A study on Zooplankton Diversity at Naleshwar Dam, Taluka-Sindewahi, District- Chandrapur (M.S), India

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Abstract

Naleshwar Dam is the second largest reservoir after Asola Mendha, present in Sindewahi taluka in Chandrapur district. It is built in the British era for irrigation purposes. the current study was carried out to discover zooplankton diversity of dam. This research, conducted over two years from 2021 to 2022, investigated zooplankton diversity, abundance, and zooplankton composition at the Naleshwar Dam. To assess the freshwater reservoir's ecological and fishing status, a zooplankton study is necessary. We found that the zooplankton populations varied seasonally during the research. Among all sites, the greatest uniform zooplankton biodiversity was recorded in summer and minimized in monsoons. The highest summer population densities may be due to increased water quality, plant decay, and sediment organic matter content. The extra variety at Site 2 is because of the presence of dense woodland areas, which might be the primary supply of natural matter. Rotifera and Cladocera have been the most important companies among all zooplankton communities. The current study targeted higher populations of rotifer species 9, Cladocera 8, Copepoda 3, Protozoa 3, and Ostracoda 1. During research 24 species were observed and distributed in 15 different genera and 4 different families, and classified into five different taxa. The current study is divided into five groups Rotiformes (38%), then Cladocera (33%), Copepoda (13%), Protozoa (12%), and ostracoda (4%). Among these, Rotiformes and Cladocera persisted Dominant group during the study period. It was noted that during the study period, the greatest zooplankton diversity was found at site 2 and the least at sites 1 and 3 due to the greatest human activity.

Key words : zooplankton, Naleshwar, Rotiformes, cladoceran, protozoa

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Water is a vital condition for all sorts of life and the most abundant on earth. The biosphere provides a vital system for sustaining human life. Its existence in a sound and functional condition is indispensable to man's existence. Freshwater is a fundamentally important natural resource. This include zooplankton the freely floating microscopic beast found in aquatic habitats. As a heterotrophic species, zooplankton is important to the food chain. Through linkage to top-tier primary producers. Zooplankton is important for studying the diversity of aquatic life. The zooplankton community fluctuates depending on the physical and chemical parameters of the environment. When it comes to the movement of energy from producers to aquatic predators, zooplankton frequently plays a significant role. Because zooplankton is highly impacted by its surroundings and responds swiftly to changes, it is a useful indicator of changes in the quality of water. Zooplankton had three different groups, namely. Protozoa, rotifer, and arthropods. Percent composed of these plankton forms were and its possible contribution to the biological as well as trophic productivity. Zooplankton has a significant role in biomonitoring water pollution. Increased food availability due to the decomposition of organic materials and zooplankton may have a high density because there's less predatory activity. A significant component of research on the diversity of aquatic ecosystems' fauna is zooplankton. Representing virtually all taxa in the kingdom. They offer the essential nutrition for higher invertebrates and support phytoplankton in their conversion of plant materials into animal tissues. The present study therefore aims to assess zooplankton diversity. The zooplankton diversity of the Kayadhu River, which is close to Hingoli, Maharashtra, was investigated by Jayabhaye³ conducted an investigation into the rotifer community in the Washim region and created a list of all the rotifers there. Pawar and Dabhade¹⁰ conducted a study on the qualitative variety of the rotifer population in the freshwater Katepurna reservoir in the district of Akola, Maharashtra, India. The diversity of zooplankton serves as a useful indication of changes in the water resources and reflects the quality of the water. In Washim town, Maharashtra, India, Kabra *et al.*,⁶ conducted research to analyse the zooplanktons of the freshwater ecosystem.

During the study period, the three different sampling stations of the naleshwar dam were selected and used to collect water samples for the current study. Water samples from the naleshwar dam were taken throughout the current study at monthly intervals for the duration of the two years from different sites of the dam. Generally, the water collection process is carried out during the early morning hours. Collected water samples were put into a bottle and taken to the laboratory. For the plankton collection, generally, the mesh size of the nylon bolting cloth is 24 mesh/mm3. Plankton nets were used to filter samples in approximately 100 litres of water. Plastic bottles containing 4% formalin solution must be used to collect and preserve water samples, which must then be delivered to the lab for additional study. Each plankton was recognised and identification was done under the binocular and light microscope. Using a Sedgewick rafter counting chamber, the density and quantitative calculation of zooplankton were determined. Using the recommendations of Needham and Needham¹², Kodakar⁵, and (1224)



Figure 1. Percentage composition of zooplankton groups



Figure 2. Number of species of zooplankton family

Sr.	Zooplankton	monsoon			winter			summer		
no	groups	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
1	rotifera	44	45	51	51	52	53	35	38	40
2	ostracoda	7	10	15	15	20	17	42	46	48
3	cladocera	30	33	36	35	37	30	22	28	26
4	copepoda	82	90	91	70	75	82	76	78	75
5	protozoa	10	12	11	09	10	11	12	8	9

Table-1. Seasonal distribution of zooplankton diversity of Dam (2021-2022)

(1225)

Sr.	Zooplankton	monsoon			winter			summer		
no	groups	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
1	Rotifera	45	48	51	52	53	54	61	54	48
2	Ostracoda	10	8	10	12	12	10	8	7	6
3	cladoceran	32	33	32	35	35	36	38	36	38
4	Copepoda	70	75	72	68	66	70	75	76	68
5	protozoa	10	12	14	16	18	20	12	15	16

Table-2. Seasonal distribution of zooplankton diversity of Dam (2021-2022)

Table-3. Zooplankton species at different selection sites

Sr no	Zooplankton			Site 1	Site 2	Site 3
	Group	Family	Species			
1	PROTOZOA		balantidium sp.	+	+	+
2			<i>cerium</i> sp.	+	+	+
3			stentor sp.	+	+	+
4	copepoda	diaptomidae	nauplius	+	+	+
5			diaptomus sp.	+	+	+
6			cyclops sp.	+	+	+
7	cladocera	chydoridae	chydorus sphaericus	+	+	+
8			chorus parvus	+	+	+
9			Chydrous reticulatus	+	+	+
10			Macrothrix sqamosa	+	+	+
11			Alona sp.	+	+	+
12			Alonella dadayi	+	+	+
13		daphnidae	ceriodaphnia cornuta	+	+	+
14			ceriodaphnia	+	+	+
			quadrangular			
15	Ostracoda	cyprididae	cypris	+	+	+
16	rotifera	branchionidae	asplanchna sp.	+	+	+
17			branchious diversicornis	+	+	+
18			brachionus plicatilis	+	+	+
19			brachionus forficulata	+	+	+
20			brachionus calyciflorus	+	+	+
21			brachialis dominates	+	+	+
22			brachionus quadridentatus	+	+	+
23			Kerala Tropicana	+	+	+
24			Kerala crassa	+	+	+

(1226)







(1227)



Chydorus sphaericus





Alonella dadayi



Chydorus parvus





Brachionus calyciflorus



Brachionus plicatilis

cyclops sp

Macrothrix squamosa

APHA¹, plankton was identified at the genus level. Zooplankton ind/L = Where, n = number of plankters in 1 ml, is the outcome of quantifying zooplankters using the Sedgwick Rafter Cell technique. C is the concentrate's volume. V is the filtered sample volume.

During the current study, this density was made visible. Seasons affect the populations of zooplankton. Displays the highest and lowest values that occur during the summer and monsoon seasons. Summertime sees the maximum concentration of zooplankton in the population because of improved water quality, decomposing plants, and higher quantities of organic materials in sediments. Therefore, zooplankton are important Pollution status, water quality, and climate indicators for Aquatic ecosystem change and productivity. Our results are consistent with the findings. The monsoon season saw the lowest zooplankton density, while the pre- and postmonsoon seasons saw the highest peak densities, with the former peak being higher than the pre-monsoon season. At every site in the current study, the summer months had the highest levels of species diversity and evenness, while the monsoon months saw the lowest levels of species diversity. 24 different species of zooplankton were identified over the course of the current investigation. Based on research findings, out of which zooplankton populations 15 genera were recorded, divided into five distinct groups at all sites, Protozoa, Rotifera Cladocera, ostracoda and Copepoda. Protozoa and copepoda make up 3 species of the genera, whereas Cladocera is made up of 8 species of zooplankton. one species of zooplankton belongs to ostracoda. Rotifers dominant over all groups consisting 9 species of zooplankton. When it comes to seasonal fluctuation, rotifers predominated in the winter at all sampling sites. Zooplankton is prevalent at the sampling locations, and often during the monsoon season, population estimates can be made based on dilution factor and physicochemical parameter fluctuations. The results of this analysis showed that the Rotifera groups stated population density at the study site varies depending on the season, Rotifera density was followed by Cladocera density and then Copepoda density. ostracoda showed least diversity and dominance. The Rotiferes, contributed 38% of all Zooplankton, followed by Cladocera (33%), Copepoda (13%), Protozoa (12%), and ostracoda (4%) of the total Zooplankton population. Many researcher conducted study over zooplankton diversity in different types of water reservoir. Kar, & Kar⁴ conducted a similar study in which they identified 40 genera of zooplankton belonging to three distinct groups: 14 are members of the Cladocera group, 4 are members of the Copepoda group, and 22 are members of the Rotifera group. Kumar, and Kumari,8 found out zooplankton abundance, community composition, and density in the water body of Jal Ghar Bhiwani, Haryana, India, were examined. Thirteen genera, nine families, five orders, and four classes comprise the total number of zooplanktons (7 species of Rotifers, 3 species of Brachiopods, 2 species of Copepods, and 1 species of Ostrachopod). Panwar, and Malik⁹ carried research on the Bhimtal Lake, located in Uttarakhand, India,. In this study, they evaluated the interactions between several zooplankton groups and abiotic variables, as well as the diversity and distribution pattern of zooplanktons in the Bhimtal Lake between September 2013 and August 2014. 29 species of zooplankton,

including 16 species of Rotifers, 8 species of Cladocera, and 5 species of Copepods, were found in the sample. Out of the three categories, the Rotifera group was the most prevalent. In 2010, There were 24 rotifers, 9 copepods, 8 cladocerans, 4 ostracods, and 2 protozoans among the 47 taxa that were identified by T., Sevarkodiyone, S. P., Thangamani, A., Sekar, M., & Archunan, G. in Three Perennial Ponds of Virudhunagar District, Tamil Nadu. Shivashankar, & Venkataramana,¹⁶ investigating the variety and abundance of zooplankton species in Bhadra Reservoir, in the Chikkamagalur district of Karnataka, India, There were twenty-three species identified in this reservoir. Eight species (22.78%) and five species of Cladocera (22.17%), Copepods (32.13%), Ostracoda (24.69%), and five species of protozoa (13.25%) are among these rotifers. The diversity of zooplankton in the freshwater lagoon ecosystem of Patna, Bihar, India was studied by Rani¹⁴. After 38 species of zooplanktons were detected from the study sites, the majority of them were Rotifera (18 species, or 47.36%), followed by Cladocera (11 species, or 28.94%) and Copepoda (9 species, or 23.68%).

The primary zooplankton species are crucial to the functioning of freshwater ecosystems, and their variety is larger in both quantity and presence. In the aquatic food chain, zooplankton is a crucial type of plankton. Zooplankton is essential for determining how polluted a body of water is. It has become crucial to measure zooplankton populations to evaluate the health of freshwater fisheries. The presence and dominance of zooplankton species were crucial to the ecosystem's functioning, and the amount of zooplankton in the water provided valuable information about the sources of life that may support the growth of fisheries. Early knowledge of the lake's richness and productivity is provided by the study, which aids in planning, conservation efforts, and pollution levels.

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