity in the flood-prone district of Madhepura. The dominance of the order Cypriniformes, especially the family Cyprinidae, is consistent with patterns observed in other wetland and riverine systems in the Indo-Gangetic plain (Jayaram, 2010; Talwar & Jhingran, 1991).

Seasonal variations in fish diversity were evident, with peak species richness and Shannon-Wiener index values observed during the post-monsoon months. This is likely due to increased water availability and favorable breeding conditions during and after the monsoon, which facilitate the growth and dispersal of fish populations (Kumar et al., 2017). The lower diversity in the pre-monsoon season may be attributed to reduced water levels, increased turbidity, and anthropogenic disturbances.

The presence of economically important species such as *Labeo rohita*, *Cirrhinus mrigala*, *Clarias batrachus*, and *Channa marulius* indicates the fishery potential of the swamp. However, the detection of signs of stress in the ecosystem—such as declining populations of larger carnivorous fish and dominance of smaller, hardy species like *Puntius* and *Mystus*—may reflect increasing anthropogenic pressure, including overfishing, agricultural runoff, and habitat degradation (Dudgeon et al., 2006; Sarkar et al., 2008).

Encroachment for agriculture and uncontrolled fishing practices, including the use of fine-meshed nets and harmful chemicals, pose significant threats to the sustainability of the swamp's fish diversity. Additionally, climate variability, especially irregular rainfall and prolonged dry spells, may alter the

hydrology of the wetland and further impact fish populations (Reid et al., 2019).

Community involvement and awareness are critical for the conservation of these wetlands. Participatory approaches, including community-based wetland management and the establishment of fish sanctuaries or no-fishing zones during breeding seasons, have shown success in similar regions (WWF-India, 2017). Integration of traditional ecological knowledge with scientific research can enhance sustainable fishery practices and biodiversity conservation.

The present findings emphasize the need for continuous monitoring and further ecological assessment of the wetland to prevent biodiversity loss. Moreover, inclusion of the Hasanpur Barahi swamp under state or national wetland conservation schemes, such as the National Plan for Conservation of Aquatic Ecosystems (NPCA), could provide institutional support for its protection.

6. Conclusion

The Hasanpur Barahi swamp harbors a rich and diverse fish community indicative of a healthy wetland ecosystem. However, rising anthropogenic pressure poses significant risks. Immediate conservation efforts, including awareness campaigns, regulated fishing, and wetland restoration, are recommended to preserve this vital aquatic habitat.

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