

Rotifer Biodiversity in Ambazari lake of Nagpur With Respect to Water Quality

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Abstract

Ambazari lake of Nagpur city is a beautiful perennial lake having a large water spread area. In order to analyse the biodiversity of Rotifers in this perennial urban lake of Nagpur city studies were undertaken monthly for qualitative and quantitative aspects for a years span during the year 2018 for January to December period.

During the study period total 15 rotifer species belonging to 11 genera were found in the urban lake water. The genus *Brachionus* was represented by 4 different species. The seasonal rotifer diversity showed peak in density and diversity during summer months, while lower values were found in rainy season. Thirteen species were recorded in winter, 14 species in summer while lowest 8 species were recorded in monsoon seasons.

The lake was slowly going towards enrichment stage by man made activities like bathing, throwing garbage and religious offerings in the catchment and its periphery. It is predicted that if suitable measures are not put into force this lake will degrade further in coming years and its water quality will deteriorate further.

KEYWORDS: Rotifers, Biodiversity, Water quality, Ambazari lake.

Introduction

Rotifers are the connecting link organisms between primary producer and consumers in aquatic ecosystems. Rotifers are residing in inland water bodies and their diversity refers to varieties of species within their communities. Rotifers occur almost everywhere in the aquatic environment and constitute an important group of zooplankton community in aquatic ecosystems of the world. The abundance of rotifers is governed by water quality parameters and seasons of the globe. The abundance of rotifers is governed by the interaction of number of physical, chemical and biological properties of lake waters of the particular terrain.

The zooplanktons are important aquatic organisms for their role in the trophodynamics and in energy transfer in an aquatic ecosystem. They provide food to fishes in freshwater ponds and lakes and play a major role in fish production.

The freshwater zooplankton form an important group as most of them feed upon and incorporate the primary producers into their bodies and make themselves available to higher organisms in food chain. With the global loss of thousands of species as a result of over population and habitat disturbance, assessment of species diversity and richness are needed (May, 1986).

In this context the present research aimed at finding out qualitative and quantitative aspects of rotifer biodiversity in Ambazari lake during the year 2018.

Materials and Methods

Water samples from 3 different sampling sites of Ambazari lake viz. east, south and north were collected on monthly basis for a period of one year i.e. from Jan. 2018 to Dec. 2018 for qualitative and quantitative estimation of rotifer biodiversity. From each sampling spot 100 litre of water was filtered through plankton net of silk bolting cloth having mesh size 64um, Filtered water sample was preserved in 4% formalin. Concentrated sample was observed under binocular microscope for qualitative and quantitative aspects in P.G. Department of Zoology of N.S.Science and Arts College, Bhadrawati Dist.Chandrapur using SedgewickRafter Cell (APHA, 1998). Rotifers were identified by Edmondson (1959), Dhanpathi (1974), Koradkar (1995), Chandrashekhar and Kodarkar (1995). The lake water quality was analysed using APHA(1998).

Result and Discussion

The water samples of Ambazari lake were examined for a period of one year in the 2018 in order to analyse the physico-chemical parameters and density and diversity of rotifer fauna in this perennial urban lake of Nagpur city during the year 2018. Table 2 shows the variations in physico-chemical parameters over a span of one year in lake water. Parameters viz. water temperature, total dissolved solids, conductivity, pH, total alkalinity, chlorides, total hardness, sulphates, total phosphate and nitrates were maximum in summer season while dissolved oxygen is maximum during winter months.

In present study in all 15 different rotifera species were recorded (Table 1) belonging to 11 different genera. The most diversified genera was *Brachionus* represented by 4 species namely *Brachionus angularis*, *Brachionus falcatus*, *Brachionus calyciflorus* and *Brachionus forficula*. The least dominant were represented by *Filinia*, *Asplanchna*, *Keratella*, *Testudinella* and *Notommata*. Monthly variations of rotifers was shown in table no. 3.

Rotifers were represented by maximum 16 different species during winter and summer while in monsoon *Filinia*, *testudinella*, *notommata* and *trichocerca* were absent from the lake. The year round rotifer biodiversity of Ambazari lake showed density and diversity during summer season indicating the influence of various physico-chemical factors which supported the lake ecosystem. The PH and temperature are the main factors in the appearance and abundance of different rotifers (Banik and Datta, 1991).

Rotifers are chiefly freshwater forms and presence of these in abundance is related to suitable conditions for their growth and development (Dhanpathi, 2000). Kaushik and Saxena (1995) have also reported abundance of *Brachionus* in various water bodies of central India. An abundance of *Brachionus* in has been registered in tropical region and various species dominate warmer parts of peninsular Indian sub continent (Sharma, 1983; Fernando, 1980).

Occurrence of *Keratella* with *Brachionus* is indicative of nutritional enrichment of the basin (Berzins and Pejler, 1987). In Ambazari lake the maximum density of rotifers was noticed at PH range of 8.80 in summer season. According to

Dhanpathi (2000) many species of rotifers are having preference for more alkaline water. The species like *Brachionus*, *Keratella* and *Platylabus* build higher population during the period when alkalinity was very high. In our investigation of lake nutrients like sulphate, nitrate and phosphate were higher in summer due to decreased water level by evaporation and more organic load due to anthropogenic activities. Rotifers utilize nutrients more rapidly to build up their population (Saboor and Altaf, 1995). Our results were supported by these. The lower values of rotifer population density and diversity was observed during monsoon season which could be due to dilution of water resulting in less nutrients or factors like dissolved oxygen, or PH (Kumar, 2001).

Sunkad (2004) and Pawar and Pulley (2005) also observed the dominance of *Brachionus* in Rakaskoppa reservoir of Belgaum and Pethwadaj dam of Nanded district in Maharashtra. The diversified rotifer fauna of ambazari lake can be linked to favourable conditions and availability of abundant food in the form of bacteria, and suspended detritus in the lake (Edmondson, 1965; Baker, 1979; Dhanpathi, 2000). The zooplankton abundance is the result of complex variations in quality and quantity of food available, chemical factors of the basin and temperature. Edmondson (1965) showed dependence of rotifer production rates on temperature and food conditions.

The present studies indicate the seasonal variations in rotifer fauna in Ambazari lake of Nagpur city during the year 2018 with respect to water quality and biodiversity of rotifer.

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Table 1
Rotifer Biodiversity in Ambazari Lake of Nagpur City during 3 different seasons

Sr.No.	Species Observed in Lake water	Winter	Summer	Monsoon
1.	<i>Brachionusforficula</i>	+	+	+
2.	<i>Brachionuscalyciflorus</i>	+	+	+
3.	<i>Brachionusangularis</i>	+	+	-
4.	<i>Brachionusfalcatus</i>	+	+	-
5.	<i>Tripleuchlanissp.</i>	+	+	-
6.	<i>Trichocercatigris</i>	+	+	-
7.	<i>Trestudinellasp.</i>	-	+	+
8.	<i>LepadellaOvalis</i>	-	+	-
9.	<i>Colurella sp.</i>	+	-	+
10.	<i>Filinia longiseta</i>	+	+	-
11.	<i>Keratellatropica</i>	+	+	+
12.	<i>Lecane sp.</i>	+	+	+
13.	<i>Monostyla bulla</i>	+	+	+
14.	<i>Asplancha sp.</i>	+	+	+
15.	<i>Lepadellaovalis</i>	+	+	+
	Total Species Recorded	13	14	9

Table 2
Water Quality Analysis of Ambazarilake during the year 2018

Sr.No.	Parameter	Winter Season	Summer Season	Monsoon Season
1.	Temperature of water ($^{\circ}$ c)	20.0 \pm 0.2	26.05 \pm 0.1	22.9 \pm 0.1
2.	D.O. (mg/lirte)	8.5 \pm 0.1	7.2 \pm 0.1	6.4 \pm 0.3
3.	pH	8.20 \pm 0.2	8.80 \pm 0.1	6.4 \pm 0.2
4.	Conductivity (ms/cm.)	118.00 \pm 0.2	185.00 \pm 0.29	110. \pm 0.3
5.	Total Alkalinity	125.00 \pm 0.26	158.00 \pm 0.32	87.00 \pm 0.25
6.	T.D.S.	490 \pm 0.3	760 \pm 0.2	230 \pm 0.28
7.	Chlorides	51.6 \pm 0.14	60.2 \pm 0.1	38.00 \pm 0.3
8.	Total Hardness	85.00 \pm 0.28	92.00 \pm 0.25	67.00 \pm 0.2
9.	Sulphate	0.17 \pm 0.004	0.21 \pm 0.007	0.12 \pm 0.1
10.	Total Phosphates	0.16 \pm 0.2	0.23 \pm 0.2	0.19 \pm 0.02
11.	Nitrates	0.22 \pm 0.03	0.3 \pm 0.02	0.18 \pm 0.03

Table 3
Quantative Study of Rotifers of Ambazarilake of Nagpur City

Sr.No.	Month-2018	Density of Rotifers(no/litre)
1.	January 2018	109
2.	February 2018	121
3.	March 2018	123
4.	April 2018	90
5.	May 2018	73
6.	June 2018	68
7.	July 2018	24
8.	August 2018	26
9.	September 2018	39
10.	October 2018	84
11.	November 2018	96
12.	December 2018	105