



ANALYZING THE ZOOPLANKTON FAUNA OF A POLLUTED RURAL LAKE OF VILLAGE CHORA IN BHADRAWATI TEHSIL OF CHANDRAPUR DISTRICT

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ABSTRACT:

Studies on zooplankton fauna were made on a freshwater lake of rural origin situated in village Chora of Bhadrawati tehsil of Chandrapur district of Maharashtra state during summer, winter and monsoon months in the year 2022. The studies were undertaken to analyze the zooplanktonic forms present in lake water. The fauna of zooplankton in the lake water is represented by Groups Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda. Rotifers are found to be dominant group (8 species), followed by Cladocera (3 species), Copepoda (3 species), Protozoa (2 species) and Ostracoda (1 species). In all the zooplankton fauna of Chora village lake water is represented by about 17 different species. Presence of Pollution indicator species like *Brachionus* and *Moina* indicate that the lake is polluted organically and is anthropogenically impacted due to man made activities prevalent in its catchment area like cloth washing and open defecation practices in the vicinity. In order to save this lake from further degradation measures are to be implemented at local level otherwise this freshwater lake will be fully degraded in coming years and will be useless for coming generations with respect to its water use for pisciculture and other activities.

Keywords:- Zooplankton, Chora village lake, Polluted lake, Bhadrawati, Anthropogenic impact.

INTRODUCTION :

A large number and types of microscopic organisms the plankton drift in aquatic ecosystems in lakes, ponds, reservoirs and dams across the Indian continent. Freshwater lentic ecosystems are amazingly the most productive ecosystems in the world having biotic component the zooplankton which plays a crucial role in functioning of the food chain. Planktons are the most heterogeneous organisms found in all the aquatic ecosystems of the world. Phytoplankton and zooplankton are the two main types of plankton which are present in aquatic ecosystems. Monitoring plankton population act as marker of environmental changes in lake waters. The responses of various plankton species to seasonal variations in the physical and chemical properties of water vary widely from continent to continent.

Zooplankton are very good indicators of aquatic pollution, therefore their abundance, diversity

and species dominance can be used for the assessment of water pollution. Zooplankton community structure reflects the ecological status of the freshwater environment as they indicate the health status of an aquatic ecosystem (Dede and Deshmukh, 2015). In recent years, from the year 2009 and onwards studies on zooplankton in India are done by researchers like Meshram (2011), Joseph and Ymakanamardi (2011), Koli and Muley (2012), Jakhar (2013), Nibalkar *et al* (2013), Pawar (2014), Verma *et al* (2013), Bhat *et al.* (2014), Kar and Kar (2016), Pandey *et al*(2017), Anbalagan and Sivakami (2019), Dahare (2020), Gadwe and Tijare (2021), Vyas and Raval (2023), Saurav Kumar and Arun Kumar (2023), Mehra and Singh (2023), Gahalaut *et al* (2023), and many more.

As compared to lotic waters (running) comprising of rivers and streams the ponds and lakes are more prone to pollution impact due to their

stagnant nature. In this context a freshwater lake located in village Chora of Bhadrawati tehsil of Chandrapur district of Maharashtra state having anthropogenic impact is studied in detail to analyze the zooplankton fauna present in its water during summer, winter and monsoon months during the year 2022. This perennial lake is totally rain fed in nature.

MATERIALS AND METHODS :

Village Chora of Bhadrawati tehsil, Chandrapur district of Maharashtra state harbor a small freshwater lake having latitude 20.199583 and longitude 79.235018 infested with aquatic weeds *Eichhornia crassipes*, *Hydrilla* and marginal weeds like *Ipomoea indica*. This aquatic ecosystem is having a depth of about 7-8 feet water in monsoon season which shrinks to about 2 feet in summer months. There is abundant organic enrichment in the basin due to death and decay of aquatic weeds continuously. The qualitative zooplankton study was undertaken for a year during 2022 by filtering the water sample using plankton net. This lake is used by fishermen community to raise production of mud dwelling catfishes having an catchment area of about 12 acres infested by aquatic weeds. Zooplankton samples were collected from 2 different sites of this perennial freshwater lake for analysis from the lake banks from east and west sites in morning hours during summer, winter and monsoon seasons. The data thus obtained from the present research will help us in understanding the existing condition of the lakes and establishing future conservation strategies. For zooplankton analysis, sample collection was carried out by filtering hundred litres of water through plankton net of mesh size 25µm and collected zooplankton samples were preserved using 5% formaline solution. Zooplanktons were identified using reference books viz. APHA(2005), Edmondson (1966), Needham and Needham (1962), Pennak (1978), Tonapi (1980).

RESULTS AND DISCUSSION :

The water quality of a natural lake is generally governed by various physico-chemical and biological conditions prevailing in its catchment and soil strata of bottom. The qualitative zooplankton of Chora lake water (Table 1) study reveals presence of *Moina sp*, *Ceriodaphnia sp*, *Bosmina sp* as a representative of Cladocera group. *Cyclops sp*, *Nauplius sp* and *Diatomus sp*. as a representative of Copepoda group.

Rotifers are represented by *Brachionus calyciflorus*, *Keratilla sp.*, *Asplanchna Sp*, *Rotaria sp*, *Hexarthra sp*, and *Colurella sp*. The protozoa are represented by *Arcella*, *Paramoecium* and *Ostracoda* by *Cypris sp*. 15 different forms are recorded in summer, 6 forms in monsoon and 12 forms in winter in the lake water. Maximum forms are recorded in summer months. Rotifer sps. are regarded as bioindicators of pollution in a water body (Arora, 1962). Presence of *Brachionus sps* with high density and number is an indication of eutrophication in a water body as this particular genus is a pollution tolerant organism (Ahmad *et al*, 2011).

Seasonal variations and changes in the availability of nutrients and temperature can affect the zooplankton abundance in a lake. Monitoring zooplankton population is essential for understanding the dynamics and health of any aquatic ecosystem. The responses of different plankton species to seasonal variations in the physical and chemical properties of water as well as their frequency and timing of occurrences vary in different regions of the world (Vyas and Raval, 2023) , (Gahalaut *et al*, 2023).

According to our research the density and diversity of rotifers are significantly influenced by parameters such as water temperature, turbidity, transparency and others through summer and monsoon months. The occurrence of *Keratella sp*. In summer and winter shows the eutrophic condition of lake (Shalini *et al.*, 2017). An increase in atmospheric temperature increased the rate of evaporation and the Copepods

favorable relationship with temperature suggested that the warm season in summer was favorable for copepod development. The presence of anthropogenic impact in the form of open defecation practices in the lake area has degraded the water quality and due to cloth washing activities of village people phosphates enter the lake water enriching its water. The lake harbours abundant aquatic weeds like *Hydrilla*, *Eichhornia* and *Nelumbo* due to death and decay of aquatic weeds and is very much shallowed down resulting in shallowing down of the lake basin. Measures to restore this lake are required on an urgent basis to retain ground water table of the area.

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Table 1 : Occurrence of Zooplankton in Chora Village Lake of Bhadrawati Tehsil during the year 2022

Sr.No.	Species	Summer season	Monsoon Season	Winter season
1.	Protozoa			
	<i>Paramoecium sp.</i>	-	+	+
	<i>Arcella sp.</i>	-	+	-
2.	Ostracoda			
	<i>Cypris sp.</i>	+	-	+
3.	Cladocera			
	<i>Ceriodaphnia sp.</i>	+	-	+
	<i>Moina sp.</i>	+	-	+
	<i>Bosmina sp.</i>	+	-	-
4.	Copepoda			
	<i>Cyclops sp.</i>	+	+	-
	<i>Diaptomus sp.</i>	+	-	-
	<i>Nauplius sp.</i>	+	-	+
5.	Rotifera			
	<i>Brachionus calyciflorus</i>	+	-	+
	<i>Keratella sp.</i>	+	-	+
	<i>Asplanchna sp.</i>	+	+	-
	<i>Filinia sp.</i>	+	-	+
	<i>Rotaria sp.</i>	+	-	+
	<i>Monostylla sp.</i>	+	-	+
	<i>Colurella sp.</i>	+	+	+
	<i>Hexarthra sp.</i>	+	+	+
	Total Species present in lake water	15	6	12