

Species Diversity of Zooplanktons from Ransai Reservoir, Uran

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Abstract: *Zooplanktons constitute an important component of freshwater ecosystems and play a significant role in maintaining aquatic food chains and ecological balance. They act as primary consumers by feeding on phytoplankton and organic matter and, in turn, serve as an important food source for fishes and other aquatic organisms. Due to their sensitivity to environmental changes, zooplanktons are widely used as biological indicators for assessing the ecological condition and water quality of aquatic ecosystems.*

The present study was undertaken to investigate the diversity and seasonal variation of zooplanktons in Ransai Dam, located in Uran Taluka of Navi Mumbai, District Raigad, Maharashtra. The investigation was carried out over a period of one year from March 2016 to February 2017. Zooplankton samples were collected regularly and analyzed to assess species composition and seasonal abundance in the freshwater ecosystem.

The zooplankton community recorded during the study was represented by five major groups namely Protozoa, Rotifera, Cladocera, Copepoda, and Ostracoda. Seasonal fluctuations in zooplankton density were observed throughout the study period, which may be attributed to variations in environmental and physicochemical conditions of the reservoir water. The occurrence of diverse zooplankton groups indicates favorable ecological conditions and good productivity of the freshwater ecosystem.

The findings of the present study provide baseline information regarding the zooplankton diversity of Ransai Dam and highlight the ecological importance of freshwater reservoirs in supporting aquatic biodiversity. Continuous monitoring of zooplankton communities is essential for understanding ecosystem health, water quality status, and sustainable management of freshwater resources.

Keywords: Zooplankton, freshwater ecosystem, Ransai Dam, biodiversity, seasonal variation, aquatic ecology.

I. INTRODUCTION

Zooplanktons are microscopic or minute free-floating aquatic animals commonly found in freshwater and marine ecosystems. They form an important component of planktonic communities and occupy a key position in aquatic food webs. Zooplanktons primarily feed on phytoplankton, bacteria, and organic detritus, thereby acting as primary consumers and transferring energy from lower trophic levels to higher trophic organisms such as fishes and aquatic invertebrates. Due to this ecological role, zooplanktons contribute significantly to nutrient cycling, energy flow, and productivity of aquatic ecosystems.

The diversity and abundance of zooplankton communities are strongly influenced by environmental conditions such as temperature, dissolved oxygen, pH, nutrient availability, transparency, and seasonal variations. Because of their rapid response to changes in physicochemical conditions, zooplanktons are considered reliable bioindicators of water quality



and ecological health. Alterations in zooplankton composition and density often reflect environmental disturbances, pollution, eutrophication, and habitat degradation in freshwater ecosystems. Therefore, studies on zooplankton diversity are important for assessing the biological productivity and ecological status of water bodies.

Zooplankton communities generally comprise a wide range of taxonomically diverse organisms including Protozoa, Rotifera, Cladocera, Copepoda, and Ostracoda. Each group has distinct ecological importance and distribution patterns within aquatic habitats. Rotifers are often dominant in nutrient-rich freshwater systems and serve as indicators of trophic conditions, whereas cladocerans and copepods play a crucial role in maintaining aquatic food chains by supporting fish populations. Protozoans contribute to microbial food webs, while ostracods are important components of benthic and planktonic communities.

Several researchers have emphasized the ecological importance of zooplankton in freshwater ecosystems. According to Pawar et al. (2006), plankton studies provide valuable information regarding the biotic potential, productivity, and overall ecological nature of water bodies. Zooplanktons also mediate the transfer of energy between primary producers and higher trophic levels, thereby maintaining ecosystem functioning. Furthermore, zooplankton diversity is often used to evaluate the suitability of freshwater habitats for fisheries and aquaculture development.

Freshwater reservoirs and dams are important aquatic ecosystems that support diverse biological communities and provide water resources for domestic, agricultural, and industrial purposes. However, increasing anthropogenic activities such as urbanization, industrialization, sewage discharge, agricultural runoff, and habitat modification may adversely affect freshwater biodiversity and ecological balance. Continuous ecological monitoring of freshwater ecosystems is therefore essential for sustainable management and conservation of aquatic resources.

Although several studies on zooplankton diversity have been conducted from different freshwater ecosystems of western India, limited information is available regarding the zooplankton diversity of freshwater reservoirs in Raigad district of Maharashtra. Ransai Dam, situated in Uran region of Navi Mumbai, represents an important freshwater ecosystem supporting aquatic biodiversity and potable water resources. However, systematic studies on zooplankton diversity from this reservoir are scarce. Therefore, the present investigation was undertaken to document the zooplankton diversity and seasonal variation in Ransai Dam and to generate baseline ecological data for future monitoring and conservation studies.

II. MATERIALS AND METHODS

Study Area

The present investigation was carried out at Ransai Dam located in Uran Tehsil of Raigad district, Maharashtra, India. Geographically, the dam is situated at 18°53'55" N latitude and 73°04'28" E longitude near Dighode village in a rural region of Uran Taluka. Ransai Dam was constructed in the year 1970 and has an approximate storage capacity of 10 million cubic meters (10 MCM). The reservoir serves as an important freshwater source supplying nearly 35 million liters per day (MLD) of water to Uran city and several nearby establishments.

The dam ecosystem supports diverse aquatic flora and fauna and plays an important role in maintaining freshwater biodiversity in the region. Owing to its ecological and economic significance, the reservoir was selected for the present study on zooplankton diversity and seasonal variation.

Collection of Samples

The study was conducted for a period of one year from March 2016 to February 2017. Zooplankton samples were collected monthly from four randomly selected sampling sites of Ransai Dam. Sampling was carried out during early



morning hours to minimize the influence of diurnal variations in plankton distribution. Water samples were collected from a depth of approximately 20 cm below the water surface following the method suggested by Hossain et al. (2007). Zooplankton collection was performed using a standard plankton net of mesh size No. 30 (41 μm). The plankton net was towed horizontally through the water for about five minutes at each sampling site to obtain representative zooplankton samples. The filtered zooplankton samples collected in the plankton bottle were carefully transferred to labeled sample containers and preserved immediately in 4% formalin solution for further laboratory analysis and identification.

Identification of Zooplankton

Preserved zooplankton samples were brought to the laboratory for detailed microscopic examination and taxonomic identification. Identification of zooplankton groups and species was carried out using standard taxonomic keys and reference literature provided by Tonapi (1980), Battish (1992), and Sudha S. (2012).

The collected zooplanktons were categorized into major groups such as Protozoa, Rotifera, Cladocera, Copepoda, and Ostracoda based on their morphological characteristics. Seasonal variations in zooplankton diversity and abundance were analyzed and recorded throughout the study period.

III. RESULTS AND DISCUSSION

The present investigation revealed considerable diversity and seasonal variation in the zooplankton community of Ransai Dam during the study period from March 2016 to February 2017. Zooplankton density and composition showed marked monthly fluctuations, which were influenced by seasonal changes and limnological characteristics of the freshwater ecosystem. Variations in physicochemical parameters such as temperature, dissolved oxygen, nutrient availability, turbidity, and transparency significantly affected the abundance and distribution of zooplankton groups in the reservoir. According to Hutchinson (1967), the type, number, and distribution of zooplanktons provide important information regarding the ecological and environmental conditions prevailing in aquatic habitats.

A total of 33 zooplankton species belonging to five major taxonomic groups were identified from Ransai Dam during the investigation. Among these, 5 species belonged to Protozoa, 10 species to Rotifera, 8 species to Cladocera, 7 species to Copepoda, and 3 species to Ostracoda. The dominance and seasonal occurrence of these groups reflected the productivity and ecological condition of the freshwater reservoir.

Protozoa

Protozoan population showed seasonal variation with maximum abundance during summer months and minimum density during the monsoon season. The low protozoan count observed during the rainy season may be attributed to dilution of reservoir water due to heavy rainfall and increased water inflow. During summer, higher temperature and increased decomposition of organic matter enriched the water with nutrients, thereby supporting greater protozoan abundance. Favorable environmental conditions such as stable temperature and reduced water turbulence during summer also contributed to increased protozoan diversity.

Rotifera

Rotifers were found to be the dominant and most diverse zooplankton group recorded during the study. Rotifer richness and abundance were highest during summer, indicating the strong influence of temperature and nutrient availability on their population dynamics. The minimum population of rotifers was recorded during monsoon and post-monsoon periods. Similar observations were reported by Pradhan et al. (2006), who documented reduced rotifer abundance during monsoon seasons in freshwater ecosystems.



Rotifers are predominantly freshwater organisms and their abundance is generally associated with favorable environmental conditions and nutrient-rich waters. The occurrence of genera such as *Keratella* and *Brachionus* in the present study indicates eutrophic or nutrient-enriched conditions within the reservoir ecosystem. Berzins and Pejler (1987) also suggested that the association of *Keratella* with *Brachionus* reflects nutrient-rich freshwater habitats. Somani and Pejaver (2003) recorded seven species of *Brachionus* from Masunda Lake, Thane, Maharashtra, highlighting the ecological importance of rotifers in freshwater reservoirs.

Cladocera

Cladocerans formed an important component of the zooplankton community and represented one of the dominant food sources for fishes in the reservoir ecosystem. Most cladoceran species are primary consumers feeding on microscopic algae, bacteria, and detrital particles, thereby contributing significantly to nutrient cycling and energy transfer in aquatic ecosystems. According to Jayabhaye and Madlapure (2006), cladocerans play a crucial role in benthic trophodynamics and ecological productivity.

In the present study, cladoceran population reached maximum abundance during summer and winter seasons. Favorable temperature, availability of food in the form of bacteria and nanoplankton, and stable environmental conditions may have supported increased cladoceran diversity during these periods. In contrast, monsoon season showed comparatively lower cladoceran density, which may be due to increased turbidity, fluctuating dissolved oxygen levels, reduced transparency, and changes in water temperature. Edmondson (1992) also reported that environmental factors such as temperature, transparency, and dissolved oxygen significantly influence cladoceran diversity and abundance.

Copepoda

Copepods were recorded throughout the study period with maximum abundance during summer months. Copepods constitute an important component of freshwater zooplankton and serve as a crucial link in aquatic food chains by transferring energy from lower trophic levels to fishes and higher organisms. The copepod diversity recorded from Ransai Dam was represented by seven species along with abundant nauplius larvae. Higher copepod abundance during summer may be attributed to increased nutrient availability, suitable temperature, and favorable environmental conditions supporting their growth and reproduction.

Ostracoda

Ostracods were represented by three species during the present study. Maximum ostracod population was observed during summer, while minimum abundance was recorded during the rainy season. Similar findings were reported by Sunkad and Patil (2004), who documented higher ostracod density during summer in Fort Lake, Belgaum, Karnataka. Increased evaporation and nutrient concentration during summer may have favored ostracod growth and reproduction in the reservoir ecosystem.

Overall, the study indicated that zooplankton diversity was highest during summer months. Higher temperature during summer increases the rate of evaporation and decomposition of organic matter, resulting in nutrient enrichment of water bodies. Such nutrient-rich conditions support greater productivity and diversity of zooplankton communities. Seasonal variation in zooplankton abundance observed in the present study reflects the ecological dynamics of the reservoir and highlights the importance of environmental factors in regulating freshwater biodiversity.



Table 1. Seasonal Distribution of Zooplankton Recorded from Ransai Dam (March 2016 – February 2017)

Abundance Scale:

+++ = Highly Abundant ++ = Moderately Abundant + = Present - = Absent

Protozoa

Sr. No.	Species	Summer	Monsoon	Post-Monsoon	Winter
1	<i>Bursaria truncatella</i>	+	+	-	-
2	<i>Chlamydomonas</i> sp.	+	-	+	+
3	<i>Diffugia</i> sp.	++	+	++	+
4	<i>Paramecium</i> sp.	++	+	+	++
5	<i>Vorticella</i> sp.	++	-	++	+

Rotifera

Sr. No.	Species	Summer	Monsoon	Post-Monsoon	Winter
1	<i>Anuraeopsis</i> sp.	++	-	-	-
2	<i>Brachionus angularis</i>	++	+	-	++
3	<i>Brachionus calyciflorus</i>	++	+	+	+
4	<i>Brachionus forficula</i>	++	+	++	++
5	<i>Brachionus havanaensis</i>	++	-	+	+
6	<i>Brachionus quadricornis</i>	++	+	-	++
7	<i>Keratella tropica</i>	++	+	-	-
8	<i>Keratella valga</i>	++	+	++	+
9	<i>Synchaeta pectinata</i>	+	-	-	++
10	<i>Trichocerca cylindrica</i>	++	-	-	++

Cladocera

Sr. No.	Species	Summer	Monsoon	Post-Monsoon	Winter
1	<i>Bosminopsis</i> sp.	+	-	+	++
2	<i>Camptocercus</i> sp.	++	-	-	+
3	<i>Diaphanosoma sarsi</i>	-	-	+	++
4	<i>Daphnia</i> sp.	++	-	++	+
5	<i>Moina micrura</i>	+	-	+	+
6	<i>Pleuroxus denticulatus</i>	+	-	+	++
7	<i>Pleuroxus procurvus</i>	+	-	-	++
8	<i>Simocephalus vetulus</i>	++	-	-	+

Copepoda

Sr. No.	Species	Summer	Monsoon	Post-Monsoon	Winter
1	<i>Cyclops viridis</i>	++	++	++	+
2	Copepod Nauplius	+++	+	++	+
3	<i>Diaptomus</i> sp.	+	+	+	++
4	<i>Mesocyclops leuckarti</i>	+	+	++	+
5	<i>Paracyclops</i> sp.	++	+	++	+
6	<i>Neodiaptomus</i> sp.	+	+	+	+
7	<i>Thermocyclops</i> sp.	+	+	++	+

Ostracoda

Sr. No.	Species	Summer	Monsoon	Post-Monsoon	Winter
1	<i>Candona</i> sp.	+	-	-	-
2	<i>Cypris</i> spp.	+	-	-	+
3	<i>Stenocypris</i> sp.	++	-	++	+



Summary of Zooplankton Diversity

Zooplankton Group	Number of Species Recorded
Protozoa	5
Rotifera	10
Cladocera	8
Copepoda	7
Ostracoda	3
Total Species Recorded	33

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