

Studies on Population Dynamics and Seasonal Abundance of Zooplankton Community in Doddavoderahallilake, Bangalore

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Abstract

The present study was undertaken to investigate the zooplankton diversity in Doddavoderahallilake through different months during the period of January 2010 to December 2010. The sample consists of moderate biodiversity of total zooplankton with 15 species belonging to four taxonomic groups. Out of 15 species 9 belonged to Rotifera, 4 to copepod, 1 to cladocera, and 1 to Ostracoda. Rotiferan species have showed a high magnitude of biodiversity in comparative to other zooplankton subgroups. The percentage dominance of Rotifers were 45.05%. The values of number of zooplankton species indicating the pattern of bio diversity have exhibited a different dominating trend of its major subgroups as given rotifera>copepoda>cladocera>Ostracoda. The present study aims at providing a preliminary knowledge on the productivity and diversity of zooplanktons which can be utilized during the formulation of management measures to improve the productivity of the lake.

Keywords:Zooplanktons, Doddavoderahallilake, population dynamics and seasonal abundance.

Introduction:

Plankton population in any aquatic system is biological wealth of water for fishes and constitutes a vital link in the food chain. Zooplankton comprising of rotifers, copepod, ostracods and cladocerans are considered to be most important in terms of population density, biomass production, grazing and nutrient regeneration in an aquatic ecosystem. Plankton is the most sensitive floating community which is being the first target of water pollution, thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. The plankton population on which the whole aquatic life depends directly or indirectly is governed by the interaction of a number of physical, chemical and biological conditions and the tolerance of the organisms to variations in one or more of these conditions. The water quality parameters and nutrient status of water play the most important role in governing the production of planktonic biomass. Water quality studies of Hoskerehalli Lake of Bangalore are made by

(Latha, N., & Mohan, M. R. 2010). Physico-chemical characteristics and phytoplankton of Hoskerehalli Lake, Bangalore, Karnataka. (N, Latha, and Ramachandra Mohan M, 2010). Impact of Climate Change on Water Quality of Shoolkere Lake, Bangalore. (Gayathri, S., Latha, N., & Mohan, M. R. 2013). Zooplankton organisms occupy a central position in the food webs of aquatic ecosystem. They not only form an integral part of the lentic community but also contribute significantly, the biological productivity of the fresh water ecosystem (Wetzel, 2001).

Zooplankton forms the microscopic animals that play an important role in an aquatic food chain as they are largely consumed by fishes and other higher organisms in food chain. Zooplanktons are important in an environmental impact study. They are extremely responsive to change in the environment and thus indicate environmental changes and fluctuations that may occur. Zooplankton acts as a biological indicator of water pollution. The zooplankton constitute an important component of secondary production in aquatic ecosystems that play a key role in energy transfer from primary to higher level in the ecosystem. Zooplankton diversity is one of the most important ecological parameters in water quality assessment. Pesticides and other chemicals are used for the better production of grains has lethal to fish population since industrial agriculture practices has promoted extraordinary use of chemicals in the form of pesticides and insecticides (Narayanaswamy, S. Y., & Mohan, M. R. 2013). As per the observations made in the present study nutrients enrich the phytoplankton species which in turn increase the zooplankton population. Some notable studies on zooplankton diversity has been made by G. Krishnamoorthy et al., (2007) and Joseph and Yamakanamardi (2011). The present study was undertaken to investigate the zooplankton diversity in Doddavoderahallilake through different months during the period of January 2010 to December 2010 in order to assess the species composition, population density and seasonal fluctuation of this faunal group.

Materials and methods:

The samples for zooplankton analysis were collected on monthly basis for a period of one year from January 2010 to December 2010. For the qualitative and quantitative analysis, the plankton samples were collected using bolting silk (20 μ aperture) conical shape plankton net from the selected site following standard methods (APHA, 1998). The plankton samples thus collected was preserved in 4% formaldehyde for analysis in the laboratory. For the quantitative study of zooplankton, a 'Sedgwick Rafter Counting Cell' was used. All the zooplankton in the counting chamber were observed and identified under microscope using keys and monographs of W. T. Edmondson (1959), R. W. Pennak (1978), S. K. Battish (1992), M. V. S. S. S. Dhanapathi (2000) and A. D. Adoni (1985). The results are expressed as number of organisms/litre.

Results and Discussion:

Plankton is one of the most important food items of the fishes and many other aquatic organisms. Almost all the fishes in their larval stages are dependent on it and some of them exclusively feed on plankton. During the study period the main bulk of total zooplankton was found to be contributed by rotifera, copepoda, cladocera and ostracoda. Monthly variation of population density (units/L) of different zooplankton groups in Doddavoderahalli lake are represented in (Table :1). Figure:1 is the graph showing the monthly variation of different zooplankton groups. Figure:2 is the graph showing the percentage composition of different zooplankton groups in Doddavoderahalli lake.

Rotifera: The rotifers are being considered as the most important soft bodied invertebrates (G. E. Hutchinson, 1967). In the present study major portion of the zooplankton population were shared by rotifers and they stand first in order to abundance with the minor peak (400 units/L) in the

month of January and the major peak (2680 units/L) in the month of April. Rotifers have often been used to indicate trophic status of a water body. The average percentage of rotifers in total zooplankton population were 45.05%. The 9 species of rotifers recorded during the study period were *Brachionus*, *B.calciflorus*, *B.angularis*, *B.caudatus*, *Keratellatropica*, *Scaridium sp.*, *Trichocera*, *T.multicrinis* and *Philodina sp.* Taxonomic dominance of rotifers was reported in several water bodies. This pattern is common in tropical and sub tropical freshwater, whether in lakes, ponds, reservoirs, rivers or streams E.V. Sampio et al., (2002) and I. F. Neves et al., (2003).

Copepoda: The living copepods constitute an essential link in the aquatic food chain. They serve as food to several fishes and play a major role in ecological pyramids. The Copepods population ranked second in order of abundance during the study period. The group exhibited two peaks, the minor peak (400 units/L) in the month of January and the major peak (2400 units/L) in April. Similar trend was observed in Renukalake, Himachal Pradesh (R. Chauhan, 1993) with maximum copepods during summer and minimum during winter. Copepods were represented by 4 species during the study period such as *Cyclops sp.*, *Macrocylops sp.*, *Nauplius* and *Neodiaptomus sp.* The average percentage of copepods in total zooplankton population was 33.13%.

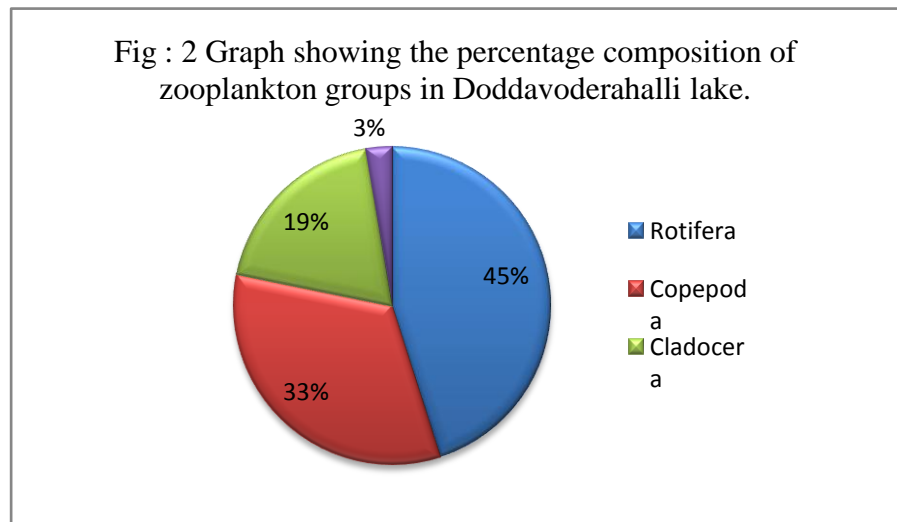
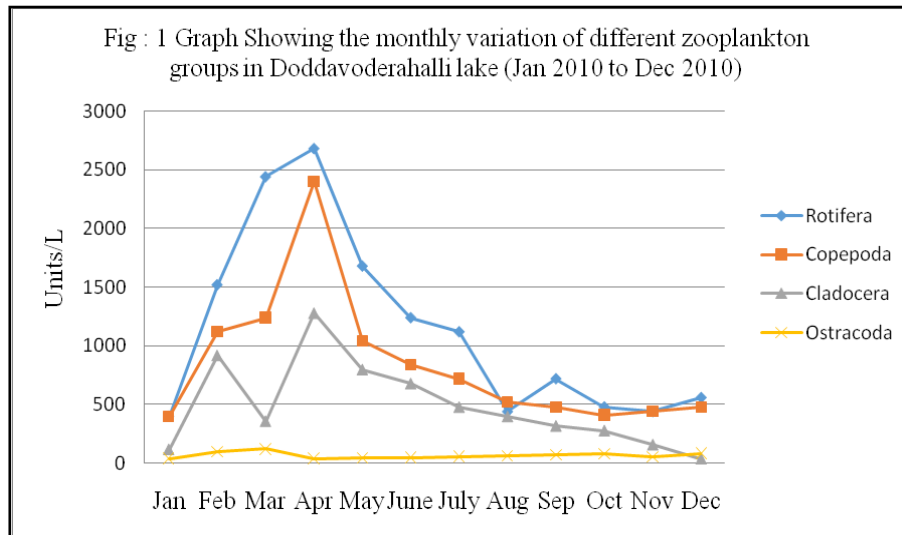
Table : 1 Monthly variation of population density (units/L) of different zooplankton groups in Doddavoderahalli lake (January 2010 to December 2010)

Zooplankton component	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
Rotifera	400	1520	2440	2680	1680	1240	1120	440	720	480	440	560	13720
Copepoda	400	1120	1240	2400	1040	840	720	520	480	410	440	480	10090
Cladocera	120	920	360	1280	800	680	480	400	320	280	160	40	5840
Ostracoda	40	98	120	42	46	51	57	62	71	80	53	82	802
Total Zooplanktons	960	3658	4160	6402	3566	2811	2377	1422	1591	1250	1093	1162	30452

Cladocera : They are popularly called as , “water flea” prefers to live in deep water and constitute a major item of food for fish. Thus they hold key role in food chain and energy transformation (J. C. Uttangi, 2001). These represent an important link in the aquatic food chain and form the favourable food for both young and adult fishes. Among the total Zooplankton population, Cladocera Species is reported as third in order of abundance with the minor peak (40 units/L) in the month of December and major peak (1280 units/L) in the month of April. *Moina* was the one species identified during the study period. The average percentage of Cladoceranin total zooplankton population was 19.17%.

Ostracoda : They are bivalve and have shape like small seeds. They occur in all kinds of freshwater and marine environments. The abundance of these provides a good food for aquatic

organisms. Cypris was the one species identified in the present investigation. Among the total Zooplankton population, Ostracod is reported as fourth in order of abundance with the minor peak (40 units/L) in the month of January and major peak (120 units/L) in the month of March. The average percentage of Ostracods in total zooplankton population was 2.63%. Similar observations were also made in Fort lake of Belgaum, Karnataka by B. N. Sunkad and H. S. Patil (2004).



Conclusion:

The present water body has exhibited a significant seasonal changes and species biodiversity of zooplankton species with their maximum values during summer and minimum in rainy and winter season. Zooplankton is the intermediate link between phytoplankton and fish, which are the secondary producers in the aquatic environment. Zooplanktons are good indicators of changes in water quality, because they are strongly affected by environmental conditions and

responds quickly to change in environmental quality. Hence, qualitative and quantitative study of zooplanktons is of great importance. The information contributed by this investigation will be highly significant and useful in order to create a general awareness in the people to prevent further water pollution and improve aquaculture and other uses of such valuable water sources in the near future.

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