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STUDIES ON ICHTHYOFAUNAL DIVERSITY OF NAKANE, SULWADE AND DEDORGAON DAMS OF DHULE DISTRICT (M.S.).

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such as Shannon-Wiener diversity index, Simpson's Dominance index, Simpson's index of diversity and Evenness index etc.

KEY WORD- Ichthyofaunal diversity, Cypriniformes, Siluriformes, Perciformes, Osteoglossiformes, Clupeiformes, Synbranchiformes, Shannon-Wiener index.

ABSTRACT

The present study deals with fish diversity from three different dams viz; Nakane, Sulwade and Dedargaon around Dhule city. It was undertaken during the period January, 2014 to October 2015. The results of investigation reveals among collection of 32 fish specimens belonging to 6 orders 11 family, 16 Genera and 20 species. In which 14, 5 and 13 species were obtained from Nakane, Dedargaon and Sulwade dams respectively. Four species i.e. *Punctius sophore*, *Punctius sarana*, *Garra mullya*, *Labeo buggut* are commonly found at all sites. The order Cypriniformes was dominant with 07 (35%) species followed by order Siluriformes with 6 species (30%), order Perciformes 04 (20%) species, while the order Osteoglossiformes, Clupeiformes and Synbranchiformes was represented by single species respectively. Fish diversity was assessed by calculating the various diversity indices

INTRODUCTION :

Since last two centuries to date various researchers have studied the taxonomy and ichthyofaunal diversity from Maharashtra as well as various states of country. Shinde et al (2009) studied on ichthyofaunal diversity of Harsool Savangi dam, district Aurangabad, Maharashtra. Patole and Patil (2009) reported ichthyofauna of Panzara River (Tah. Sakri) of Dhule district of Maharashtra. Patole and More (2010) reveal biodiversity of fresh water fishes from Sakri- Tahsil (Dist- Dhulia) of Maharashtra. Shaikh et al (2011) worked on the ichthyofaunal diversity of upper Dudhana water reservoir near Somthana in Jalna district, Maharashtra. Rankhamb (2011) studied on ichthyofaunal diversity of Godavari River at Mudgal, district Parbhani. Madhusudan et al (2011) studied on diversity of fish in Gondoor and Nakane lakes in Dhulia (M.S.). Joshi (2012) studies on ichthyofaunal diversity of Buldhana district (M.S.). Jaiswal and Ahirrao (2012) studied on ichthyofaunal diversity of Rangavali dam, Navapur district Nandurbar (M.S.). Ubharhande and Sonawane (2012) worked on study of freshwater fish fauna at Paintakli dam from Buldhana district of Maharashtra. Kharat et al (2012) studied on freshwater fish fauna of Krishna river at Wai, Northwestern Ghats, India. Nagma and Khan (2013) report fish diversity from Bijnor district in western Uttar Pradesh. Kalbande et al (2013) worked on Rawanwadi lake of Bhandara district (M.S.) Sheikh (2014) reports from Pranhita river, Sironcha district Gadchiroli (M.S.) Khodke et al (2014) studied



ichthyofaunal diversity in Jamkhedi reservoir in Dhule district of Maharashtra, India. Patole (2014) reported ichthyofaunal diversity of Nandurbar district (Northwest Khandesh region) of Maharashtra (India). Recently, Patole (2015) noted ichthyofaunal diversity of Tapi River flows through Dhule and Nandurbar districts of Northwest Khandesh (Maharashtra) and very recently, Kawade and Pandarkar (2016) studies diversity indices of fish Heterogeneity of Kalu dam, Ahmednagar, Maharashtra.

In last few decades much attention is being paid to aquaculture as a source of food to the growing population of the country. Fishes constitute the most conspicuous component of inland aquatic fauna and rank very high as a source of proteins. They are one of the important elements in the economy of nation as they have been a staple item in the diet of many people. For sustained exploitation and simultaneous conservation of fisheries resources, basic scientific information on biodiversity is vital (Sone and Malu, 2000; Shendge, 2008; Pawar et al., 2011). Fish diversity is also a good bioindicator of water quality (Madhusudan et al., 2011; Patole, 2014). Fish diversity is declining rapidly each day due to unending anthropogenic stress. This diversity is not only the wealth of our world but it also has some serious implications on fishery (Sakhare, 2001). Thus there is an urgent need for proper investigation and documentation of this fish diversity in order to develop a fresh water fish diversity information system having both bioinformatics and georeferenced databases of fish and fish habitat. Biodiversity is essential for balancing ecosystem and facing varied problems to environment. Nowadays the aquatic ecosystem is adversely affected due to release of wastes in it along with over exploitation, habitat loss, introduction of exotic species and contamination of surface waters by anthropogenic activities that affects and threatened the fish biodiversity.

In present study; Nakane, Sulwade and Dedorgaon dams of Dhule district are selected for ichthyofaunal diversity. Where many edible fish species natively occurred and some are commercially harvested and fishing is done throughout year. There is tremendous scope for enhancing inland fish production by scientific manner. No attempt so far is been made to study fish diversity from these reservoirs. Therefore our main aim is to collect data regarding fish diversity of the dams around Dhule city.

MATERIAL AND METHODS

The fish specimen was collected from above mentioned dams with the help of fishermen during January, 2014 to October 2015. The members of local fishermen were used different types of nets. A photograph of fresh fish was taken with help of digital camera (Sony, DSC-W610). The fishes which were procured from fisherman is brought to the laboratory and immediately preserved in 4% formalin solution and subsequently after 4-8 h fixation and washing with tap water, transferred to 70 % ethanol. The large sized specimen was given incision on belly. The preserved material was send to Western Regional Station, Zoological Survey of India, Akurdi Pune (M.S.) for authentication. The identified fishes and their valid scientific names have incorporated in the present paper.

Study area: Dhule district is North Western part of Maharashtra State. It is formerly known as West Khandesh. Geographically it is located in North-West corner of Maharashtra state, spread between Latitude 20° 38' to 21° 06' N and Longitude 73° 50' to 75° 11' E. The district is bounded by Gujarat and Madhya Pradesh States in the North, by Nasik district in the West and by Jalgaon district in the East. The Nakane dam is located at the 5 km away from the Dhule city. It is major reservoir; which provides 50 % of drinking water to the city. The Sulwade dam is at the 45 km away from the city; which covers 32% area of the city. It constructed on Tapi River at near Sukhwad, Tal- Sindkheda Dist- Dhule (M.S.). The Dedorgaon dam is comparatively small reservoir; it covers 18 % of city area and it is 15 km away from the city.

The diversity indices are calculated from the abundance of the organisms and serve as very good indicator of pollution. One widely used measure of diversity that combines species richness with equitability is the Shannon-Weiner index. Simpson's dominance index is also an important index used widely for water quality monitoring. For determination of diversity indices, total number of species, total number of individuals in a sample and total number of individuals of a species were determined. From these data Shannon- Weiner index (H), Simpson's Dominance index (D), Simpson's index of diversity (1-D) and Pielou's evenness index (J) were determined using following equations.

i. Shannon-Weiner Index (H): It depends on both the number of species present and the abundance of each species.

$$H = \sum P_i (\ln P_i),$$

Where 'P_i' is the proportion of each species.

$$P_i = A/T,$$

Where 'A' is number of each species in the sample, and T is the total number of individuals of all species in the sample.

ii. Simpson's Dominance Index (D): It is determined using the following equation;

$$D = \frac{n_1(n_1-1) + n_2(n_2-1) + n_3(n_3-1) + \dots + n_{20}(n_{20}-1)}{N(N-1)}$$

Where 'n' is the total number of individual of a particular species and 'N' is the total number of individuals of all species.

iii. Simpson's Index of Diversity: 1-D

iv. Pielou's evenness Index (J): $H/\ln(S)$

Where 'H' is the Shannon-Weiner Index and 'S' is the number of species.

RESULTS AND DISCUSSION

The result of present study i.e. fish diversity is shown in table-1. This table also shows order, family, Species and their localities in the form of different collection sites. Viz S1 (Nakane dam), S2 (Dedorgaon) and S3 (Sulwade) dams. We collected total 32 fish specimens, among them 20 species belonging to 16 genera, 11 families and 06 orders. The order wise short list is given below;

Order I. Cypriniformes: It includes 07 species.

a) Family- Cyprinidae

1. *Punctius sophore* (Hamilton), 2. *Salmophasia bacaila* (Hamilton), 3. *Punctius sarana* (Val.), 4. *Cirrhinus reba* (Hamilton), 5. *Garra mullya* (Sykes), 6. *Labeo buggut* (Sykes) and 7. *Labeo calabasu* (Hamilton).

Order II. Siluriformes : It include 06 species

a) Family- Siluridae

8. *Ompak bimaculatus* (Bloch) and 9. *Ompak malabaricus* (Val.)

b) Family -Bagridae

10. *Mystus bleekeri* (Day), 11. *Mystus sp.* And 12. *Sperata aor* (Hamilton)

c) Family -Claridae

13. *Heteropneustes fossilis* (Bloch)

Order III. Perciformes: It include 04 species

a) Family -Ambassidae - 14. *Parambassis sarana* (Hamilton).

b) Family- Chilidae - 15. *Oreochromis mossambica* (Peters)

c) Family -Gobiidae -16. *Glossogobius giuris* (Hamilton)

d) Family- Channidae - 17. *Channa puntus* (Bloch)

Order IV. Osteoglossiformes: It include 01 species

Family- Notopteridae, includes 18. Notopterus notopterus (Pallas)

Order V. Clupeiformes : It include 01. Species

Family–Clupeidae, 19. Tenulosa ilisha (hamilton)

Order VI. Synbranchiformes : It include 01 species

Family–Mastacembelidae, 20. Macrogathus pancalus (Hamilton)

Similar types of work were carried out by earlier workers like Patole and More (2010). They have been studied biodiversity of fresh water fishes from Sakri – Tahsil. They examined 221 specimens, among them 31 species (25 genera's) of 05 orders, also recorded 17 new species. Ubarhande et al. (2011) observed 08 orders, 11 families, 22 genera and 27 species. Madhusudan *et al* (2011) have showed 18 fish species in Gondoor and Nakane lakes where Cyprinidae was dominance over other families. Sakhare (2001) noticed the occurrence of 23 fish species belonging to 7 orders in Jawalgaon reservoir in Solapur district of Maharashtra. Patole (2014) studied ichthyofaunal diversity of Nandurbar district of Maharashtra State; he reported 32 species from 24 genera. Where order Cypriniformes dominate over the other orders. Patole (2015) mentioned ichthyofaunal diversity of tapi river flows through Nandurbar and Dhule district. He reported 32 fish species belonging to 23 genera. He finds similar results i.e. order Cypriniformes where dominance. Kawade and Pandarkar (2016) studied on diversity indices of Kalu dam, Ahmednagar (M.S.). They reports 27 fish species where order Cypriniformes was dominated over other orders.

In present study occurrence of 20 fish species from study area indicates good fish diversity and their production. It might be due to the suitable water quality of the dams that provides proper breeding ground for fish. The observation on Nakane, Dedorgaon and Sulwade dams which were selected for a present study that there is rich diversity of fish. In Nakane dam (45%) it is followed by Sulwade (38%) and Dedorgaon (16%). The fishes belonging to the family Cyprinidae was dominant in all reservoirs.

The diversity indices were presented in table-2. This shows that, in present study species abundance was 607, Shannon-Weiner Index (H) recorded 2.365. The Simpson's Dominance Index (D) was recorded 0.066 and the Simpson's Index of Diversity (1-D) was recorded 0.934. The Pielou's evenness value (J) was recorded 0.369.

CONCLUSION

The aquatic ecosystem is an important and having large number of economically important animals specially fish which is important source of protein food. The study of fish fauna of an aquatic body is useful for planning of fish development for fish and other fishery culture. It is concluded that the dams of Dhule district lost some rare species because of some anthropogenic activities like over fishing and recreational activities besides water pollution. It is therefore essential to prevent depletion of fresh water fish resources and illegal method of fish catching.

ACKNOWLEDGEMENT

Authors are thankful to Principal S. G. Patil College, Sakri for providing the laboratory and free library facilities during the period of work. We are also thankful to Zoological Survey of India, Western Regional Station, Akurdi, Pune for their valuable guidance and fish identification.

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Plate-1: Punctius sophore



Plate-2: Salmophasia bacaila

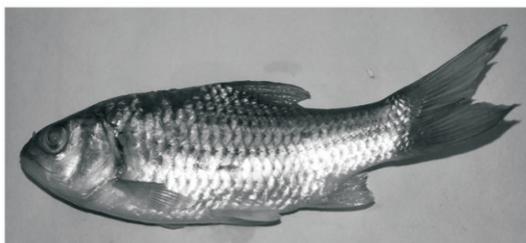


Plate-3: Punctius sarana



Plate-4: Cirrhinus reba



Plate-5: Garra mullya



Plate-6: Labeo boggut.



Plate-7: Labeo calabasu



Plate-8: Ompak bimaculatus

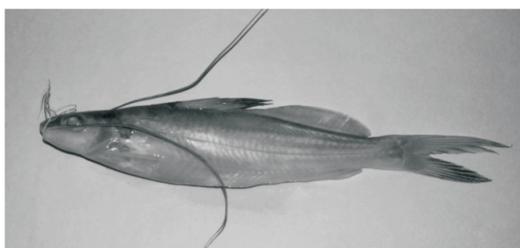


Plate-9: Mystus bleekeri

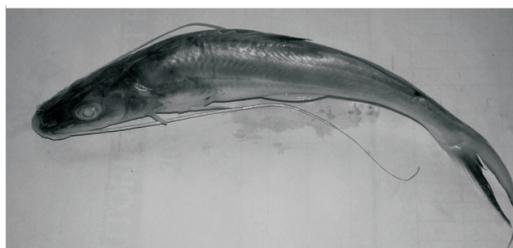


Plate-10: Sperata aor

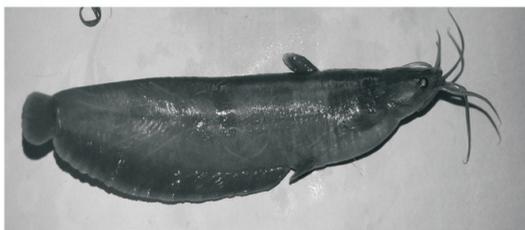


Plate-11: Heteropneustes fossilis

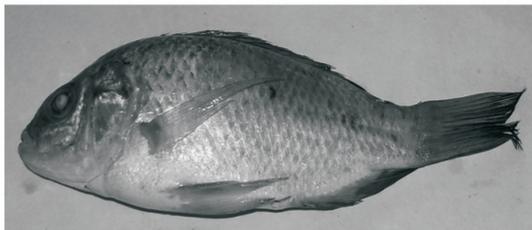


Plate-12: Oreochromis mossambica



Plate-13: Glossogobius giuris



Plate-14: Channa punctatus



Plate-15: Notopterus notopterus



Plate- 16: Tenulosa ilisha



Plate-17: Macrognathus pancalus

Table-1: Ichthyofaunal diversity and Abundance

Sr. No.	Fish- Scienfic name	Order	Family	Common name	* Collection sites			Abundance		
					S1	S2	S3			
1.	<i>Punctius sophore</i> Hamilton.	Cypriniformes	Cyprinidae	Lal-debhari	+	+	+	40		
2.	<i>Salmophasia bacaila</i> Hamilton			Chal	+	-	+	22		
3.	<i>Puntius sarana</i> Val			Kunder	+	+	+	62		
4.	<i>Cirrhinus reba</i> Hamilton			Reba	-	-	+	68		
5.	<i>Garra mullya</i> Sykes			Mhya	+	+	+	72		
6.	<i>Labeo boggut</i> Sykes			Ger masa	+	+	+	41		
7.	<i>Labeo calbasu</i> Hamilton			--	+	-	+	28		
8.	<i>Ompak bimaculatus</i> Bloch			Siluriformes	Siluridae	Papada	-	-	+	12
9.	<i>Ompak malabaricus</i> Val					--	-	+	-	06
10.	<i>Mystus bleekeri</i> Day					Bagridae	Chichva	-	-	+
11.	<i>Mystus</i> Spp.			--	+	-	-	04		
12.	<i>Sperata aor</i> Hamilton			Ek-Kati	-	-	+	03		
13.	<i>Heteropneutes fossilis</i> Bloch	Perciformes	Claridae	Tochya	+	-	-	10		
14.	<i>Parambasis ranga</i> Hamilton			Ambassidae	Debhari	+	-	+	12	
15.	<i>Oreochromis mossambica</i> Peters			Chilidae	Shilpi	+	-	-	42	
16.	<i>Glossogobius giurus</i> Hamilton			Gobidae	Khavalya	+	-	+	40	
17.	<i>Channa punctata</i> Bloch			Channidae	Dok- masa	+	-	-	48	
18.	<i>Notopterus notopterus</i> Pallas			Osteoglossiformes	Notopteridae	Patoda	+	-	-	22
19.	<i>Tenulosa ilisha</i> Hamilton			Clupeiformes	Clupeidae	Bhat-masa	-	-	+	58
20.	<i>Macrognathus pancalus</i> Hamilton	Synbranchiformes	Mastacembelidae	Vam-masa	+	-	-	12		

* Collection sites : S1 = Nakane dam, S2 = Dedorgaon dam and S3 = Sulwade dam.

Table -2: The fish species richness and diversity indices

Sr. No.	Index	Values
01	Species richness	20
02	Species abundance (N)	607
03	Shannon-Weiner Index (H)	2.365
05	Simpson's Dominance Index (D)	0.066
06	Simpson's Index of Diversity (1-D)	0.934
07	Pielou's evenness (J)	0.369

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