

Zooplankton Fauna of a Freshwater Pond in Bhadrawati Town of Chandrapur District in Maharashtra State (India)

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Abstract

The zooplankton constitute an important component of the freshwater pond biodiversity on which a large number of organisms depend throughout the year. Freshwater zooplankton is an important component in aquatic ecosystem whose main function is to act as primary and secondary link in the food chain.

In this context, studies were undertaken on a small anthropogenically impacted pond situated near N.S.Science and Arts College, Bhadrawati in Chandrapur District of Maharashtra State to assess the type of forms present during summer and winter season in the year 2012. The zooplankton fauna of this beautiful pond having varied weeds is categorized as *Protozoa*, *Rotifera*, *Cladocera*, *Copepoda* and *Ostracoda* groups. The pond shows 27 different species in its water of which maximum species are represented by *Rotifera*, while minimum are represented by *Protozoa* and *Ostracoda*. Maximum species were recorded during summer while minimum in winter season. The abundant organic detritus, wastewater inflow in the basin laden with nitrate and phosphate and the open defecation practices prevalent in the catchment area by local residents are adding and enriching it day by day which are reflected through the species composition.

From the studies it is noted that a large number of diverse zooplanktonic forms with rich biodiversity is supporting this beautiful pond ecosystem in summer and winter seasons.

KEYWORDS: Bhadrawati , Zooplankton, Freshwater Pond.

INTRODUCTION

Lakes and Ponds are freshwater habitats for aquatic plants and animals which play a key role in maintaining regional biodiversity. The important component of the ecological pyramid of the freshwater ecosystem is plankton. Planktonic communities in natural aquatic ecosystems serve as a key group for energy production (Alikunhi *et al.*, 1955).

All aquatic animals depend directly or indirectly on the plankton and a healthy zooplankton community in aquatic ecosystems is necessary for productivity of the system. Zooplankton form a component of grazing food chain in aquatic ecosystems and are useful in cycling the organic matter in an aquatic ecosystem. Zooplankton are present in each and every water body of the world with different characteristics and different trends in their diversity and density associated with the fluctuating physico-chemical conditions. Every lake or pond has unique kind of zooplanktons which fluctuate monthly

as well as seasonally with respect to seasonal and physico-chemical conditions of the pond basin.

The studies on zooplankton throughout the world were undertaken by investigators like Chakrabarty *et al.*, (1959), Edmondson (1959), Nasar (1977), Jyoti and Sehgal (1979), Rajapaska and Fernando (1982), Dumont and Isabella Van De Velde (1977), Sharma (1983), Sladeczek (1983), Patil and Gouder (1985), Hudec (1987), Rao *et al.*, (1994), Nogueira (2001), Gupta (2002), Sampaio *et al.* (2002), Arora and Mehra (2003a), Arora and Mehra (2003b), Ugale *et al.*, (2005), Sreelatha (2007), and many more.

But still the studies on qualitative assessment of a small freshwater pond ecosystem in Bhadrawati town of Chandrapur district situated near the campus of N.S.College in Bhadrawati region are not taken for research by any investigator. Looking from this point of view the biodiversity of zooplankton in this freshwater rural pond the studies were undertaken to know the types of forms present during summer and winter seasons.

MATERIALS AND METHODS

The freshwater pond under investigation is situated adjacent to N.S.Science and Arts College, in Bhadrawati town of Chandrapur district in a depression like roughly oblong area having a catchment of about 1.5 -2.00 acres. This pond harbours a lot of nuisance aquatic weeds throughout the year. The limnological investigation was carried out on this small freshwater rural pond during a span of January to December 2012 covering two seasons summer and winter only.

The pond receives water mainly through its catchment area via rainfall, through households on the bank and is having a depth of about 5-7 feet water in centre during rainy season. From this pond water samples were collected from the surface water from 3 different sampling locations for qualitative studies on zooplankton. The points for water collection were selected based on access for sample collection. Samples from these points were collected between 7.00 A.M. to 8.00 A.M. in the morning. Water sample was filtered through plankton net of silk bolting cloth (mesh size 25 μ m) and samples were fixed on the spot using 4% formaldehyde and shifted to the laboratory for identification of forms. The identification of zooplankton was done according to Ward and Whipple (1959), Needham and Needham (1972), and APHA (2005).

RESULTS AND DISCUSSION

From the freshwater pond a total of 27 different species were identified (Table 1). From all the forms 15 belonged to rotifera, 8 to cladocera, 2 to copepoda, 1 of ostracoda and 1 of protozoa.

Rotifers are considered opportunists due to their highest intrinsic rates of natural increase among the major zooplankton groups. Rotifers were found to be maximum in summer season and *Brachionus* is the dominant form among the rotifers throughout the study period in the pond. Sunkad (2004) and Pawar and Pulley (2005) also observed the dominance of *Brachionus* in Rakaskoppa reservoir of Belgaum, North Karnataka and

Pethwadaj dam of nanded District in Maharashtra state. The Diversified rotifer fauna of the pond can be linked to favorable conditions and availability of abundant food in the form of bacteria, nanoplankton and suspended detritus in the lake water (Edmondson, 1965, Baker, 1979 and Dhanpathi, 2000). The zooplankton population is the result of complex variations in numerous factors the most important being quality and quantity of available food, temperature and chemical factors. Edmondson (1965) showed dependence of rotifer production rates on temperature and food conditions.

The zooplankton of Indian freshwater bodies consists of varied forms belonging to different taxonomic groups. Their type, number and distribution provide a clue on the environmental conditions existing in that particular region (Hutchinson, 1967).

In the present study Protozoa were represented by *Paramoecium* which feeds on dead and decaying organic matter. The Cladocera are popularly known as “water fleas” which prefer to live in deep waters and constitute a major item of food for fish. Cladocera were maximum during winter season (Table 1).

Copepods were maximum in summer. Ostracods are bivalve crustaceans which inhabit a wide range of freshwater habitats like lakes, pools, swamps, streams and also heavily polluted sites (Edmondson, 1965). The ostracods were recorded abundant in winter season. The maximum count of zooplankton in summer is due to abundance of rotifers in large numbers during summer season while in winter season Cladocera dominate the waters. The temperature of water is of enormous importance to aquatic organisms as it regulates various physico-chemical and biological activities of the organisms. Depending on temperature fluctuations the various species of zooplankton thrive and grow in waters in different months.

During summer increasing temperature enhances the rate of decomposition due to which the water becomes nutrient rich, similarly due to concentration followed by evaporation in summer season the nutrient concentration increased and abundant food present in the form of phytoplankton and micro-organisms to zooplankton that's why high zooplankton population density during the summer season could be related to stable hydrological factors and low water level. They were resumed again in monsoon due to dilution and high water level which has been reported by Rajagopal *et al.*,(2010), Mulani *et al.*, (2009), Pejaver and Gurav (2008), Jayabhaye and Madlapure (2006). The growth of rotifers occurs during summer months (Dumont, 1983), while it gives a thrust of increase to cladocera in winter months. It has been stated that the physico-chemical parameters and quantity of nutrients in water play significant role in distributional patterns and species composition of plankton (Mahar *et al.*, 2000). Fluctuation in plankton population is a general phenomenon in the freshwater impoundments (Welch, 1952). Factors contributed to its variations are rainfall, depth, silting and other physico-chemical parameters. The presence of a species depend on its environmental tolerance, but the resources available would determine their abundance. If competition or predation is reduced or food supply or suitable habitat increased, the species would become more abundant.

The addition of sewage laden wastewater and the open defecation practices in the catchment are fully responsible for enriching its basin. Phosphorus and nitrogen inputs

from domestic wastewaters accelerate the process of eutrophication (Rao et al , 1994). A fully eutrophicated lake with organic enrichment sustain a large number of flora and fauna as evident from the Table 1. The genus *Brachionus* is the index of eutrophic waters (Sladeczek, 1983), and its abundance is considered as a biological indicator of eutrophication (Nogueira, 2001). The *Brachionus calyciflorus* is considered as indicator of eutrophication (Samperio *et. al*, 2002). Similar observations were recorded in reservoir of Buldhana district by researchers viz. in Nalganga reservoir, Wari reservoir, Takli reservoir which have reached upto eutrophic stages similar to our findings.

The present study reveals that zooplankton species richness was high in summer season compared to winter season. In summer the death and decay of macrophytes and the availability of organic matter production is much more on which zooplankton thrive best. The above factors contribute for high species diversity in that season. The increased input of sewage, siltation and high input loading in the form of wastewater are major cause of eutrophication resulting in species increase. Similar observations were recorded by Arora and Mehra (2003b) in Yamuna river. The study throws light on the rich fauna present in this small water body affected by anthropogenic activities.

So from the present study it can be concluded that the freshwater pond harbors a rich and bio-diverse fauna which fluctuates according to prevailing physico-chemical conditions of the pond water.

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TABLE 1
ZOOPLANKTON FAUNA OF FRESHWATER POND IN BHADRAWATI
REGION
DURING SUMMER AND WINTER SEASON OF 2012

SR.NO	GENUS/ SPECIES OF ZOOPLANKTON FOUND IN POND	SUMMER SEASON	WINTER SEASON
1.	CLADODERA		
	FAMILY : SIDIDAE		
	<i>Diphanosoma sarsi</i>	-	+
	FAMILY : DAPHNIDAE		
	<i>Ceriodaphnia</i>	-	+
	FAMILY : MOINIDAE		
	<i>Moina macrocopa</i>	+	+
	FAMILY: BOSMINIDAE		
	<i>Bsosminopsis deiteresi</i>	-	+
	FAMILY : MACROTHRICIDAE		
	<i>Macrothrix sps.</i>	-	+
	FAMILY: CHYDORIDAE		
	<i>Alona pulchella</i>	-	+
	<i>Chydorus sphaericus</i>	-	+
<i>Pleuroxus denticulatus</i>	-	+	
2.	COPEPODA		
	FAMILY: DIAPTOMIDAE		
	<i>Heliodiaptomus spp.</i>	+	+
	FAMILY: CYCLOPIDAE		
	<i>Mesocyclops leuckarti</i>	+	+
3.	ROTIFERA		
	FAMILY: BRACHIONIDAE		
	<i>Brachionus angularis</i>	+	-
	<i>Bachionus calyciflorus</i>	+	-
	<i>Platytias quadricornis</i>	+	-
	<i>Keratella tropica</i>	+	-
	FAMILY: LECANIDAE		
	<i>Lecane Luna</i>	+	-
	<i>Monostyla bulla</i>	+	-
	FAMILY: EUCHLANIDAE		
	<i>Euchlanis dilatata</i>	+	-
	FAMILY: TESTUDINIDAE		
	<i>Testudinella patina</i>	+	-
	FAMILY: NOTOMMATIDAE		
<i>Cephallorella gibba</i>	+	-	

	FAMILY: ASPLANCHANIDAE		
	<i>Asplanchna Periodonta</i>	+	
	FAMILY: COLURELLIDAE		
	<i>Lepadella ovalis</i>	+	-
	FAMILY: TRICHOCERCIDAE		
	<i>Trichocerca similes</i>	+	-
	FAMILY: FILINIDAE		
	<i>Filinia longiseta</i>	+	-
	FAMILY: PHILODINIDAE		
	<i>Rotatoria neptunia</i>	+	-
4	OSTRACODA		
	<i>Stenocypris spp.</i>	-	+
5.	PROTOZOA		
	<i>Paramoecium caudatum</i>	+	+
	TOTAL FORMS RECORDED IN POND	17	12