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Studies on Ichthyofaunal Diversity of Ankarsol Ka Naka of District Dungarpur, Rajasthan

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Abstract
This study documents the freshwater fish diversity of Ankarsol Ka Naka during 2019-2020, recording 40 species across 13 orders and 23 families. Cypriniformes dominated (15 species, 37.5%), followed by Siluriformes (11 species, 27.5%), with Cyprinidae being the most speciose family (12 species, 30%). Bagridae (3 species) and Cobitidae/Osphronemidae (2 species each) were also well-represented, while 10 families contributed single species. Ecologically significant and commercially valuable taxa like Labeo rohita (Rohu), Catla catla, and Wallago attu were recorded. IUCN assessments revealed 80% species as Least Concern, but four were Near Threatened (Ompok pabda, Wallago attu), one Endangered (Anguilla rostrata), and one Vulnerable (Cyprinus carpio). The findings highlight Cyprinidae's ecological dominance and underscore conservation needs for threatened species in this freshwater ecosystem.
Keywords: *Freshwater fish diversity, IUCN status, Ankarsol Ka Naka, threatened species, Fish taxonomy.*

I. Introduction

According to Ahirrao and Mane (2000) and Shinde (2009), India is the ninth most diverse nation in terms of its freshwater biodiversity. India is also one of the countries that are considered to be mega-biodiverse. According to Ehrlich and Wilson (1991), preservation of biodiversity is essential for the maintenance of ecosystems and the preservation of environmental quality. According to Yağcı et al. (2016), fishes play a crucial role in the preservation of aquatic ecosystems and serve as bioindicators of water quality. The distribution of fishes is controlled by both biotic and abiotic variables. There is a correlation between the availability of organic matter and the species variety of an ecosystem (Verma et al., 2019). In addition, planktonic communities provide a substantial contribution to the dynamics of an ecosystem (Kar & Barbhuiya, 2004). There are numerous health benefits associated with eating freshwater fish, including the provision of proteins, lipids, vitamins, and therapeutic properties (Khora, 2013). Over the past few decades, however, the biodiversity of freshwater systems has decreased at a rate that is greater than that of terrestrial or marine systems (Mantyka-Pringle et al., 2014). These are the key factors that contribute to the loss of biodiversity (Dudgeon, 2000; Carley & Christie, 2017). Habitat degradation, water abstraction, invasive species, pollution, and climate change are further contributing factors. This research investigates the ichthyodiversity of Ankarsol Ka Naka, which is located in Dungarpur, Rajasthan. It documents species that are commercially relevant and highlights the importance of conservation efforts.

II. Materials and Method

The present study on ichthyofaunal diversity was conducted in Ankarsol Ka Naka, a freshwater ecosystem in Dungarpur district, Rajasthan, from March 2019 to feb. 2020. Fish specimens were collected seasonally (pre-monsoon, monsoon, and post-monsoon) using multiple fishing techniques, including gill nets (mesh size 15–50 mm), cast nets (4–6 m diameter), and drag nets, to ensure comprehensive sampling across different microhabitats (deep pools, shallow riffles, and vegetated margins).

Specimens were preserved in 10% formalin solution and subsequently identified using standard taxonomic keys (Talwar & Jhingran, 1991; Jayaram, 2010; APHA, 2017). Morphometric measurements (standard length, total length, weight) and meristic counts (fin rays, scales) were recorded for each species. Habitat characteristics (substrate type, vegetation cover, flow velocity) were documented to assess ecological preferences.

Species diversity indices (Shannon-Wiener, Simpson's) and dominance were calculated using PAST software (v4.03). Conservation status was verified against the IUCN Red List (2021), and anthropogenic impacts (fishing pressure, land-use changes) were recorded through field surveys and local interviews. Data were analyzed for seasonal variation and habitat-specific species distribution to evaluate ecosystem health and conservation priorities.

III. Results and Discussion

The 40 freshwater fish species spanning 2019-2020, 13 different orders and 23 families showcase a diverse representation of freshwater fish taxonomy of Ankarsol Ka Naka. The most dominant order is Cypriniformes, contributing 15 species (37.5%), followed by Siluriformes with 11 species (27.5%), highlighting their ecological significance in freshwater ecosystems. Other notable orders include Anabantiformes (3 species, 7.5%), Cichliformes (1 species, 2.5%), Mugiliformes (1 species, 2.5%), and Osteoglossiformes (1 species, 2.5%), among others.

At the family level, Cyprinidae (carp and minnow family) is the most diverse, accounting for 12 species (30%), while Bagridae (bagrid catfishes) follows with 3 species (7.5%). Other families, such as Channidae, Cichlidae, Clariidae, Cobitidae, and Osphronemidae, each contribute 1-2 species (2.5-5%), indicating a broad distribution across different evolutionary lineages.

The Cyprinidae family emerges as the dominant group in this dataset, contributing 12 species (30% of the total 40 freshwater fish species). This remarkable representation underscores Cyprinidae's ecological and economic importance in global freshwater ecosystems. The family includes commercially vital species like *Labeo rohita* (Rohu), *Catla catla* (Catla), and *Cirrhinus mrigala* (Mrigal Carp), which form the backbone of aquaculture in South Asia, as well as smaller ornamental species such as *Puntius sophore* (Pool Barb) and *Pethia conchonius* (Rosy Barb). Cyprinids demonstrate exceptional adaptability, occupying diverse habitats from fast-flowing rivers (*Garra gotyla*) to stagnant ponds (*Cyprinus carpio*). Their dominance in the dataset reflects both their natural biodiversity and human-mediated distribution through aquaculture and aquarium trade.

The **Bagridae** family follows with **3 species (7.5%)**, featuring catfish such as *Mystus cavasius* (Gangetic Mystus) and *Mystus vittatus* (Striped Dwarf Catfish). Other well-represented families include **Cobitidae** (2 species, 5%), with loaches like *Botia lohachata (reticulated loach*), and **Osphronemidae** (2 species, 5%), housing popular aquarium fish such as *Trichogaster lalius (dwarf gourami*).

Several families contribute **only 1 species (2.5% each)**, including **Notopteridae** (*Notopterus notopterus*, Bronze Featherback), **Mugilidae** (*Mugil cephalus*, Flathead Grey Mullet), **Schilbeidae** (*Ompok pabda*, Pabdah Catfish), **Siluridae** (*Wallago attu*, Giant Sheatfish), **Cichlidae** (*Oreochromis niloticus*, Nile Tilapia), **Channidae** (*Channa striata*, Striped Snakehead), **Mastacembelidae** (*Mastacembelus armatus*, Zig-zag Eel), **Heteropneustidae** (*Heteropneustes fossilis*, Stinging Catfish), **Pangasiidae** (*Pangasius pangasius*, Yellowtail Catfish), **Clariidae** (*Clarias batrachus*, Walking Catfish), **Sisoridae** (*Bagarius bagarius*, Goonch Catfish), **Poeciliidae** (*Poecilia reticulata*, Guppy), **Characidae** (*Astyanax mexicanus*, Mexican Tetra), **Latidae** (*Lates calcarifer*, Barramundi), **Sciaenidae** (*Boesemania microlepis*, Smallscale Croaker), **Ictaluridae** (*Ictalurus punctatus*, Channel Catfish), **Salmonidae** (*Oncorhynchus mykiss*, Rainbow Trout), **Anguillidae** (*Anguilla rostrata*, American Eel), and **Adrianichthyidae** (*Oryzias latipes*, Japanese Rice Fish).

This distribution highlights the **rich diversity of freshwater fish**, with Cyprinidae being the most species-rich family, while many others are represented by only a single species, reflecting varied ecological niches and evolutionary adaptations.

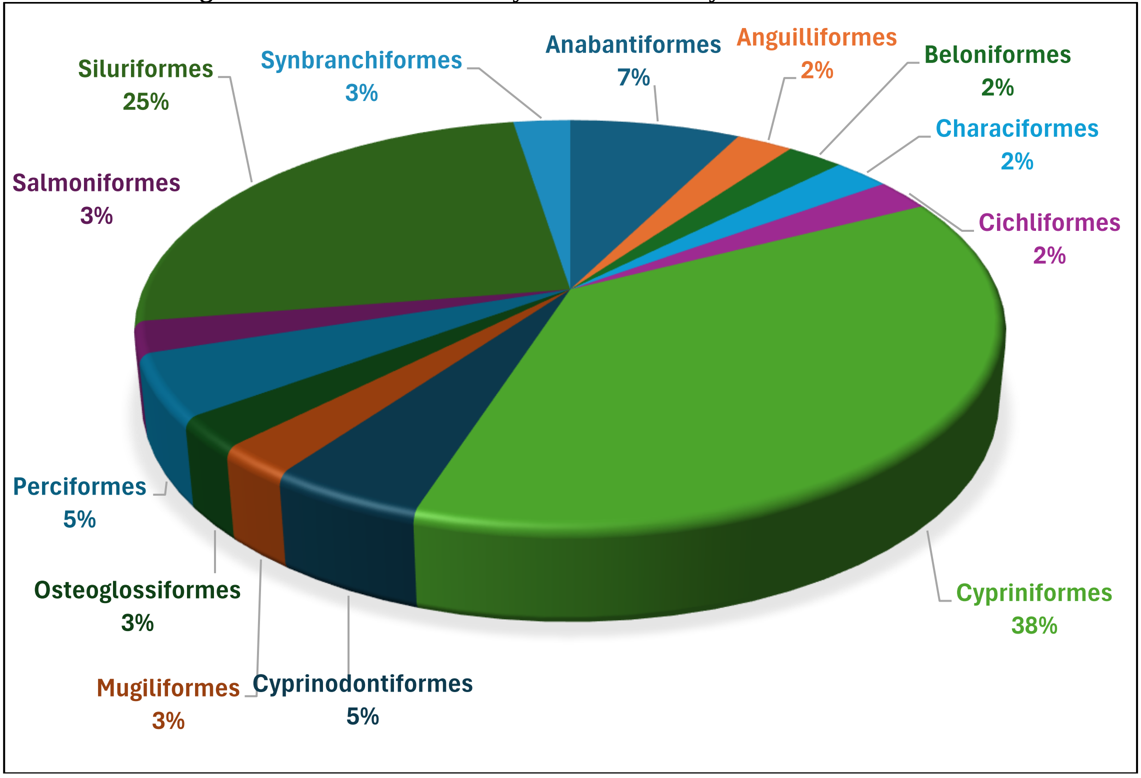
Regarding IUCN conservation status, the majority of species (32, or 80%) are classified as Least Concern (LC), suggesting stable populations. However, 4 species (10%) are Near Threatened (NT), including the Giant Sheatfish (*Wallago attu*) and Pabdah Catfish (*Ompok pabda*), while 1 species (2.5%), the American Eel (*Anguilla rostrata*), is Endangered (EN). Additionally, the Common Carp (*Cyprinus carpio*) is listed as Vulnerable (VU), and the Rainbow Trout (*Oncorhynchus mykiss*) remains Not Evaluated (NE) (Table 1 and fig. 1). Plate 1 & 2 shows some fish species.

Table 1 – Ichthyofaunal Diversity of Ankarsol ka Naka

Order	Family	Scientific Name	Common Name	IUCN Status
Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Bronze Featherback	LC
Mugiliformes	Mugilidae	*Mugil cephalus*	Flathead Grey Mullet	LC
Cypriniformes	Cyprinidae	*Labeo rohita*	Rohu	LC
Siluriformes	Schilbeidae	*Ompok pabda*	Pabdah Catfish	NT
Cypriniformes	Cyprinidae	*Puntius sophore*	Pool Barb	LC
Siluriformes	Siluridae	*Wallago attu*	Giant Sheatfish	NT
Cichliformes	Cichlidae	*Oreochromis niloticus*	Nile Tilapia	LC
Anabantiformes	Channidae	*Channa striata*	Striped Snakehead	LC
Siluriformes	Bagridae	*Mystus cavasius*	Gangetic Mystus	LC
Synbranchiformes	Mastacembelidae	*Mastacembelus armatus*	Zig-zag Eel	LC
Cypriniformes	Cyprinidae	*Labeo calbasu*	Orange-fin Labeo	LC
Cypriniformes	Cyprinidae	*Labeo bata*	Bata Labeo	LC
Siluriformes	Bagridae	*Mystus tengara*	Tengara Mystus	LC
Siluriformes	Bagridae	*Mystus vittatus*	Striped Dwarf Catfish	LC
Siluriformes	Heteropneustidae	*Heteropneustes fossilis*	Stinging Catfish	LC
Cypriniformes	Cyprinidae	*Catla catla*	Catla	LC

Cypriniformes	Cyprinidae	*Cirrhinus mrigala*	Mrigal Carp	LC
Cypriniformes	Cyprinidae	*Puntius ticto*	Ticto Barb	LC
Cypriniformes	Cyprinidae	*Pethia conchonius*	Rosy Barb	LC
Cypriniformes	Cyprinidae	*Garra gotyla*	Suckerhead Fish	LC
Cypriniformes	Cobitidae	*Botia lohachata*	Reticulated Loach	LC
Cypriniformes	Cobitidae	*Lepidocephalichthys guntea*	Guntea Loach	LC
Siluriformes	Pangasiidae	*Pangasius pangasius*	Yellowtail Catfish	LC
Siluriformes	Clariidae	*Clarias batrachus*	Walking Catfish	LC
Siluriformes	Sisoridae	*Bagarius bagarius*	Goonch Catfish	NT
Anabantiformes	Osphronemidae	*Trichogaster lalius*	Dwarf Gourami	LC
Anabantiformes	Osphronemidae	*Trichopodus trichopterus*	Three-spot Gourami	LC
Cyprinodontiformes	Poeciliidae	*Poecilia reticulata*	Guppy	LC
Cyprinodontiformes	Poeciliidae	*Xiphophorus hellerii*	Swordtail	LC
Characiformes	Characidae	*Astyanax mexicanus*	Mexican Tetra	LC
Perciformes	Latidae	*Lates calcarifer*	Barramundi	LC
Perciformes	Sciaenidae	*Boesemania microlepis*	Smallscale Croaker	LC
Cypriniformes	Cyprinidae	*Cyprinus carpio*	Common Carp	VU
Cypriniformes	Cyprinidae	*Carassius auratus*	Goldfish	LC
Cypriniformes	Cyprinidae	*Hypophthalmichthys molitrix*	Silver Carp	LC
Cypriniformes	Cyprinidae	*Ctenopharyngodon idella*	Grass Carp	LC
Siluriformes	Ictaluridae	*Ictalurus punctatus*	Channel Catfish	LC
Salmoniformes	Salmonidae	*Oncorhynchus mykiss*	Rainbow Trout	NE
Anguilliformes	Anguillidae	*Anguilla rostrata*	American Eel	EN
Beloniformes	Adrianichthyidae	*Oryzias latipes*	Japanese Rice Fish	LC

Fig. 1 Order wise based Ichthyofaunal Diversity of Ankarsol ka Naka



This finding aligns with global freshwater biodiversity trends, where Cypriniformes (carps and minnows) and Siluriformes (catfishes) frequently dominate due to their adaptive radiation and ecological versatility (Fricke et al., 2023; Nelson et al., 2016). The Cyprinidae family alone contributed 12 species (30%), reinforcing its ecological and economic significance in South Asian freshwater systems (Rahman, 2022). The prevalence of cyprinids such as *Labeo rohita* and *Catla catla* reflects their dual role in aquaculture and wild ecosystems, supporting food security while maintaining aquatic biodiversity (FAO, 2021).

The uneven distribution across families, with 10 families represented by only a single species, suggests niche specialisation and varying evolutionary success. For instance, the presence of endemic or habitat-specific species like *Ompok pabda* (NT) and *Bagarius bagarius* (NT) underscores the vulnerability of specialised taxa to habitat degradation (IUCN, 2022). The IUCN status data further highlights conservation concerns, with 10% of species classified as Near Threatened or Endangered, primarily due to overfishing, habitat loss, and invasive species (Dudgeon et al., 2006). The endangered status of *Anguilla rostrata* mirrors global declines in eel populations, driven by dams and climate change (Jacoby et al., 2015).

The dominance of Least Concern (80%) species suggests relative stability for generalist taxa like *Oreochromis niloticus* and *Channa striata*, which thrive in altered habitats (Froese & Pauly, 2023). However, the vulnerable status of *Cyprinus carpio* signals risks even for widely introduced species, possibly due to genetic erosion in wild populations (Koehn et al., 2020). The lack of evaluation for *Oncorhynchus mykiss* highlights gaps in conservation assessments for non-native species, necessitating further study (Gozlan et al., 2010).

Protecting Ankarsol Ka Naka's freshwater biodiversity requires habitat restoration, sustainable fisheries policies, and targeted conservation for threatened species like *Wallago attu* (NT) (Allan et al., 2005). Future research should monitor population trends of data-deficient species and assess impacts of invasive competitors.

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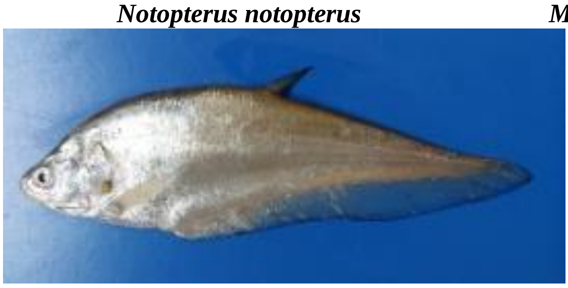
Notopterus notopterus



Mugil cephalus

Channa striata

Puntius sarana

Ompok pabda

Wallago attu

PLATE 1

Channa punctata

Oreochromis niloticus

Labeo bata

Osteochilus vittatus

Anguilla bengalensis ***Mystus seenghala***

PLATE 2