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Post-Monsoon Ichthyofaunal Diversity of the Upper Stretch of Narmada River, Madhya Pradesh

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ABSTRACT: The Narmada River is a holy river that is home to a variety of micro- and macroorganisms, including Ichyofauna. It is regarded as the fifth largest river in India and is a west-flowing river. It is also known as the lifeline of M.P., covering approximately 88% of M.P. alone. For the Ichyofaunal diversity in the upper stretch of the Narmada, a total of eight sites have been covered from its origin, and fifty Itchyo species have been observed from various sections of the Narmada River, belonging to 33 genera, 16 families, and six orders. The physicochemical properties of the Narmada River have been reported to fluctuate with the standard value and limitations as proposed by WHO and BIS (Bureo of Indian Standard). The order Cypriniformes (major and minor carps) dominated the major group of fishes, followed by Siluniformes and Atheriniformes. The order clupeiformes has a lower abundance of Ichyofauna. The main challenge of the study was the collection and identification it was rectified with the help of a faunal expert present in the Zoological Survey of India. This is the study made an around the Amarkantak area, this study will enhance the diversity of the city.

Keywords: Narmada, Ichthyofaunal diversity, Post Monsoon, Physico-chemical properties.

INTRODUCTION

The rest of the ichthyofauna is found in other parts of the world (Talwar and Jhingram 1991). M.P. is located in the center of the India map and receives roughly six reverse rivers: the Namely Ganga, Narmada, Mahi, Godavari, Mahanadi, and Tapti. Fish have been documented as a good protein source and a stable diet (Day, 1878; Datta and Shrivastava 1988; Sharma, 2007; Paunikar *et al.,* 2012; Khedkar *et al.,* 2014; Bhawsar *et al.,* 2015; Vishwakarma and Vyas 2016; Raina *et al.,* 2016; Kumar *et al.,* 2017; Shukla and Bhat 2017; Bhakta *et al.,* 2018; Froese and Pauly 2019; Gujjar *et al.,* 2020; Sharma *et al.,* 2021) Fish fauna is essential to interpret the status of fish species and also assist in future planning to improve and conserve biodiversity (Myers *et al.,* 2000; Lakra *et al.*, 2007; Bose *et al.,* 2013; Rani and Behara 2023) river Narmada is the largest river in MP and flows through the west. It started its started way the Maikal mountain close to Amarkantak which is situated in the Anuppur district of Madhya Pradesh (three rivers Narmada, Tapti, and Mahi) in peninsular India runs from east to west and Narmada is one of them. The river Narmada covers three states *viz.,* Madhya Pradesh (1077 km) MH (74 km) Gujarat (74 km) the present study has been undertaken to record ichthyofaunal diversity in the upper stretch of Narmada during the post-monsoon season, from September to October 2022.

MATERIAL AND METHODS

Fish species distributed along the river Narmada, several ponds, and Reservoirs of Narmada River, Madhya Pradesh state are presented in this paper. The checklist was prepared by taking previous publications and by collecting fish species by the net trap method; species were categorized into their current status list. Ichthyofaunal diversity status is a criterion according to the IUCN, 1994 and Molar and Worker, 1998. Under the biological parameters, only the Ichthyofauna diversity of the upper stretch of the Narmada River has been examined. A sample of ichthyofauna will be collected adjacent to fish landing sites and photographed for documentation. Ichthyofauna has been collected from the selected sites by fish-catching devices.

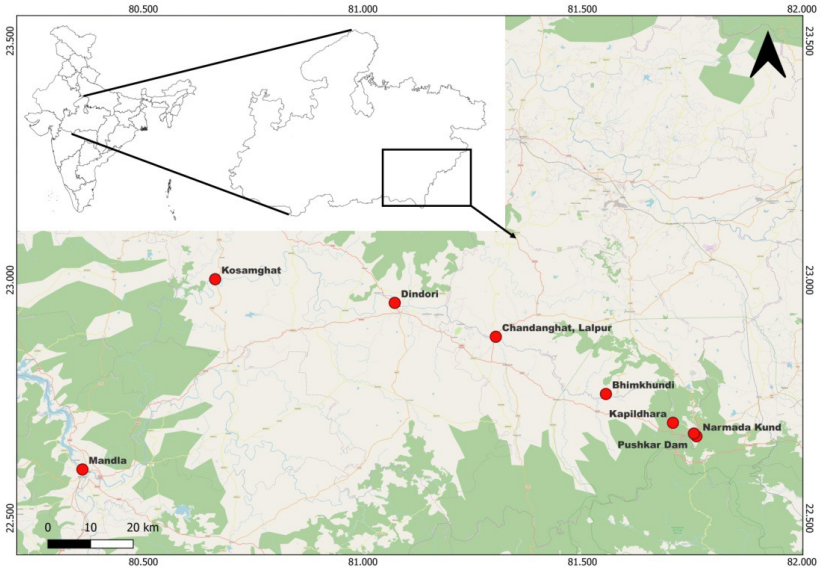

Fig. 1. Study site map.

Study Area and Sampling Sites

Location of Sampling Sites. River Narmada supports a wide variety of living organisms that inhabit different stretches of the river depending upon the ecological conditions. Narmada, a west-flowing river, is the fifth largest and one of the most sacred rivers in India. Narmada is also known as the Lifeline of Madhya Pradesh. The major part of the Narmada River (88%) flows in this state. It originates from Amarkantak of eastern M.P. It flows westwards over a length of 1,312 km before draining through the Gulf of Cambay (Khambhat) into the Arabian Sea in Gujarat (NVDA, 2014).

Description and Location of Sampling Sites. All eight (8) sampling sites have been selected to cover a 208 km long river path (length) from Amarkantak to Mandla, from where samples will be collected. The details of the location of sampling sites are given in Fig. 1 and 2.

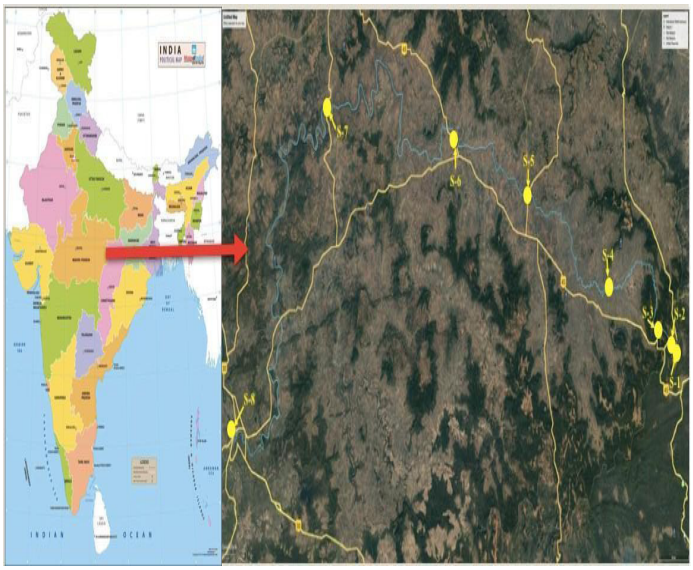

Fig. 2. Location of sampling sites in the Study Area.

S1- Narmada Kund,
S2- Pushkar Dam (Distance from Site 1 - 0.7 km),
S3- Kapildhara (Distance from Site 2 - 6.5 km),
S4- Bhimkhundi (Distance from Site 3 - 31 km),
S5- Chandanghat, Lalpur (Distance from Site 4 - 41 km),
S6- Dindori (Distance from Site 5 - 33 km),
S7- Kosamghat (Distance from Site 6 - 56 km),
S8- Mandla (Distance from Site 7 - 78 km)

RESULT AND DISCUSSION

The present study includes 50 fish species belonging to 33 genera, 16 families, and 6 orders from an upper stretch of the Narmada River. Some fishes are still not evaluated and data deficient. as per (Table 1, Fig. 3) Family Cyperidae shows the highest abundance. Fig. 4 shows site wise abundance of species. While Fig. 5 reflecting number of species and their local status in the

study area. Earlier work on Narmada River fishes was done by (Rao *et al.*, 1991) 45 genera, 20 families, and 6 orders; (Singh, 2009) 79 species; (Das *et al.,* 2013) reported 90 fish species; (Khedkar *et al.*, 2014) 83 species based on DNA recombination technology. (Bhakta *et al.*, 2018) 85 species; Scientists of CIFRI in 2020 describe 79 species belonging to 13 orders, 3 families, and 66 genera; (Bhakta *et al*., 2020) and 196 species belonging to 14 orders, 51 families, and 126 genera. Das *et al*. (2021) gave a review of the Ichthyofaunal diversity of the Narmada River.

The present study will encompass the Limnological characteristics and diversity of Ichthyofauna and their site-wise distribution in the upper stretch of the Narmada River. The study will help in relating the current trophic status of the Narmada River (Upper stretch) from Amarkantak to Mandla.

Table 1.

	Cohart: Archaeophylaces	Common Name	Status	Distribution site-wise
	Superorder: Osteoglossomorpha			
	Order: Osteoglossiformes			
	Family: Notopteridae			
1.	*Notopterus notopterus* (Pallas,1769)	Feather Back	UC	8
	Cohart: Euteleostei			
	Superorder: Ostariophysi			
	Order: Cypriniformes			
	Family: Cyprinidae			
2.	*Chela* (*Chela*) *cachius* (Hamilton, 1822)	Chela	VC	1,2, 4, 6,7,8
3.	*Chela* (*Chela*) *laubuca* (Hamilton, 1822)	Winged Rasbora	C	3,8,6
4.	*Salmostoma bacaila* (Hamilton, 1822)	Chalar	UC	3,6
5.	*Esomus danricus* (Hamilton, 1822)	Flying Barb	C	7
6.	*Danio devario* (Hamilton, 1822)	Danio	VC	1, 2, 3, 4,6,7,8
7.	*Danio rerio* (Hamilton, 1822)		C	1, 3, 6
8.	*Rasbora daniconius daniconius* (Hamilton, 1822)	Common Rasbora	VC	1, 2, 4,6,7,8
9.	*Rasbora rasbora* (Hamilton,1822)		C	2, 5, 7
10.	*Aspidopariya jaya* (Hamilton,1822)		C	1, 6, 8
11.	*Barilius bendelisis bendelisis* (Hamilton, 1822)		C	2, 4, 6
12.	*Puntius amphibius* (Valenciennes, 1842)	Scarlet Banded Barb	C	3,5,8
13.	*Puntius chola* (Hamilton, 1822)	Green Barb	C	1,3,7
14.	*Pethia conchonius* (Hamilton, 1822)	Stigma Barb	C	1,5,7
15.	*Puntius punjabensis* (Day, 1871)		VC	1,2, 4,5,7,8
16.	*Puntius sarana sarana* (Hamilton, 1822)	Olive Carp	C	
17.	*Puntius sophore* (Hamilton, 1822)	Stigma Barb	VC	1,3, 4,6,7,8
18.	*Pethia ticto* (Hamilton, 1822)	Fire Fin Barb	C	1,3,7
19.	*Labeo bata* (Hamilton, 1822)	Bata	UC	5
20.	*Labeo calbasu* (Hamilton, 1822)	Orange Fin Labeo	UC	4
21.	*Labeo gonius* (Hamilton, 1822)	Kursa	UC	3
22.	*Labeo rohita* (Hamilton, 1822)	Rohu	C	
23.	*Tor putitora* (Hamilton, 1822)	Mahur	UC	4
24.	*Cirrhinus mrigala* (Hamilton, 1822)	Mrigal	C	
25.	*Cirrhinus reba* (Hamilton, 1822)	Reba	UC	6
26.	*Catla catla* (Hamilton, 1822)	Catla	C	3,5,8
27.	*Garra lamta* (Hamilton, 1822)	Stone Sucker	C	2,3,7
28.	*Garra mullya* (Sykes, 1839)	Stone Sucker	C	3,5,6
	Family: Homalopteridae			
29.	*Noemacheilus denisoni dayi* Hora (day,1867)		UC	7
	Family: Cobitidae			
30.	*Lepidocephalichthys guntea* (Hamilton, 1822)	Loach	C	1,5,8
	Order: Siluriformes			
	Family: Bagridae			
31.	*Rita kuturnee* (Sykes, 1839		C	2,4,6
32.	*Mystus bleekeri* (Day, 1877)		C	3,5,8
33.	*Mystus montanus* (Jerdon, 1849)		VC	1,2, 4,6,7,8
34.	*Mystus vittatus* (Bloch, 1794)	Striped Dwarf Cat Fish	UC	8
	Family: Siluridae			
35.	*Ompok bimaculatus* (Bloch, 1794)	Butter Cat Fish	C	2,4,6
36.	*Wallago attu* (Schneider, 1801)	Freshwater Shark	UC	8
	Family: Schilbeidae			
37.	*Pseudeutropius atherinoides* (Bloch, 1794)		C	1,3,7
	Family: Sisoridae			
38.	*Bagarius bagarius* (Hamilton, 1822)	Bagarius	UC	5
	Family: Claridae			
39.	*Clarias batrachus* (Linn, 1758)	Air Breathing Cat Fish	UC	3
	Family: Heteropneustidae			
40.	*Heteropneustes fossilis* (Bloch, 1794)	Stinging Cat Fish	C	5,6,8
	Superorder: Atherinomorpha			
	Order: Atheriniformes			
	Family: Belonidae			

41.	*Xenentodon cancila* (Hamilton, 1822)	Freshwater Garfish	C	2,3,7,8
	Order: Channiformes			
	Family: Channidae			
42.	*Channa marulius* (Hamilton, 1822)	Giant Snake-head Murrel	C	5,4,6
43.	*Channa orientalis* (Schneider, 1801)	Brown Snake-head Murrel	C	3,5,8
44.	*Channa punctatus* (Bloch, 1794)	Green Snake-head Murrel	C	4,7,8
45.	*Channa striatus* (Bloch, 1794)	Striped Snake-head Murrel	UC	2
	Order: Perciformes			
	Family: Chandidae			
46.	*Chanda nama* (Hamilton,1822)	Indian Glass Fish	C	2,4,6
	Family: Cichlidae			
47.	*Oreochromis mossambica* (Peters,1852)		C	3,7,8
	Family: Gobiidae			
48.	*Glossogobius giuris giuris* (Hamilton,1822)	Bar-eyed Goby	C	4,5,8
	Order: Mastacembeliformes			
	Family: Mastacembelidae			
49.	*Mastacembelus armatus armatus* (Lacepd,1800)	Spiny Eel	UC	5
50.	*Mastacembelus pancalus* (Hamilton,1822)	Spiny Eel	UC	7

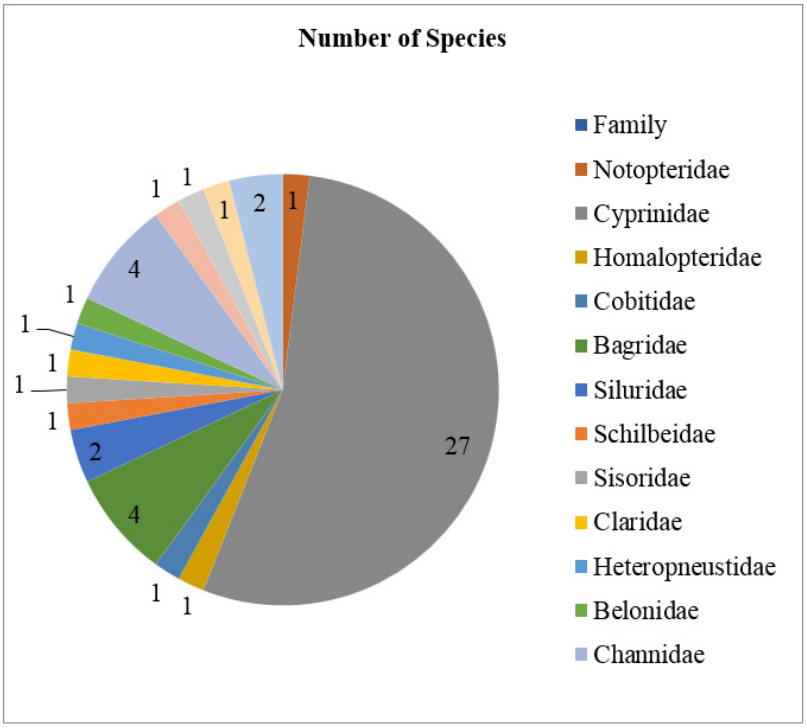

Fig. 3. Shows the numbers of species from the respective family.

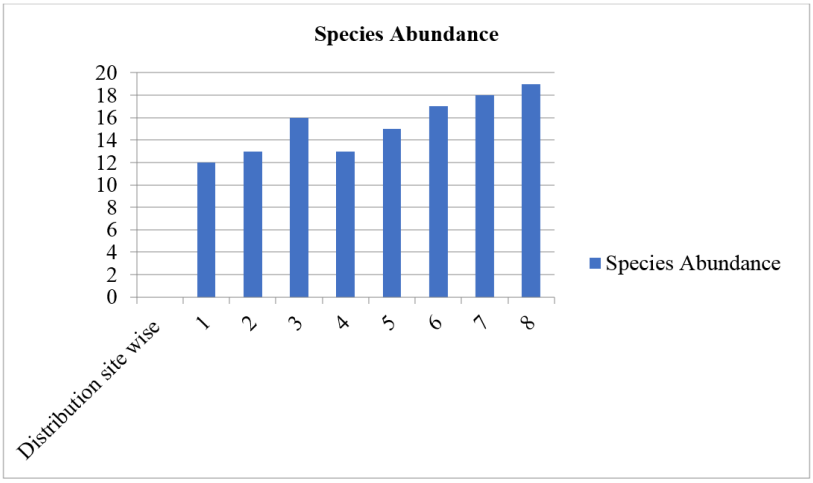

Fig. 4. Showing site wise species richness site-wise.

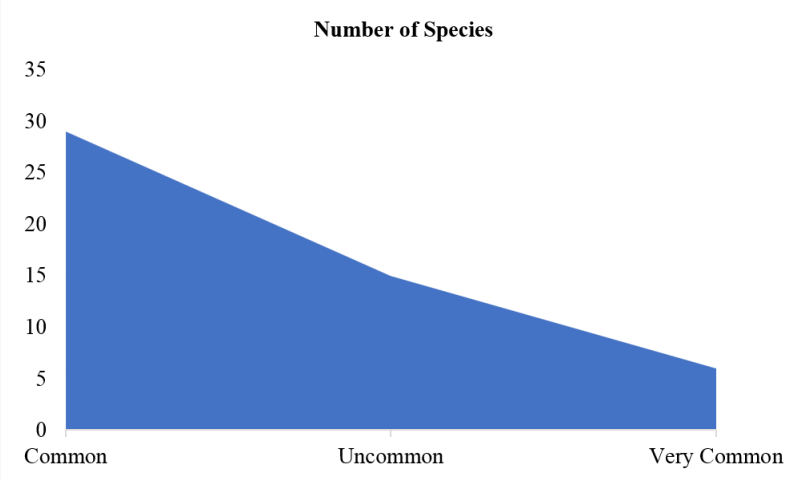

Fig. 5. Number of species and their local status in the study area.

LIMNOLOGICAL DATA

A healthy life requires access to fresh water. River water is utilized for several things, including irrigation, bathing, and drinking. Sewage disposal, industrial waste, and human activities all degrade the quality of the river water, polluting this natural resource. To monitor the river's water quality, numerous physicochemical characteristics must be analyzed. The proposed study was conducted between January 2022 and July 2022 at 8 chosen sites to count the various physicochemical characteristics of the Narmada River. Seasonally, water samples from the sampling location were collected to analyze the various physicochemical parameters, including temperature, pH, TDS, conductivity, DO, sulfate, phosphate, nitrate, and heavy metals. Most of the physicochemical properties of the Narmada water samples, according to the findings, were within WHO guidelines.

Research into the physicochemical properties of River Narmada water shows that different metrics rely on the hydrochemistry of the research region. Water quality is greatly influenced by physical elements including temperature, pH, and turbidity. Water quality maintenance also heavily relies on lighting intensity and water level. Changes in pH values have been made in aquatic solutions to improve water quality. The pH of water is directly tied to the carbonate and bicarbonate ions that are present in it. It is also tightly related to CO_2 pressure and the ionic strength of the solution. The results of the current investigation are summarized in a table. The results of the physicochemical characteristics acquired during the ongoing investigation were discovered to vary from the standard values of water quality provided by the World Health Organization, BIS (Bureau of Indian Standards), to classify the locations according to their pollution load.

CONCLUSIONS

The findings in the upper stretch of the Narmada reveal the maximum abundance of major and minor carps belonging to the order cyprinoformes and less abundance of fishes belonging to the order clupiformes and family Notopteridae, which contain featherback. The main objective of this research is to enrich the faunal diversity of Amarkantak. Overall, 50 species under the 33 genera belonging to 16 families were added to this study. Earlier this type of research was carried out by Johnson *et al.* (2012) in Ken River.

Conflict of Interest. None.

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