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Full Length Research Paper

Zooplankton Community composition of Gowrikere tank, Anandapura, Sagara, Shivamogga, Karnataka, India

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ARTICLE DETAILS

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ABSTRACT

Zooplanktons are tiny organisms that play an important role in aquatic ecosystems and are considered bio indicators of water quality. In this study, the composition and diversity of zooplankton in Gowrikere tank, Shivamogga district were assessed using a standard methodology. Sampling was carried out at three selected stations from March 2022 to April 2023. A total of 16 species belonging to 14 genera were recorded of which rotifers and cladocerans were dominant. The study revealed that, the tank water should not be used by human beings for drinking and cooking. There is an urgent need of action plan for the conservation of the Murughamatta tank.

1. Introduction

The zooplanktons include animals suspended in water with limited powers of locomotion. Zooplankton assume a great ecological significance in aquatic ecosystem as they play vital role in food web of the pond chain, nutrient recycling, and in transfer of organic matter from primary producers to secondary consumers like fishes (Krishnamurthy *et al.,* 1979). The zooplankton determine then quantum of fish stock. The failure of fishery resources is attributed to the reduced zooplankton population (Stottrup, 2000).

Zooplankton supports the economically important fish population. They are the major mode of energy transfer between phytoplankton and fish. The Zooplankton community is composed of both primary consumers which eat phytoplankton and secondary consumers which feed on the other zooplankton. They provide a direct link between primary producers and higher trophic levels like fish. Nearly all fishes depend on zooplankton for food during their larval phases and some fishes consume to eat zooplankton throughout their entire lives (Madin *et al*., 2001). Zooplankton acts as main source of food for many fishes and plays an important role in early detection and monitoring the pollution of waster (Nagabhush Reddy *et al.,* 2020). Zooplankton community distribution depends on some complex factors viz, change of climatic conditions, physical and chemical parameters and vegetation. Zooplankton exhibits bimodal oscillation in a spring and autumn in the temperate lakes and reservoirs. This fluctuation is greatly influenced by variations in the temperature along with many other factors. Among several factors, temperature seems to exhibit the greatest influence on the periodicity of zooplanktons (Thirupathaiah *et al.,* 2012). The present study was undertaken to investigate the diversity of zooplankton in Gowrikere tank of Anandapura.

2. Materials and Methods

2.1 Study area

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Gowrikere tank (Anandapura tank) is a perennial freshwater body situated at about 16 km away from the Sagara town, located between 14° 4' N latitude and 75° 38' E longitude. This is a medium sized tank, with a total waster spread of 27.79 hectare, where rain is the main source of water. The river basin of the tank is Krishna. The water has undergone moderate changes in the physico-chemical properties due to overflowing of water from adjacent paddy fields and other excessive human activities. The water is used for agricultural purpose and domestic activities.

2.2 Plankton Analysis

The zooplankton samples were collected by plankton net of mesh size 50 microns. Further, these samples were fixed in 4% formaldehyde and identification of zooplankton was done with the help of monographs and workshop manual (Needham and Needham, 1941; Battish, 1992).

3. Results and Discussion

A total of 16 species belonging to 14 genera were recorded in the study area. The obtained zooplankton forms were represented by four group's viz. Cladocera, Copepoda, Rotifera and Protozoa. Among these, Rotifera comprises 5 species, Cladocera and Copepoda comprises four species each. Protozoa comprises three species. All the dominant group of zooplankton was present throughout the year. Genus composition of different zooplankton groups are depicted in Figs. 1-4. Zooplankton showed a dominant position of Rotifers members (31.12%), followed by Cladocera (25%), Copepoda (25%) and Protozoa (18.75%). Genus compositions of different genera are shown Figs. 1-4.

Rajgopal *et al*. (2010) has described 24 genera of Rotifers, 8 genera of Cladocera, 9 genera of Copepoda in perennial ponds of Virudhunagar district, Tamilnadu. Mulani *et al.* (2009) reported; 6 genera of Protozoa, 36 genera of Rotifers, 5 genera of Cladocera, 8 genera of Copepoda in Panchganga river, Kolhapur. Purushothama *et al.* (2011) reported 5 genera of Cladocera, 5 genera of Copepoda, 2 genera of Rotifers and 2 genera of Protozoa in Heggere tank of Sagara taluk of Shivamogga district.

In the Present investigation, Rotifera invariably constitute a dominant component of tank. Rotifers are smallest animals and occur worldwide in primarily freshwater habitats. They are important in freshwater ecosystem as they occur in all biotypes (Purushothama *et al.* 2011) About 90% of the rotifers are encountered in freshwater, while 5% are from brackish or marine waters and most are free living. Like the other zooplankton, rotifers also form a link in the aquatic food chain. They have a rapid turnover and high metabolic rates and feed on detritus. The organisms serve as bioindicators to depict water quality and are extensively cultured for use as fish feed. Rotifers are represented by 4 genera and 5 species. The genus *Branchionus* was represented by 2 species. Genera *Rotatoria*, *Lepadella* and *Karatella*are represented by a single species each.

The Cladocera are a group of micro crustaceans commonly known as water fleas. Cladocerans are known to be abundant in water with good littoral vegetation, while ponds and lakes without vegetation have fewer Cladocera species. The tank comprises 3 genera and 4 species of cladocerans. The genus *Macrothrix*was represented by 2 species. The genera *Daphnia* and *Diaphanosoma* are represented by a single species.

Copepods are aquatic crustaceans, smaller relatives of crabs and lobsters, in terms of their size, abundance and diversity of way of life. Copepods were represented by 4 genera and 4 species of zooplanktons. The genera *Mesocyclops*, *Paracyclops*, *Heliodiaptomus* and *Cyclops* were represented by a single species each. Copepods are sometimes used as bioindicators. Protozoa are microscopic unicellular eukaryotes that have a relatively complex internal structure and carry out complex metabolic activities. Most species are free living, but all higher animals are infected with one or more species of protozoa. They come in many different shapes and sizes. Protozoans are represented by 3 genera and 3 species. The genera *Paramecium*, *Vorticella* and *Arcella* are represented by a single species each.

Table: 1 List of Zooplanktons

Sl. No.	Zooplankton groups	Zooplanktons
1		*Daphnia carinata*
2		*Diaphanosoma sarsi*
3	Cladocera	*Macrothrix goeldi*
4		*Macrothrix laticornis*
5		*Mesocyclops hyalinus*
6		*Paracyclops fimbriatus*
7	Copepoda	*Heliodiaptomus vidus*
8		*Cyclops* sp.
9		*Branchionus falcatus*

10		*Branchionus quadridentatus*
11	Rotifera	*Rotatoria neptunia*
12		*Lepadella ovalis*
13		*Karatella tropica*
14		*Paramecium caudatum*
15	Protozoa	*Vorticella* sp.
16		*Arcella* sp.

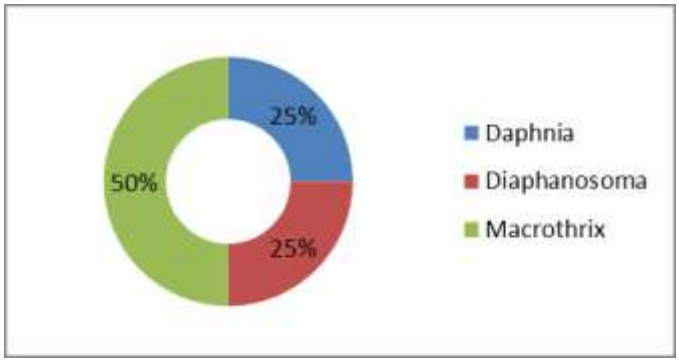

Fig: 1 Genus composition of Cladocera

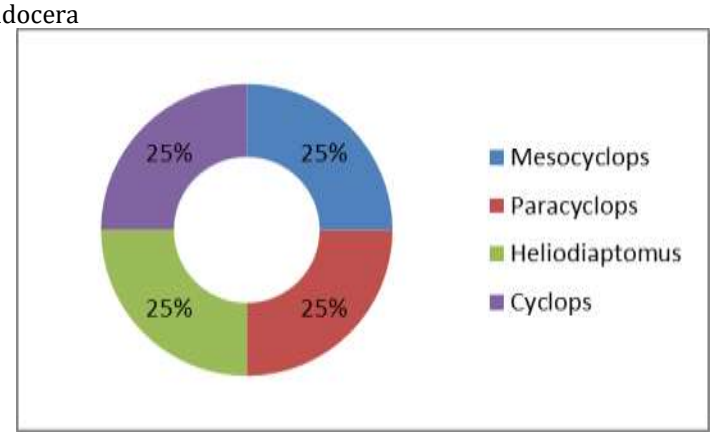

Fig: 2 Genus composition of Copepoda

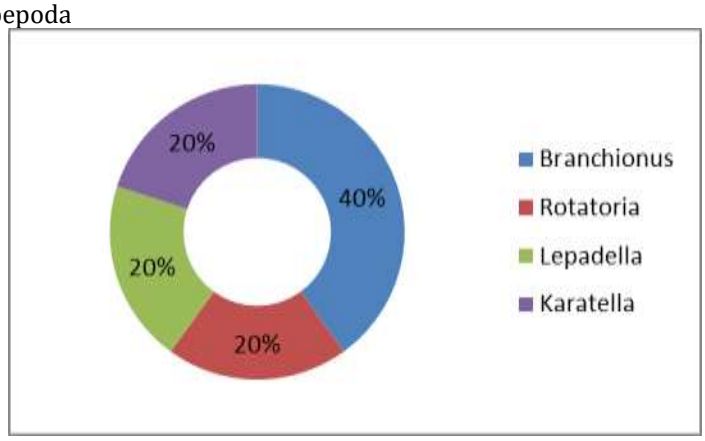

Fig: 3 Genus composition of Rotifera

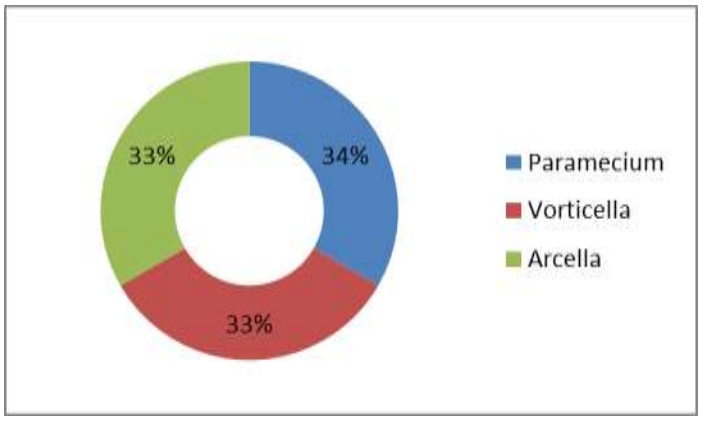

Fig: 4 Genus compositions of Protozoa

4. Conclusion

The water samples from Gowrikere tank was collected and analyzed for zooplankton composition. The ecological status of the pond was found to be impoverished in terms of species composition. A rich zooplankton fauna with 5 species of rotifers, 4 species of copepods, 4 species of Cladocera and 3 species protozoans were reported. The present investigation reveals the presence of high density of rotifers among other Zooplankton groups. Presence of high density of rotifers in the water body is an indication that the tank gradually enhancing towards pollution. During the study period, there are instances human activities being observed such as sewage effluents, washing of households, bathing of animals etc. which is leading to pollution of the tank. Moreover, this tank is mainly used for aquaculture so effective measures should be immediately taken.

5. Acknowledgement

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