



Assessment of Zooplankton Density in Khajikotnoor Reservoir, Kalaburagi District, Karnataka

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ABSTRACT: Zooplankton are of prime importance in aquatic systems, playing vital roles as water-quality indicators and having significant influences on food web dynamics. This paper examines the abundance and diversity of zooplankton species in the Khajikotnoor reservoir, which is a vital freshwater body in Khajikotnoor village, Kalaburagi District, Karnataka. The sampling was conducted from January 2024 to December 2024 using conventional methods for the collection of plankton. Later, the zooplanktons collected were analyzed and grouped up to the species level. A total of 26 different zooplankton species were documented. They were grouped under principal groups consisting of Rotifers, Cladocera, Copepods, and Ostracoda. Among them, Rotifers turned out to be the dominant group. The results indicate that the Khajikotnoor reservoir harbours a very diverse population of zooplankton with a relatively healthy aquatic ecosystem. But human activities and eutrophication pose potential threats to the reservoir's biodiversity. This research highlights the significance of continuous monitoring of zooplankton diversity as a bioindicator in assessing ecological well-being and formulating conservation strategies to protect the aquatic biodiversity of the reservoir.

KEYWORDS: Aquatic ecosystem, Copepods, Cladocera, Khajikotnoor reservoir, Rotifers, Zooplankton diversity.

INTRODUCTION

Aquatic systems like lakes, reservoirs, rivers, and wetlands are some of the most productive and biodegradable habitats on earth, and they offer critical ecosystem services like food supply from fisheries, water storage, nutrient cycling, and climate regulation [10]. These aquatic systems are very vulnerable to human-made alterations such as eutrophication, pollution, and climatic stress. Under these conditions, zooplankton play a fundamental ecological role, connecting primary producers to the higher levels of trophics and making significant contributions to organic matter decomposition and nutrient cycling [10].

Zooplankton, tiny heterotrophic animals dwelling in the water column, play a central role in energy transfer in aquatic foodwebs [11]. Their metabolic processes, such as sloppy feeding and defecation, unload dissolved organic matter and nutrients that power microbial processes and maintain ecosystem productivity [11].

Additionally, zooplankton are generally used as sensitive water quality bioindicators. Several studies report strong correlations between environmental stressors such as nutrient enrichment, temperature fluctuations, and pollution and changes in zooplankton community structure e.g., species composition, density, and diversity indices (Shannon–Wiener, Pielou's evenness). In Indian inland waters, zooplankton research has reported intense seasonal differences and community alterations due to trophic status and environmental modifications. Similarly, investigations of the Karanja Reservoir in Bidar District, reported 36 species and noted community changes linked to physicochemical parameters across seasons [3]. In six freshwater bodies of Dharwad district, it was observed significant alterations in zooplankton composition with changes in trophic status, reinforcing their value as ecological indicators [2].

Khajikotnoor Reservoir in Kalaburagi District, Karnataka, sustains a rich biota-including fish, plants, insects, and migratory birds-but information about its zooplankton community is limited. Given the ecological and socioeconomic importance of this reservoir, a systematic investigation of its zooplankton community structure is timely. Therefore, this study aims to document diversity and composition of zooplankton in the Khajikotnoor Reservoir. This work will establish a reference baseline and facilitate future comparative studies, conservation planning, and resource management for this freshwater system.

MATERIALS AND METHODS

Study Area and Sample Collection

The Khajikotnour reservoir is located 17 KM towards East from District headquarters Gulbarga ($17^{\circ}21'49.9''N$ $76^{\circ}57'55.9''E$). Four sampling sites were identified based on accessibility and the water samples were collected from all the four sampling sites on monthly basis over a period of one year from January 2024 to December 2024 using conventional techniques for collecting plankton. The samples were preserved in 4% formalin on the site and brought back to laboratory for further analysis

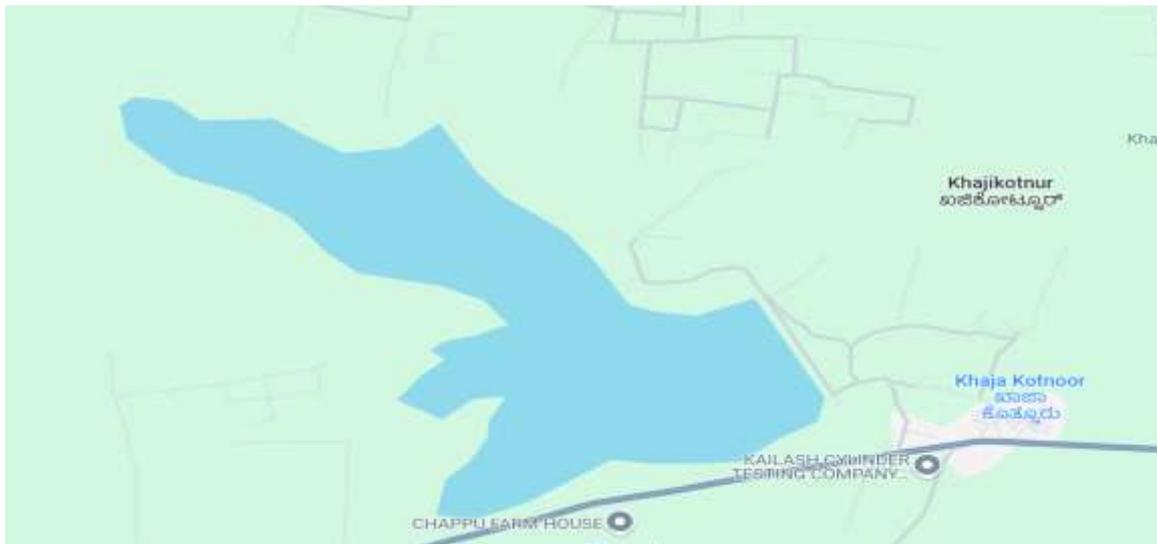


Figure 1. Khajikotnour, Kalaburagi

Zooplankton Analysis

The samples were transferred to the laboratory for further analysis, the samples were analysed using stereomicroscope (Olympus SZX7). The zooplanktons were identified to the species level using standard identification keys.

RESULTS AND DISCUSSION

Twenty-six different species of zooplankton were identified during the period of study. The identified zooplanktons were classified into Rotifers, Cladocera, Copepods, and Ostracoda. Out of 26 species, 10 species of rotifers were found, Cladocera comprises 8 species, copepods comprise of 5 species and Ostracoda comprises 3 species.

Rotifera

Rotifers dominated the community throughout the study, consistent with patterns documented in Ukkadam Lake and Karanja Reservoir, where Rotifera accounted for over 50–60 % of total abundance [3][5]. Their dominance is likely due to Rapid reproductive cycles and small size, allowing fast population growth, Broad dietary range, enabling efficient resource use. Environmental resilience, with high tolerance to temperature and nutrient fluctuations. Rotifer densities peaked during the pre-monsoon season, when temperature and phytoplankton availability were highest, and declined in winter, aligning with findings from Ukkadam Lake [5].

Cladocerans

Cladocerans, with 8 species, represented the second-largest group. Their densities also peaked in pre-monsoon and declined in winter, underscoring temperature's role as a key driver of seasonal abundance [2][7]. In the Samudrabundh pond, Bankura, Cladocera often dominated in warmer months (46 %), indicating productivity-supported abundance [6].

Copepoda

Five copepod species were recorded. Although less abundant, their presence signifies relatively stable conditions, as copepods tend to thrive in moderately nutrient-rich waters [5][7]. In Ukkadam Lake, Copepoda comprised 16 % of the community similar to our observations peaking in summer [5].



Ostracoda

Ostracods with 3 species were the least represented, likely due to their benthic habitat preference and the limitations of plankton nets in sampling bottom-dwellers a pattern mirrored in other reservoir studies [3].

The dominance of rotifers and cladocerans, especially during pre-monsoon, reflects a highly productive reservoir with nutrient pulses. Seasonal declines during monsoon reveal system sensitivity to hydrological disturbances. These characteristics position zooplankton as early-warning indicators for shifts in trophic dynamics, mirroring observations from studies in Ukkadam, Bhadra, and Samudrabundh ecosystems [5][7]. Our findings reaffirm that seasonality particularly temperature, nutrient availability, and hydrological fluctuations—is the primary driver behind zooplankton dynamics in Khajikotnoor Reservoir. The observed seasonal cycles are consistent with multiple Indian freshwater studies, supporting the conclusion that zooplankton communities are valuable indicators of ecosystem health.

CONCLUSION

The present study provides a comprehensive assessment of zooplankton diversity and composition in the Khajikotnoor Reservoir, highlighting its ecological richness and seasonal dynamics. A total of 26 zooplankton species were documented, with Rotifers emerging as the dominant group, followed by Cladocerans, Copepods, and Ostracods. The observed seasonal variations in species abundance particularly the pre-monsoon peak and monsoon-related declines underscore the influence of environmental factors such as temperature, nutrient availability, and hydrological changes on zooplankton communities.

These results confirm the use of zooplankton as valid bioindicators of the health of aquatic ecosystems. The moderate degree of diversity and proportionate representation among the diverse groups indicate that the Khajikotnoor Reservoir is presently in a productive and fairly stable ecological state. The same conclusions were reached by [14] who highlighted the significance of zooplankton diversity as an imperative indicator of water quality and ecological balance of freshwater systems. Not only does this research set a useful baseline for future comparative studies, but it also spurs the necessity for the implementation of integrated management procedures in order to preserve the aquatic biodiversity of the Khajikotnoor Reservoir.

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