Volume : 3 | Issue : 6 | June 2014 • ISSN No 2277 - 8160

Research Paper Zoology

Zooplankton Seasonal Abundance in Relation to Physico-Chemical Features in Yelahanka Lake, Bangalore

S. Ramakrishna Department of Zoology, Bangalore University, Bangalore-560 056.

ABSTRACT

Physico-chemical analysis and zooplankton survey of the yelahanka was carried out on monthly basis for the period of one year from April-2013 to March-2014. PH determined alkaline nature of the lake ranging 7.5 to 8.2, Dissolved oxygen was recorded in the range of 3.50 to 4.80 mg/l, while other parameters recorded were alkalinity (180 to 320 mg/l), total Hardness (172 to 290 mg/l), chlorides (110 to 170 mg/l). The nutrients like phosphates and nitrates were at peak in summer and minimum in rainy season. During the study period, total 41 species of zooplankton were identified by four groups such as Rotifera (21 sp), cladocera (6 sp), copepoda (3 sp) and protozoa (11 sp). The highest numbers of zooplanktons were recorded in summer months and lowest in rainy season.

KEYWORDS : Water Quality, Zooplankton, protozoa, Rotifera, Cladocera.

Introduction

Zooplanktons are the animal component of plankton and form a vital link in aquatic food chains between microscopic photosynthetic algae and fish. Zooplankton communities respond to a wide variety of disturbances including nutrient loading (Dodson, 1992) and also play a key role in the aquatic food chain (Sharma, 1998). Zooplanktons respond rapidly to environmental changes and hence their standing crop and species composition are more likely to indicate any damage in the aquatic system.

A change in the physico-chemical aspect of a water body brings about a corresponding change in the relative composition and abundance of the organisms in that water. Bio-monitoring is the systematic use of living organisms or their responses to determine the quality of the environment (Rosenberg et al, 1993). The present study deals with the impact of various physico-chemical factors on the abundance of Zooplankton in Yelahanka Lake.

MATERIAL AND METHODS:

Study area

Yelahanka lake is situated in Yelahanka town, an extension which is about 15kms towards north of Bangalore and covers an area of about 200 acres. The geographic location details of the lake are 13^{0}0.6382 N latitude and 77^{0}35.783 longitude at a mean altitude of 917 m above MSL.

Sample collection and analysis

The present investigation was conducted for the period of one year from April-2013 to March-2014. The samples were collected in morning between 7 to 9 am. The water samples were collected from 3 different points of the lake. Water samples were collected by using one liter wide mouth plastic container at each sampling station. Water quality parameters were analysed as per methods of APHA (1998). DO was fixed at sampling stations itself and further analysis was done in the laboratory. For the quantitative and qualitative estimation of plankton, 50 liters of water samples were filtered by using the 125µ mesh size plankton net and preserved in 4% formalin. Literature was used for taxonomic position and identification of the plankton (Tonapi, 1980; Edmondson, 1992).

Figure 1. Seasonal average value variation in physico-chemical parameters of Yelahanka lake during April-2013 to March-2014.

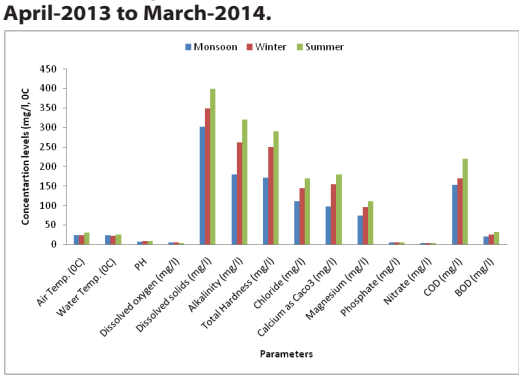

Table 1 of Zooplankton Species recorded in Yelahanka Lake during 2013-2014

ROTIFER	PROTOZOA
1. Ascomoypha saltans 2. Asplanchna priodota 3. Brachionus bidentata 4. Brachionus calyciflorus 5. Brachionus caudata 6. Brachionus plicatilis 7. Cephallodella forficula 8. Conochilus unicornis 9. Colurella obtusa 10. Epiphanes senta 11. Filinia longiseta 12. Gastropus minor 13. Gastropus stylifer 14. Harringia rousseleti 15. Hexarthra mira 16. Horella brahmi 17. Keratella coachlearis 18. Keratella hiemalis 19. Keratella quadrata 20. Keratella tropica 21. Keratella vulga	1. Amoeba proteus 2. Centropyxis sp. 3. C. arcelloides 4. Ceratium hirudinella 5. Chlamydomonas minor 6. Cyphoderia ampulla 7. Difflugia lebes 8. Elaeorhanis oculea 9. Euglena acus 10. Paramecium sp. 11. Volvox aureus CLADOCERA 1. Bosmina longirostris 2. Ceriodaphnia laticaudata 3. Chydorus Sphaericus 4. Daphnia laevis 5. Leydigia acanthocercoides 6. Moina brachiata COPEPODA 1. Cyclops sp. 2. Eucyclops agilis 3. Nauplii

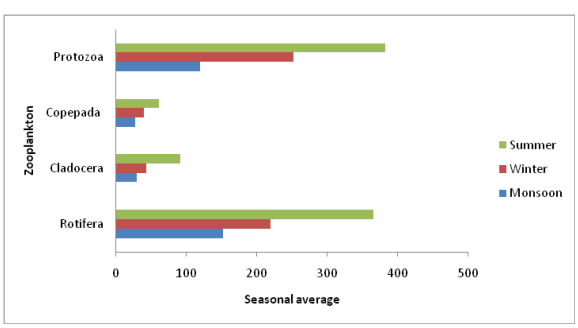

Figure 2. Seasonal Average value variations in Zooplankton Abundance in Yelahanka Lake during 2013-2014.

RESULTS AND DISCUSSION

In the present investigation, seasonal variation in the physico-chemical parameters of Yelahanka Lake has been illustrated in Figure 1. Temperature influences the physical, chemical and biological conditions of the lake. The temperature recorded was maximum in summer. A similar trend in temperature variations has been reported by other workers (Bagude and Varma, 1985). Recorded P^{H} confirms the alkaline nature of the lake. The parameters like Alkalinity, Total Hardness, Carbonates, minerals and nutrients like phosphates and nitrates were recorded maximum in summer and minimum in monsoon season (Figure 1).

During the study period Zooplankton biodiversity of Yelahanka lake was represented by 41 species consisting of 21 Species of Rotifera, 11

Species of Protozoa, 03 Species of Copepoda, and 06 Species of Cladocera (Table 1). Seasonal Average value variations in Zooplankton abundance in Yelahanka lake throughout the study period (Figure 2). Rotifer richness and its biodiversity was found to be maximum in summer in Yelahanka lake (Figure 2) indicating the influence of temperature which was supported by direct relation between summer temperature and Rotifera population. This observation is in concurrence with work of Kaushik and Sharma (1994) and Singh (2000) who have studied Zooplankton population in Malsya Sarovar Gwalior and in tropical lake respectively.

Biodiversity of protozoans was recorded at peak in summer months and their count remains low during monsoon period. Dilution of water cansed by monsoon rain may explain low protozoan count observed during monsoon while maximum population during summer months indicated a positive relationship with temperature, bicarbonate, chloride, calcium, magnesium etc. Similar type of observations was recorded by paliwal (2005) in Kali-Nadi. Cladocera were found to be maximum in summer followed by winter and minimum in monsoon months. The maximum population of cladocera in summer may be attributed to favourable temperature and availability of food in the form of bacteria, nanoplankton and suspended detritus. While in monsoon the factors like water temperature, DO and Turbidity play an important role in controlling the diversity and density of cladocera (Edmondson, 1965; Baker 1979).The copepod population in Yelahanka lake may be due to richness of organic matter. Similar observations were also made by Somani and Pejaver (2004) in lake Masunda.

In conclusion, protozoa appeared to be most dominating community throughout the study period. Overall Zooplankton population fauna of the lake was much more diversified indicating the Yelahanka lake as nutrient rich water body which may undergo the state of eutrophication, if not managed properly.

REFERENCES

APHA, (1998) Standard methods for examination of water APHA, AWWA, Washington. | Bagde. U.S. and Varma, A.K. 1985. Physico-chemical Characteristics of water of JNU lake at Delhi. India. J. Ecol. 12(1) : 151-156. | Baker S.L. (1979) Specific status of Keratella cochlearis (Gosse) and K. Ahlastrar (Rotifera : Brachionidae) : Ecological considerations, Can. J. Zool, 7(9) : 1719- 1722. | Dodson, S. 1992. Predicting crustacean Zooplankton species richness. Limnology and Oceanography. 37(4) : 848-856. | Edmondson, N.T. (1965) Reproductive rates of planktonic rotifers related to food temperature in Nature. Ecol, 5: 61-68. | Edmondson W.T., Freshwater Ecology, 2nd Ed. Periodicals supply service, New Delhi, P. 1248. International books and periodicals supply services, New Delhi, 1248, (1992). | Kaushik. S and D.N. Sharma (1994) Physico-chemical characteristic and Zooplankton population of a perennial lake, Malsya sarovar, Gwalior, J. Environ. Ecol., 1 : 429-434. | Paliwal. A.K. (2005) Seasonal variation in freshwater protozoans in Kali-Nadi. District Etah, U.P. India, Ecology of plankton. | Pawar, S.K. and J.S. Pulle (2005) Qualitative and quantitative study of Zooplankton in pethwaraj Dam, Nanded District (Maharashtra) India: J. Agro. Biol., 20(2): 53-57. | Rosenberg D.M. and Resh V.H.,(eds) Freshwater Biomonitoring and Benthic Macro invertebrates, Chapnan and Hall, New York, 488 (1993). | Sharma, B.K. 1998. In: Faunal diversity of India (Eds. J.R.B. Alfred, A.K. Das and A.K. Sanyal). Zoological survey of India, Environmental centre: 57-70. | Singh D.N. (2000) Seasonal variation of Zooplankton in a tropical lake, Geobios, 27:92-100. | Somani, V. and M. Pejawar (2004) Crustacean Zooplankton population of the lake Masunda, Thane, Maharashtra: J.Aqua. Biol. Vol. 19(1): 57-56. | Subbamma, D.V. (1992) Plankton of a temple pond near Machli Patnam, Andhra Pradesh. J.Aqua.Biol,. 17(12), 17-21. | Sunkad, B.N. and H.S. Patil (2004) Water quality assessment of Fort lake of Belgaum (Karnataka) with special reference to Zooplankton. J.Environ Biol., 25(1), 99-102. | Tonapi G.T., Fresh water animals of India. Oxford IBH publishing. Co. New Delhi, 311,(1980). |