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Fish Fauna of River Damodar in Dhanbad district of Jharkhand, India

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Abstract

The study, which took place from April 2022 to September 2022, was undertaken to comprehensively investigate the ichthyofaunal diversity within the stretch of Damodar River located in the Dhanbad district of Jharkhand. The meticulous examination of the river's fish fauna has unveiled a total of 35 distinct species, distributed across 30 genera, belonging to nineteen families and ten orders. Notably, the family Cyprinidae emerged as the dominant taxonomic group, boasting eight species, with Donionidae closely following, comprising five species within the study area. Of particular concern is the conservation status of these species, with one being categorized as endangered, another as near threatened, and three more falling into the vulnerable classification. These findings underscore the pressing need for concerted efforts to conserve and manage this invaluable aquatic ecosystem.

Keywords:
Ichthyofauna, Damodar River, Dhanbad, Conservation and management

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Introduction

Indeed, rivers are of immense significance in maintaining ecosystems and supporting life on Earth. They are vital freshwater sources and can be likened to the Earth's living arteries. In countries like India, rivers hold a myriad of values, deeply intertwined with the socio-cultural fabric and emotional connection to their free-flowing environment. India's most notable river systems include the Ganges, Godavari, Damodar, and many more. These rivers play multifaceted roles, from providing water for agriculture and industry to holding cultural and spiritual importance in the lives of the people along their banks. Bezbaruah *et al.* (2023) reported 23 species in the upper stretch of River Brahmaputra in Jorhat district of Assam. Gupta *et al.* (2022) reported 26 species in the middle stretch of River Ganga in Prayagraj district of Uttar Pradesh. The Damodar river, flowing through Jharkhand and West Bengal, is significant in India. It's often called the 'Sorrow of Bengal' due to its devastating floods in West Bengal's plains (Sheet *et al.*, 2023). It originates in the Khamparpet hills of Palamu district in the Chota Nagpur Plateau in Jharkhand and eventually merges into the Hooghly River, a distributary of the Ganges in West Bengal (Purnanjali & Kasiviswanathan, 2022) having total length 592 km (Das *et al.*, 2021). This river is essential for society, fueling various economic activities and nurturing ecological diversity in its surroundings (Chakraborty *et al.*, 2021The Damodar river is fed by various tributaries like Barakar, Konar, and others. It courses through six Jharkhand and five West Bengal districts, receiving an annual rainfall of 765-1605 mm. (CIFRI, 2013).

River Damodar accommodates a high diversity of fish, including ornamental fish (CIFRI, 2013). In the Lower Damodar region, fisheries have been a long-standing source of income and a significant part of the local food supply. In the early fifties, 89 fish species from 20 families were identified, with 25 having commercial value. Due to factors like delinking and reduced river depth, the number of commercially viable species has now dropped to 16 from 6 families (Ghosh –2011; Das 2013). Biodiversity is crucial for ecosystem stability and environmental quality (Vijaykumar, 2008). River Damodar supports high ichthyofaunal diversity. Saha & Patra (2013) reported 46 fish species in Damodar stretch of district Burdwan, West Bengal. The 123 km stretch of river Damodar from Jamalpur to Ramgarh accommodates 68 fish species (CIFRI, 2013). Despite previous research efforts, there remains a notable gap in the study of ichthyofauna in the Dhanbad district of Jharkhand. As a result, the current study seeks to address this deficiency by conducting a comprehensive assessment of fish species diversity in the Dhanbad district. This research endeavor aims to contribute valuable insights into the local Damodar stretch fish diversity and fishing gear used.

Fig 1. Fish sampling sites of River Damodar in Dhanbad district of Jharkhand

Fig 2. Fisheries activities at river Damodar, A- drag net operation, B- Push net and C- Sorting fish species.

Methodology

Three major fishing sites were selected in district Dhanbad: Pathardih, Bhojudih and Sindri. These areas are adjacent to the Jharkhand-Bengal border (Table 1 & Figure 1). Fish were caught from three sampling sites using different fishing gears like drag net, gill net, cast net, push net and traps. Most of the catch comes from drag net followed by gill net, cast net traps and push net. They used a 7-9 m plank-built boat to deploy the 300m drag net with a 1.2mm mesh size (Fig. 2). The fish samples were caught fortnightly for six months from April 2022 to September 2022. The collected fish samples underwent a series of steps for preservation and identification. Firstly, representative specimens were anesthetized and carefully cleaned. Following this, they were preserved in a 10% formalin solution to facilitate further analysis in the laboratory. This preservation process ensures that the fish samples remain suitable for detailed examination and scientific study. To ascertain the species of the collected fish samples, identification procedures recommended by reference books authored by Talwar and Jhingran (1991) and Jayaram (2010) were consulted and followed. These established references are valuable resources for accurately identifying and classifying fish species, contributing to the precision and reliability of the study's findings.

Table 1. Fish sampling sites of River Damodar in the Dhanbad district of Jharkhand

Sampling site	Latitude	Longitude
Pathardih	23°41'24'' N	86°24'18'' E
Bhojudih	23°38'58'' N	86°26'58'' E
Sindri	23°38'21'' N	86°30'34'' E

Results and discussion

The primary goal of this research was to document the fish diversity within the Damodar River stretch, with a particular emphasis on the Dhanbad district in Jharkhand. The table labeled "Table 1" contains a comprehensive list of observed species, complete with their local names, size ranges and IUCN status. A total of 35 fish species, representing ten orders, nineteen families, and thirty genera, were documented within the study area, as depicted in Figure 3. Cyprinidae was found to be the most abundant family with eight species.

Notable. a previous study conducted by Job *et al.* (1952) reported the occurrence of 89 species, while Sarkar and Banerjee (2010) documented 79 fish species. Similarly, CIFRI (2013) reported 68 species along a 123-kilometer stretch of the Damodar River from Jamalpur to Ramgarh. Additionally, Saha and Patra (2013) reported the presence of 46 species in the Burdwan district of West Bengal. However, in the present study, only 35 species were recorded, signifying a substantial and concerning decline in fish diversity in the region.

The study conducted by CIFRI (2013) reveals significant findings regarding fish populations in the Damodar River. Specifically, it shows that 9 species (25%), 19 species (41%), and 17 species (44%) are experiencing a decrease in population at the Durgapur barrage, Burdwan, and Mundeshwari Bifurcation sites, respectively. The construction of four large dams (Konar, Tilaiya, Maithon, and Panchet), Durgapur barrage, and Tenughat reservoir, aimed at flood control and water resource management through an integrated approach (Ghosh and Guchhait, 2013), has altered the river's flow pattern, consequently impacting fish habitats.

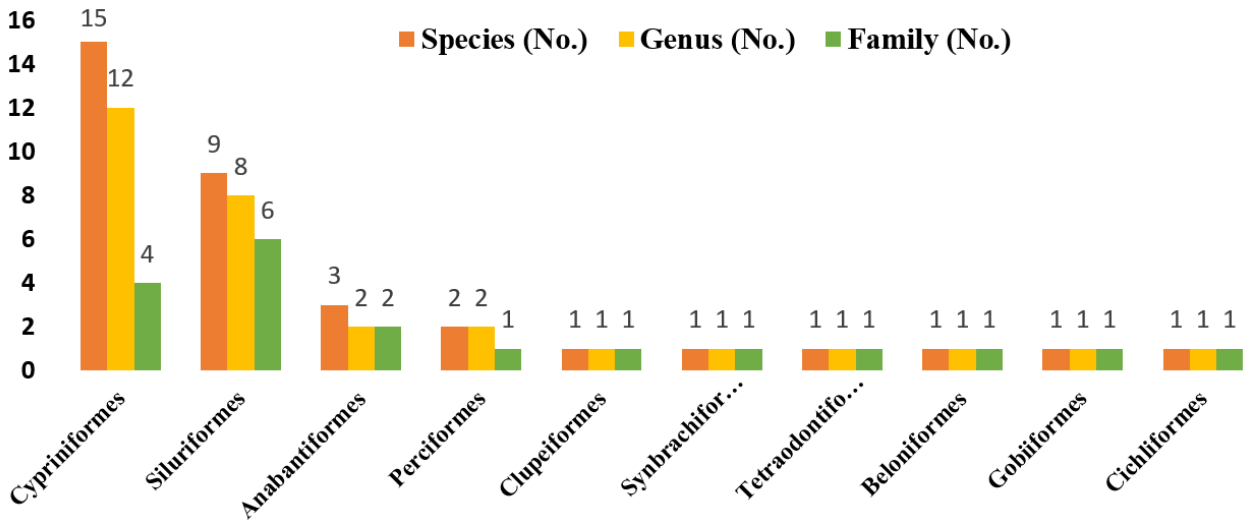

Fig 3. Number of families, genera and species of fish recorded under ten orders from River Damodar in the Dhanbad district of Jharkhand

Table 2. Checklist of fish from River Damodar in Dhanbad district of Jharkhand with local name, size range and IUCN status

Order: Family & Species	Local Name	Size Range (cm)	IUCN status
Cypriniformes: Cyprinidae			
Osteobrama cotio	*Gurumda/Koti*	*10-20*	*least concern*
Cirrhinus reba	*Reba*	*15-25*	*least concern*
Puntius sophore	*Kunchon punghti*	*10-15*	*least concern*
Lebeo calbasu	*Kalbasu/Talbagus*	*15-25*	*least concern*
Labeo rohita	*Rohu*	*30-90*	*least concern*
Labeo catla	*Katla*	*40-120*	*least concern*
Cirrhinus mrigala	*Mirrig*	*20-30*	*least concern*
Cyprinus carpio	*Koman*	*30-120*	*vulnerable*
Cypriniformes: Xenocyprinidae			
Ctenopharyngodon idella	*Grass carp*	*30-75*	*least concern*
Cypriniformes: Danionidae			
Esomus dadricus	*Pedu*	*5-6.5*	*least concern*
Amblypharyngodon mola	*Maurala*	*5-7.5*	*least concern*
Rasbora rasbora	*Derhki*	*4-6.5*	*least concern*
Salmostoma bacaila	*Pedi*	*15-20*	*least concern*
Securicula gora	*Bhasa machh*	*15*	*least concern*
Cypriniformes: Cobitidae			
Lepidocephalus guntea	*Geta machh*	*5-6.5*	*least concern*
Perciformes: Ambassidae			
Chanda nama	*Chand puthi*	*3.8-5*	*least concern*
Parambassis ranga	*Sisa machh*	*5-7.5*	*least concern*
Anabantiformes: Channidae			
Channa punctatus	*Garai*	*30-40*	*least concern*
Channa striata	*Shol*	*45-60*	*least concern*
Anabantiformes: Nandidae			
Nandus nandus	*Nadosh*	*10-15*	*least concern*
Siluriformes: Sisoridae			
Gagata cenia	*Kukuriya machh*	*3-5.5*	*least concern*
Bagarius bagarius	*Baghari*	*30-100*	*vulnerable*
Siluriformes: Siluridae			
Ompok pabda	*Pabda*	*15-30*	*near threatened*
Wallago attu	*Buari*	*90-150*	*vulnerable*
Siluriformes: Bagridae			
Mystus cavasius	*Tengra*	*15-30*	*least concern*
Mystus vittatus	*Tengra*	*7.5-12.5*	*least concern*
Siluriformes: Clariidae			
Clarias magur	*Magur*	*30-45*	*endangered*
Siluriformes: Heteropneustidae			
Heteropneustes fossilis	*Singhi*	*30-45*	*least concern*
Siluriformes: Ailiidae			
Clupisoma garua	*Garua*	*15-25*	*least concern*
Tetraodontiformes: Tetraodontidae			
Tetraodon cutcutia	*Phula/Tepa*	*10-15*	*least concern*
Clupeiformes: Dorosomatidae			
Gudusia chapra	*Kheri machh*	*5-7.5*	*least concern*
Synbrachiformes: Mastacembelidae			
Macrognathus pancalus	*Turi/Pangkal*	*20-30*	*least concern*
Gobiiformes: Gobiidae			
Glossogobius giuris	*Bheda/Bele*	*10-15*	*least concern*
Beloniformes: Belonidae			
Xenentodon cancila	*Kanley*	*15-25*	*least concern*
Cichliformes: Cichlidae			
Oreochromis niloticus	*Telpia*	*15-30*	*least concern*

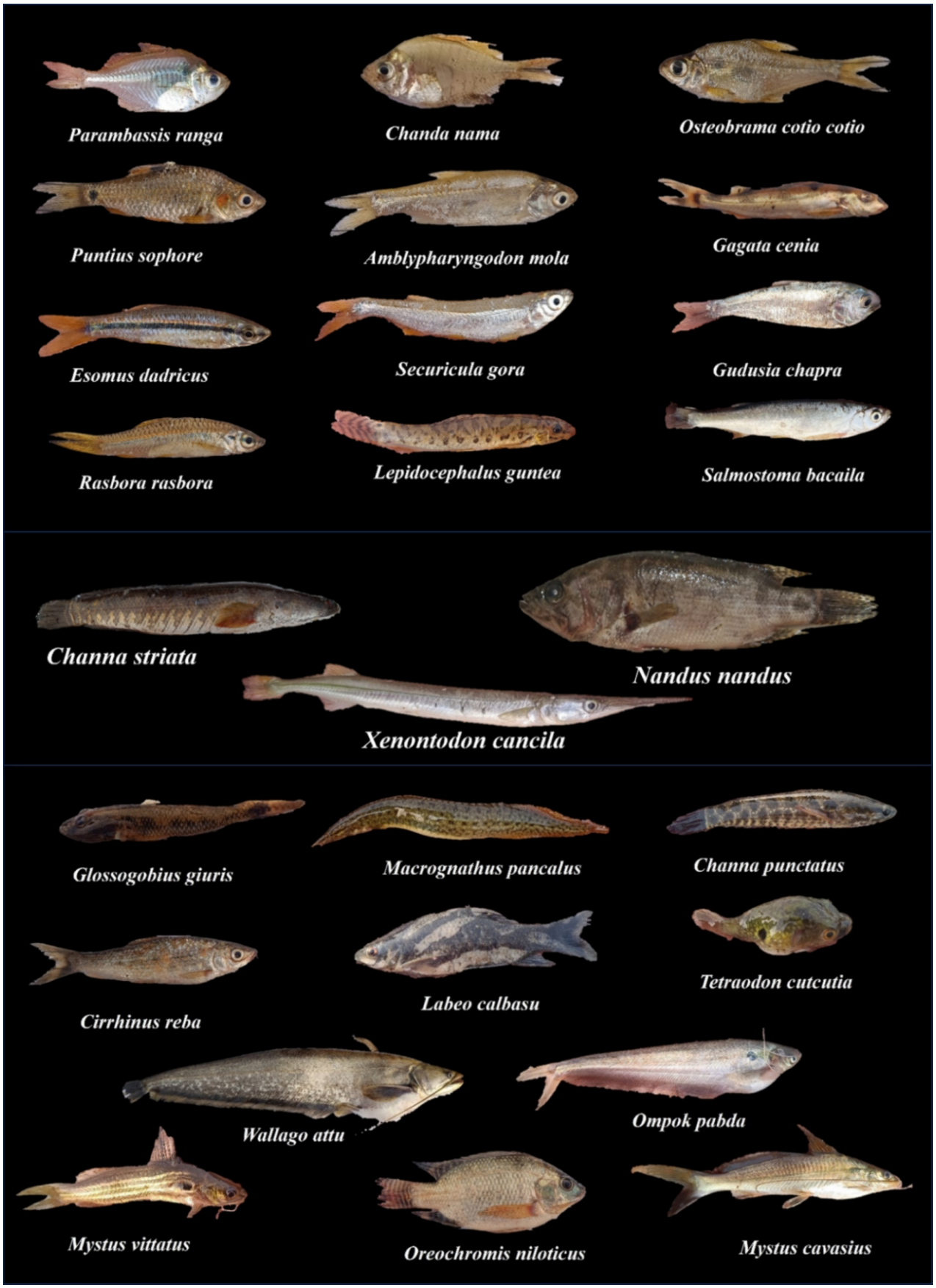

Fig 4. Fishes of Damodar River from Dhanbad district of Jharkhand

The decline in fish populations within an aquatic system serves as an indicator of environmental degradation within that system. Seal *et al.* (2022) further underscores the environmental challenges faced by the Damodar River basin. Their research reports elevated levels of heavy metal contamination (including Fe, Cu, Zn, Mn, As, Co, Cd, Hg, Cr, Ni, and Cu) in the river basin, stemming from industrial and mining activities. These contaminants have had a discernible impact on the hydro-chemical properties of the river, contributing to the observed changes in fish populations.

Conclusion

Among the 35 species documented, it's concerning to note that one species falls under the endangered category, one is categorized as near threatened, and three species are classified as vulnerable. What's particularly significant is that 33 of these species hold food value, emphasizing their importance for sustenance and livelihoods. In light of the declining trend in fish diversity observed in the Damodar River, there is an urgent and compelling need for effective management of these fisheries resources. This management should focus on mitigating the adverse impacts of dam construction and anthropogenic pollution, both of which pose significant threats to the aquatic ecosystem and the valuable fish species it supports.

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