Diversity of the Ichthyofauna at the Ghunghutta Dam in the Surguja District of Chhattisgarh.

Swati Soni[1]; Manoj Singh[1*]; Rajkishor Singh Baghel[2]; Ajay Kumar Harit[1]; Yashmita-Ulman[3]; Shekhar Kumar Soni[4]

[1]Department of Zoology, Kalinga University, Naya Raipur, Chhattisgarh
[2] Zoology, Govt. Lahiri P.G. College, Chirmiri, Chhattisgarh
[3]Department of Silviculture and Agroforestry, College of Horticulture and Forestry, ANDUAT, Kumarganj, Ayodhya
[4]Agricultural development Officer, Dist.-Surajpur, Chhattisgarh
*Email: manoj.singh@kalingauniversity.ac.in

Abstract

The study discusses the richness of the ichthyofauna at Ghunghutta Dam in Surguja District, Chhattisgarh, where research on fish diversity was done from December 2020 to November 2021. Aquatic resources have suffered severe degradation as a result of human activities, altering both structure and function. It is crucial to maintain the diversity of fish because they make up about half of all vertebrates. In order to analyze the fish diversity in Gunghutta Dam Ambikapur, the current study was carried out. There were found to be 82 fish altogether, divided into 8 different groups. Cyprinidae had the highest species richness (6 species) among the different families, followed by Channidae (3 species) and Bagridae 2 species). Only one fish species was present for each of the other families. Cyprinidae made up 61.63% of all fish species, followed by Channidae (9.88%), Siluridae (6.98%), Bagridae (5.82%), Anguillidae (4.07%), Gobiidae (3.49%), Anabaenidae (2.91%), Aplocheilidae (2.33%), Cichlidae (1.74%), and Clariidae (1.16%) in percentage terms. 16 species, 82 individuals, 1.02 Shannon Wieners index, 0.092 Simpson's dominance index, and 0.91 Simpson's diversity index.

Keywords: Ichthyofaunal Diversity, Ghunghutta Dam

Introductions

The Western Ghats and the Eastern Himalayas, two of the world's top eight most significant biodiversity hotspots, are located in India, one of the countries with 12-mega biodiversity regions. It also boasts a wide variety of freshwater fish in rivers, irrigation canals, tanks, lakes, and reservoirs. The constant stress caused by anthropogenic activity is primarily eroding this diversity on a daily basis. This diversity not only adds to India's and the world's wealth, but it also has significant effects on the fishery. The nation is endowed with a wide range of resources, including a rich biodiversity and river biological legacy. There are many different freshwater fishery locations, including rivers and canals totaling 45,000 kilometres, ponds and tanks covering 2.36 million hectares, and reservoirs covering 2.05 million kilometres (Ayappan and Birdar, 2004). Jenkins (2003) claims that during the past 30 years, freshwater biodiversity has decreased more quickly than marine or terrestrial biodiversity. Thus, the goal of the current study was to evaluate Ichthyofaunal Diversity in Ghunghutta Dam of Chhattisgarh's Suguja District.

Material and Methods

The study was conducted in Ghunghutta dam in the Surguja region in Chhattisgarh, India. North of Chhattisgarh in India, in the Surguja region (220 94N latitude, 830 164E longitude), is where the Ghunghutta dam is situated. The Ghunghutta irrigation project, which spans the Ghunghutta River in the Rehar Sub basin Sone River in the Ganga Basin, was constructed in 2002. The dam is located 14 kilometers from Ambikapur's provincial head's quarters. Water from the dam is used for agriculture, aquaculture, and other domestic uses. The Ghunghutta, a tributary of the dam that is near to agricultural land and a source of electricity, is 242.20 metres long and 31.50 metres high. From December 2020 to November 2021, the water quality of the Ghungutta dam was assessed.

Data Collection

Between December 2020 and November 2021, local fishermen used various types of nets to help sample fish at five sampling locations. Since formalin causes the fish to lose their colour, photos were taken before they were preserved. Depending on the size of the species, fish that were brought to the lab were preserved in this solution in separate jars. Larger fish required an abdominal incision before being fixed, but smaller fish were simply dropped into the formalin solution.

The fish were labelled with serial numbers, the precise location of the collection, the date of the collection, and the regional name of the species. Fish identification was done by referring to Talwar and Jhingran (1991).

Between 8 and 9 am, water samples were obtained, and they were immediately taken to the lab for additional testing. Mercury thermometers were used to measure the water's temperature at the time of sample, and conventional pH metres were used to determine the pH. The American Public Health Association's (APHA, 1992) recommended methods were used in the laboratory to examine additional parameters.

Diverse indices, like the Shannon-Weiner Index (H) (1963), the Simpson Dominance Index (D), and the Simpson Index of Diversity (ID), were used to analyse the diversity of fish (1949).

The formula used to determine the Shannon-Weiner index was H = pi log 2Pi, where H represents the Shannon-Weiner index. Pi = ni /N

ni = Number of each species' individuals in the sample.

N stands for the total number of samples across all species.

The total number of fishes present at all locations was used to calculate the fish population's abundance. The diversity of fish species in five distinct sites served as a simple proxy for estimating species richness. Both primary (direct observations and interactions with neighborhood stakeholders and fishermen) and secondary sources were used to gather information about the challenges facing the fish species.

Indicators of Simpson's Diversity: A measurement of diversity is the Simpson's Diversity Index. It is frequently done in ecology to estimate how diverse an environment is. It considers both the total number of species and the relative abundance of each species.

The following formula was used to calculate Simpson's index of dominance:

$$D = \Sigma \frac{ni(ni-1)}{N(N-1)}$$

where ni is the total population of a specific species. N is the total population of all species.

Simpson's variety index: 1 =D

Discussion

Tables 1, 2, and Fig. 1 include details on the numerous fish species that were caught in the system. The Table shows that a total of 82 fish species from 8 distinct families were found. Cyprinidae had the highest species richness (57 species) among the different families, followed by Channidae (6 species) and Bagridae (5 species). Only one fish species was present for each of the other families. Cyprinidae made up 62.28% of all fish species, followed by Channidae (9.88%), Siluridae (6.98%), Bagridae (5.82%), Anguillidae (4.07%), Gobiidae (3.49%), Anabaenidae (2.91%), Aplocheilidae (2.33%), Cichlidae (1.74%), and Clariidae (1.16%) in percentage terms. A family comparison shows that the most numerous species in the Cyprinidae family was *Catla catla*, followed by *Cirrhinus mrigala*, while the most numerous species in the Channidae family was Channa striatus, and the most numerous species in the Bagridae family was *Mystus carasius*. According to published research, both biotic and abiotic variables are significant contributors to fish diversity in freshwater ecosystems. While Sharma and Gupta (1994) showed that the optimal temperature for fish growth was between 14.5 and 38.6 C, Sivakami et al. (2014) reported that pH and dissolved oxygen are significant habitat variables which can be associated to fish diversity. The water temperature in the current study was found to vary between 22 and 30 C, which appears to be favorable for fish growth.

Jhingran proposed that a pH of 7 to 9 units was optimal for fish growth. The pH ranged from 7 to 8.8, which is favorable for fish growth, in the current study as well. According to Welch (1952), waters should have a DO level of at least 5 mg/l in order to be conducive to fish culture, and levels of less than 3 mg/l should be considered dangerous to lethal under normal circumstances. Examining the DO levels in the current investigation showed that they were consistently higher than 3 mg/l. According to Prasad et al. (2009) and Dhurvey and Kashyap (2019), higher BOD values may lower DO levels and have an impact on fish productivity.

A review of the literature reveals that Saket and Pandey (2019) reported maximum diversity to occur in Cyprinidae followed by Clariidae when analysing the fish diversity in Bansagar Pond, while Shukla and Pandey (2019) reported maximum diversity to occur in Cyprinidae followed by Channidae, Anabantidae, and Bagridae. These outcomes line up with the most recent observations.

Table 1: Ichthyofaunal Diversity of Gunghutta Dam during Dec. 2020 to Nov2021

S. No.	**Family**		**Fishes**	**No. of Individual**	**%age**
1.	Cyprinidae	1.	*Catla catla*	21	25.61
		2.	*Cirrhinus mrigala*	12	14.34
		3.	*Cirrhinus reba*	7	8.54
		4.	*Ctenopharyngodon idella*	6	7.32
		5.	*Cyprinus carpio*	5	6.09
		6.	*Labeo rohita*	6	7.32
2.	Bagridae	7.	*Mystus carasius*	3	3.66
		8.	*Mystus vittatus*	2	2.44
3.	Channidae	9.	*Channa punctatus*	2	2.44
		10.	*Channa striatus*	1	1.22
		11.	*Notopterus notopterus*	3	3.66
4.	Siluridae	12.	*Ompok bimaculatus*	3	3.66

5.	Anabantidae	13.	*Anabas testudineus*	4	4.89
6.	Anguillidae	14.	*Anguilla bengalensis*	2	2.44
7.	Aplocheilidae	15.	*Aplocheilus lineatus*	2	2.44
8.	Clariidae	16.	*Clarias batrachus*	3	3.66
				82	100

Table 2: Fish Diversity Indices

Species richness	16
Abundance number	82
Shannon Wieners Index	1.02
Simpson's dominance index	0.092
Simpson's diversity index	0.91

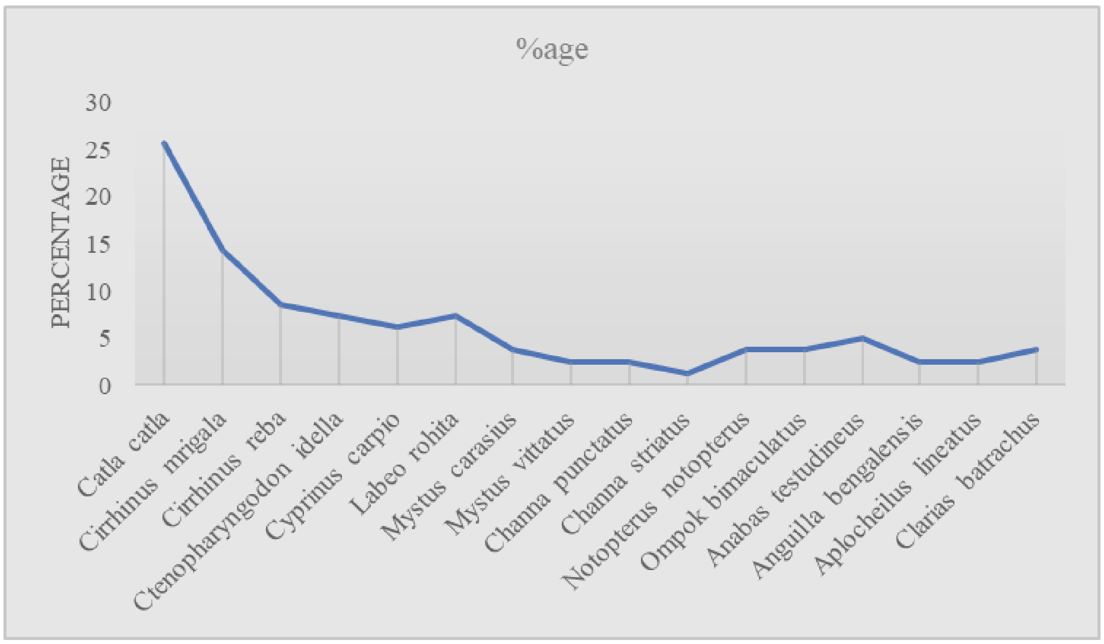

Fig 1: Graph analysis of fish population in family wise at Ghunghuttadam during Dec. 2020 to Dec. 2021.

Acknowledgement

We are thankful to fishermen who helped me in various ways during study period. We would also like to acknowledge the support extended by the higher Authorities of Kalinga University during the research work.

References

1. Ayappan S, Birdar S R. Enhancing Global Competition, Survey of Indian Agriculture (The Hindu) 2004, 98.
2. Jenkins, M., Prospects for Biodiversity. Science 2003; 302:1175-1177.
3. Talwar P K, Jhingran V G. Inland Fishes of India and Adjacent Countries. Oxford and IBH Publishing Co., New Delhi 1991;1-2:116.
4. APHA Standard methods for the examination of water and wastewater. American Public Health Association, Washington, USA 1992.

5. Sivakami R, Sirajunisa V, Abdul Kader K, Prem Kishore G. Fish Diversity and its Conservation in Uyyakkondan Channel, Tiruchirappalli District, Tamil Nadu. Inter. J. Zoo. Research 2014.

6. Sharma L L, Gupta M C. Some aspects of limnology of Awarchand reservoir, Rajasthan. Physical Parameters, *Poll. Res* 1994; 13:16-179.

7. Welch P S. Limnological Methods. McGraw-Hill Book Co. Inc., New Delhi 1952, 280.

8. Prasad D, Venkataramana G V, Thomas M. Fish diversity and its conservation in major wetlands of Mysore. Journal of Environmental Biology 2009; 30:713-718.

9. Dhurvey Seema, Kashyap, Vinita R. Physico-chemical and fish diversity of Matiyari dam in Mandla district (M.P.), International Journal of Zoology Studies 2019;4(2):57-59.

10. Shukla Minakshi, Pandey Umesh. Analysis of fish productivity of Govindgarh Lake, Rewa (M.P.), International Journal of Zoology Studies 2019;4(5):58- 61.

11. Saket Sheela, Pandey Umesh. Studies on the pathogenicity of selected major Carps at Bansagar colony pond, Rewa (M.P.), International Journal of Zoology Studies 2019;4(6):31-33.