

Dynamics of Zooplankton Diversity in Freshwater Ecosystem across Seasons

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Abstract: *Zooplankton are cosmopolitan in nature and they play vital role in the aquatic food chains. The current study deals with the monthly changes in the diversity of zooplankton in Jallihal Budruk dam of Jath Tehsil, Maharashtra. The work was carried out for the period of one year from January 23 to December 23. During the present study total 21 species of zooplanktons belonging to 3 groups i.e. Rotifera (16 species), Cladocera (03 species) and Copepoda (02 species) are found. The zooplankton sample consisted of 76 % Rotifera, 14 % Cladocera and 10 % Copepoda respectively. Rotifera was the dominant group of zooplankton recorded with respect to diversity.*

Keywords: Zooplankton, Jallihal Budruk Dam, Rotifera, Cladocera, Copepoda.

I. INTRODUCTION

Zooplanktons refer to the wide range of very small and microscopic aquatic animals. Zooplankton play key role in cycling of organic materials as they are important trophic link in food chain being heterotrophic organisms. Zooplanktons play important role in recycling nutrients as well as cycling energy of their environment. Zooplankton are crucial elements of freshwater lake ecosystems as they are at the centre of aquatic food web and act as important food for almost all freshwater fish species at some stage of their life (Lampert and Sommer, 1997). Zooplanktons act as crucial indicator of water quality as they are strongly affected by environmental fluctuations. Zooplankton communities respond to wide range of disturbances such as nutrient loading, acidification etc. They act as well-suited tool for understanding water pollution status.

Though numerous works on zooplankton are being reported from various parts of India but there is lack of scarcity of recent report from freshwater bodies of different parts of Maharashtra except some significant to note are Darvekar and Raut (2022); Jarupala et. al. (2025); Vishnu et. al. (2025); Munde et. al. (2026) and Rani and Poolpandi (2026). The lack of detailed studies on Jallihal Budruk dam, the present investigation was undertaken to analyse the diversity, composition, and seasonal variation of zooplankton communities.

II. MATERIAL AND METHODS

Study Area

Jallihal Budruk Dam (Lat.17002'30" N and Long. 75036'24" E) situated in Jath Tehsil of Sangli District, Maharashtra, India. This is an earthen type of dam used for irrigation purpose and borders of the dam are surrounded by agricultural fields. The length of the dam is 648 meter and height of the dam is 14.05 meter.

Zooplankton Sampling

The study was carried out for the period of one year from January 23 to December 23. The Zooplanktons were sampled monthly by using plankton net of bolting silk of mesh size 125 micron (No. 12). Then the sample were filtered and placed in 100 ml wide-mouth, screw-capped polypropylene bottles and preserved by using 4% Formalin. The zooplanktons were identified using standard available literature of Pennak (1978), Khan (2003) and Dang et. al. (2015).



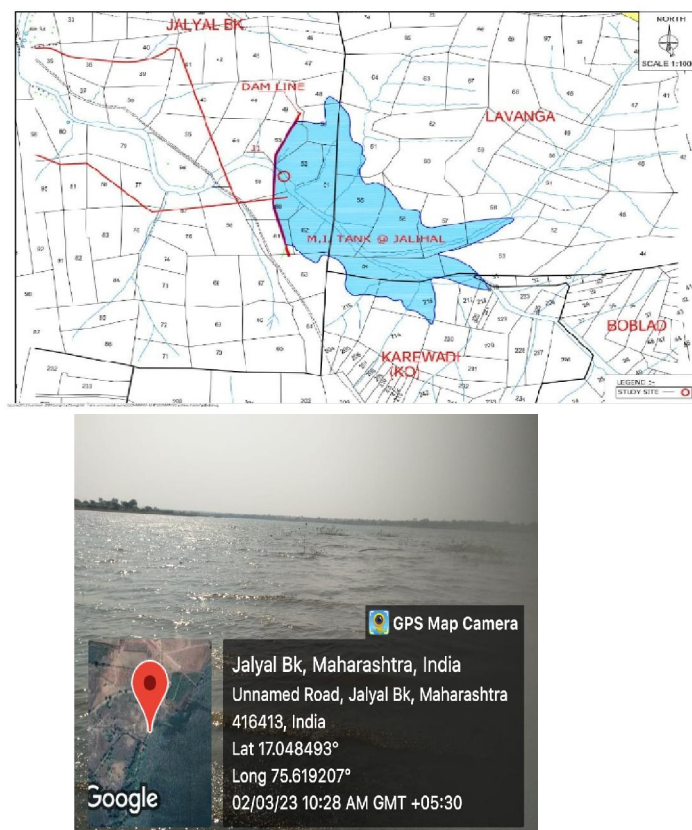


Fig.1 Map showing sampling site at Jallihal Budruk Dam, Jath, Maharashtra

III. RESULT AND DISCUSSION

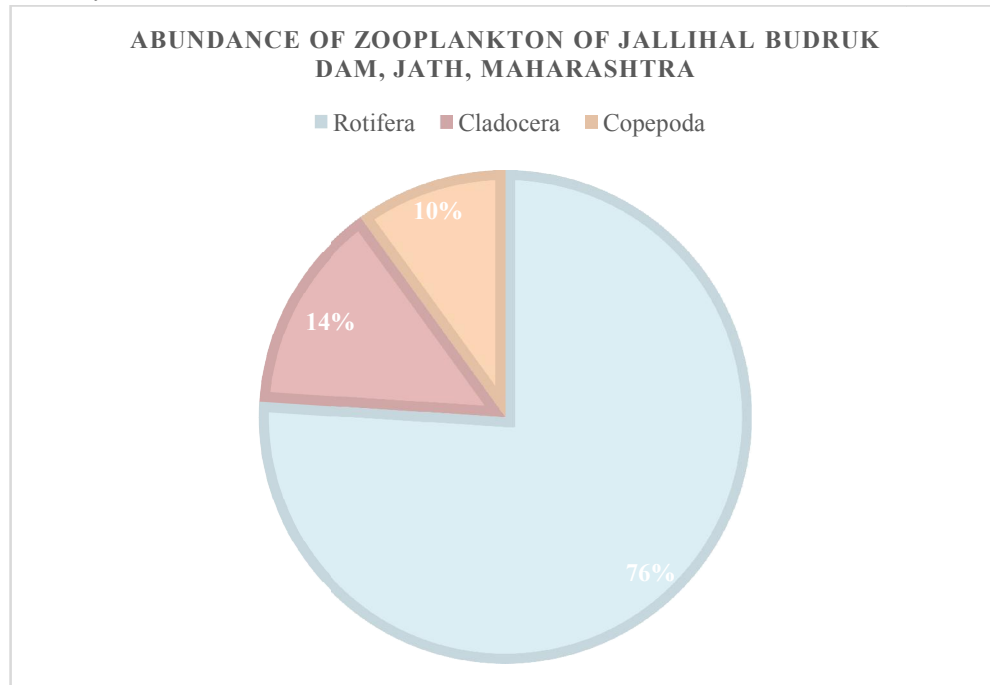
During the present study, 21 genera of zooplankton were recorded from the dam belonging to the three groups viz, Rotifera, Cladocera and Copepoda. Among the recorded genera, 02 belonging to Copepoda, 03 belonging to Cladocera and 16 genera belongs to Rotifera group (Table I). Similar observations were made by many researchers including Kar and Kar (2013) reported 26 genera of Zooplankton from from Oxbow Lake of Cachar, Assam; Tyor et. al. (2014) studied zooplankton diversity in a shallow lake of Gurgaon, Harayana recording Rotifera with highest diversity followed by Cladocera and then Copepoda showing list diversity; Darvekar and Raut (2022) reported 26 species of Zooplankton from Ramadeshwar lake, Ramtek, Nagpur out of which 13 species belong to Rotifera, 08 species belong to Cladocera and 05 Species belongs to Copepoda.

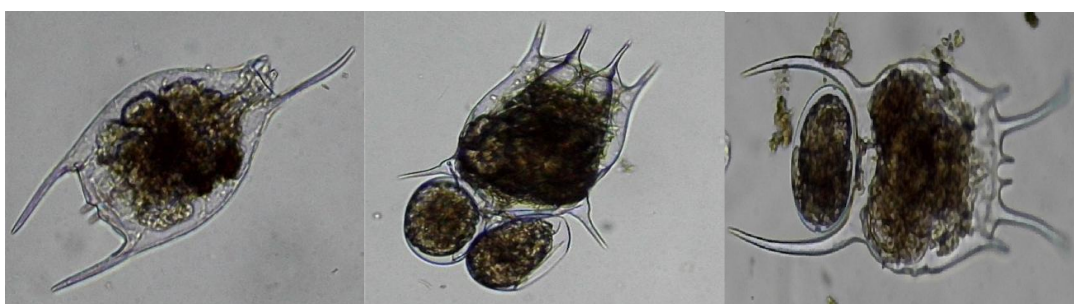
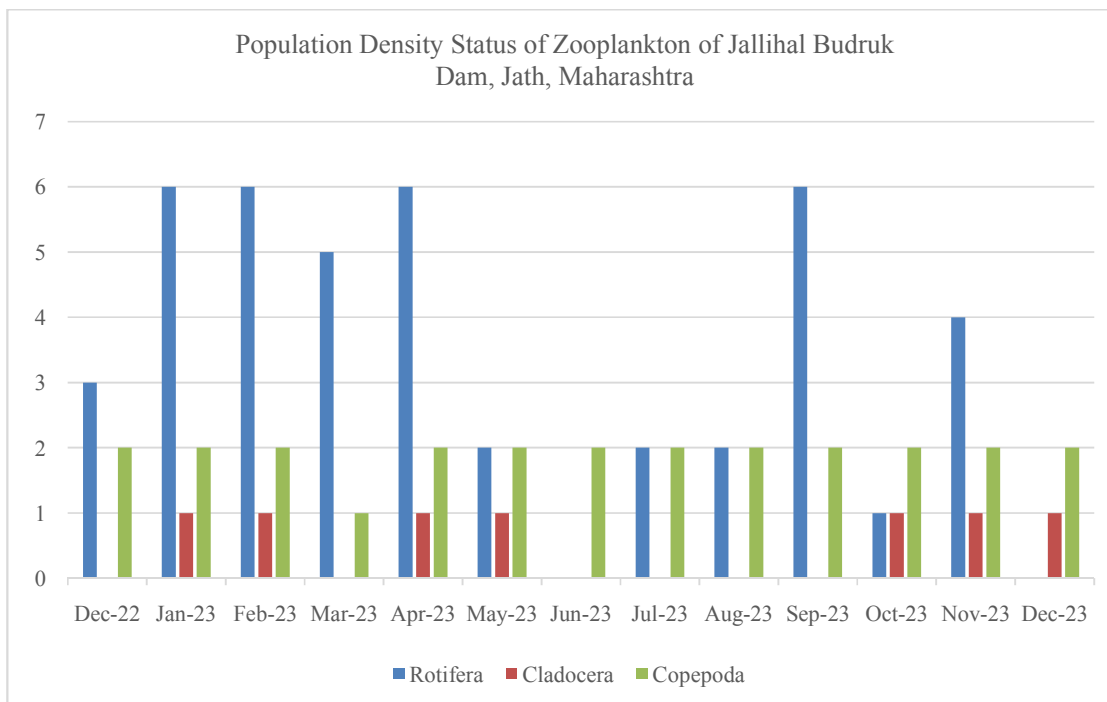
The population density of zooplankton from Jallihal Budruk Dam is illustrated in Fig. 2. During the study period, among Copepoda Cyclopoid nauplius and Microcyclops varicans were recorded throughout the year; from Cladocera Nicsmirnovius exesimius, Moina sp. and Pleuroxus sp. were recorded throughout the year and Branchionus forficula, Branchionus diversicornis, Branchionus calyciflorus, Branchionus falcatus, Branchionus caudatus, Branchionus plicatilis, Keratella tropica, Asplanchna sp., Trichocerca longiseta, Lecane sp., Lecane curvicornis, Lecane bulla bulla, Filinia longiseta, Lepadella sp., Anuraeopsis fissa and Monostyla copies were recorded throughout the year among Rotifera. In the present study, the site was characterized by a greater diversity of zooplankton taxa during winter season.

During the present study, Rotifera was dominant group of zooplankton recorded. In tropical freshwater wetlands, dominance of Rotifers is a common feature as similar findings were recorded by Mwebaza and Nadwula (2005) and

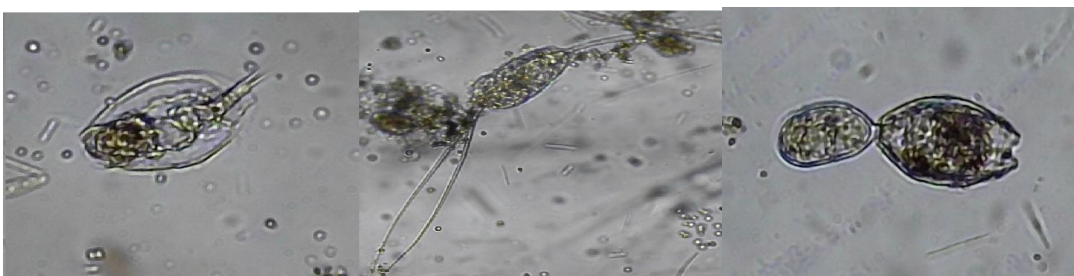


Darvekar and Raut (2022). The present study population density of Rotifera group vary in different seasons. Highest density of Rotifers was observed during the months of January, February, April followed by September (Fig. 2) The species of Rotifera reported in the present study are the best indicators of water pollution. Species of Brachionus, especially act as better indicator of water pollution as it is least affected by the algal blooms in eutrophic water (Ceirans, 2007; Dadhich et al., 1999). Attayde & Bozelli (1998) reported that Asplanchna sp., Brachionus sp., and Filinia sp. were excellent indicators of eutrophic waters and probably Brachinus sp. alone can determine the eutrophic status of water body.





Branchionus diversicornis *Branchionus calyciflorus* *Branchionus falcatus*



Lecane bulla

Filinia longiseti

Anuraeopsis fissa

Plate 1: Some of the Rotifera species found in Jallihal Budruk Dam, Jath, Maharashtra





Nicsmirnovius exesimius **Moina species**

Pleuroxus species

Plate 2: Some of the Cladocera species found in Jallihal Budruk Dam, Jath, Maharashtra



Microcyclops

varicans

Cyclopoid nauplius

Table 1: Abundance of Zooplankton Species of Jallihal Budruk Dam, Jath, Maharashtra

Sr. No.	Zooplankton Species	Presence												
		Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
		J1	J1	J1	J1	J1	J1	J1	J1	J1	J1	J1	J1	J1
I	Rotifera	-	-	-	-	-	-	-	-	-	-	-	-	-
1	Branchionus forficula	-	-	-	-	-	-	-	-	-	+	-	-	-
2	Branchionus diversicornis	-	+	+	-	-	+	-	-	-	-	-	-	-
3	Branchionus calyciflorus	+	+	-	-	-	-	-	+	-	-	-	-	-
4	Branchionus falcatus	-	-	-	-	-	-	-	-	+	+	-	+	-
5	Branchionus caudatus	-	+	-	-	-	-	-	-	-	+	-	-	-
6	Branchionus plicatilis	-	-	+	+	-	-	-	+	-	+	-	+	-
7	Keratella tropica	+	-	+	+	-	-	-	-	-	+	+	+	-
8	Asplanchna species	-	-	+	+	+	-	-	-	+	+	-	-	-
9	Trichocerca	-	+	+	+	-	-	-	-	-	-	-	-	-



	longiseta													
10	Lecane species	-	+	-	-	+	-	-	-	-	-	-	-	-
11	Lecane curvicornis	-	-	-	-	+	-	-	-	-	-	-	-	-
12	Lecane bulla bulla	-	+	+	-	+	+	-	-	-	-	-	-	-
13	Filinia longiseta	-	-	-	+	+	-	-	-	-	-	-	-	-
14	Lepadella species	-	-	-	-	-	-	-	-	-	-	-	+	-
15	Anuraeopsis fissa	-	-	-	-	+	-	-	-	-	-	-	-	-
16	Monostyla copeis	+	-	-	-	-	-	-	-	-	-	-	-	-
II	Cladocera	-	-	-	-	-	-	-	-	-	-	-	-	-
1	Nicsmirnovius exesimius	-	-	+	-	-	-	-	-	-	-	-	-	-
2	Moina Species	-	-	-	-	-	-	-	-	-	-	+	+	+
3	Pleuroxus species	-	+	-	-	+	+	-	-	-	-	-	-	-
III	Copepoda	-	-	-	-	-	-	-	-	-	-	-	-	-
1	Cyclopoid nauplius	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Microcyclops varicans	+	+	+	-	+	+	+	+	+	+	+	+	+

IV.CONCLUSION

The present study on Jallihal Budruk Dam exhibits diverse Zooplankton species dominated by Rotifera throughout the study period which reveals that the dam is very much suitable for aquaculture as Rotifers are known to be the best food for fish larvae.

Rotifers also act as bioindicators for freshwater pollution and among the Rotifers Brachionus sp. is the best indicator of water pollution in water body and may be used to track the trophic status of any eutrophic water body. Therefore, Jallihal Budruk Dam is presently Mesotrophic and may change to Eutrophic condition if timely pollution control measures are not undertaken. And such Eutrophic Jallihal Budruk Dam water will hamper its use for irrigation due to fear of microbial contamination of crops and recreational activity due to deterioration of water quality.

The eutrophication rate may be slowed down by controlling the nutrient and pollution sources to the Dam as well as by encouraging fish culture activity in the Dam to graze on Zooplankton of the Dam.

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