

STUDY OF ZOOPLANKTON DIVERSITY IN WALDEVI DAM, NASHIK (M. S.), INDIA

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ABSTRACT

Zooplankton plays a crucial role in aquatic food webs because they are primary consumers and are food for other invertebrates, vertebrate including fishes. They are cosmopolitan in nature. In the present investigation, authors studied diversity of different zooplanktons in the water of Waldevi dam during February 2015 to January 2017. In the study period, total 55 species of different zooplanktons were recorded categorized into four major groups viz. Rotifera > Copepoda > Cladocera > Ostracoda. Rotifera was the major group comprising 67 % of total number of zooplanktons recorded with respect to diversity.

KEY WORDS: Zooplankton, Diversity, Waldevi, Dam, Nashik

INTRODUCTION

Plankton is the most sensitive floating community, which is primarily affected by water pollution, thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. The measurement of plankton's productivity helps to understand conservation ratio at various trophic level and resources as an essential input for proper management of lake. 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 responds to a wide variety of disturbances including nutrient over loading (Dodson, 1992) Zooplankton also plays a key role in aquatic food chain (Sharma, 1998). Owing to this they have attracted the attention of a large number of researchers throughout the world. Many lakes are important to nearby communities as sources of fresh water supply or for subsistence and commercial fishing.

Therefore, major environmental changes could have cultural and social implications detrimental to the local population. Monitoring these important lakes 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 (Vincent and Hobbie, 2000).

Though, numerous studies is 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. Waldevi 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.

MATERIALS AND METHODS

Study Area-Waldevi is an earth fill dam constructed in 1995 on Waldevi River near Pimplad village of Nashik tehsil, about 10 km away from city (Figure 1). The bottom of reservoir is rocky and possesses water throughout the year. It lies between 73° 40' 42" E and 19° 54' 16" N having storage capacity, 8,089.86 Cu. M.

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 (W₁, W₂ & W₃) 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.

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 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.

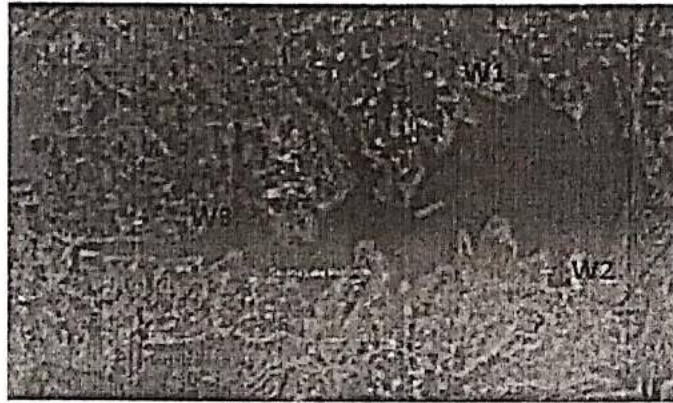


Figure 1. Satellite View of Waldevi dam

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.

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.

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).

RESULTS AND DISCUSSION

At the Waldevi dam water also observed great diversity of zooplanktons. The results were shown in Figure 2 and 3 ND Table 1. From all three (W_1 , W_2 and W_3) sampling sites altogether total 55 zooplankton species were observed. Of which, 37 represents rotifer, 09 represents copepoda, 08 represents Cladocera and 01 of ostracoda. Total number of zooplanktons found on sites W_1 , W_2 and W_3 are 36, 37 and 30 respectively (Table. 1).



Figure 2 : % of occurrence of different classes of Zooplanktons

Table 1. Zooplankton's observed in Waldevi dam for the period February 2015 to January-2017.

Sl. No	Name of Zooplankton	Waldevi Dam		
		W1	W2	W3
A Rotifera				
1	<i>Anuraeopsis navicula</i>	+	-	-
2	<i>Asplanchna priodonta</i>	+	+	+
3	<i>Asplanchna sp</i>	+	+	-
4	<i>Asplanchna herricki</i>	+	+	+
5	<i>Brachionus angularis</i>	-	-	-
6	<i>Brachionus budapestinensis</i>	+	-	-
7	<i>Brachionus calyciflorus</i>	-	+	-
8	<i>Brachionus caudatus</i>	+	-	+
9	<i>Brachionus diversicornis</i>	-	-	+
10	<i>Brachionus falcatus</i>	-	+	+
11	<i>Brachionus forficula</i>	+	-	-
12	<i>Brachionus quadridentatus</i>	+	+	+
13	<i>Cephalodella gisleni</i>	-	-	-
14	<i>Cephalodella sp</i>	-	+	-
15	<i>Filinia longiseta</i>	+	+	+
16	<i>Filinia opoliensis</i>	-	+	+
17	<i>Filinia terminalis</i>	+	+	-
18	<i>Ilexarthra sp</i>	-	+	-
19	<i>Keratella cochlearis</i>	-	+	-
20	<i>Keratella crassa</i>	-	+	+
21	<i>Keratella hispida</i>	-	-	+
22	<i>Keratella procurva</i>	+	+	-
23	<i>Keratella tecta</i>	+	-	-
24	<i>Keratella tropica</i>	+	-	+
25	<i>Keratella valga</i>	+	+	-
26	<i>Lacane leontina</i>	+	+	-
27	<i>Lecane aspasia</i>	+	+	+
28	<i>Lepadella decora</i>	+	-	+
29	<i>Monostyla bulla</i>	-	+	-
30	<i>Notholca foliacea</i>	+	+	-
31	<i>Polyarthra remata</i>	+	+	+
32	<i>Polyarthra sp.</i>	+	-	-
33	<i>Pompholyx sp</i>	+	+	+
34	<i>Sinaniherina semibullata</i>	+	+	+
35	<i>Synchaeta sp</i>	+	-	-
36	<i>Trichocerca sp</i>	-	+	+
37	<i>Trichotria tetractis</i>	+	+	+
B Copepoda				
1	<i>Acanthocyclops vernalis</i>	+	+	-
2	<i>Cyclopoida sp.</i>	-	+	+
3	<i>Cyclops viridis</i>	+	-	+
4	<i>Eucyclops agilis</i>	+	+	+
5	<i>Eucyclops sp.</i>	-	+	-
6	<i>Eurytemora affinis</i>	+	+	+
7	<i>Harpacticoida sp.</i>	-	+	+
8	<i>Macrocyclops albidus</i>	+	-	+
9	<i>Mesocyclops sp</i>	+	+	-
C Cladocera				
1	<i>Bosmina longirostris</i>	+	+	+
2	<i>Bosmina sp</i>	+	+	+
3	<i>Chydorus sp.</i>	-	+	-
4	<i>Daphnia sp</i>	+	+	+
5	<i>Eubosmina longispina</i>	+	+	-
6	<i>Macrothrix sp</i>	-	-	+
7	<i>Moina sp</i>	+	-	+
8	<i>Pleuroxus sp</i>	+	+	+
D Ostracoda				
1	<i>Cypris sp.</i>	+	-	-

Many researchers also recorded nearly similar results throughout the country. Kather *et.al* (2015) during their study on Ambattur Lake of Tamil Nadu recorded four major groups of zooplanktons which include Protozoa, Rotifera, Copepoda and Cladocera. Being the dominant group represented by 13 species, followed by rotifera (6 species), Cladocera (6 species) and Copepoda (4 species). Sehgal *et.al.* (2013), made a special attempt to study the zooplankton diversity in Dimbhe reservoir of Maharashtra. They recorded 7 species of zooplanktons during winter as well as summer season, of which only one species belongs to rotifer, one of cladocera, four species of Copepoda and one of Ostracoda. Rajgopal *et. al.* (2010), were studied zooplankton diversity of three ponds of Virudhunagar of Tamilnadu. They recorded total of 47 zooplankton species including 24 rotifers, 09 copepods, 08 cladocerans, 04 ostracods and 02 species of protozoa. Manickam *et. al.* (2015) were worked on Barur lake of Tamil Nadu reported a total 47 species of zooplankton. The species were belong to four orders namely rotifer (18 species), cladocera (11 species), copepoda (11 species) and ostracoda (7 species).

In the present study, Rotifera being the dominant group comprise 67 % of total zooplanktons. Copepoda contributing 16 %, Cladocera contributing 15 % and Ostracoda 2 % of total zooplanktons present in the water of Waldevi dam.

The maximum diversity of rotifers was observed in the monsoon season. The maximum diversity of Copepoda was observed during summer and minimum during monsoon. The minimum number of Cladocera was found in winter and maximum in summer. During the study period, the group Ostracoda is occurred with only one genus and one species, *Cypris spp.* The maximum Ostracoda observed during summer and minimum during winter.

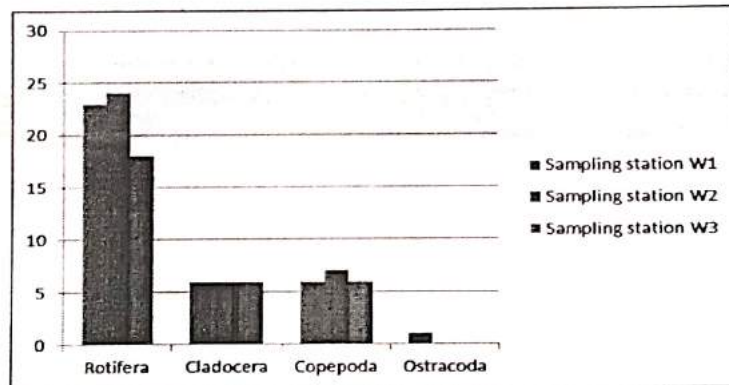


Figure 3. Graph indicating Site wise and class wise species of Zooplanktons

CONCLUSION

From the above results it is clear that, the water body, Waldevi dam exhibits rich and diversified zooplanktons dominated by Rotifera throughout the study period. This is very suitable for aquaculture because, rotifers are known to be best food for fishes. The diversity of zooplankton also reveals that the, diversity of zooplanktons is an indication of healthy water body. This water body should be conserved and maintained as it is.

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