



ASSESSMENT OF FISH DIVERSITY IN CHACHAI DAM, MADHYA PRADESH

Zoology

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ABSTRACT

The current study was designed to identify the diversity of fishes in the Chachai dam that lies in the Son river basin of M. P., India. Biodiversity is essential to maintain the balance of ecosystem along with protection of overall environment and identification of importance of all organisms present on the planet Earth. Fishes can be considered biological resources that are important to ecological studies at different levels of eco-system. Apart from this, fish species are used for assessment of quality of water against the presence of any harmful toxins. Besides their ecological importance, fishes are considered rich in proteins and form an important part of diet in the form of foods providing fats, vitamins-A and vitamins-D. They are also used in medical purposes. The global fresh-water biodiversity of fish is declining due to factors such as alterations in water flow, pollution, unsustainable fishing practices, spread of invasive species, and the effects of climate change. The objective of this review work is to provide a better understanding of fish diversity in relation to abundance and richness in India's fresh-water aquatic ecosystems. Monthly surveys were conducted from July 2025 to June 2026 using experimental fishing nets, cast nets, and local fishermen catches. During the study period, a total of 26 fish-species belonging to 6- Orders and 11- Families were recorded. The dominant order was Cypriniformes, followed by Siluriformes and Perciformes. Economically important fishes such as Catla catla, Labeo rohita, Mozambique tilapia, Cirrhinus mrigala, Wallago attu, Clarias batrachus, Mystus seenghala, and Channa punctatus were found to be abundant. The Shannon-Wiener Diversity Index indicated moderate to high fish diversity. This study provides insight into the diverse range of fishes found in Chachai Dam in the Son River basin of Madhya Pradesh, India.

KEYWORDS

Fish Diversity, Ichthyo-fauna, Chachai-dam, Biodiversity, Freshwater Ecosystem.

INTRODUCTION

Fresh-water eco-systems are highly productive ecosystems with diverse fish fauna. The fish in these ecosystems serve not only as an important source of protein but also make an important contribution to the rural community economies. Assessment of fish diversity is important to have an insight into the health of the ecosystem, fisheries prospects, and conservation requirements. Aquatic eco-systems are important natural resources, which support the existence of different living organisms, like plants, insects, fish, invertebrates, microorganisms. Specifically, fresh-water fish serve as bio-indicators, which are very responsive to the changes in their habitats, and thus become important indicators of the state of the ecosystem. Hence, periodic assessments of water bodies are necessary to obtain comprehensive data on biodiversity (Das et, al. 2023). Understanding the importance of biodiversity assessment is the foundation for well-informed decision-making concerning environmental management and conservation (Dwivedi & De, 2024).

When coal is used for producing electricity, it produces coal fly-ash. Coal ash Includes dangerous substances and heavy metals, which threaten the health of the ecosystem once they are introduced into water bodies. Irrational fishing practices, along with environmental issues such as reduced water volume, increased sedimentation, water extraction, and pollution over the years, have led to a decline in fish diversity. In India's fresh-water eco-systems, several species have been lost and are categorized as endemic, endangered, or threatened (Kantaraj et. Al. 2011). Dams and reservoirs create unique aquatic habitats that support diverse fish communities. The Son River basin is known for its fisheries resources and ecological importance. The Chachai Dam, located near Chachai Falls in the Son River system, serves multiple purposes including water storage, irrigation, and fisheries. However, there is limited information available regarding the fish diversity of the Chachai Dam. Therefore, a present study was conducted to document the ichthyofaunal diversity of Chachai Dam and evaluate its ecological significance.

MATERIALS AND METHOD

1. Study Area:-

The Chachai Dam is located in the Son River basin in M.P. The reservoir primarily receives water from the Son River and seasonal tributaries. The surrounding region has a tropical monsoon climate, with clearly defined summer, monsoon, and winter seasons.

Sampling Methods:-

From July 2025 to June 2026, fish samples were systematically collected on a monthly basis from specific sampling stations within the reservoir. The sampling techniques employed comprised of Trap Nets, Cast Net, Gill Net, Drag Net, and also involved the catches of local fishermen. After collection, the specimens were photographed and then preserved in 10% formalin for the purpose of identification.

Identification of Fish & Taxonomic Study:-

Fish species were identified using standard taxonomic keys. Additionally, Fin Formulas and regional fish identification manuals were utilized for this purpose.

Various morphometric measurements were taken for the specimens, including total length, standard length, body depth, head length, height of the head at occiput, head width, eye diameter, snout length, interorbital width, predorsal length, post dorsal length, pre-pelvic distance, length of pectoral fin, length of dorsal fin, length of pelvic fin, least height of caudal peduncle, length of caudal peduncle, length of longest fin ray, postorbital length, suborbital width, and width of gape of mouth. In addition to morphometric measurements, the fin rays and scale count were also recorded for each specimen. To ensure accuracy, the measurements were taken using digital calipers. Furthermore, the species of the specimens were identified using the classification keys provided by Day (1967), Talwar and Jhingran (1991), Menon and Devi (1992), as well as Jayaram (1999, 2010).

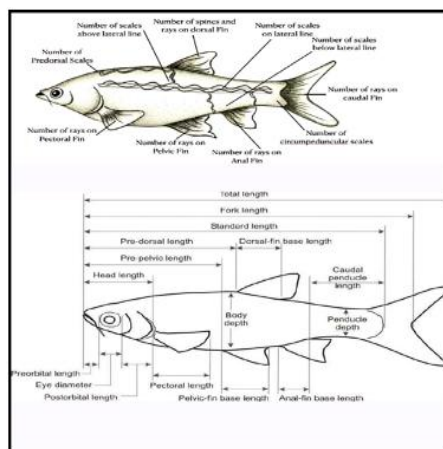


Image No. 01: Meristic and Morphometric Characters of Fish Used for Taxonomic Identification.

Diversity Analysis:-

Species richness and diversity were assessed using:
Species Richness (S)
Shannon-Wiener Diversity Index (H')
Relative Abundance (%)

RESULTS:-

In the current study, a total of 26 species of fresh-water fishes from six orders and 11 families were documented. The comprehensive list of

the recorded fishes, including their respective order and family, can be found in Table number-01.

TABLE:-1. Fish Species Recorded from Chachai Dam

S.No.	SPECIES	ORDER	FAMILY
1	<i>Catla catla</i>	Cypriniformes	Cyprinidae
2	<i>Labeo rohita (Rohu)</i>	Cypriniformes	Cyprinidae
3	<i>Cirrhinus mrigala</i>	Cypriniformes	Cyprinidae
4	<i>Cirrhinus reba</i>	Cypriniformes	Cyprinidae
5	<i>Labeo bata</i>	Cypriniformes	Cyprinidae
6	<i>Labeo calbasu</i>	Cypriniformes	Cyprinidae
7	<i>Puntius chola</i>	Cypriniformes	Cyprinidae
8	<i>Amblypharyngodon mola</i>	Cypriniformes	Cyprinidae
9	<i>Cyprinus carpio (Common Carp)</i>	Cypriniformes	Cyprinidae
10	<i>Mystus seenghala</i>	Siluriformes	Bagridae
11	<i>Mystus aor</i>	Siluriformes	Bagridae
12	<i>Mystus cavasius</i>	Siluriformes	Bagridae
13	<i>Wallago attu</i>	Siluriformes	Siluridae
14	<i>Ompok bimaculatus</i>	Siluriformes	Siluridae
15	<i>Rita rita</i>	Siluriformes	Bagridae
16	<i>Channa punctata</i>	Perciformes	Channidae
17	<i>Channa striatus</i>	Perciformes	Channidae
18	<i>Channa marulius</i>	Perciformes	Channidae
19	<i>Nandus nandus</i>	Perciformes	Nandidae
20	<i>Glossogobius giuris</i>	Perciformes	Gobiidae
21	<i>Notopterus notopterus</i>	Osteoglossiformes	Notopteridae
22	<i>Chitala chitala</i>	Osteoglossiformes	Notopteridae
23	<i>Mastacembelus armatus</i>	Synbranchiformes	Mastacembelid
24	<i>Clarias batrachus</i>	Siluriformes	Clariidae
25	<i>Heteropneustes fossilis</i>	Siluriformes	Heteropneustidae
26	<i>Oreochromis mossambicus (tilapia)</i> Exotic fish	Cichliformes	Cichlidae

TABLE:-2 . Order-wise Distribution

S.NO.	ORDER	NUMBER OF SPECIES	PERCENTAGE
1	Cypriniformes	09	30.00
2	Siluriformes	08	29.18
3	Perciformes	05	20.83
4	Osteoglossiformes	02	8.33
5	Synbranchiformes	01	6.33
6	Cichliformes	01	5.17

The table displays photos of selected species from the overall recorded fish species.

TABLE -3: List of Species Recorded From Chachai Dam

	
<i>Catla catla</i> [CATLA]	<i>Labeo rohita</i> [ROHU]
	
<i>Cirrhinus mrigala</i> [MRIGAL]	<i>Mystus cavasius</i>
	
<i>Rasbora daniconius</i>	<i>Channa nama</i>
	
<i>Channa punctata</i> [SAUR]	<i>Oreochromis mossambicus</i> [TILAPIA]
	
<i>Wallago attu</i>	<i>Puntius chola</i>
	
<i>Notopterus notopterus</i>	<i>Channa marulius</i>

DISCUSSION

Throughout ancient times to the present, fish have been the only major group of vertebrates that have had a significant impact on human civilization. They have served as an important and affordable source of protein for people of all economic backgrounds. As a result, it is crucial to study their distribution and availability in freshwater reservoirs and tanks, as noted by Shelke in 2016.

The present study documented the presence of 26- fish species, which are classified into six (06) orders and eleven (11) families. Cypriniformes and Siluriformes were determined to be the dominating orders in the region, in line with the observation that has been made from different reservoirs and river system of Madhya Pradesh. It is evident from the presence of Indian Major Carps (*Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala*) that the environment favors the presence of such fishes and hence supports fisheries. *Channa punctata* and Catfish species including *Wallago attu* and *Mystus seenghala* play an important role in the commercial fisheries industry.

The Chachai Power Plant has experienced multiple incidents involving ruptured pipelines connecting the electrostatic precipitators for coal fly-ash transport. These ruptures have led to the entry of large quantities of fly-ash into water resources, potentially causing disruption to the aquatic environment. The pollution resulting from this can have adverse effects on fish diversity and other forms of aquatic life. In addition to these incidents, future fish populations may also be affected by increasing anthropogenic pressures, overfishing, and habitat disturbances.

CONSERVATION RECOMMENDATIONS

1. It is important to conduct regular monitoring of fish diversity to ensure a comprehensive understanding of the fish population in a given area.

2. Prohibiting destructive fishing practices is crucial for the preservation of fish habitats and overall fresh-water biodiversity.

3. Protecting breeding habitats during spawning seasons is essential to maintain healthy fish populations and ensure their continued reproduction. Implementation of stock enhancement programmes can help in replenishing and maintaining balanced fish populations in a given eco-system.

4. Regular water quality monitoring is necessary to assess the health of aquatic environments and ensure the well-being of freshwater life.

5. Encouraging community participation in fisheries management can lead to more sustainable practices and better conservation of fish stocks.

6. To prevent ash leachate from seeping into groundwater, impermeable HDPE (High-Density Polyethylene) liners should be installed on the bottom and sides of all ash ponds.

7. Adopting a closed-loop system, where the ash-water slurry is recycled and treated for reuse at the thermal power plant, can significantly reduce the impact of ash discharge on surrounding water bodies.

CONCLUSION

Fish bio-diversity in freshwater is highly critical for balancing ecosystems and ensuring human well-being. This literature review highlights the high prevalence and richness of freshwater fishes across different aquatic environments in Madhya Pradesh. Biodiversity is threatened by several factors like habitat destruction, pollution, overfishing, and climate change. For sustainable preservation of freshwater fish diversity, it is imperative to formulate strategies that include conservation, habitat management, and environmental policies. Monitoring and research regarding fish diversity should be done continually.

The study found that Chachai Dam a rich and economically significant fish fauna, including 26-species from six orders and eleven families. *Cypriniformes* and *Siluriformes* were the dominant groups in the reservoir. The dam has substantial fisheries potential and plays a vital role in local livelihoods. It is crucial to implement sustainable management and conservation measures to uphold the ecological integrity and fish biodiversity of the reservoir.

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