

Zooplankton Biodiversity in Ghotnimbala Reservoir in Bhadrawati Tehsil of Chandrapur District

Shashikant R.Sitre

P.G. Deptt. Of Zoology, Nilkanthrao Shinde Science & Arts College Bhadrawati

Distt: Chandrapur PIN Code : 442 902, Maharashtra, India

Abstract

The Bhadrawati tehsil of Chandrapur district harbors a number of small and large water bodies. Many of these water bodies are deteriorating fast due to siltation and anthropogenic activities. Taking this into consideration a beautiful water body called Ghotnimbala reservoir having an area of approximately 18 acres is selected for investigation. With respect to biodiversity assessment of zooplanktons. This perennial water body is fast deteriorating due to anthropogenic activities. A study of zooplankton fauna was undertaken year round to assess the types of zooplankton present in this beautiful water body.

The zooplankton biodiversity of reservoir water is represented by seven different groups like *Protozoa*, *rotifera*, *cladocera*, *copepoda*, *ostracoda*, *nematoda* and *annelida*, with 21 different species. Occurrence of pollution indicator species like *Moina dubia*, *Brachionus angularis*, *Filinia longiseta* confirms that the lake ecosystem is organically polluted due to man made activities in the catchment area.

This water body is utilized by local residents for cloth washing and open defecation on the reservoir banks is responsible for fast deterioration of the lake ecosystem due to these anthropogenic activities. Siltation is also playing a crucial role in clogging this beautiful ecosystem to a large extent along with death and decay of aquatic macrophytes. If the present trend of enrichment continues for some years this water body will soon be degraded fully and convert into a dry land in near future and will be lost for ever from the present water bodies of Chandrapur district in Maharashtra state.

KEYWORDS : Bhadrawati, Biodiversity, Ghot nimbala reservoir, Zooplankton.

INTRODUCTION

Fresh water is one of the abundantly available resources which man has utilized for the sustenance of life. Water of good quality is required by living organisms to meet their everyday demands. Increasing level of pollutants into the surface waters has been causing serious disturbances in the aquatic ecosystems which are reflected in the biotic community structure (Cairns, 1979).

Zooplankton is microscopic organisms, which move at the mercy of water currents. *Rotifera*, *cladocera*, *copepoda*, and *Ostracoda* constitute the major groups of zooplankton. They occupy an intermediate position in the food web. Studies on zooplankton in Indian continent are made by researchers like Arora (1962), Chandra Mohan and Rao (1976a), Sharma (1980), Michael and Sharma (1988), Verma and Dutta Munshi (1987), Rao and Durve (1989), Kodarkar (1994), Babu Rao (1997), Mishra and Saksena (1998), Dhanpathi and Rama Sarma (2000), Trivedi (2000), Sharma (1980), Baghela (2006), Pandit et al (2007).

Zooplankton communities respond to a wide variety of stresses including nutrient loading, acidification and sediment input, and have an immense place in fisheries (Jhingran, 1991). Although zooplankton exists under a wide range of environmental conditions, yet many species are limited by dissolved oxygen, pH, salinity and other physico-chemical factors. Plankton population is very much sensitive to the environment in which they live and alteration in them leads to change in the communities in terms of tolerance, abundance, diversity and dominance in the habitat. Therefore plankton population observation may be used as a reliable tool for biomonitoring studies to assess the pollution status (Baruah et al. 1997, Gunale 1991).

The main aim of present study is to evaluate biodiversity of zooplankton in Ghotnimbala reservoir of Bhadrawati tehsil of Chandrapur district representing summer, winter and monsoon seasons.

MATERIALS AND METHODS

Ghotnimbala reservoir is a freshwater lake situated at about 15 kms. distance from bhadravati town in Chandrapur district in rural area on outskirts of village Ghot nimbala. This lake is usually used for washing activities by locals polluting it through various detergents and chemicals daily. The average water spread area of this lake is about 18 acres approximately and is a totally rain fed lake with embankments erected on sides. Open defecation practice is prevalent since long on the banks adding organic pollution to it. Presently the lake basin is shallowed down due to siltation and is infested by aquatic weeds like *Ceratophyllum*, *Myriophyllum* and lotus which has covered much of the area of this beautiful lake. The water level is losing rapidly due to siltation and the lake is progressing towards deterioration. Sooner or later this beautiful water body will perish due to gross negligence. Taking into view its degraded status investigations are undertaken for assessing the diverse zooplankton fauna present in this water body for a period of one year during 2011.

In order to study the zooplankton biodiversity samples were collected from surface waters from three sampling sites viz. east, south and north sides of lake by filtering 50 litres of lake water through nylon bolting silk cloth (mesh size 45 μ m). The samples were fixed using 4% formaline and the identification of zooplankton was done in laboratory using Edmondson (1959), Tonapi (1980) and Battish (1992).

RESULT AND DISCUSSION

The zooplankton fauna of Ghotnimbala reservoir is represented by about 21 different species (Table 1). Phylum Protozoa is represented by 4 different species, rotifera by 8 different species, Cladocera by 4 different species, Copepoda by 3 different species, Ostracoda by 1 species, Nematoda and Oligocheta by 1 species. Maximum 18 species are recorded in summer month's i.e in April, while minimum 5 species are recorded in November i.e. winter season.

It has been observed that water level was considerably reduced in reservoir during April months due to intense summer heat. Due to abundance of organic detritus the Ostracoda group represented by *Cypris* is present in the lake water which is abundant in monsoon. Tonapi (1980) has reported higher population of Ostracoda during monsoon months due to abundance of fine detritus available during this period.

The most abundant species are represented from Rotifera group with about 8 different forms present in the lake water. In the lake water *Brachionus falcatus* was abundant during rainy season; *Brachionus forficula* was abundant during winter season while *Brachionus angularis* was abundant during summer season. The richness of different rotifers could be attributed to the phenomenon of succession in rotifers. Sheshgiri Rao and Khan (1984) also reported that the community structure, diversity and biomass of rotifers is governed by the nutrition ecology of each species. Several species of *Brachionus* are recorded from highly polluted Hussainsagar lake of Hyderabad city by Malathi et al (1998) which is attributed to highly eutrophic status of the lake ecosystem.

Plankton particularly rotifers have long been identified as indicators of water quality (Arora, 1962). Because of their short life cycles rotifers in general respond quickly to environmental changes and hence their standing crop and species composition indicates the quality of water mass in which they are found (Chandrashekhar and Kodarkar 1995, Dhanpathi, 1997).

The occurrence of indicator species like *filinia longiseta*, *Brachionus forficula* and *Brachionus angularis* points out towards organic pollution and subsequent enriched status of the reservoir water (Schindler and Noven, 1971; Rao and Durve 1989). The Cladocera group is represented by 4 different species like *Bosmina*, *moina*, *chydorus*, and *macrothrix* from among which the presence of *moina* also points out that the lake is in highly degraded condition with lot of organic matter in it.

The rotifers play an important role as suspension feeders within the zooplankton community. The differences in periodicity and population density of different rotifer species are due to biotic interactions and nutritional content of the lakes. The rotifers exhibit marked differences in their tolerance and adaptability to changes in physico-chemical and biological parameters. Chandrasekhar (1996) observed that in summer season the factors like water temperature, turbidity, transparency and dissolved oxygen play an important role in controlling the diversity and density of rotifers. In the present investigation 7 different species are recorded due to interplay of above said parameters in summer months, while less species are recorded in winter season.

The Cladocerans are primary consumers which feed on algae and fine particulates thus influencing cycling of matter and energy in food chain in the detritus. According to Datta Munshi (1995) abundance of Cladocera can be attributed to thick deposit of organic matter in the aquatic environment. In the present investigation it is observed that the lake was slowly progressing towards organically enriched state with large number of macrophytes in the catchment area with floating detritus in the basin.

So it can be inferred from the present study that the aquatic ecosystem of the lake has been in a degraded state with presence of pollution indicator forms with high biodiversity of zooplankton and is slowly progressing towards organic enrichment and sooner or later this beautiful ecosystem will perish, and will be lost for ever for the human use.

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TABLE-1
Biodiversity of Zooplankton in Ghot nimbala Reservoir of Bhadrawati Tehsil

Sr. No.	Form Present/Species	Ma y	Jun e	Jul y	Au g.	Sep t.	Oc t.	No v.	De c.	Jan .	Feb .	Marc h	April	
1	PROTOZOA													
	<i>Diffugia corona</i>	+	-	-	-	-	-	+	+	+	+	+	-	
	<i>Arcella sp.</i>	+	-	-	-	-	+	+	+	+	+	+	+	
	<i>Actinophrys sol</i>	+	-	+	-	-	-	-	-	-	+	-	+	
	<i>Euplotes sp.</i>	+	-	-	-	-	-	-	+	+	+	+	+	
2	ROTIFERA													
	<i>Brachionus falcatus</i>	+	+	+	+	-	-	-	-	-	+	+	+	
	<i>Brachionus forficula</i>	-	-	-	-	+	+	+	+	+	-	+	+	
	<i>Lecane luna</i>	+	+	+	-	-	-	-	-	-	-	+	-	
	<i>Brachionus angularis</i>	+	-	-	-	-	-	-	-	-	+	+	+	
	<i>Trichotria similes</i>	-	+	+	+	+	+	-	-	-	-	-	+	
	<i>Platyias quaadricornis</i>	+	+	+	-	-	-	-	-	-	-	-	+	
	<i>Filinia longiseta</i>	+	+	+	+	+	-	-	-	-	-	-	-	
	<i>Testudinella sp.</i>													
	3	CLADOCERA												
		<i>Bosmina longirostris</i>	-	+	+	-	-	-	-	-	-	-	-	+
<i>Moina dubia</i>		+	-	-	-	-	-	-	-	-	-	+	+	
<i>Chydorus sphaericus</i>		-	-	+	+	+	+	-	-	-	-	+	+	

	<i>Alona sp.</i>												
4	COPEPODA												
	<i>Mesocyclops sp.</i>	+	+	+	-	-	-	-	-	-	-	+	+
	<i>Diaptomus spp.</i>	-	-	+	+	+	+	-	-	-	-	+	-
	<i>Copepod nauplius</i>	-	-	-	+	+	+	+	-	+	+	+	-
5	OSTRACODA												
	<i>Cypris spp..</i>	-	-	+	+	+	-	-	-	-	-	+	+
6	NEMATODA												
	<i>Paradoxorhabditis spp.</i>	+	+	-	-	-	-	-	-	-	+	+	+
7	OLIGOCHETA												
	<i>Aelosoma hemprichi</i>	+	+	-	-	-	+	+	-	-	-	-	+
	TOTAL Forms present	13	10	13	9	9	7	5	6	6	8	16	18

(-) = Absent in the water

(+) = Present in the water