Zooplankton Fauna Assessment of Naik Lake of Nagpur City (M.S.) India

Shashikant R. Sitre
Assistant Professor, Department of Zoology, N.S.Science and Arts College, Bhadrawati, Distt.Chandrapur (M.S.) India 442902

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 important group in all the water bodies of the world and become part of food chain on which existence of man is dependent.

Looking at this the biodiversity of zooplankton from Naik lake of Nagpur city was studied in monsoon, post monsoon, winter and summer season. The zooplankton biodiversity of lake water was represented by 5 different groups viz. protozoa, rotifera, cladocera, copepoda and ostracoda. In all 36 zooplankton species were recorded from the lake waters representing 5 different groups in different seasons of the year. Maximum species were recorded in summer season (32) with abundance of rotifers, while minimum (13) were recorded in monsoon. The abundance of zooplankton species in the lake water points out towards its enriched status with nutrients due to anthropogenic activities prevailing in the catchment area.

KEYWORDS: Biodiversity, Naik lake, Nagpur city, Zooplankton fauna.

INTRODUCTION

The freshwater ecosystems cover a vast area and the organisms present in it are under the influence of its physico-chemical parameters. Zooplanktonic organisms are one of the components of fauna of freshwater bodies. There are different varieties of zooplankton which thrive in varied types of freshwater bodies. The occurrence and abundance of zooplankton depends on its 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). With the global loss of many species everyday as a result of pollution and habitat disturbance assessment of species diversity is needed today (May, 1986).

The environmental pollution invariably leads to undesirable alterations leading to direct or indirect changes in physico-chemical characteristics and biodiversity in any habitat (Kumar et. al., 1987).

The zooplankton diversity 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 in ambient physico-chemical parameters like light, temperature and nutrients 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 dynamics of zooplankton population in Naik lake, a polluted urban lake of Nagpur city.

MATERIALS AND MEHODS

The Naik lake of Nagpur is a fresh water body in a very dense locality of Nagpur city located in North east area. This water body receives a large amount of solid as well as liquid waste from the adjacent localities. Man made activities like discharge of garbage as well as nirmalya and ganesh visarjan activities add of pollution to this water body every year. The large number of paints used in preparation of idols get dispersed in this water body after idol immersion and disturb its ecology every year. In this context in order to assess the fauna prevailing in this water body, samples from 3 different directions of this lake were collected in monsoon, post monsoon, summer and winter season to assess the biodiversity of zooplankton.

From each sampling spot 50 Litre water was filtered through plankton net made of silk bolting cloth no. 25. Filtered water was preserved in 4% formalin and few drops of glycerin were added. The sample was qualitatively analyzed using Sedgewick Rafter Cell Method (APHA, 1998), The zooplankton were identified using standard available literature viz. Edmondson (1959), Dhanpathi (1974), Chandrashekhar and Kodarkar (1995), Pennak (1978), Adoni (1985) and Battish (1992).

RESULT AND DISCUSSION

The zooplankton fauna of the Naik lake waters was represented by protozoa, rotifera, cladocera, copepoda, and ostracoda groups. The seasonal variations of different forms are presented in Table No.1. In summer season the fauna was represented by 32 different species, the number reduced to 13 in monsoon, 20 in post monsoon and 24 in the winter season.

The population of Protozoa was recorded at peak in summer months (6 different forms) and their count remains low during monsoon period (2 different forms). Dilution of water caused by monsoon rains causes low protozoan count observed during monsoon while maximum population during summer months occur due to degradation of organic detritus in the basin, favouring increase in different forms.

Rotifers were found to be minimum in monsoon (6 forms) and post monsoon (9 forms) period. Similar findings were recorded by Rajan et. al., (2008) in polluted water bodies in Tamil Nadu. Pradhan et al (2006) also reported minimum rotifers in monsoon and post monsoon period. Rotifer richness and diversity were found to be maximum in summer indicating the influence of temperature. This observation is in concurrence with work of Kaushik and Sharma (1994) and Singh (2000) who studied zooplankton population in Matsya Sarovar Gwalior and in a tropical lake. Rotifers are chiefly

freshwater forms and presence of these organisms in abundance is related to suitable conditions for their survival in summer season (Dhanpathi, 2000). Occurrence of *Keratella* with *Brachionus* indicate nutrient rich status of water body (Berzins and Pejler, 1987).

The Cladocera plays an important role in benthic trophodynamics. Most of the cladoceran species are primary consumers and feed on microscopic algae and the fine particulate matter in the detritus thus influencing cycling of matter and energy in benthos (Jayabhaye and Madlapure, 2006). During the present investigation cladocera were found to be maximum in summer followed by winter and minimum in monsoon. The maximum population of clacdocera 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 monsoon the factors like water temperature, dissolved oxygen, turbidity and transparency play an important role in controlling the diversity and density of cladocera (Edmondson, 1992; Baker, 1979).

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

Maximum ostracod population was recorded in summer months while minimum in rainy season. Sunkad and Patil (2004) also recorded maximum ostracod population in summer in fort lake in Belgaun (Karnataka.).

So the present investigation of the Naik lake waters reveals a biodiverse zooplankton fauna having anthropogenic influence with presence of pollution indicator species like *Moina*.

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TABLE 1

Zooplankton Biodiversity During Different Seasons in Naik Lake of Nagpur City (M.S.) India

Sr. No.	Group/Species	Summer	Monsoon	Post Monsoon	Winter
	PROTOZOA				
1	***Bursaria truncatella***	+	+	-	-
2	***Paramoecium sp.***	+	+	+	+
3	***Vorticella***	+	-	+	+
4	***Chllamydomonas sp.***	+	-	+	+
5	***Difflugia lebes***	+	-	-	+
6	***Centropyxis sp.***	+	-	-	-
	ROTIFERA				
1	***Filinia longiseta***	+	+	+	+
2	***Cephalodella sp.***	+	+	+	+
3	***Epiphanes senta***	+	-	+	+
4	***Colurella obtuse***	+	-	-	-
5	***Keratella tropica***	+	+	-	-
6	***Lecane luna***	+	-	-	+
7	***Lepadella ovalis***	+	-	+	+
8	***Monostylla bulla***	+	-	+	+
9	***Polyarthra sp.***	+	-	-	-
10	***Trichocerca cylindrica***	+	-	-	+
11	***Brachionus angularis***	+	+	+	+
12	***Brachionus forficula***	+	+	+	+
13	***Brachionus calyciflorus***	+	+	+	+

14	***Testudinella patina***	**+**	**-**	**-**	**-**
15	***Tripleuchlanis plicata***	**+**	**-**	**-**	**-**
16	***Hexarthra mira***	**+**	**-**	**+**	**+**
17	***Horella brahmi***	**+**	**-**	**-**	**-**
	CLADOCERA				
1	***Bosmina longirostris***	+	-	-	+
2	***Alona sp.***	+	-	-	-
3	***Moina micrura***	+	+	+	+
4	***Bosminopsis sp.***	+	-	+	+
5	***Leydigia sp.***	+	-	-	-
	COPEPODA				
1	***Cyclops viridis***	-	+	+	+
2	***Diaptomus sp.***	-	+	+	+
3	***Copepod nauplius***	-	-	+	+
4	***Mesocyclops leukarti***	-	+	+	+
	OSTRACODA				
1	***Candona sp.***	+	-	-	-
2	***Cyprinotus sp.***	+	-	-	-
3	***Cypris subglobosa***	+	+	+	+
4	***Stenocypris sp.***	+	-	+	+
	TOTAL Forms Present	**32**	**13**	**20**	**24**

+ Indicates Present - Indicates Absent in the season