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Diversity And Conservation Strategies Of Ichthyofauna In Hanumanthapura Lake, Tumakuru, Karnataka, India

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Abstract:
Purpose: Fish make up just about half of the all vertebrates in the worldwide. Economy of the country is directly associated with fisheries and provide alternative resource of food for the growing population. Fish diversity good indicator of health of aquatic ecosystem and favourable to maintains balance in the food chain by consuming small plankton and animals while serving as prey for many other animals.
Method: In recent years due to varied ecological conditions and impacts of human activity have increased variations in abiotic and biotic factors of aquatic ecosystems. The objective of the study was to report ichthyofaunal diversity of Hanumanthapura Lake, Tumakuru District, Karnataka, India. This study carried out for period of one year from Dec-2023 to Nov-2024. Result: The present study revealed that occurrence of ten fish species belonging to four families and four orders. The order Cypriniforms was most dominant with six fish species followed by order Siluriform with two species, order Perciformes and Anabantiformes with one species. Conclusion:Several anthropogenic activities barrages, dumping of waste, over fishing activity and sedimentation were found to threaten the fish diversity, and Physicochemical characteristics of water are also responsible for the occurrence and distribution of fishes in Hanumanthapura lake. It is necessary to take up the sustainable steps to monitor and conserve fish diversity.
Key Words *Cypriniforms, Ecological Health, Economy, Fish diversity, Food chain, Hanumanthapura Lake, Overfishing, Pollution.*

INTRODUCTION:

Biodiversity is apparent at all levels of biological structure, from single cells to large ecosystems. Terrestrial, marine, and freshwater habitats all require a wide range of creatures to live. Rich biodiversity maintains the ecological equilibrium required for the long-term development and survival of all living things, including humans (Ashok, 2018). India is a mega diversity hotspot, highlighting diverse ecosystems such as the Eastern ghats greater Himalayans and Western ghats. It is home to rich variety of Freshwater fish, with 756 species documented in the NBFGR database, highlighting the country's significant contribution to global biological resources.Fishing is the second most common occupation in Karnataka villages, contributing to roughly 30%, behind farming (Ramchurjee et al., 2006). Karnataka has over 0.52 million hectares of freshwater resources, with approximately 0.15 million hectares designated for fish aquaculture. Despite its massive water-spread area, Karnataka barely provides 8% of overall Indian fish production, demonstrating that many technical and socioeconomic challenges impede fish production. (Basavakumar et al., 2011).Fishes are to be consider as sources high amount of proteins content and an important food source for human beings with supplying fat, vitamins A and D, which are important in the daily life. In addition, to these nutrient values fishes are used in several medical treatments, provide aesthetic beauty in aquariums. Due to this multiple use of fisheries resources, fishing has become a major industry in country like India and provided livelihood for several families. Fish play a crucial role in maintaining ecological health and abundance by devouring plankton and small creatures, as well as providing food for many other animals. Pollution in aquatic systems can disrupt the balance of the food chain. Dam development, foreign species introduction, and overfishing pose significant challenges to fish diversity. Understanding the status of fish fauna is crucial to prevent the extinction of specific species. These important biological resources are under threat of extinction due to habitat and environmental degradation has critically affected the fauna of fishes. Monitoring the fish diversity of water bodies is

necessary to ensure the ecosystem's stability and sustainable development. In order to maintain sustainable development and stability of ecosystem, surveillance of fish diversity of water bodies is significantly needed. In the present study an attempt has been made to highlight the ichthyofaunal diversity of Hanumanthapura Lake.The goal of this study is to draw attention to Hanumanthapura Lake ichthyofaunal diversity. Knowledge on available information and the biological characters of fish species are providing the firsthand information for further conservation aspects.

STUDY AREA:

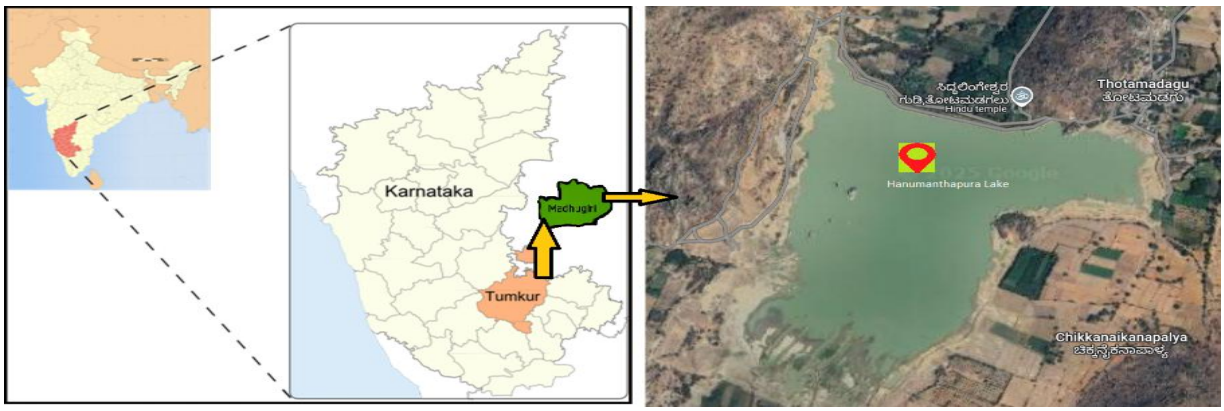


Fig-1 Satellite view of Hanumanthapura Lake

Hanumanthapura Lake is located in the village of Hanumanthapura, situated in the Madhugiri Taluk of Tumakuru District, Karnataka. Among the 200 tanks in Madhugiri Taluk, the present study specifically focuses on Hanumanthapura Lake. Geographically, the lake is positioned within the coordination of 13°49′24.30″ N to 77°13′29.75″ E Latitude and Longitude. This water body falls under the North Pennar basin sub-basin Dodderi. The catchment area covers 19.89 Km^2 and the live capacity of the water body is 121.05 m. cft. which spread over 21.05 hectares. It is perennial in nature, the main source of water is rain fed and is utilized enormously for irrigation and fish culture.

MATERIALS AND METHODS:

Fishermen will be employed to collect fishes using various mesh size gill nets, cast nets, dragnets, and Bhor-jar. Fishes will be brought to the laboratory, and preserved in 4% formalin solution in separate jars based on size. Small fishes will be directly placed in formalin, while large fishes will receive an abdominal incision before preservation.

Meristic and morphometric characters will be measured for species-level. Identification was done by using standard keys Talwar and Jhingran (1991), Jayaram (1981), and Rahman (2005).

RESULT AND DISCUSSION:

This extensive study examined that occurrence of ten fresh water fish species includes four orders, four families and seven genera were recorded in the Lake. The Phylogenetic account of fish diversity in Hanumanthapura Lake given in table-1. Among all the families Cyprinids are more dominant, consists six species represents 60% of the fish diversity followed by Bagridae consists of two species, represents 20% of the fish diversity then Chanidae and Cichlidae each one consists single species forms 10% of each one of the fish diversities in Hanumanthapura Lake Fig-1. According to (IUCN-2025) report one species is vulnerable (10%), eight species were least concern (80%), one species is near threatened (20%), two species are exotic (20%) Fig -2. Parimala (2021) studied diversity of fishes in relation to habitat of freshwater Bhima Sandra Pond in Tumakuru, Karnataka and identified 24 fish species consists ten species of cyprinids. Sathish gouda et al., (2022) has reported fifteen species of fishes in Chikkere water body of Sira, Tumkur. Cyprinid are most dominated includes seven species followed by Bagridae 02, Siluridae 01 species, Claridae 01 species, Cichlidae 02 and Chanidae 02 species. Shivaraju et al., (2017) has identified 17 fish species in Mydala Lake of Tumakuru, Karnataka state, in which maximum 9 species belonging to the family cyprinid. Cyprinids dominate South Asian streams due to their adaptive

variability, dominating tropical Indian rivers (Johnson and Arunachalam, 2009). Fish diversity is influenced by biotic and abiotic factors, including hydrobiological features, mean depth, water level oscillations, body age, bottom topography, and ecosystem types. These factors have significant ecological effects (Venkateshwarlu and Somashekar, 2005). Similar result was also reported by Sreedhara nayaka (2018), Sanjay and Prakash (2020), Yadav and Sharma (2021).The poor diversity and diminishing population density of fish species in the pond were caused by multiple factors, including over-exploitation, low breeding rates, unsuitable habitat, pollution, and introduction of exotic species. To prevent further decline of the species in lakes and ponds, conservation measures such as habitat restoration, invasive species control, public awareness, and education should be implemented to improve fisheries, aesthetics, economic value, and genetic diversity (Parimala 2021).

Table-1 Phylogenetic account of Icthyofauna in Hanumanthapura lake

Sl.NO	Family	Family	No. of genus	No. of species
1.	Cypriniformes	Cyprinidae	4	6
2.	Perciformes	Cichilidae	1	1
3.	Anabantiformes	Channidae	1	1
4.	Siluriformes	Bargidae	1	2
Total	4	4	7	10

Table-2 Biodiversity Status of Fish species in Hanumanthapura Lake

Sl. No	Species Name	Vernacular Name	Status	IUCN status
1.	*Cirrhinus mrigala*	Mrigala meenu	C	LC
2.	*Cyprinus carpio**	Kannadi meenu	A(ES)	NT
3.	*Catla catla*	Doddagende meenu	A	LC
4.	*Labeo rohita*	Rahu meenu	C	LC
5.	*Labeo kontius*	Kari meenu	C	LC
6.	*Labeo bata bata*	Kemmi meenu	C	LC
7.	*Oreochromis mossambicus**	Gelabi meenu or Bahanika meenu	A (ES)	VU
8.	*Channa straitus*	Aul meenu	C	LC
9.	*Mystus cavasius*	Girlu meenu	C	LC
10.	*Mystus seenghala*	Surgi meenu	C	LC

A=Abundant, C-Common, *ES-Exotic species, LC-Least concern, NT-Near threatened, VU-Vulnerable

Table-3 Economically Importance of fishes in Hanumanthapura Lake

Family	Species	Category			
		C	F	S	O
Cyprinidae	*Cirrhinus mrigala*	+	+	+	+
	Cyprinus carpio	+	+	+	+
	Catla catla	+	+	-	-
	Labeo rohita	+	+	+	+
	Labeo Kontius	+	+	-	-
	Labeo bata bata	+	+	+	-
Cichilidae	*Oreochromis mossambicus*	+	+	+	-
Channidae	*Channa straitus*	+	+	+	+
Bargidae	*Mystus cavasius*	+	+	+	+
	Mystus seenghala	+	+	-	+

+ = Positive, - =Negative, C-Cultivable fishes, F-Food fishes, S-Sport fishes, O-Ornamental fishes.

Fig.-2 Percentage of occurrence of families of fish species in Hanumanthapura Lake

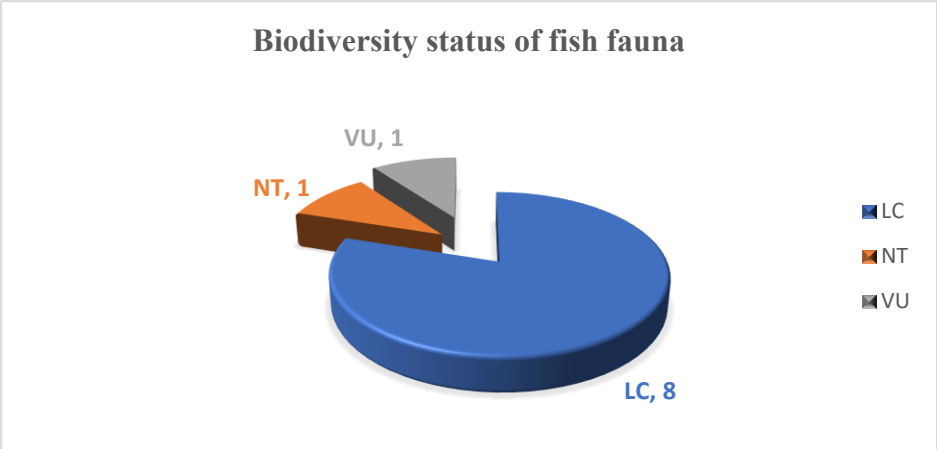
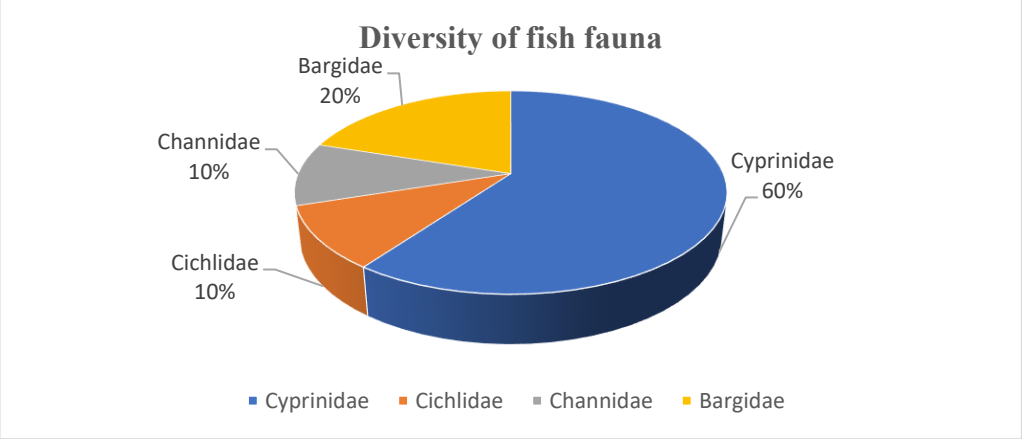


Fig.-3 Biodiversity status (IUCN) of fishes in Hanumanthapura Lake.



CONCLUSION:

The overall study reported that diversity and importance of freshwater fisheries in the enlightening the National economy. It affects particularly in Hanumanthapura village also. The study accomplishes that cyprinid species are more dominated in this lake due to their adaptive variability. Overall, Hanumanthapura Lake also supports rich ichthyofaunal diversity with considerable potential for fisheries, food supply, and ornamental fishery development. However, the discharge of agricultural waste from surrounding areas possesses a threat to fish diversity, imposing regular monitoring and examination to protect these fish. This research will encourage in planning, managing, protecting sustainable fisheries and conservation of Hanumanthapura Lake.

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