SEASONAL ZOOPLANKTON VARIATION IN NAGARTAS DAM NEAR PARTUR DIST. JALNA (M.S) INDIA

Pramod P Gaike, B. M. Mohite, K. B. Ningule, A. H. Kambale and K. B. Shejule

Dept. of Zoology, P. V. P. College, Patoda Dist.Beed – 414204 (M.S) India
Dept.of Geography, P. V. P. College, Patoda Dist.Beed – 414204 (M.S) India
Dept. of Zoology, Jamkhed Mhavidyalaya, Jamkhed Dist-Ahemadnagar
Dept. of Zoology, Dr. B. A. M. University Aurangabad – 431004 (M.S) India.
pramodgaike0@gmail.com

ABSTRACT

In the present work, we provide quantitative information on the seasonal variations of zooplankton and selected physico-chemical variables a large man-made reservoir in the Jalna district. In the study period we have recorded 24 species of which, 10 species belongs to rotifera, 6 species belongs to cladocera, 5 species belongs to copepoda and 3 species of ostracoda. Among zooplankton, particularly rotifera was the dominant group throughout the study period and highest count was recorded in the summer season while low incidence was observed in southwest monsoon season. Zooplankton community is also correlated with physicochemical parameters. The results indicate that the distribution and density of zooplankton species influenced by physical and chemical factors of the environment.

Keywords: Rotifera, Cladocera, physico-chemical parameters, seasonal fluctuations.

INTRODUCTION

Dry lands are located in arid, semi-arid or dry sub humid climatic zones, comprising 41% of all continental areas of the Earth's surface and are home to more than 2 billion people, or approximately one-third of the world population. It is estimated that around 20% of the dry lands of the planet are already completely desertified and that the decertified areas will increase considerably in the coming decades Millennium Ecosystem Assessment (2005). In semiarid regions, the droughts and the highly irregular rainfall, together with high evaporation rates, cause the loss of a great part of the surface waters. As a result, almost the entire hydrologic network is alter, which leads to a severe problem for the storage and uses of this essential resource. Therefore, many reservoirs are constructed in these regions with the main purpose of storing water for various purposes. The frequent alterations in trophic state, other physico-chemical factors in these reservoirs represent an important selective factor for the success of potentially colonizing species. Furthermore, these reservoirs are relatively, highly vulnerable to wind action and to oscillations in climatic conditions, which represent other important selective factors for the biota. Hence, the composition and the relative abundance of species in the aquatic communities must be influenced by the variations in the trophic state, seasonal changes of physicochemical variables of the water body. Zooplankton has been recommended as regional bioindicators of lake eutrophication (Attayde and Bozelli, 1998); (Pinto-Coelho *et al.*, 2005a); (Pinto-Coelho *et al.*, 2005b); Burns and (Galbraith, 2007); (Stemberg and Lazorchak, 1994); (Straile and Geller, 1998); acidification (Pinel-Alloul,1990); disturbances by agriculture. Although zooplankton are usually considered to be good indicators of environmental changes and have a fundamental role in energy flow and nutrient cycling in aquatic ecosystems, these organisms have been little studied in aquatic ecosystems of Marathawada region Maharashtra state. Therefore, their potential value as indicators of alterations in the water quality of reservoirs in these regions needs to be assessed. Also, there is an increasing demand by environmental monitoring programs for bioindicators of water quality. This study attempted to investigate the structure and composition of the zooplankton community in Nagartas dam.

MATERIALS AND METHODS

Monthly zooplankton samples were obtained from each of these sites for the period December 2007 to November 2008. Concurrently, water samples were taken for measuring selected physico-chemical variables. For zooplankton samples, we filtered 40 l of water using plankton net of 50 µm mesh size. Samples were collected from the surface (0.5 m) during the morning hours. Although we collected the samples for some months at fortnightly intervals, for presentation we pooled the data and expressed it on a monthly basis. Zooplankton samples were preserved in 10%formalin at the site itself. At the time of sampling, we measured the surface water temperature and pH, conductivity and secchi depth. Analyses of other variables (dissolvedoxygen, free ammonia, dissolved ammonia, nitrite, nitrate and phosphate) were conducted in the laboratory using standard procedures. Identification of zooplankton species was done using standard literature (Dussart and Defaye, 1995);(Korovchinsky and Smirnov, 1998); (Koste, 1978). For quantitative analysis, we counted the number of individuals for each species present in aliquot of 1ml from the concentrate (to 100 ml) of field collected zooplankton. The data were later converted to the actual quantity of water filtered from the lake. We used 3–4 aliquots for each sample. Density of zooplankton was expressed as number of individuals per liter.

RESULTS AND DISCUSSION

The range of atmospheric temperature throughout the study period varied from 29 OC (December) to 36 OC(May) and the water temperature was ranged between 16.9 OC (December) to 32 OC (May). During the study period, the range of dissolved oxygen values varied from 5.1 to 9.5 mg/l, the lowest being during the winter and highest during summer. Similarly pH of the reservoir indicated an alkaline condition. High values pH (8.7) was observed in summer while the values were near-neutral in winter (pH=6.8). The concentration of nitrate content was ranged between 0.35 mg/l to 1.15 mg/l. Phosphate values were ranged between 0.77mg/l to 1.08 mg/l). Secchi disc transparency values recorded between 0.89 to 2.12 m depending on the period of sampling. In general, higher transparency values were recorded during the northeast monsoon season. Monthly and seasonal abundance of zooplankton for one year of investigation. The zooplankton of Nagartas dam consists of Rotifers, Cladocera, Copepoda and Ostracoda; the total 24 species were recorded from the reservoir during the present study, in which 10 taxa of rotifera, 6 taxa of cladocera, 5 taxa of copepoda and 3 taxa of ostracoda contributed to zooplankton diversity in the reservoir. There was a distinct seasonal fluctuations and composition of the zooplankton in the Nagartas dam with productive (October to May), retardation (June to August) and recovery (September onwards) periods. The total zooplankton population was dominated by rotifera (41%), cladocera (28%), copepoda (23%) and ostracoda (8%) respectively. Among zooplankton, rotifer was the dominant group. The rotifera group was represented by 10 genera. The most dominant being *Brachionus species,* represented by 4 species viz., *Brachionus angularis, B. candatus, B. calyciflorus and B. rubens.* The others were*, Tricocera cylinderica, T. smiles, Lapadella ovalis, Lecane luna, Keratella tropica,* and *K. cochlearis.* The most common species occurring throughout the year were *Keratella tropica, Keratella cochlearis, Brachinus angularis, and Trichocerca similis.* Maximum density of rotifera between 71 ind/l to 204 ind/l was recorded during December 2007 to November 2008. The highest numerical abundance of rotifera population was observed in the month of May (204 ind/l), while low density was observed in the month of September 2008. The maximum density of rotifera noticed in summer season, while low incidence was recorded in northeast-monsoons season. Among the rotifers *Brachionus angularis, Tricocera cylinderica, Keratella tropica, and K. cochlearis* were dominant species. In the present investigation cladocera group represented by 6 species *Viz. Monia brachiata, Monia macrocopa, Daphnia carinata, Daphnia pluxes, Euryalona orientalis, Alona pulchella.* This group was second dominant group during the study period. The maximum density was observed in southwest monsoon season and northeast monsoon season, while low density was observed in summer season. Among the cladocera *Daphnia Pluex* and *Monia brachiata* were dominant species throughout the study period. The copepoda group is epresented by 4 species *Viz.*, *Mesocyclops lukarti, M.hyalinus, Paracyclops fimbriatus, and Neodiaptomus strigilipes.*

High incidence of copepoda was encountered in southwest monsoon season and northeast monsoon season. The maximum density of cladocera was recorded in the month of October 2005 (223ind/l), while low density was noticed in summer season in the month of April (39 ind/l). Ostracoda occupied fourth position of zooplankton and represented very low population diversity compared to other groups. This group represented by three species *Viz.,*

Table 1: Monthly variation in Zooplankton (org/ml)

Month	Year 2007-2008	
	Station 'A'	Station 'B'
December	110	115
January	396	408
February	426	432
March	352	364
April	896	814
May	906	816
June	1035	1019
July	866	804
August	716	700
September	242	288
October	214	226
November	138	142

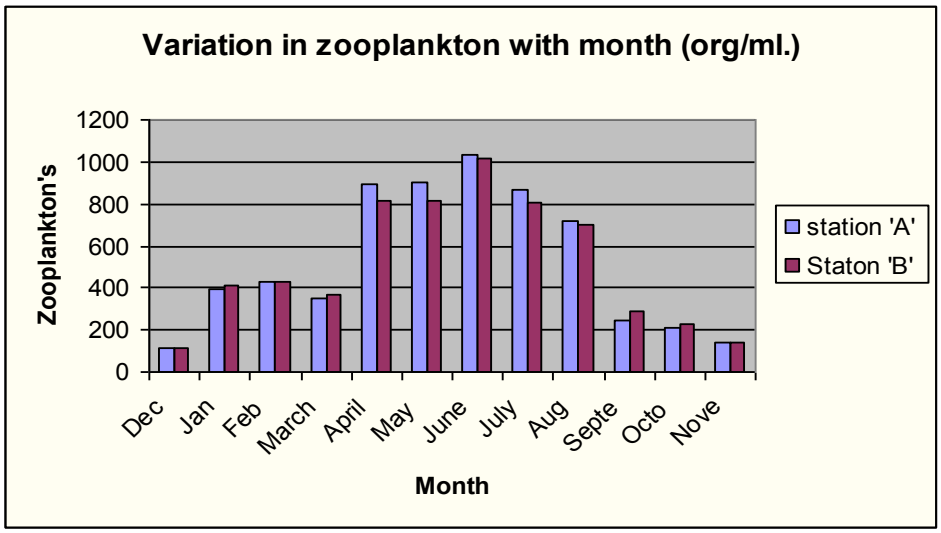

Fig. 1: Variation in Zooplankton with Month (org/ml.) X axis – Month, Y axis – **Zooplanktons**

LITERATURE CITED

APHA, 1989. *Standard Methods for the Examination of Water and Wastewater.* American Public Health Association,Washington, DC.

Attayde JL and Bozelli RL, 1998. Complexity in marine ecosystem . *Can. J. Fish. Aquat. Sci.,* **55:** 1789–1797.

Burns CW and Galbraith LM, 2007. Comparative Assessment of the Physico-Chemical and Bacteriological Qualities of Selected Streams in Louisiana*. J. Plankton Res.,* **29**: 127–139.

Dussart BH and Defaye D, 1995. *Introduction to the Copepoda.* Vol. 7. SPB Academic Publishing, Amsterdam: pp. 277

Korovchinsky N and Smirnov NN, 1998. *Introduction to the 'Cladocera' (Ctenopoda, Anomopoda, Onychopodaand Haplopoda). Supplemented forAmerica. Study Material, ENEPIztacala, UNAM, Mexico*: pp. 143.

Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well Being: Desertification Synthesis. World Resources Institute, Washington, DC.*

Pinto-Coelho R., Pinel-Alloul B, Me´thot G, 2005b. Composition and structure of zooplankton community are affected by eutrophication. *Can. J. Fish. AquaticSci*., **62**:348–361.

Rajashekhar M, Vijaykumar K and Zeba Paerveen, 2010. Zooplankton diversity of three freshwater lakes with relation to trophic status, Gulbarga district, North-East Karnataka, South India*. International Journal of Systems Biology*, **2** (1): 06-11.

Stemberg RS and Lazorchak JM, 1994. Vertical distribution and seasonal abundance in two shallow Ontario. *Can. J. Fish. Aquat. Sci*., **51**:2435–2447.