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An Investigation of Zooplankton Diversity in Anjaneri Dam, Nashik (M. S.), India

Varsharani A. Ghatule [1] Hemant K. Bhagwan [2] Bhagwat W. Chavre[3]
[1]Department of Zoology, H.P.T. Arts, & R.Y.K. Science College, Nashik (M.S.), India.
[2]Department of Zoology, S.M. Dnyandeo Mohekar College, Kalamb, Dist. Osmanabad, (M.S.), India.
[3]Department of Botany Arts, Commerce and Science College, Nandgaon, Dist. Nashik, (M.S.), India.
E-Mail- chavrebhagwat@gmail.com

Abstract

Zooplanktons are very sensitive group of organisms because they respond even at a small environmental changes. They act as indicator for pollutions and plays a key role in aquatic food webs because they are primary consumers and are food for other invertebrates, vertebrate including fishes. Most of the zooplankton species are cosmopolitan in nature. In the present investigation, authors studied diversity of different zooplanktons in the water of Anjaneri dam during February 2015 to January 2017. In the study period, total 54 species of different zooplanktons were recorded and are categorized into four major groups viz. Rotifera > Cladocera > Copepoda > Ostracoda. Rotifera was the major group comprising 48 % of total number of zooplanktons recorded with respect to diversity.

Key Words- *Investigation, Zooplankton, Diversity, Anjaneri, Dam, Nashik*

Introduction

Planktons are the most important and main components of aquatic food chain and also very sensitive floating community, which is primarily affected by anthropogenic impacts. Thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. The quantification of plankton's productivity helps to understand conservation ratio at different trophic level and resources as an important input for correct management of water body. Study of Plankton is beneficial in the prediction of long-term changes in a pond ecosystem, because these communities are highly sensitive to environmental variations. The occurrence and abundance of zooplankton depend on productivity of water body which in turn is influenced by biotic and abiotic factors. They link the primary producer, phytoplankton with higher large trophic level organisms. Zooplankton community affected by physicochemical changes occur in the water body. Zooplankton plays a key role in aquatic food chain (Sharma, 1998). Due to these reasons zooplanktons have brought the attention of many researchers all over the world. Many lakes and ponds are important to nearby areas as sources of fresh water supply for various reasons such as household purpose irrigations, and commercial fishing. Therefore, major environmental fluctuations may have affected economy and social implications of the local population. Through the study of these important lakes and ponds could aid in preparing for these human impacts, as well as improving our understanding of how climatic change may affect these high latitude freshwater bodies (e.g., Vincent and Hobbie, 2000).

Though, numerous studies are taken place in the field of hydrobiology on the different water bodies of India and most specifically in Maharashtra, some of the most important water bodies remained unexplored regarding their Hydrobiological point of view. Anjaneri dam of Nashik district is one of such a dam remained unexplored, so authors concentrated on it and conducted a systematic study on the dam water.

Satellite View of Anjaneri dam

Material and Methods

1 **Study area** Anjneri is an earth fill dam located at Anjaneri village near Nashik –Tryambakeshwar highway. The location of the dam is about 750 meters from mean sea level and is located at 19^0 56' 20" latitude and 73^0 55' 36" longitudes. This water body was constructed by using soil in the year 2006. The total storage capacity is 3242 cu. M. From the foundation its height is 28.19 m and length of entire project is 715 m. It Posses water throughout the year.

2. **Zooplankton Collection, Preservation and Identification-** The study of zooplankton was carried out by the monthly collection of water samples of the selected water from three sampling sites (W_1, W_2 & W_3) for the period of two years. Water sampling done once in each month between 7:00 am to 11:00 am. The water samples for zooplankton were collected by filtering 100 liters of surface water through net of bolting silk cloth No. 25 having mesh size 63 micrometer.
3. **Preservation of plankton**

The collected plankton samples are preserved in 4% formulation in 100 ml bottles. A label is affixed to the bottles indicating the site number, date of sampling, water temperature, transparency, pH etc. The

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Lugol's iodine solution is added in each bottle and is kept in dark for 24 hours to settle down the plankton. After 24 hours the supernatant is removed with the help of pipette and plankton (sediment) is collected. The sediment plankton is diluted by adding few ml of diluted water. The plankton samples are again preserved in Lugol's iodine solution for further investigation.

4. Concentration of sample

The concentration of sample is done by sedimentation technique. The sample was concentrated in series of steps by quantitatively transferring the sediment from the initial container to sequentially smaller one. The setting chamber was filled without forming vortex and kept over a vibration free surface. The supernatant was siphoned out.

5. Mounting and preparation of slides

0.1ml of each sample is taken on separate glass slides and cover slip was kept over the sample by rinsing the cover slip with an adhesive (clear nail polish) to prevent evaporation. For semi-permanent slides glycerin was mixed with sample, as the sample age evaporates, leaving the organisms embedded in glycerin.

6. Identification

The planktons were identified using methodology by APHA (1981) and Kodarkar (1992). The preserved samples were studied for the diversity of zooplanktons under the research binocular microscope by using standard keys and literature (Pennak, 1953, Altaf, 2004, and Kodarkar et. al.2006).

Result And Discusion

Zooplankton Diversity- In Anjaneri dam, the zooplanktons are observed in different four groups viz. rotifera (26 species), Cladocera (17 species), copepoda (10 species) and Ostracoda (01 species) as shown in table No.1. It is clear that; rotifera is the dominant group of zooplanktons in Anjaneri water body. Total 54 species of zooplanktons have been observed during the study period from three sampling sites (A_1, A_2 and A_3). From sampling site A_1, total 46 species were recorded. 41 species are recorded from site A_2 and site A_3 showed total 36 species of zooplanktons. Data is given in table No. 20 & 22.

Many researchers also recorded nearly similar results throughout the country R. Anbalagan et.al (2019) according to their research on Freshwater zooplankton biodiversity and physico chemical parameters of Mayanur dam, Tamil Nadu. They observed that, total 22 species of zooplankton belonging to Protozoa, Rotifera, Cladocera, Copepoda, Ostracoda and Anostraca. Among the various groups of zooplankton, the most dominant one was rotifers representing 50%. Krishna et.al (2017) studied seasonal variations of zooplankton community in selected ponds at Lake Kolleru region of Andhra Pradesh. According to their study, total number 16 species recorded of which 9 are Rotifera, 3 are Cladocera and 4 are Copepods. In the rotifers the genus *Brachionus* is the dominant group.

Sandhya et.al (2016), explored Bhogaon Reservoir in Parbhani District of Maharashtra and observed that all the zooplanktons are found to be minimum in monsoon period and maximum in post-monsoon period. Banerjee et.al (2014) made a study on the zooplankton production in ponds under different fish farming system in West Bengal. They identified zooplanktons from 4 different orders namely copepoda, rotifera, cladocera, and Diaptomus. Dominant groups of the zooplankton available in all the samples were observed to be Copepoda and Cladocera represented by *Cyclops sp.*and *Daphnia sp.*, respectively. Verma1 et.al (2013) recorded the zooplanktons which are represented by five groups of organisms in order Rotifera>Crustacean > Cladocera > Protozoa > Copepoda.

Table.1 Zooplankton's observed in Anjaneri pond for the period February 2015 to February 2017

Sr No	Name of Zooplankton	Anjaneri pond		
		A-1	A-2	A-3
A	**Rotifera**			
1	*Anuraeopsis navicula*	+	+	+
2	*Asplanchana sp*	+	+	+
3	*Brachionus angularis*	+	+	-
4	*Brachionus calyciflorus*	+	+	-
5	*Brachionus caudatus*	-	+	+
6	*Brachionus dimidiatus*	+	+	-
7	*Brachionus diversicornis*	+	+	+
8	*Brachionus forficula*	-	+	+
9	*Brachionus falcatus*	+	+	+
10	*Brachionus havanensis*	+	-	+
11	*Brachionus quadridentata*	+	+	+
12	*Brachionu bidentata*	+	+	-
13	*Collotheca edentata*	+	+	-
14	*Herringia sp.*	+	+	-

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15	*Hexarthra sp.*	+	-	+
16	*Keratella cochlearis*	+	+	+
17	*Keratella tecta*	+	+	-
18	*Keratella tropica*	+	-	+
19	*Keratella valga*	+	+	-
20	*Lacane sp*	+	+	+
21	*Lepadella heterodactyla*	+	+	-
22	*Notommata sp*	+	+	-
23	*Plainate sp*	+	+	+
24	*Polyarthra sp*	+	+	+
25	*Testudinella sp*	+	+	+
26	*Wigrella wiszniewski*	+	-	-
B	**Cladocera**			
1	*Bosmina longirostris*	+	+	-
2	*Ceriodaphnia cornuta*	+	-	+
3	*Ceriodaphnia reticulata*	-	-	+
4	*Ceriodaphnia rigaudi*	+	+	+
5	*Chydoridae pleuroxus denticulatus*	+	-	+
6	*Daphnia pulex*	+	-	+
7	*Daphnia magna*	+	+	+
8	*Daphnia sp.*	+	+	+
9	*Diaphanasoma brachyurum*	+	+	-
10	*Eubosmina.longiconi*	+	+	+
11	*Ilyocryptus spinifer*	+	+	+
12	*Leptodora kindti*	+	+	-
13	*Leptodora.sp*	-	-	+
14	*Macrothrix sp*	+	+	+
15	*Moina sp.*	+	+	+
16	*Polyphemus pediculus*	+	+	+
17	*Pseudosida bidentata*	+	-	-
C	**Copepoda**			
1.	*Calanoid sp*	+	+	+
2.	*Cyclops strenuus*	-	+	+
3.	*Cyclops viridis*	-	+	-
4.	*Diacyclois thomasi*	+	-	-
5.	*Diacyclops sp*	+	+	+
6.	*Diaptomus sp*	+	+	+
7.	*Eucyclops serrulatus*	+	+	-
8.	*Halicyclops sp.*	-	-	+
9.	*Harpacticoida sp.*	+	+	+
10.	*Tropocyclops prasinus*	+	+	+
D	**Ostracoda**			
1	*Cypris sp.*	-	-	+

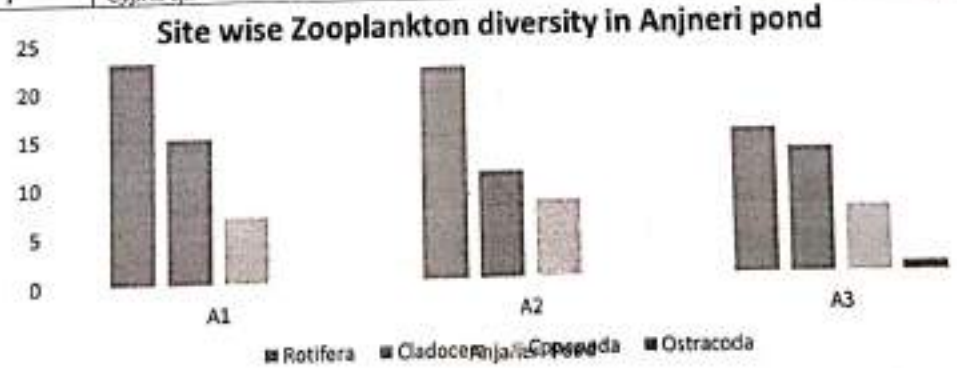

Fig. 2. Graph indicating Site wise and class wise species of Zooplanktons diversity in Anjaneri pond.

Conclusion

According to above observations, it is concluded that, the water of Anjaneri pond exhibits rich and diversified zooplanktons dominated by Rotifera throughout the study period. This is very suitable for aquaculture because, zooplanktons are known the major source of food for fishes and other aquatic

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animals. This water body should be conserved and maintained as it is and should be protected from pollution.

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