

# Zooplankton Diversity and Seasonal Variation of Kakaddhaba Dam, District Hingoli, Maharashtra State, India

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**Abstract:** The present investigation deals with zooplankton diversity and seasonal variation of Kakadhaba Dam, District Hingoli, Maharashtra, the study was conducted over one year, from January 2023 to December 2023. Study reveals that a total of 29 species were found in this reservoir. Among these, Copepods comprise 11 species (33.79%), Rotifers 9 (22.83%), Cladocera 7 (22.75%), and Ostracoda 2 (20.61%). The season-wise zooplankton analysis showed that the population was highest during summer, followed by monsoon, and lowest during winter.

**Keywords:** Kakaddhaba Dam, Zooplankton, Seasonal variation, and Diversity.

## 1. Introduction

Zooplankton are a diverse group of microscopic and macroscopic heterotrophic organisms that drift in aquatic environments, including oceans, seas, lakes, and rivers. They play an important role in aquatic ecosystems as primary consumers, feeding on phytoplankton and transferring energy to higher trophic levels such as fish and other aquatic animals.

The zooplanktons are key component of the food web, and their qualitative and quantitative studies play an important role in the water quality assessment. They are an important component of secondary production in aquatic system and act as primary consumers and constitute an important link between primary producers (phytoplankton) and higher consumers like carnivore fish in aquatic food chain (Pradhan, 2014). Functioning of any aquatic system depends to a great extent on the physico-chemical characteristics of water (Sharmila and Rajeswari, 2015). The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem (Pandit and Solanki, 2004 and Thirupathaiah et al., 2012) and it also helps in determining the health of the water body (Shinde et al., 2011).

Some of the works which have been carried out regarding zooplankton by Paterson, (2001), Iloba (2002), Ibrahim (2009) Rajkumar T. Pawar (2016, 2020). Due to their high population density, short life span, mobility, species diversity, and sensitivity to environmental stressors, zooplankton are widely used as bioindicators of physical, chemical, and biological processes in aquatic ecosystems (Gadekar, 2020). Their abundance and composition vary across sites even under seemingly similar ecological conditions (Boyd, 1982). Particularly, rotifer populations are strongly influenced by both abiotic and biotic environmental factors (Karuthapandi et al., 2013).

Zooplankton diversity and seasonal variation of Kakadhaba Dam were used to the consequences indicates the

prosperity of aquatic ecosystem which useful for the aquaculture management practices.

## 2. Material and Methods

### Study Area

The dam location about 20 km. away from Hingoli district. The basin bounded by Latitude 77°8'-10" Longitude 19°34'-5'. The Basin is Godavari River and Sub-Basin is Kayadhu River. The dam is constructed during 1985. The catchment area of dam is 23.60 Sq. Km., Gross storage 2.48 mm<sup>3</sup>. The study of the basin area related with Biodiversity and Ecological features on different aspects.

### Collection of sample, preservation, Identification:

Water samples were collected randomly in different four selected site of the dam on monthly basis for a period of one year from January 2023 to December 2023. A collection of Zooplankton was carried out by using a plankton net. Sampling was made between 8.00 am to 10.00 am. By Plankton net (mesh size 25 µm) was swept through the surface water. 100 litres of surface water were sieved through the plankton net and filtered samples were transferred to plastic containers and 4% formalin was added for sample preservation. These samples were then brought to laboratory for further studies.

The systematic identification of plankton was made by using standard keys of Adoni (1985), IAAB (1998), Michael and Sharma (1988), Krishnaswamy (1973), Edmondson (1959), Pennak (1968), Dhanapathi (2000), Altaff (2004).

## 3. Results and Discussion

Four different groups of zooplankton such as Copepoda, Rotifera, Cladocera and Ostracoda were represented the zooplankton community in Kakaddhaba Dam. A total of 29 zooplankton species were collected during the period of sampling. Among these zooplankton communities, copepodes were the richest group with 11 species, followed by rotifers (9 species), cladocerans (7 species) and ostracoda

(2 species). (Table1). A similar investigation are made by Mourya et al. (2024) reported 24 zooplankton species in Ramoua Dam, also highlighting Rotifera as the dominant group throughout the study in Gwalior district, Madhya Pradesh. Also Tiwari et.al., (2025) similar observation made the total of 29 zooplankton species were recorded, classified into five major groups: Protozoa (3 species), Rotifera (12 species), Copepoda (5 species), Ostracoda (4 species), and Cladocera (5 species). The Study revealed the monthly variation zooplankton diversity is represented in Table 2.

The total numbers of species recorded were 10178.75 of which copepods 3440.25 (33.79%), rotifers are 2324.50 (22.83%), Cladocerons 2316 (22.75%) and Ostracods 2098 (20.61%) Table 3. Similar investigation by Mourya et al. (2024) reported Total 2353 individual number of zooplankton recorded belonging to different groups. Out of them, higher population of zooplankton (226) was recorded in the month of November while less number of zooplankton populations (173) was recorded in the month of October. Rotifera group was reported to be dominant among all other Zooplankton groups with 1210 (617.94 %) numbers followed by protozoa group with 449 (228.27%) numbers, Copepoda group with 311 (158.99%) numbers, Ostracoda group with 223 (111.9%) and Cladocera group with 160 (82.69%).

The present study the occurrence of season wise zooplankton groups was dominant in the following increasing order Table 4.

Summer : Copepoda > Rotifera > Cladocera > Ostracoda

Rainy : Copepoda > Rotifera > Cladocera > Ostracoda

Winter : Copepoda > Cladocera > Ostracoda > Rotifera

Zooplanktons are small animals that float freely in the water column of lakes, reservoirs and oceans and those

distributions are primarily determined by water movements and mixing. The zooplankton fauna of this water body comprises four major groups, viz. Copepoda, Rotifera, Cladocera, and Ostracoda. All these groups of zooplankton showed highest density in summer months, followed by monsoon and lowest during winter. In summer highest density due to higher temperature, higher standing crop of primary producers leading to availability of food, higher alkalinity and less quantity of water (dilution effect), simultaneously, dissolved oxygen and hardness of water were also favourable for planktonic growth. A strong and significant correlation was found between zooplankton and phytoplankton.

Normally, winter and monsoon are associated with lower densities due to their dilution effect and decreased photosynthetic activities by primary production. Similar results were reported by Salve and Hiware (2010) in Wanprakalpa reservoir of Nagapur (M.S.), Khare (2005) observed an increasing trend in the months of winter season with peak during summer months, March to June. He recorded the minimum population during the rainy season. Kadam et al., (2006) observed maximum number of rotifers during summer season. Also similar observation was made by Dushyantkumar Sharma (2012), seasonal variations were observed in the distribution of zooplankton. Seasonally, the number was highest during summer, followed by monsoon and lowest during winter. Verma et al. (2013) also observed monthly fluctuations in zooplankton abundance in a freshwater body, Futera Anthropogenic Pond, Damoh District. Similarly, Manickam et al. (2014) reported seasonal changes in zooplankton diversity in a perennial reservoir at Thoppaiyar, Dharmapuri District, South India. These findings align with the current study, where species diversity index values of the major zooplankton groups showed monthly and seasonal variations.

**Table 1:** Checklist of Zooplankton from Kakad Dhaba Dam

Rotifera	Cladocera	Copepoda	Ostracoda
<i>Philodina gregaria</i>	<i>Ceriodaphnia dubia</i>	<i>Mesocyclops leuckarti</i>	<i>Heterocypris incongruens</i>
<i>Branchionus rubens</i>	<i>Ceriodaphnia rigaudi</i>	<i>Macrocyclops albidus</i>	<i>Eucypris virens</i>
<i>Euchlanis dilatata</i>	<i>Pleuroxus striatus</i>	<i>Macrocyclops fuscus</i>	
<i>Trichocerca pusilla</i>	<i>Bosmania deitersi</i>	<i>Macrocyclops distinctus</i>	
<i>Branchionus urceolaris</i>	<i>Diphanosoma celebensis</i>	<i>Macrocyclops macrurus</i>	
<i>Branchionus forficula</i>	<i>Daphnia magna</i>	<i>Cyclops elegans</i>	
<i>Branchionus caudatus</i>	<i>Chydorus sphaericus</i>	<i>Cyclops roseus</i>	
<i>Tripleuchlanis plicata</i>		<i>Cyclops strenuus</i>	
<i>Keratella procurva</i>		<i>Eucyclops agilis</i>	
		<i>Eucyclops serrulatus</i>	
		<i>Eucyclops speratus</i>	

**Table 2:** Monthly variation of zooplankton (No./Lit) at three stations of Kakad Dhaba Dam, Maharashtra.

Month/ Stations	Copepods				Rotifera				Cladocera				Ostracods			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Jan	235	239	225	224	199	197	188	199	178	180	198	190	161	156	160	169
Feb	270	267	245	249	198	190	198	200	198	187	196	192	180	176	140	165
Mar	290	298	279	287	201	200	219	221	200	201	202	200	190	200	221	201
Apr	325	329	398	378	222	235	240	251	239	248	249	248	223	245	267	278
May	457	488	490	488	369	357	340	345	278	290	298	290	211	243	257	289
Jun	421	400	388	398	267	252	239	378	201	190	199	179	190	195	166	158
Jul	339	342	359	378	200	199	198	188	189	179	193	192	150	159	150	145
Aug	292	278	248	275	140	122	145	152	146	155	155	166	155	160	149	145
Sept	200	200	190	192	122	141	124	146	165	173	195	178	156	149	166	168
Oct	224	235	230	222	162	125	106	109	126	140	143	154	156	120	150	152
Nov	189	179	200	198	165	141	121	102	149	168	142	198	140	154	148	150

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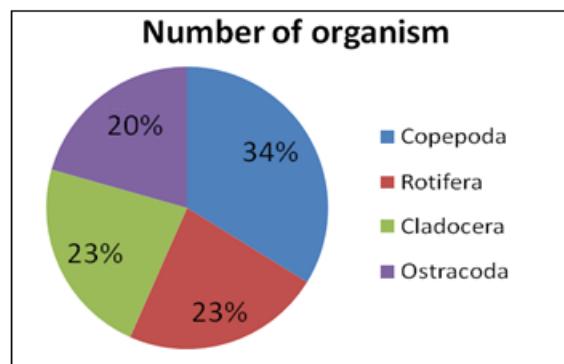
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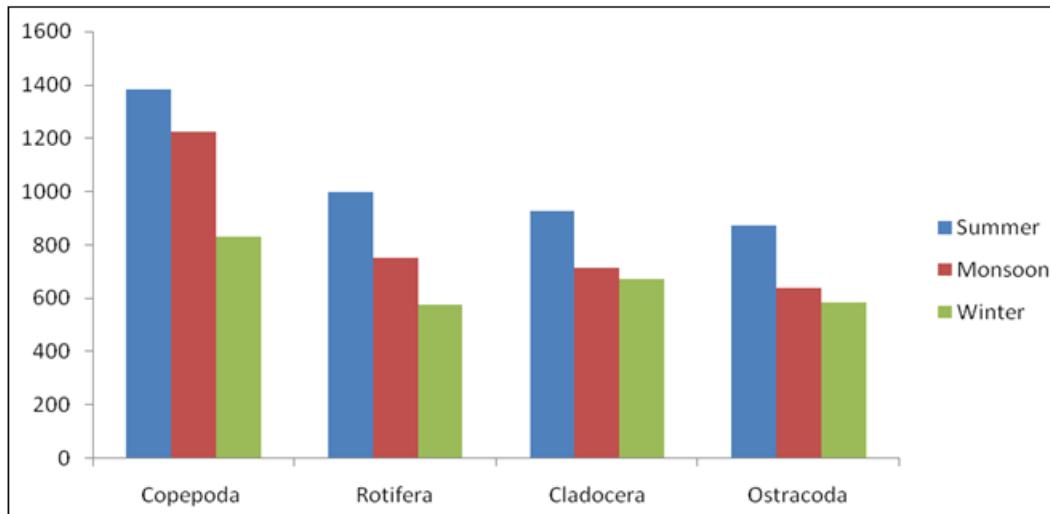
Dec	146	200	179	198	155	109	110	111	175	185	189	178	116	122	165	126
Total	3388	3455	3431	3487	2400	2268	2228	2402	2244	2296	2359	2365	2028	2079	2139	2146
Mean	3440.25				2324.5				2316				2098			

**Table 3:** Zooplankton variation of Kakaddhaba Dam during January 2023 to December 2023

Sr. No.	Group	Number of Organism	Percentage
1	Copepoda	3440.25	33.79%
2	Rotifera	2324.5	22.83%
3	Cladocera	2316	22.75%
4	Ostracoda	2098	20.61%

**Figure 1:** Shows the zooplankton variation of Kakad Dhaba Dam**Table 4:** Groupwise seasonal variation of zooplankton in Kakad Dhaba Dam during January 2023 to December 2023.

S. No.	Seasons	Copepoda	Rotifera	Cladocera	Ostracoda
1	Summer	1384.50	996.50	929	871.50
2	Monsoon	1225	753.25	713.75	640.25
3	Winter	830.75	574.75	673.25	586.25

**Figure 2:** Shows Groupwise seasonal variation of zooplankton in Kakad Dhaba

#### 4. Conclusion

The present study reveals seasonal variation in the diversity and distribution of zooplankton in Kakad Dhaba Dam. All four groups of zooplankton were recorded throughout the study period. The number was highest during the summer and lowest during winter. The study indicates that temperature has an important role in the distribution of zooplankton in a freshwater habitat.

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