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Study Of Zooplankton Diversity In Lanjud Dam At Buldhana District Of Maharashtra

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Abstract:

Zooplankton is essential to the trophic structure of aquatic environments and is involved in the transfer of energy. In the present investigation, a quantitative and qualitative study of the Zooplankton population of Lanjud Reservoir from 4 different sites from August 2019 to July 2020 was undertaken. It was observed that a total of 19 zooplankton species belonging to diverse groups were identified. Among them, 8 sp. belong to Rotifera, 4 sp. belong to Cladocera, 5 sp. belong to Copepoda, and 2 sp. belong to Ostracoda. Study shows that Rotifera is a dominant group (1554) followed by Cladocera (920), Copepoda (778), and Ostracoda (218).

Keywords: Lanjud Reservoir, Zooplankton, Rotifera, Buldhana

Introduction:

Zooplankton are creatures that mostly drift and float. The bulk of them are microscopic, single-celled, or multicellular species, ranging in size from a few microns to at least a millimeter. These beings vary in terms of size, physical characteristics, and taxonomic position. The Zooplankton lacks mobility or has very weak swimming ability. (Pandey *et al.*, 2013). Zooplankton can be carnivorous, meaning they eat other zooplankton, or herbivorous, meaning they eat phytoplankton. They serve as the essential link between primary production (phytoplankton) and fish since fish eat them. The absence of these key consumers would result in the collapse of herbivores and other food chain tiers (Wetzel, 2001).

The presence and quantity of zooplankton are dependent on productivity of lake, which is impacted by abiotic variables as well as the nutritional content of water. Trophodynamics and trophic development of water bodies requires an awareness of their quantity, diversity, and distribution. Plankton has lately been employed as a bioindicator to access the aquatic ecosystem and water integrity (Beaugrand *et al.*, 2000). Zooplankton are effective indicators of water quality changes due to their acute sensitivity to environmental variables and rapid response (Gannon and Stemberger, 1978).

The objective of the present study is to find out the Zooplankton diversity, exploring the seasonal and monthly differences in response to the present environmental condition of the Lanjud reservoir. Understanding the taxonomic diversity and abundance of zooplankton populations is crucial for sustainable fisheries development and water quality management.

Material and Methods-

Study area:

The Lanjud dam is situated 10 km, on Khamgaon-Nandura Highway i.e. NH 6, North-West of Lendi River and surrounded by human settlements like Parkhed, Kurha, Pimpri -Deshmukh villages and has a concern with the MIDC area. It has a catchment area of about 66.96sq km and comes under a Medium Irrigation Project and was sanctioned in 1984. The gross storage capacity of the Dam is 1.9892 mcm. It coordinates 760 –36'-00" longitudinally and 200- 00'- 45" latitudinal. The dam has a total length of 1215m with a height of about 12.55m. It was mainly constructed to supply water to MIDC Khamgaon, nearby

agriculture, and drinking water to the surrounding villages.

Fig 1: Showing the study area of Lanjud Reservoir near Khamgaon.

Methodology:

From August 2019 to July 2020, zooplankton samples were taken every month from four distinct reservoir locations. Between 7:00 and 9:00 in the morning, samples were gathered. 50 liters of water were passed transversely through a bolting silk plankton net no. 25, which has a 64-micron mesh size. The obtained samples were placed in distinct, labelled 200 ml plastic bottles and kept in 4% formalin for preservation. Photographs were taken and the samples were examined under a microscope. One milliliter of the sample was put in a "Sedgwick-Rafter cell" for the quantitative examination of zooplankton, and the results were represented in terms of organisms per liter (APHA,1998). The zooplankton qualitative analysis was carried out up to the genus or species level by using standard keys, monographs, books, and journals given by Edmondson, 1959; Battish, 1992; Murugan *et al*, 1998; Dhanapathi, 2000 and A.P.H.A.

Observation:

Table No. 1: List of zooplanktons recorded in perennial Lanjud Reservoir from August 2019 to July 2020.

Rotifera	**Copepoda**
1) *Asplanchna brightwelli* 2) *Brachionus diversicornis* 3) *Brachionus forticula* 4) *Brachionus caudatus* 5) *Keratella tropica* 6) *Lecane bulla* 7) *Lecane pyriformes* 8) *Trichocerca rattus*	1) *Cyclops bicuspidatus* 2) *Tropocyclops prassinus mexicanus* 3) *Orthocyclops modestus* 4) *Nauplius larva of cyclops* 5) *Mesocyclops edax*
Cladocera	**Ostracoda**
1) *Alona rectangular* 2) *Ceriodaphnia quadrangula* 3) *Daphnia Catawba* 4) *Diphanosoma brachyurum*	1) *Cyprinotus pellucidus* 2) *Stenocypris malcomsoni*

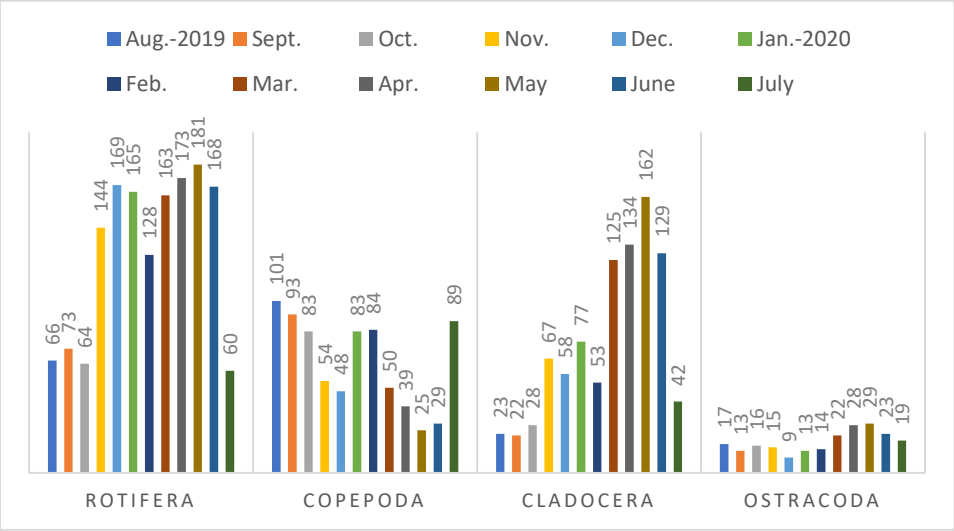

Fig. No. 2: Monthly variations in the number of Rotifera, Copepoda, Cladocera, and Ostracoda communities at Lanjud Reservoir (August 2019-July 2020).

Table No. 2: Yearly variation in zooplankton diversity indicating Shannon Weiner diversity index (H'), Evenness (E), and Richness (R) of the year 2019-20.

Sr. No.	Sites	Zooplankton		
		H	E	R
1	Site 1	2.91	2.27	6.21
2	Site 2	2.91	2.28	6.08
3	Site 3	2.82	2.21	6.14
4	Site 4	2.83	2.22	6.10

Result and Discussion:

The diversity of zooplankton found in Lanjud Reservoir between August 2019 and July 2020. Several taxa from the Cladocera, Ostracoda, Copepoda, and Rotifera families are among the noteworthy discoveries. For example, *Asplanchna brightwelli, Brachionus diversicornis, Brachionus forticula, Brachionus caudatus, Lecane bulla, Lecane pyriformes, Trichocerca rattus, and Keratella tropica* are among the eight species that make up Rotifera. Five species of Copepoda (*Cyclops bicuspidatus, Tropocyclops prassinus mexicanus, Orthocyclops modestus, Nauplius larvae of cyclops, and Mesocyclops edax*) were observed. Four species of Cladocera (*Alona rectangular, Diphanosoma brachyurum, Ceriodaphnia quadrangula, and Daphnia Catawba*) and two species of Ostracoda (*Cyprinotus pellucidus, and Stenocypris malcomsoni*) are represented.

The number of Rotifera communities varies each month, which indicates changes in the amount of zooplankton present throughout the month. With 181 individuals, rotifera populations peaked in May, and with 60 individuals in July, they reached their lowest point. Rotifera populations included 1554 individuals over the study period. Cladocera populations peaked in May with 162 individuals, and in September they had their lowest count of 22 individuals. Cladocera populations changed over the course of the research. Copepoda populations reached a maximum of 101 individuals in August and a minimum of 25 individuals in May, respectively. There were 778 individuals in the Copepoda populations during the research period. The numbers of ostracoda reached its maximum in May, when there were 29, and their lowest point was in December, when there were just 9.

Four sites in the Lanjud Reservoir were used to evaluate the annual fluctuation in zooplankton diversity, as measured by the Shannon Weiner diversity index (H'), evenness (E), and richness (R) during the 2019–20 year. An H' value of 2.91325, an E value of 2.27829, and an R-value of 6.216 were observed at Site 1 (S1). Similar diversity measures were shown by Site 2 (S2), where H' was 2.91822, E was 2.282177, and R was 6.082. While Site 4 (S4) had comparable diversity indices with H' at 2.83964, E at 2.220724, and R at 6.100, Site 3 (S3)

displayed significantly lower diversity with H' at 2.82943, E at 2.21274, and R at 6.147. These results highlighted zooplankton diversity levels that were comparatively constant. Khobragade and Kulkarni (2016) have reported 5 species of Rotifers from Salim Ali pond Aurangabad (M.S.). Kumar *et al.*, (2011) reported 3 species of ostracoda in Railway pond, Sasaram State Bihar with highest population density in summer and lowest density in monsoon season. In a study published in 2023, Can and Bozkurt found a diverse ecosystem of zooplankton in a different reservoir, identifying 87 different species. 66 rotifers (75.86%), 15 cladocerans (17.24%), and 6 copepods (6.90%) were the most common species found in this. From various Washim region sample sites, Dabhade and Chaba (2019) recorded 27 zooplankton species, comprising 11 Rotifer species, 6 Copepod, 9 Cladocera, and 1 Ostracod.

Conclusion:

The current study on Lanjud Dam shows a rich and varied zooplankton throughout the study period, with Rotifera predominating. This suggests that the wetland is especially suitable for aquaculture because of the zooplankton. This study advances our knowledge of the diversity of zooplankton in tropical floodplains generally, which is advantageous to aquaculture in natural floodplains specifically.

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