

## Research Article

# An evaluation of the fish population dynamics at Akkalpada dam in the Dhule location of Maharashtra over several seasons

\*<sup>1</sup>Swapnil A. Patil and <sup>2</sup>Pramod N. Mahale

<sup>1,2</sup>Department of Zoology, S.V. P. S's, L. K. Dr. P.R. Ghogrey Science College, Dhule, Maharashtra, India

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## ABSTRACT

Purpose of current research were investigated that the diversity of ichthyofauna from the Akkalpada dam. The investigation of fish diversity from July 2021 to June 2022 served as the foundation for the assessment. In all, Twentyone fish species from six family and five order discovered in the dam throughout the research period. With eleventh species, the order Cypriniformes dominated, followed by Synbranchiformes (two species), Channiformis (three species), Siluriformes (four species) and Osteoglassiformes (one species). By computing the different diversity indices, such as the Shannon-Wiener diversity index (H), Pielou's evenness Index (J), Simpson's diversity index (1-D) and Simpson's dominance index (D) of fish diversity was evaluated.

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## Introduction

Inland fisheries have received a lot of attention in recent years as a means of providing food for India's expanding population. Fish are the most noticeable members of the aquatic fauna found in inland areas and are a very valuable source of natural proteins. Because they are a staple meal in many people's diets, fish play a significant role in the economies of many countries. Similar to zooplankton species, fish variety is a useful bioindicator of water quality and may be used as a biological instrument for biomonitoring and determining the tropic state of water bodies was investigated Kawade and Pandarkar in 2015. The physicochemical and biotic elements of an aquatic environment have a direct impact on the variety of plants and animals found in water bodies were studied by Borane, 2015. The only major vertebrate group that has had an impact on human culture since ancient times is the fish. An important method for improving fish output is the research of fish variety in reservoirs, which is employed in fish farming. Numerous researchers have already made contributions in the area of fish variety in various freshwater bodies (Sharma and Nayak, 2001; Pawar and Pandarkar, 2010; Srivastava et al., 2008; Soni et al., 2008; Khedkar, 2005; Pawar et al., 2011 and Rao et al., 1998).

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\* Corresponding author.

E-mail address: [sapati1986@gmail.com](mailto:sapati1986@gmail.com) (Swapnil A. Patil)

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When it comes to freshwater biodiversity, India is ranked ninth in the world. Worldwide, there are around 478 families of freshwater fish; of the 2657 fish species found in India, 1647 are marine and 978 are freshwater (Ubarhande et al., 2011 and Das BK, et al., 2014). The research will focus on the freshwater body of Akkalpada Dam, where frequent fishing is conducted and numerous kinds of edible fish are found. Through scientific management, there is a great deal of potential to increase inland fish output in this body of water. To far, there has been no further effort to investigate the fish variety from this Panzara River dam.

## Material and method

### Study area

About 35 km west of Dhule city lies the Akkalpada Dam, which is situated at 20°05' 22" N latitude and 74°0 27' 22"E longitude. River water is primarily used for agriculture, fishing, and the provision of drinking water to Dhule City and the surrounding communities. Local fishermen also harvested fish throughout the year.

### Sample collection

Local fishermen provided the fish, which were then photographed using a Nikon camera and stored in 4% formalin before being delivered to the lab. Each specimen had a label attached with the serial number, the precise location, the date, and the time of collection. Local fishermen utilised casting nets to harvest fish from the water of the Akkalpada Dam between July 2017 and June 2018. Using standard identification keys for fish (Day, 1978, Jayaraman, 1981; Talwar and Jhingran, 1991 and Jhingran, 1991) information gathered from extended cooperation; local researchers and local fishermen in western region office, Zoological survey of India, Pune were used to characterize and identify each fish specimen with its family, class, subclass, genus and species. Shannon-Weiner index was a popular diversity metric that combines species richness with equitability. Another significant indicator that is often used for tracking water quality is the Simpson Diversity Index. The total number of species, total number of individuals in a sample, and total number of individuals of a species were calculated for the purpose of determining diversity indices. The following formulas were used to calculate the Pielou's evenness index (J); Simpson's dominance index (D); Shannon-Weiner index (H) and Simpson's index of diversity (1-D) using this data.

#### 1. The Weiner-Shannon Index (H)

It is dependent upon the quantity of each species as well as the total number of species present  
H is equal to  $-\sum P_i (\ln P_i)$ , where  $P_i$  is the percentage of each

$P_i$  is equal to  $A_i/T$ , where  $T$  is the total number of individuals species in sample

$A_i$  is the number of each species in sample

#### 2. The following formulas are used to calculate Simpson's dominance index (D)

D is equal to  $(n_1 - 1) + (n_2 - 1) + \dots + (n_{20} - 1) / N(N - 1)$

N is represents the overall number of individuals across all species

n is represents the total number of individuals in a certain species

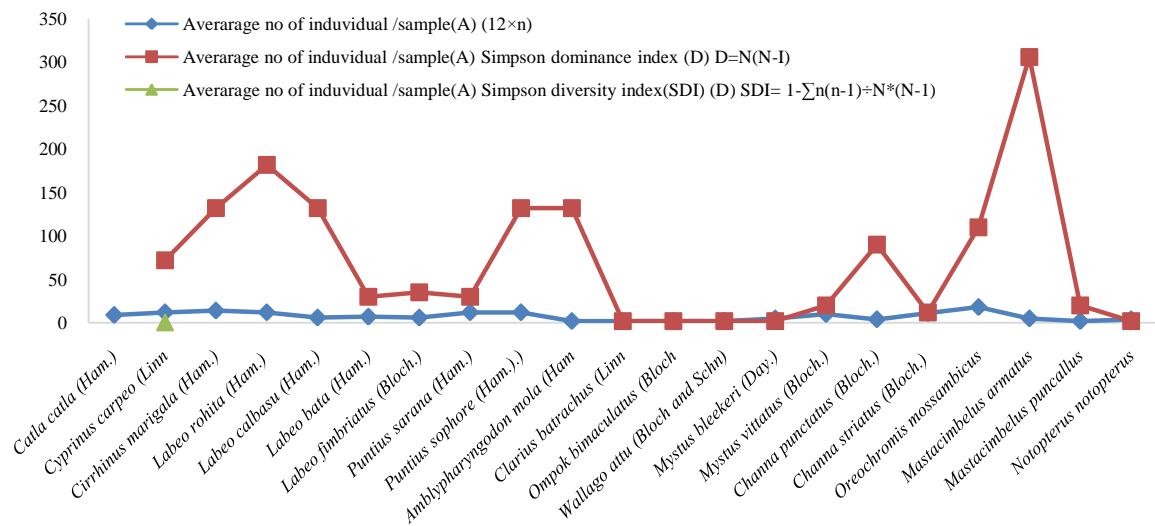
DH is the Simpson's index of diversity

**Table- 1)** Fish feeding patterns, relative abundance and species distribution in the Akkalpada dam

Order	Family	Species	Occurrence	No. of Species Specimens
Cypriniformes	Cyprinidae	<i>Catla catla</i> (Ham.)	+++	<b>09</b>
		<i>Cyprinus carpio</i> (Linn.)	++++	<b>12</b>
		<i>Cirrhinus marigala</i> (Ham.)	++++	<b>14</b>
		<i>Labeo rohita</i> (Ham.)	+++	<b>12</b>
		<i>Labeo calbasu</i> (Ham.)	++	<b>06</b>
		<i>Labeo bata</i> (Ham.)	+++	<b>07</b>
		<i>Labeo fimbriatus</i> (Bloch.)	++	<b>06</b>
		<i>Puntius sarana</i> (Ham.)	+++	<b>12</b>
		<i>Puntius sophore</i> (Ham.)	+++	<b>12</b>
	Claridae	<i>Amblypharyngodon mola</i> , (Ham.)	+	<b>02</b>
		<i>Clarias batrachus</i> (Linn.)	+	<b>02</b>

Siluriformes	Siluridae	<i>Ompokbi maculates</i> (Bloch)	+	<b>02</b>
		<i>Wallago attu</i> (Bloch & Schn)	+	<b>02</b>
		<i>Mystus bleekeri</i> (Day.)	++	<b>05</b>
		<i>Mystus vittatus</i> (Bloch.)	++++	<b>10</b>
Channiformis/Channidae/	Channidae	<i>Channa punctatus</i> (Bloch.)	++	<b>04</b>
		<i>Channa striatus</i> (Bloch.)	+++	<b>11</b>
		<i>Oreochromis mossambicus</i> (T)	++++	<b>18</b>
Synbranchiformes	Mastacembalidae	<i>Mastacembelus armatus</i>	++	<b>05</b>
		<i>Mastacembelus punctatus</i>	+	<b>02</b>
Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>	++	<b>04</b>

(Abundantly found ++++; less abundantly found +++; moderately found ++ and rarely found +)



**Figure-1)** Shows the species diversity index, index average and Simpson dominance from Akkalpada dam

**Table- 2)** Table shows diversity indices of fishes at Akkalpada dam

Sr. No	Name of fish	Average no of individual /sample	Total no. of species (T)	Shannon weiner index (H)	Simpson dominance index (D)	Simpson diversity index
1	<i>Catla catla</i> (Ham.)	09	21 (n)	0.428	72	0.594
2	<i>Cyprinus carpio</i> (Linn.)	12		0.571	132	
3	<i>Cirrhinus marigala</i> (Ham.)	14		0.666	182	
4	<i>Labeo rohita</i> (Ham.)	12		0.571	132	
5	<i>Labeo calbasu</i> (Ham.)	06		0.284	30	
6	<i>Labeo bata</i> (Ham.)	07		0.333	35	
7	<i>Labeo fimbriatus</i> (Bloch.)	06		0.284	30	
8	<i>Puntius sarana</i> (Ham.)	12		0.571	132	
9	<i>Puntius sophore</i> (Ham.)	12		0.571	132	
10	<i>Amblypharyngodon mola</i> , (Ham.)	02		0.095	02	
11	<i>Clarias batrachus</i> (Linn.)	02		0.095	02	
12	<i>Ompokbi maculates</i> (Bloch)	02		0.095	02	
13	<i>Wallago attu</i> (Bloch & Schn)	02		0.095	02	
14	<i>Mystus bleekeri</i> (Day.)	05		0.238	20	
15	<i>Mystus vittatus</i> (Bloch.)	10		0.476	90	
16	<i>Channa punctatus</i> (Bloch.)	04		0.190	12	
17	<i>Channa striatus</i> (Bloch.)	11		0.523	110	

18	<i>Oreochromis mossambicus</i> (T)	18		0857	306	
19	<i>Mastacembelus armatus</i>	05		0.238	20	
20	<i>Mastacembelus punctatus</i>	02		0.095	02	
21	<i>Notopterus notopterus</i>	04		0.190	12	
<b>Total</b>		157(N)		7.476	1457	

### Result and Discussion

Diverse fish species were seen at the Akkalpada Dam in the Maharashtra district of Dhule during the current research. Throughout the research period, fish from 14 genera, 6 families, and 5 orders were gathered. Numerous fish are valuable economically and are sold at the neighbourhood fish market after being collected. The Akkalpada dam yielded twentyone species of fish between July 17 and June 18, 2018, which are representative of fourteen genera, six families, and five orders. Based on the study's findings, the order Cypriniformes had the most member elevength followed by the order Siluriformes, which had four species, the order Synbranchiformes, which had two species, the order Catniformis, which had two species, and the order Osteoglossiformes, which had one species. The Cyprinidae family of fish is dominated, based on the previously described studies. Kadam and Gaikwad, 2006; Khedkar, 2005; Mishra and Gupta, 2007; Ahirrao and Mane, 2000 and Shrikant et al., 2009 are a few examples of freshwater bodies where the dominance of fish species from the Cyprinidae family has been documented by Rankhamb S.V. in 2011. Various researchers as Khodake et al., (2014); Pandarkar et al., (2014), Jaybhaye et al., (2013), Kharate et al., (2012); Mishra et al., (2012), Jaiswal and Ahirrao, 2012 and Ubharhande and Sonwane, 2012 there are 28 different species of fish in the current research, indicating a good variety of fish and the river's acceptable water quality, making the Akkalpada Dam an ideal location for fish to reproduce. According to their relative abundance, the fish species that were gathered (Table- 1) were likewise divided into three categories: abundant, moderate, and uncommon. According to their relative abundance, (Table- 2) were likewise divided into three categories: plentiful, moderate, and uncommon. Fish species richness and other diversity metrics are shown in column 4. It is noted that the species abundance in the current research was 1198, with a Shannon-Weiner Index (H) value of 7.624. The measurement of the Simpson's Index of Diversity (1-D) was 0.607, however the report of the Simpson's dominance index (D) was 1627.

### Conclusion

A significant portion of the abundant variety of fish found in Akkalpada Dam may be endangered as a result of human activity. Designing and executing conservation methods to raise fishermen's awareness of fishing, discourage juvenile fishing, offer scientific training, and provide facilities for fishermen may all benefit from fish variety and distribution. These tactics may also result in increased production.

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