



A preliminary study on zooplankton diversity in Nal Damayanti (Simbhora) Dam, Morshi, Amravati

U.W. Fule¹, S.S. Nimghare¹, P.M. Telkhade², S.B. Zade³ and N.R. Dahegaonkar²

Received: 15-01-2009

Accepted: 10-09-2009

Abstract

The present paper reports the zooplankton diversity in Nal Damayanti (Simbhora) dam in Morshi Taluka of Amravati district, Maharashtra State. Nal-Damayanti reservoir constructed on river Wardha, having an area of 1335 hectares and 9729 hectares of total catchment area. The samples were collected during October-2007 to March-2008. The sample analysis showed great diversity in zooplankton consisting 39 species belonging to five groups. Rotifera were dominant by contributing 21 species followed by Cladocera 11 sps., Copepoda by 5 sps., Protozoa by 5 sps. and Ostracoda by 3 sps.

Keywords:- Nal Damayanti, Simbhora, Zooplankton, Diversity

Introduction

Zooplankton community of fresh water bodies constitute an extremely diverse assemblages of organisms represented by most of the invertebrate phyla. Zooplankton has been used as an indicator for monitoring the water quality, trophic status and pollution level.

Zooplankton is a major link in energy transfer to the higher trophic level. They form an integral component of aquatic ecosystem and comprises of microscopic animal life that passively float or swim freely. Taxonomic groups of Protozoa, Rotifera, Cladocera and Copepoda represents the principal components of zooplankton in lentic environment. Zooplankton incorporates primary and partly secondary micro faunal consumer operative system. This serves the functional role of harvesting primary and partly secondary microfaunal consumer operative system. This serves the functional role of harvesting primary production and grazing the bacterial biomass on the detrital spectrum in water (Rao, 2005).

Several workers, Arora (1964), Rao *et al.* (1981), Khanna *et al.* (1993) Katiyar (1995), Ejsmont (1996), Witek (1998), Bini *et al.* (1997) and Kesre *et al.* (2007) have studied zooplankton of various lakes and reservoirs and opined that limnological characteristics of any water body alter the zooplankton diversity inhibiting in it.

Materials and Method

The samples were collected once in a month for a period of 6 months from October-2007 to March-2008 from the Dam. The plankton net of mesh size 56.00 μ m made up of Bolting silk cloth swept through subsurface and samples were collected during 8.30 A.M. to 9.30 A.M. Collected samples were preserved in 4% formalin and identified using pertinent literature, Edmondson (1959), Dhanapathi (2000), Kodarkar (1992) and Khanna and Bhutiani (2004).

Author's Address

¹Hutatma Rashtriya Arts and Science College, Ashti, Distt. Wardha (M.S.)

²Arts, Commerce and Science College, Tukum Chandrapur (M.S.)

³Deptt. of Zoology, R.T.M. Nagpur University, Nagpur



Results and Discussion

In the present investigation, zooplankton studied under five groups *viz.* Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda. Among the five groups, maximum number of species (21 species) belongs to Rotifera (Table-1). Similar findings has been reported by Ferneska and Lewkosiez (1966) and Schindler and

Noven (1971). They have noted the enormous growth of rotifers in the lakes and reservoirs at Ontario. Jyoti and Sehgal (1979) have reported the most diversified species and rich Rotifera groups in reservoirs. Pandey *et al.* (2007) reported that rotifers occur more predominantly than cladocerans and copepods. Alikunhi (1957), Michael (1964) and Singh and Sahai (1978), has also reported dominance of rotifers than other groups.

Among rotifers, *Brachionus* and *Keratella* species showed their dominance. Mahajan (1981) recorded dominance of *Brachionus* species in zooplankton showed similar observation. Hutchinson (1967) observed that the *Brachionus* species are very common in temperate tropical waters. Somani and Pejaver (2003) stated that Rotifera is quite a diverse group of organism and large generic variety is observed in various lentic environments all over India. However, *Brachionus* and *Keratella* are the most commonly recorded genera in Indian lakes. Devi (1994) and

Malathi (1999) recorded *Keratella tropica* as common eutrophic perennial forms in lakes of Hyderabad.

The Group Cladocera represented by 11 species among the total Cladocerans recorded (Table-2). *Moina brachiata*, *Moinodaphnia*, *Chydorus* species showed their dominance over other species. Cladocera groups was at second position in the present investigation, such lower contribution of Cladocerans was also recorded by Dutta Munshi and Dutta Munshi (1995).

The copepods are mainly dominated by *Cyclops* and *Diaptomus*. They showed their dominance during the month of October and in the month of March. Prabhawati and Sreenivasan (1977), observed maximum peak of copepods and cladoceron in the month of September and October. No definite period is observed to be suitable as January and February observed by Subbamma and Ramasarma (1992), March reported by Malathi (1999). Water rich in organic matter support higher number of cyclopoids.

Table-1 : Rotifera diversity

1	<i>Asplanchna brightwelli</i>
2	<i>Brachionus calyciflorus</i>
3	<i>B. plicatilis</i>
4	<i>B. quadridentata</i>
5	<i>B. bidentata</i>
6	<i>B. falcatus</i>
7	<i>B. caudatus</i>
8	<i>Polyarthra indica</i>
9	<i>Epiphanes senta</i>
10	<i>Filinia longiseta</i>
11	<i>F. opaliensis</i>
12	<i>Trichocerca cylindrica</i>
13	<i>T. longiseta</i>
14	<i>Rotaria citrinus</i>
15	<i>Keratella tropica</i>
16	<i>K. varga</i>
17	<i>Hexarthra mira</i>
18	<i>Lepadella ovalis</i>
19	<i>Monostyla bulla</i>
20	<i>Lecane luna</i>
21	<i>Platyias polyacanthus</i>

Table-2: Cladocera diversity

1	<i>Alona monocantha</i>
2	<i>Alona affinis</i>
3	<i>Acroperus harpae</i>
4	<i>Bosmina longirostris</i>
5	<i>Ceriodaphnia laticaudata</i>
6	<i>Chydorus sphericus</i>
7	<i>Moinodaphnia macleayil</i>
8	<i>Moina brachiata</i>
9	<i>Dadaya macrops</i>
10	<i>Leydigia acanthocercoides</i>
11	<i>Simocephalus vetulus</i>

Table-3: Copepoda diversity

1	<i>Diaptomus gracilis</i>
2	<i>Diaptomus breweri</i>
3	<i>Cyclops viridis</i>
4	<i>Eucyclops agilis</i>
5	<i>Mesocyclops edax</i>



Subbamma and Ramasarma (1992) suggested their preponderance in higher trophic state of water. The group protozoa was represented by 5 species (Table-4) and the group follows Copepoda in species diversity. In protozoa, *Arcella polyopora* and *Diffugia urceolata* are dominant than others. Similarly, observed by Sawane *et al.* (2006) in Erai river at Erai dam site District Chandrapur Maharashtra. In the present investigation, only three species of *Ostracoda* are recorded (Table-5). Pailwan (2005) recorded 3 species of *Ostracoda* from perennial tanks of Kolhapur District. Environmental factors like temperature, salinity, DO and sediment composition seem to influence cummulatively on the distribution of *Ostracoda*. *Ostracoda* abundance is also dependent upon the availability of food as opined by Swain (1955), Engel and Swain (1967) and Joy and Clark (1977).

Table-4: Protozoa diversity

1	<i>Amoeba proteus</i>
2	<i>Paramecium caudatum</i>
3	<i>Arcella polyopora</i>
4	<i>Platyophrya vorase</i>
5	<i>Diffugia urceolata</i>

Table-5: Ostracoda diversity

1	<i>Cypris subglobosa</i>
2	<i>Cyclocypris globosa</i>
3	<i>Stenocypris fontinalis</i>

References

- Alikunhi, 1957. Fish culture in India. FM. Bull. Indian Coun. *Agri. Res.*, 20: 144 - 150.
- Arora, H.C., 1964. Studies on Indian Rotifera [part-III]. *J. Zoo. Soc. India.*, 16 (1-2) : 1-6
- Bini, L.M., Tundisi, J.G., Tundisi, T.M. and Metheus, C.E., 1997. special variation of zooplankton groups in a tropical resevoir (Broa Reservoir, Sao Paula State Brazil). *Hydrobiologia*, 357(1-3): 89-98.
- Devi, M.J., 1994. Seasonal variation and population density of rotifers in three Lakes of Hyderabad. A.P. *India. J. Aqua. Biol.*, 9(1-2): 41-44.
- Dhanapathi, M.V.S.S.S., 2000. *Taxonomic notes on the Rotifera from India*. IAAB, Hyderabad. pp: 1-178.
- Dutta Munshi, J. and Dutta Munshi, J.S., 1995. *Fundamentals of freshwater Biology*. Narendra Publishing House, New Delhi.
- Edmondson, W.T., 1959. *Freshwater Biology*. Ed. Ward and Whipl, 2nd Edn, John Wiley Sons Inc, New York. pp: 95-189.
- Ejsmont, K.J., 1996. Long term changes in the abundance and structure of the community of plankton rotifera in a human lake, as a result of liming. *Ekolpolska*, 54(1-2): 39-51.
- Engel, P.L. and Swain, F.M., 1967. Environmental relationship of recent Ostracods in Mesquite, Aransas and Copano bays, Texas Gulf Coast. *Trans. Gulf. Coast Assoc. Geol. Soc.*, 17: 249-253.
- Ferneska, M. and Lewkosiez, S., 1966. Zooplankton in pond in relatioin to certain Chamilal factors. *Acta. Hydrobiol.*, 8: 127-153.
- Hutchinson, G.E., 1967. *A treatise on Limnology*. II. Introduction to the Lake biology and the lommoplankton. John Wiley and Sons, Inc., New York, London.
- Joy, J.A. and Clark, L.D., 1977. The distribution ecology and systematics of the benthic Ostracoda of central Arctic ocean. *Micropaleontology*, 23: 129-154.
- Jyoti, M.K. and Sehgal, H.S., 1979. Ecology of rotifers of Surnisar, a subtropical freshwater Lake in Jammu (J&K), India. *Hydrobiologia*, 65(1): 23-32.
- Katiyar, S.K., 1995. Limnological studies on Bhopal lakes: Freshwater protozoan communities as indicators of organic pollution. *J. Environ Biol.*, 18 (3): 271-282.
- Kesre, Vivek, Mudgal, L.K., Khanna, D.R., Matta, Gagan and Kumar, Dheeraj, 2007. Study of physico-chemical parameter for a reservoir at Khandwa District (M.P.). *Environment Conservation Journal*, 8(3): 127-132.
- Khanna, D.R., Badola, S.P. and Dobriyal, A.K., 1993. Plankton ecology of River Ganga at Chandighat, Hardwar. In: Advances in Limnology, Ed. H.R. Singh. pp: 171-174.
- Khanna, D.R. and Bhutiani R., 2004. *Water analysis at a glance*. ASEA Publication House, Rishikesh. pp :1-172.
- Kodarkar, M.S., 1992. *Methodology for water analysis, physico-chemical, biological and micro-biological*. Indian Association of Aquatic Biologists, Hyderabad. Publ. pp: 2-50.
- Mahajan, C.L., 1981. Zooplankton as Indicators for Assessment of water pollution, presented at WHO workshop on Biological Indicators and Indices of Environmental Pollution, 1981. Cent. Ed. Prev. cont. Poll. Osmania. University, Hyderabad, India. pp: 135-148.
- Malathi, D., 1999. Ecological studies on Lake Hussain Sagar with special reference to the zooplankton communities- Ph.D. Thesis Osmania University, Hyderabad.
- Michael, R.G., 1964. Diurnal variation in physico-chemical factors and zooplankton in surface layers of three tropical freshwater ponds. *J. Fish*, 13: 48-81.
- Pailwan, I.F., 2005. Limnology and Fisheries potential of perennial Tanks of Kolhapur Distt. Ph. D. Thesis submitted, Shivaji University, Kolhapur.



- Pandey, B.N., Ambasta O.P., Jha, A.K. and Shambhu, K., 2007. Seasonal variation in physico-chemical and biological properties of river Panar (Bihar). *Env. Cons. J.*, 8(3): 133-153.
- Prabhawati, G. and Sreenivasan, A., 1977. *Ecology of warm freshwater plankton of Tamilandu*. Proc.symp. Warm Fresh, Water Zool. UNESCO/NIO. Goa, Spl. Pub. pp: 319-329.
- Rao, M.B., Mukhopadhaya, S.K., Muley, E.V. and Siddiqi, S.Z., 1981. Species diversity in zooplankton community as an indicator of organic and industrial pollution in Hussain Sagar, Hyderabad. *Proc. Zool. surv. India*, 4(1): 61-66.
- Rao, S.I., 2005. *Zooplankton Limnology in the, Indian subcontinent*. Ukaaz Publication, Hyderabad. pp: 209-227.
- Sawane, A.P., Puranik, P.G. and Lonkar, A.N., 2006. Preliminary study on the seasonal distribution of plankton in Irai river at Irai dam site, District Chandrapur, Maharashtra. *Indian J. Environ. and Ecoplan*, 12(1): 207-212.
- Schindler, D.W. and Noven, D., 1971. Vertical distribution and seasonal abundance of zooplankton in two shallow Lakes of the experimental Lake area, North Western Ontario. *J. Fish Res. Bd. Canada*, 28: 245 -256.
- Singh, S.B. and Sahai, R., 1978. Seasonal fluctuation of zooplankton population in relation to certain physico-chemical factors of a pond. *Geobios.*, 5: 228 - 230.
- Somani, V. and Pejaver M., 2003. Rotifer diversity in Lake Masunda, Thane (Maharashtra). *J. Aqua. Biol.*, 18(1): 23-27.
- Subbamma, D.V. and Ramasarma, D.V., 1992. Studies on the water quality characteristics of a temple pond near Machilipatnam, Andhra Pradesh. *J.Aqua Biol.*, 7: 22-27.
- Swain, F.M., 1955. Ostracods of San Antonia Bay, Texas. *J. Paleont.*, 29: 561-646.
- Witek, M., 1998. Annual changes of abundance and biomass of planktonic ciliates in the Gdansk Basin, Southern Baltic. *Int. Rev. Hydrobiol.*, 83(1): 163-182.

