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Fish diversity of Dahaura Lake, Bahraich, U.P.

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Abstract
Fishes are very important components of the wetlands and they play an important role in food wed. The results of the present study reveal that occurrence of 28 fish species belonging to 21 genera 15 families and 7 orders. The member of order Siluriformes were dominated by 9 species followed by Cypriniformes (7 species); Perciformes (05 species), Ophiocephaliformes (02 species), Clupeiformes (02 species), Synbranciformes (02 species), and Beloniformes (01 species). All the species identified in the present study are reporting first time under mopping survey programme. It is concluded that the fish in this areaare under threat due to anthropogenic activities such as overfishing and pollution of the fresh waterbodies.

Keywords: Biodiversity, Dahaura Lake, Wetland

Introduction

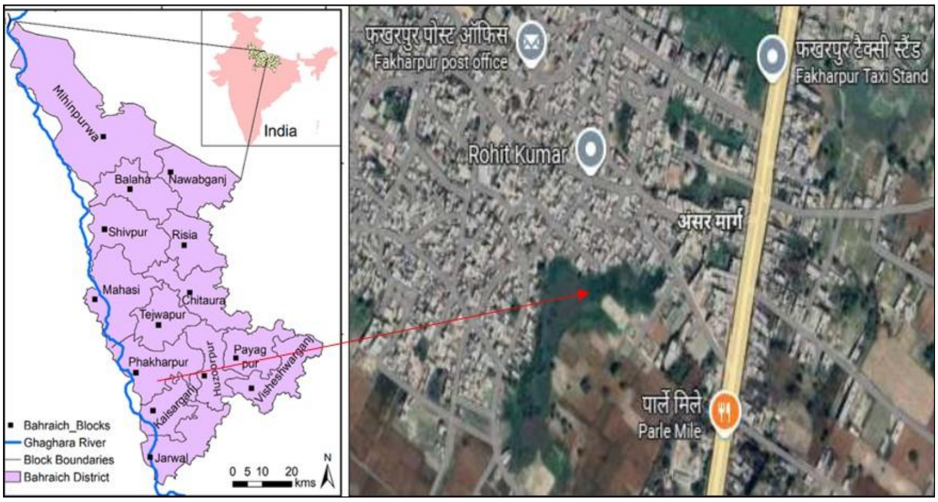
Fish is a vital component of the human diet, providing essential nutrients such as proteins, lipids, vitamins, essential amino acids, and omega-3 polyunsaturated fatty acids including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) as well as important minerals. These nutrients support bodily growth, development, and the maintenance of overall health by helping prevent various nutritional deficiency diseases. Beyond their role in human nutrition, fish serve multiple purposes. They are utilized not only as food and medicine but also as bio-indicators, research models, ecological connectors between ecosystems, sources of recreation, and even tools for controlling vector-borne diseases (Prakash, 2020a; Verma, 2021) [17,23]. Freshwater fish diversity holds particular significance for both ecological balance and the livelihoods of communities that depend on these ecosystems. In India, the fisheries sector ranks third globally in total fish production. It contributes approximately 1.07% to the national Gross Domestic Product (GDP) and about 5.34% to the agricultural GDP. With this global standing, India's fisheries sector has immense potential for promoting rural development, ensuring nutritional security, and generating employment opportunities-especially in states like Uttar Pradesh.

Fish diversity is increasingly affected by changes in land use and water systems, leading to significant losses in species, with the remaining populations often facing heightened risk (Chakraborty, *et al*., 2021) [3]. Freshwater fish, in particular, are exposed to harsher and more variable environmental conditions compared to their marine counterparts. These stresses are further intensified by human activities, placing additional pressure on these ecosystems. In contrast, fish in natural water bodies typically evolve under relatively stable environmental conditions. Therefore, understanding the distribution and variation of fish biodiversity across time and space is crucial (Efe *et al*., 2021) [6]. Without accurate knowledge of species diversity and its temporal and spatial dynamics, it becomes challenging to design effective conservation strategies and to plan sustainable development projects related to water resources (Verma, 2018; Prakash and Verma, 2022) [22,16]. Consequently, there is an urgent need for comprehensive investigation and systematic documentation of freshwater fish diversity. Establishing a robust freshwater biodiversity information system is essential for informed decision-making and long-term conservation planning.

Natural water bodies provide stable environmental conditions, which play a crucial role in the evolution of fish species. Therefore, documenting biodiversity and understanding its spatial and temporal distribution are essential. Without this knowledge, it becomes challenging to design effective conservation measures and implement sustainable water resource development projects (Verma and Prakash, 2016a) [24]. Understanding the fish diversity of a specific region is vital not only for the rational management of its ichthyofauna but also for developing appropriate conservation strategies (Verma and Prakash, 2022) [26]. Several researchers have studied the taxonomy, biodiversity, and distribution of freshwater fishes in various lentic ecosystems such as ponds, taals, and wetlands across Uttar Pradesh including (Prakash and Verma, 2015; Prakash, 2020b; Prakash and Singh, 2020) [14, 18, 13]. The Bahraich district of eastern Uttar Pradesh is endowed with numerous freshwater ecosystems, including lentic and lotic water bodies such as ponds, lakes, wetlands, reservoirs, streams, and rivers. These aquatic resources offer significant potential for the development of inland fisheries. However, effective utilization of these water bodies for fish culture requires a clear understanding of the existing fish fauna. A lack of such baseline knowledge poses a major constraint to the sustainable exploitation and management of these resources. In light of this, the present study focuses on investigating the fish fauna of Dahaura Lake, a wetland located in the Bahraich district of eastern Uttar Pradesh.

Materials and Methods

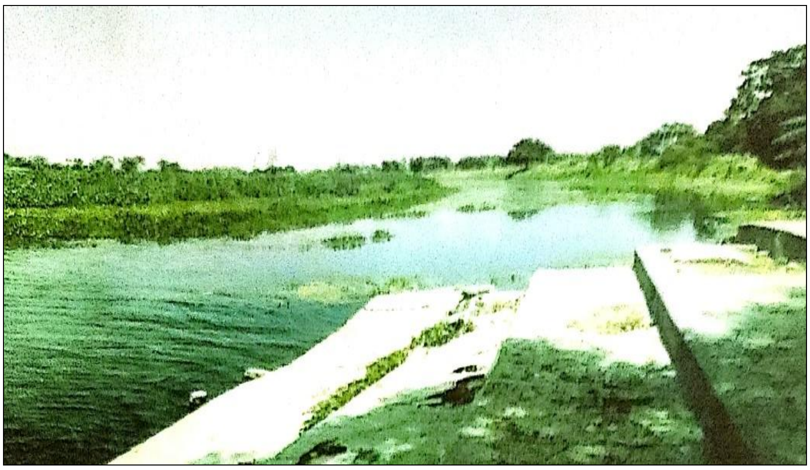
Dahaura Lake (also known as Dahaura Talab), a wetland is a large shallow lentic waterbody. The area of wetland is about 300acre with maximum depth of water 15feet during monsoon and minimum 6-7 feet in summer. It is situated about 30 km away from Kisan P.G. College, Bahraich. It is situated between the latitude 27^{O}40.27$^{/}$N latitude and 81^{o}58.99$^{/}$ E longitude. This Lake is enriched with several type of vegetation such as *Nymphaea*, *Nelumbo* and Nymphya as well as aquatic birds like Duck, Bagula, Saras cranes (Verma *et al*., 2015; Verma and Prakash, 2016b) [27, 25].



Satellite map of Dahaura Lake of Phakharpur Block of Bahraich district of U.P.

The collected fish specimens were preserved on-site using a 10% formaldehyde solution. Smaller specimens (less than 10 cm in length) were preserved directly without any incision, while larger specimens were preserved after making an incision in the abdominal region to ensure proper fixation. All preserved specimens were stored in plastic containers. Additionally, the coloration of each specimen was documented prior to preservation.

Fishes will be collected from Dahaura Lake collected during July, 20123 to June, 2024 with the help of local fisherman by using hand-nets, gill nets, cast nets, drag nets, scoop net including hooks and lines mainly during the time of fishing and will be identified up to species level. while identifying its natural colour, pattern of scales, fins, mouth pattern, identification marks like black or red spots,Bloch on operculum, paired and unpaired fins and body parts with the help of standard literature and taxonomic keys for fishes (Day, 1989; Datta and Srivastav, 1988; Menon, 1992; Srivastava, 2002; Jayram, 2010) [5,4, 12, 21,10].



Photograph of Dahaura Lake of Phakharpur Block of Bahraich district of U.P.

Results and Discussion

The fish diversity of collected and identified fish species from Dahaura Lake of Bahraich district of eastern Uttar Pradesh, India shown in Table-1. In the present study total 28 fish specieswere collected, belonging to 7 orders, 15 families and 21 genera (Table 1).

Table1: Ichthyofauna of Dahaura Lake, Bahraich

S.N.	Fish Species	Common Name/ Local Name	Availability In District
Order- Cypriniformes; Family- Cyprinidae			
1.	*Catla catla* (Hamiliton)	Bhakur	Rare
2.	*Labeo rohita* (Hamiliton)	Rohita	Rare
3.	*Labeo bata* (Hamiliton)	Bata	Common
4.	*Cirrhinus mrigala* (Hamiliton)	Naini	Rare
5.	*Cirrhinus reba* (Hamiliton)	Reba	Common
6.	*Puntius sarana* (Hamiliton)	Sarana	Common
7.	*Puntius ticto* (Hamiliton)	Two spot barb	Moderate
Order- Siluriformes; Family- Bagridae			
8.	*Mystus seenghala* (Sykes)	Tengara	Rare
9.	*Mystus vittatus* (Bloch)	Tengara	Rare
10	*Mystus tengara* (Hamiliton)	Tengara	Rare
Order- Siluriformes; Family- Siluridae			
11.	*Wallago attu* (Schneider)	Pardni	Common
12.	*Ompak pabda* (Hamiliton)	Pabdah catfish	Common
Order- Siluriformes; Family-Schilbeidae			
13.	*Pangasius pangasius* (Hamiliton)	Pangas catfish	Rare
14.	*Ailia coila* (Hamiliton)	Gangetic ailia	Rare
Order- Siluriformes; Family- Clariidae			
15.	*Clarias batrachus* (Linnaeus)	Mangur	Rare
Order- Siluriformes; Family- Saccobranchidae			
16.	*Heteropneustes fossilis* (Bloch)	Singhi	Rare
Order- Ophiocephaliformes; Family- Ophiocephalidae			
17.	*Channa punctatus* (Bloch)	Saura	Common
18.	*Channa striatus* (Bloch)	Saura	Common
Order-Perciformes; Family- Gobiidae			
19	*Glossogobius giuris* (Hamiliton)	Balia / Bhalia	Rare
20.	*Badis badis* (Hamiliton)	Blue Perch	Rare
Order-Perciformes; Family- Anabantidae			
21.	*Anabas testudenius* (Bloch)	Kawai	Rare
Order-Perciformes; Family- Osphronemidae			
22.	*Colisa fasciatus* (Bloch)	Rainbow gourami	Moderate
Order-Perciformes; Family- Ambassidae			
23.	*Chanda nama* (Hamiliton)	Chanda	Moderate
Order -Clupeiformes; Family- Notopteridae			
24.	*Notopterus notopterus* (Pallas)	Patara / Pholi	Rare
Order -Clupeiformes; Family-Clupeidae			
25.	*Gudusia chapra* (Hamiliton)	Suhia / Suiya	Rare
Order -Beloniformes; Family- Belonidae			
26.	*Xenentodon cancila* (Hamiliton)	Kauwamachhali	Moderate
Order -Synbranchiformes; Family- Mastacembeleidae			
27.	*Mastacembelus armatus* (Lacepede)	Bam	Rare
28.	*Mastacembelus aculeatus* (Bloch)	Bam	Very Rare

Table 2: Name of the Order, Number of species and % of Abundance**.**

S.N.	Name of Order	Number of Species	% of Abundances
1	Cypriniformes	07	25.0%
2	Siluriformes	09	32.14%
3	Ophiocephaliformes	02	7.14%
4	Perciformes	05	17.86%
5	Clupeiformes	02	7.14%
6	Beloniformes	01	3.57%
7	Synbranciformes	02	7.14%

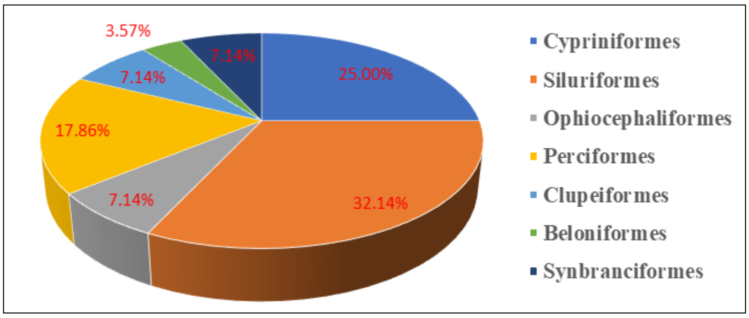


Fig 1: Relationship between Order and Species Abundance of Fish

Of these 07 orders, on the basis of species richness and percentage composition the order Siluriformes was most dominant (9 species) followed by Cypriniformes (7 species), Perciformes (05 species), Ophiocephaliformes (02 species), Clupeiformes (02 species), Synbranciformes (02 species), and Beloniformes (01 species) (Table-2; Figure- 1).

Table 3: Name of the family, Number of species and Percentage (%) of Abundance

S.N.	Name of Families	No. of Species	Abundances%
1	Cyprinidae	07	25.00
2	Bagridae	03	10.71
3	Siluridae	02	7.14
4	Schilbeidae	02	7.14
5	Claridae	01	3.57
6	Saccobranchidae	01	3.57
7	Ophiocephalidae	02	7.14
8	Gobiidae	02	7.14
9	Anabantidae	01	3.57
10	Osphronemidae	01	3.57
11	Ambassidae	01	3.57
12	Notopteridae	01	3.57
13	Clupeidae	01	3.57
14	Belonidae	01	3.57
15	Mastacembeleidae	02	7.14

Of these 15 families based on the species richness and percentage composition, the family Cyprinidae was most dominant (7 species), followed by family Bagridae (03 species), Siluridae (02 species), Schilbeidae (02 species), Claridae (01 species), Saccobranchidae (01 species), Ophiocephalidae (02 species), Gobiidae (02 species), Anabantidae (01 species), Osphronemidae (01 species), Ambassidae (01 species), Notopteridae (01 species), Clupeidae (01 species), Belonidae (01 species), and Mastacembeleidae (02 species) (Table-3; Figure- 2).

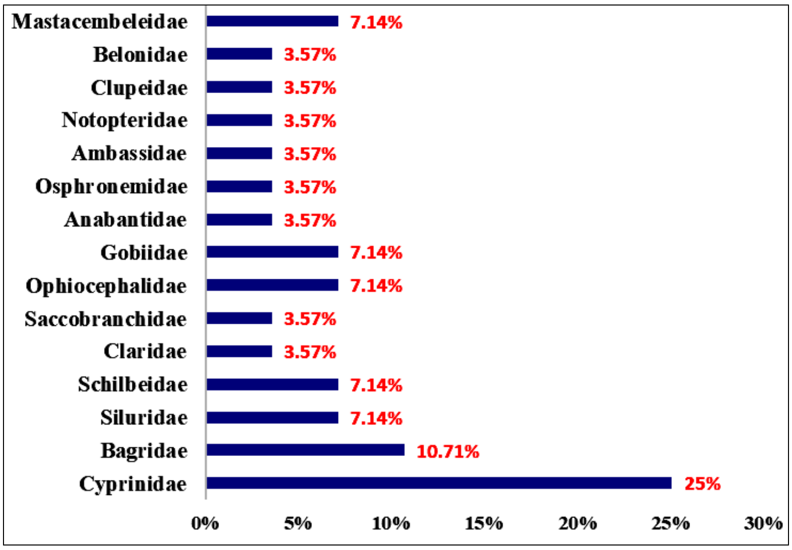


Fig 2: Relationship between Family and Species Abundance

The present investigation revealed that the total of about 28 fish species were recorded belonging to 07 orders and 15 families. The information collected from the local fish formers and sellers of the area reveals a high decline in the fish population in the last few years. Some species of *Clarias*, *Heteropneustes*, *Puntius*, *Mystus*, *Mastacembelus*, *Anabas* etc., *Glossogobius giuris* and *Badis badis* were found rarely but these were collected commonly by fishermen before a few years. There is a need for revaluation of threatened category of fishes because these species were not available in very large quantity though its market demand is very high. This may due to uncontrolled fishing to meet the high market demand of the local fishes.

Fish diversity is increasingly threatened by illegal and destructive fishing practices, pollution, habitat alteration, eutrophication, siltation, and excessive water abstraction. These factors collectively have a significant negative impact on overall fish populations (Jayaram, 2010) [10]. Among these, illegal and harmful fishing methods-such as the use of fine mesh nets, poisoning, destructive gear, overfishing, and the indiscriminate capture of fish across all life stages are particularly concerning (Gibbs, 2000) [8]. The use of long, fine-mesh nylon nets is especially damaging, as it leads to the unselective capture of juvenile fish and brooders, particularly during the breeding season (Habit *et al*., 2006) [9]. These unsustainable practices, driven by short-term economic gain, result in overexploitation and a steady decline in fish diversity (Allan *et al*., 2005) [1].

The rapid growth of the human population has led to an increased demand for food, prompting the conversion of lake areas into agricultural land. As a result, wetlands are under significant pressure of pollution and other human activities and are increasingly being transformed into croplands (Ashok, 2017; Singh *et al*., 2023) [2,20]. To boost crop yields, farmers often apply chemical fertilizers (Savei, 2012; Kumar, 2017) [19,11], which contribute to eutrophication and reduce dissolved oxygen levels in water bodies conditions that adversely affect fish diversity (Fu *et al*., 2003) [7]. Furthermore, the growing dependence of the human population on aquatic resources, including fisheries and water, along with the continuous introduction of exotic species into the natural water bodies of eastern Uttar Pradesh, poses a serious threat to freshwater fish biodiversity. Without the implementation of effective conservation measures, the decline in fish diversity is likely to accelerate. The most effective strategy for conserving fish species is to raise awareness among fishermen and other stakeholders (Prakash and Verma, 2016) [15]. Disseminating information, education, and best practices regarding the risks of species extinction and the importance of conservation is essential for ensuring the long-term sustainability of aquatic ecosystems.

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