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## Zooplankton diversity in Gagnai dam, Marwahi block, GPM (Chhattisgarh)

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### Abstract

The Gagnai dam is situated in the Marwahi block of GPM, Chhattisgarh. This investigation examines the monthly variations in the diversity and density of zooplankton in Gagnai Dam. The project was conducted for a duration of one year, from June 2023 to May 2024. The zooplankton population comprised 30 genera. Cladocera comprised the predominant group at 46.67%, followed by Rotifera at 40.00% and Copepoda at 13.33% of the total zooplankton.

**Keywords:** Zooplankton, diversity, Rotifera, density

### Introductions

Ecologically, zooplankton represent a crucial biotic component and a diverse group of heterotrophic creatures that consume phytoplankton, replenish nutrients through their metabolism, and transfer energy to higher trophic levels. It plays a crucial role in nutrient recycling and energy cycling within their respective environments. The primary sources of natural food for fish, directly linked to their survival and growth, constitute the foundation of food chains and food webs in all aquatic ecosystems. Zooplankton varies from site to site within identical biological conditions; hence, both qualitative and quantitative analyses of zooplankton in a water body are crucial for effective aquaculture management. Zooplankton serves as an effective indicator of water quality alterations due to its significant sensitivity to environmental circumstances, responding rapidly to variations in both physical and chemical parameters. Zooplankton communities react to numerous stressors, including fertilizer loading, acidification, and sediment input. It is an apt instrument for comprehending the situation of water pollution (Contreras *et al.* 2009) <sup>[1]</sup>. The abundance and variety of zooplankton in freshwater ecosystems are regulated by many variables. Temperature, dissolved oxygen, and organic matter are critical elements that regulate zooplankton growth. Bhakti and Rana (1987) <sup>[2]</sup> Numerous studies have employed several zooplankton groups to assess the trophic state and contamination potential of aquatic environments. This study aimed to document the zooplankton diversity of Gagnai Dam, District GPM.

### Materials and Methods

#### Location of study area

Gagnai dam located in the Marwahi block of GPM (Chhattisgarh). According to Census 2011 information the location code or village code of Bharridand village is 437574. Bharridand village is located in Marwahi tehsil of GPM (Chhattisgarh), India. It is situated 12km away from sub-district headquarter Marwahi (tehsil office) and 123 Km away from district headquarter Bilaspur. As per 2009 stats, Bharridand village is also a gram panchayat. The present aquatic body "Gagnai dam" was constructed in the year 1972 on local nala of Gangnal nala of Pendra road district GPM. It is situated 22°-54'-45" latitude and 82°-01'-36" longitude. The height of the dam is 14.65 mt. and length 330 mts. Mainly the water of this dam is used for irrigation and fish culturing.

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**Fig 1:** Showing map Gagnai dam, Marwahi block, GPM (Chhattisgarh)

**Zooplankton sampling**

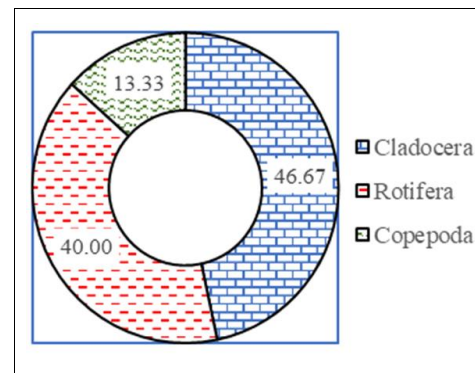
The study was conducted for a period of one year from June 2023 to May 2024. Zooplankton were sampled weekly from the site following standard method of Battish (1992) [3]. Then the sample were filtered and placed in Tarson (100 ml) Container, subsequently fixed in Lugol’s Solution and stored in cool and dark place. For studying the diversity of zooplankton sample were taken in Sedgwick Rafter counting chamber & observed under a light microscope under required magnification (X 10 initially followed X 40) & the specimen were identified following literature of Battish (1992) [3], Edmondson (1959) [4], Michael and Sharma (1998) [5], Sharma & Sharma (2008) [6].

**Results and Discussion**

In the current study, 30 taxa of zooplankton were identified from the marsh, classified into three groups: Rotifera, Cladocera, and Copepoda. Of the documented genera, 12

are classified under Rotifera, 4 under Copepoda, and 14 under Cladocera. Many researchers across the country made similar observations. Kar & Kar (2013) [7] documented 26 species of zooplankton from an Oxbow Lake in Cachar, Assam. Tyor *et al.* (2014) [8] investigated zooplankton diversity in a small lake in Gurgaon, Haryana, discovering that Rotifera had the maximum diversity, followed by Cladocera, with Copepoda demonstrating the least diversity. Mishra (2024) [9] found 26 species of zooplankton in the Kori Dam of Bilaspur, Chhattisgarh, India.

The abandoned status of zooplankton in the group recorded from Gagnai Dam is illustrated in Table 1. The current study demonstrated that the freshwater body examined had 14 genera of Cladocera, 4 genera of Copepoda, and 12 genera of Rotifera. Cladocera comprised the predominant group at 46.67%, followed by Rotifera at 40.00% and Copepoda at 13.33% of the total zooplankton (Fig. 2). Various zooplankton species exhibited abundance in response to favorable conditions.



**Fig 2:** Percentage variation of zooplankton in Gagnai dam.

**Table 1:** Monthly variation of zooplankton in Gagnai dam from June 2023 to May 2024

Class	Genera	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Cladocera	<i>Alona sp.</i>	+	+	+	+	+	+	-	+	+	+	+	+
	<i>Alonella sp.</i>	+	+	+	+	+	-	+	-	+	+	+	+
	<i>Bosmina sp.</i>	-	+	+	+	+	+	+	+	+	+	-	+
	<i>Bosminopsis sp.</i>	+	+	+	-	-	+	+	+	+	-	+	+
	<i>Ceriodaphnia sp.</i>	+	+	+	+	-	-	-	+	+	+	+	+
	<i>Chydorus ciliates</i>	+	+	+	-	+	-	+	+	+	+	+	+
	<i>Chydorus sp.</i>	+	+	+	+	+	+	+	+	-	+	+	+
	<i>Daphania sp.</i>	+	+	+	+	+	+	+	+	+	+	+	+
	<i>Diaphanosoma sp.</i>	+	+	+	+	-	+	+	-	-	+	+	+
	<i>Macrothris sp.</i>	-	-	+	+	+	-	-	+	+	+	+	-
	<i>Moina daphania sp.</i>	+	-	+	+	+	+	+	-	-	+	+	+
	<i>Monia sp.</i>	+	+	-	-	-	+	+	+	+	+	+	+
	<i>Scapholeberis sp.</i>	+	+	-	+	+	+	+	+	+	+	+	+
	<i>Sida sp.</i>	+	+	+	+	+	+	+	+	+	+	+	+
Copepoda	<i>Heliodiaptomus sp.</i>	+	+	+	+	+	+	+	+	+	+	-	+
	<i>Mesocyclops sp.</i>	+	+	+	+	-	+	+	+	-	+	+	+
	<i>Nauplius sp.</i>	+	+	+	-	+	+	+	+	-	+	+	+
	<i>Thermocyclops sp.</i>	+	+	+	+	+	+	-	+	+	+	-	+
Rotifera	<i>Ascomorpha sp.</i>	-	+	+	+	+	-	-	-	-	+	+	+
	<i>Brachionus sp.</i>	-	+	+	+	+	+	+	+	+	+	+	-
	<i>Cephalodella sp.</i>	+	+	+	+	+	+	+	+	+	-	+	+
	<i>Filinia sp.</i>	-	+	+	+	+	+	+	+	+	+	+	+
	<i>Keratella sp.</i>	+	+	+	+	+	+	+	+	+	+	-	-
	<i>Lacana sp.</i>	+	+	+	+	+	+	+	+	+	+	-	+
	<i>Lepadella sp.</i>	-	+	+	+	+	+	+	+	-	-	+	+
	<i>Mytilina sp.</i>	+	-	+	+	+	+	+	+	-	+	-	+
	<i>Polyarthra sp.</i>	+	+	+	-	-	-	+	+	+	-	+	+
	<i>Rotaria sp.</i>	-	-	+	-	-	+	-	+	+	-	+	-
	<i>Scaridum sp.</i>	+	+	+	-	-	+	+	+	-	+	+	+
	<i>Testudinella sp.</i>	-	+	+	+	+	+	+	+	+	+	+	-

The Population density status of Zooplankton recorded from Gagnai Dam is depicted Table - 1. During the study period among Cladocera- *Sida species*, *Alona species*, *Bosmina sp.*, *Daphnia*, *Diaphanosoma*, *Chydorus cillites*, *Moina sp.*, recorded throughout the year and among Rotifera *Keratella sp.*, *Lacane sp.* *Brachionus Mytilina*, *Cyphalodella sp.*, *Rotaria sp.* *Scardium sp.* Were recorded throughout the year and Copepoda - *Nauplius and Mesocyclops* were recorded throughout the year. Present investigation reveals high value of species richness reflecting the suitability of the wetland for the dominant species (Arora & Mehra 2003) <sup>[10]</sup>. In the present study the site was characterized by greater diversity of zooplankton taxa during winter season.

In the current study, the Rotifera group was shown to be predominant among all other zooplankton groups. The dominance of the rotifer group is a common trait in tropical freshwater wetlands. The current examination demonstrated that the population density of the Rotifera group observed at the study site fluctuates across different seasons. The density was reported to be at its peak in December. The density of Rotifera was succeeded by Cladocera and subsequently by Copepoda, mirroring the findings of Tyor *et al.* (2014) <sup>[8]</sup> in their investigation of zooplankton diversity in a shallow lake in Gurgaon, Haryana, where Rotifera was followed by Cladocera and then Copepoda, exhibiting minimal diversity and dominance, with merely four genera comprising 20% of the total zooplankton population.

### Conclusion

The current investigation of Gagnai Dam demonstrates a diverse and abundant zooplankton community, predominantly consisting of Rotifera throughout the study duration. This indicates that the wetland is highly conducive to aquaculture, as zooplankton, especially rotifers, are recognized as optimal nourishment for fish larvae in aquaculture. The study significantly contributes to understanding the diversity of zooplankton in tropical floodplains, which is particularly beneficial for sustaining aquaculture in natural floodplain environments. Therefore, considering the significance of the study, measures should be implemented for the conservation and maintenance of freshwater wetlands.

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