

Zooplankton Biodiversity in Lonara Lake of Nagpur Rural, Maharashtra State, India

^a**Shashikant R.Sitre**, ^b**L.B.Tonape**

^aN.S.Science and Arts College, Bhadrawati, Dist.Chandrapur 442902, Maharashtra, India

^bY.C.Mahavidyalaya, Karmala, Dist.Solapur, Maharashtra, India

Corresponding Author: Shashikant R.Sitre

Abstract

The aquatic ecosystems of the world covers a vast area and the organisms residing in it are under the influence of its physico-chemical parameters. The occurrence and abundance of zooplankton depends on its productivity, which in turn is influenced by abiotic factors of the environment and the level of nutrients present in the water body. The freshwater zooplankton form an key group in all the water bodies of the world and form an important link as they form the part of food chain on which existence of man is dependent through fish.

Looking from this angle Lonara lake of Nagpur rural area of Nagpur district was studied in four different seasons of the year monsoon, post monsoon, summer and winter season to analyze the species present in its basin. The zooplankton biodiversity of lonara lake water was represented by 5 different groups viz. protozoa, rotifera, cladocera, copepod, ostracoda and diptera.

KEYWORDS: Zooplankton, Biodiversity, Lonara lake, Nagpur rural.

INTRODUCTION

The freshwater ecosystems of the world cover a vast area and the organisms residing in it are under the influence of its physico-chemical conditions. There are different varieties of zooplankton which thrive in varied types of freshwater ecosystems. The occurrence and abundance of zooplankton depends on lakes productivity which in turn is influenced by abiotic factors and the level of nutrients present in it. 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 (Michael, 1973). The knowledge about their abundance diversity and distribution is important in understanding trophodynamics and trophic progression of water bodies. With the global loss of many species everyday as a result of pollution and the habitat disturbance assessment of species diversity is highly needed today (May, 1986). The environmental pollution invariably leads to undesirable alterations leading to direct changes in physico-chemical characteristics and biodiversity in any habitat (Kumar et al., 1978).

The zooplankton is one of the most important ecological parameters in water quality assessment. Zooplankton as indicators are extensively used due to their important role in fast emerging concepts in environmental management. The planktonic organisms in lakes show distinct seasonal dynamics that have been attributed mainly to changes, which in turn govern primary production and autotroph-herbivore interactions (Hessen *et. al*,

2005). Since zooplankton play an important role in aquatic ecosystems as bioindicators of pollution, present investigation was carried out to evaluate the impact of pollution on the zooplankton population in Lonara lake a polluted rural lake of Nagpur district rural area having a catchment area of about 4-5 acres.

MATERIALS AND METHODS

The Lonara lake of Nagpur rural is a freshwater body in a very sparse locality of Nagpur rural outskirts located about 10 kms. from Nagpur city towards north direction on Bokhara road (Koradi area). This water body is perennial in nature and is used for discharging nirmalya and religious things including idols of ganesha and various utsav materials regularly by the nearby villagers. Its water is getting polluted due to man made activities regularly. The idol immersion has disturbed its ecology completely. This lake is 5 feet deep in centre and about 2-3 feet deep on periphery and has a temple on its bank on north side. Zooplankton samples were collected from this lake in 4 different seasons from four different sides of this beautiful lake to assess the biodiversity. From each sampling spot about 50 lt. water was filtered through plankton net with silk bolting cloth mesh no. 25. Filtered water was preserved in 4% formalin and few drops of glycerine were added to it. The sample was qualitatively analyzed using Sedgewick Rafter Cell Method (APHA,1998). The zooplankton were identified using Edmondson (1959), Chandrashekhar and Kodarkar (1995), Dhanpathi (1974), Pennak (1978), Adoni (1985), Battish (1992).

RESULT AND DISCUSSION

The cladoceran components of zooplankton play an important role in benthic trophodynamics. Most of the cladoceran species are primary consumers and feed on microscopic algae and the fine particulates matter in the detritus thus influencing cycling of matter and energy in benthos (Jayabhaye and Madlapure, 2006).

Mesocyclops leukarti and *moina micrura* were recorded maximum in all the sampling stations. Therefore they were designated as bio-indicators of organic pollution in this water body. During monsoon period *moina micrura* was found to be dominant species from the cladocera group. Rotifers were found to be minimum in monsoon and post monsoon period. Similar findings were recorded by Rajan et al., (2007) in 3 polluted water bodies in Tamil Nadu. Pradhan et al (2006) also reported minimum rotifer in monsoon and post monsoon period.

During summer the 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 copepods might be reduced and finally disappeared in summer season. They are resumed again in monsoon due to dilution of water. The cyclopoid copepods were reported as pollution sensitive taxa by Verma et al. (1984) and Jain and Dhamija (2000).

Rotifer richness and diversity were found to be maximum in summer indicating the influence of temperature. Protozoan population was recorded at peak in summer months and their count remains low during monsoon period. Dilution of water caused by

monsoon rains may explain low protozoan count observed during monsoon while maximum population during summer.

During the present investigation cladocera were found to be maximum in summer season followed by winter and minimum in monsoon. The maximum population of cladocera in summer and winter may be attributed to favorable temperature and availability of food in the form of bacteria, nanoplankton and suspended detritus while in the monsoon the factors like water temperature, dissolved oxygen turbidity and transparency play an important role in controlling the diversity and density of cladocera. Maximum ostracod population was recorded in summer while minimum in rainy season. Rotifers are chiefly freshwater forms and presence of these organisms in abundance is related to suitable conditions for their survival in summer season. The occurrence of *keratella* with *Brachionus* indicate the nutrient rich status of water body (Berzins and Pejler, 1987).

REFERENCES

- Adoni, A.D.(1985). Workbook on Limnology (Ed). Department of Environment, Government of India, Bandona Printing Service, New Delhi.
- APHA, (1998). Standard Methods for Examination of Water and Wastewater, APHA, Washington.
- Battaish, S.K.(1992). Freshwater Zooplankton of India, Oxford and IBH Publishers.
- Berzins, B and B.Pejler (1987). Rotifer occurrence in relation to pH. *Hydrobiologia*. Vol 182 : 171-182.
- Chandrashekhar, S.V.A and M.S.Kodarkar (1995). Studies on *Brachionus* from Saroornagar lake, Hyderabad. *J.Aqua.Biol.* 10(1) : 48-52.
- Dhanpathi ,M.V.S.S.S (1974). Rotifer from Andhra Pradesh, Part I .*Hydrobiol.* 45 (4) : 357-372.
- Edmondson, W.T. (1992). Freshwater Biology, IInd edition, John Wiley and Sons New York. 1248 pp.
- Hessen, D.O.,Ellen Van Donk and Ramesh Gulati (2005). Seasonal seston stoichiometry : effects on zooplankton in cyanobacteria dominated lakes. *J.Plankton Res.* Vol. 27 No. 5 pp. 449-460.
- Jayabhaye V.M. and V.R.Madlapure (2006). Studies on zooplankton diversity in Parola Dam, Hingoli, Maharashtra,India.*J.Aqua.Biol.* Vol. 21 (2): 67-71.
- Kumar J.K.,M.A.Khan, M.Azizhussain and M.Mehmood (1978). Observation on diurnal variations in hydrobiological conditions of two fish ponds, Hyderabad. *Comp.Physiol.Ecol.* 3 pp 111-114.
- May R.M. (1986). How many species are there? *Nature*, Vol 324: 514-515
- Michael R.G. (1979). A Guide to the Study of Freshwater Organisms : 2 Rotifera.

J.Madurai Univ. Suppl. Vol.I : 23-26.

Prasenjit Pradhan, Sunirmal Giri and Kumar Chakraborty (2006). Ecological gradients determining the density and diversity of rotifers in a freshwater rive system of south west bendal,India. *J.Aqua.Biol.* 21 : 19-28.

Pennak R.W.(1978). Freshwater Invertebrates of the United States, 2nd edition John Wiley and Sonc, Inc.New York.

Rajan M.K. , Mahendran M., Pavaraj M and S.Muniasamy (2008). Zooplanktonic assemblage in three pollluted water bodies of virudhanagar district, Tamil Nadu. *J.Aqua Biol.* Vol. 23(1): 18-21.

Verma S.R.,Permanand Sharma,Alok Tyadi ,Savita ranik ,Ashok Kumar Gupta and R.C.Dalela (1984).Pollution and saprobic status of eastern kalinandi. *Limnologia* (Berlin) 15 (1): 69-133.

Table 1 : Biodiversity of Zooplankton Species in Lonara lake of Nagpur Rural Area During Four Different Seasons of the Year

Group	Summer	Monsoon	Post Monsoon	Winter
ROTIFERA	+	+	+	+
<i>Filinia longiseta</i>	+	+	+	+
<i>Cephalodella</i> sps.	+	-	+	+
<i>Epiphanes senta</i>	+	-	-	-
<i>Colurella obtusa</i>	+	-	-	-
<i>Keratella tropica</i>	+	+	-	-
<i>Lecane luna</i>	+	-	-	+
<i>Lepadella ovalis</i>	+	-	+	+
<i>Monostylla bulla</i>	+	-	+	+
<i>Polyarthra</i> sps.	+	-	-	-
<i>Trichocerca</i> sp	+	-	-	+
<i>Brachionus angularis</i>	+	+	-	-
<i>Brachionus forficula</i>	+	+	+	+
<i>Brachionus calyciflorus</i>	+	+	+	+
<i>Testudinella patina</i>	+	-	-	-
<i>Tripluchlanis plicata</i>	+	-	-	-
<i>Hexarthra mira</i>	+	-	+	-
<i>Horella brahmi</i>	+	-	-	-
Protozoa				
<i>Bursaria truncatella</i>	+	+	-	-
<i>Paramoecium</i> sp.	+	+	+	+
<i>Vorticella</i>	+	-	+	+
<i>Chlamydomonas</i> sp.	+	-	+	+

<i>Diffugia lebes</i>	+	-	-	+
<i>Centropyxis sp.</i>	+	-	-	-
Copepoda				
<i>Cyclops viridis</i>	-	+	-	+
<i>Diaptomus sp.</i>	-	+	+	+
<i>Copepod nauplius</i>	-	-	+	+
<i>Mesocyclops sp.</i>	-	+	+	+
Cladocera				
<i>Bosmina longirostris</i>	-	-	-	+
<i>Leydigia sp.</i>	-	-	-	+
<i>Moina sp.</i>	+	+	+	+
<i>Camptocercus sp.</i>	+	-	+	+
<i>Leydigia sp.</i>	+	-	-	-
Ostracoda				
<i>Stenocypris sp.</i>	+	-	+	+

- = Absent + = Present