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DIVERSITY STATUS OF ZOOPLANKTON IN A TYPICAL POND ECOSYSTEM OF CACHAR DISTRICT, ASSAM, INDIA

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ABSTRACT

An experiment was designed through a thorough systematic process to determine the abundance of several zooplankton group of Barambaba temple pond as they are important biotic components influencing all the functional aspects of an aquatic ecosystem, such as food chains, food webs, energy flow and cycling of organic matter. The experiment was carried out under the suitable environment of this freshwater pond. Continuous collection of plankton species was made up for one years. During this study total 30 zooplankton genera were encountered belonging from 4 major zooplankton groups. Cladocera represented by 12 genera while copepoda represented by 4 genera, again 13 genera found belonging from rotifer and only 1 genera found from the ostracoda. Among all the 4 groups rotifera found to be most dominant group both in quantitatively and qualitatively while ostracoda found to be least dominant quantitatively as well as qualitatively.

KEYWORDS: Abundance, Diversity, Freshwater, Zooplankton

INTRODUCTION

The term biodiversity was first coined by E. O. Wilson in the literature in 1988. Life is diverse at many levels from the beginning including genes and extending to the complexity of species, several life forms and functional natures, organised in spatial patterns from biological communities to ecosystems, regions and beyond.

In a aquatic ecosystem zooplanktons are an essential food item of omnivorous and planktivorous fishes and the most essential for larvae culture. Zooplanktons are the main sources of natural food for fish and shellfish which is directly related to the survival and growth and these are the base of food chains and food webs in all aquatic ecosystems (Miah, 2013). They are most essential for larvae culture. In India for the last two decades, several studies have been made on plankton in relation to fish culture in freshwater ecosystem (Singh, 2011). Many authors have opined that the abundance of plankton has a define relation with the change of the season (Moitra and Mukherjee 1972 and Chakraborty and Asthana 1998). They also play a major role in recycling nutrients as well as cycling energy within their respective environments. Zooplankton is economically and ecologically important group of aquatic organisms. The knowledge of zooplankton abundance, species diversity and specific distribution is helpful in understanding the trophodynamics and trophic progression of water bodies (Verma and Dutta Munshi, 1987). Both the qualitative and quantitative abundance of zooplankton in a fish pond are of great importance in managing the successful aquaculture operations.

For the determination of zooplankton diversity different indices can be used. The most commonly used diversity indices can be grouped in a coherent system of diversity numbers developed by Hill (1973) that includes species richness, the Simpson index and a derivation of the Shannon-Wiener index as special cases. In this system species are different only

when their abundance is different. Hence, during last decade a number of indices have been introduced which take into account the taxonomic position, trophic status or body size of the species.

MATERIALS AND METHODS

Study Area

Baram baba temple Pond is situated at Silcoori, Cachar District, Assam, India. It is lying between 29 ^{O} 43'44.60'' N and 092 ^{O} 47'19.6'' E having Alt 11m ± 14m MSL.

Collection and Identification

Zooplankton collection was made of standard literature of Battish (1992) with the help of plankton net of bolting silk No 25 (0.06 mm mesh size). After collection sample was transferred into Tarson 100 ml container and then preserved in 5% formalin. Weekly Collection was done about one year from August 2014 to July 2015.

For quantitative analysis, collected zooplankton samples were counted using Sedgwick- Rafter Counting Chamber and then observed under light microscope using X10 and X40 magnification. The identification was done following standard keys and literature by Needham and Needham (1962), Pennak(1978), Battish (1992), Michael and Sharma (1988), Sharma (1999), Sharma and Sharma (2002).

Abundance of zooplankton diversity of the study areas were analysed statistically using standard literature. (Zar, 1999)

RESULTS AND DISCUSSIONS

Table 1: Abundance of Several Zooplanklton Species during the Study Period at Barambaba Temple Pond

Zooplankton Species	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Cladocera												
Bosmina sp.	+	+	+	+	+	+	+	+	+	+	+	+
Diaphanosoma sp.	+	+	+	+	+	+	+	+	+	+	+	+
Bosminopsis sp.	+	+	+	+	+	+	+	+	+	+	+	+
Alona sp.	+	+	+	-	+	-	+	+	+	+	+	+
Sida sp.	+	+	-	-	+	+	-	+	+	-	+	+
Ceriodaphnia sp.	-	+	-	-	+	-	-	+	+	+	+	-
Pleuroxus sp.	+	-	+	-	+	-	-	+	+	-	+	+
Pseudochydorus sp.	+	-	+	+	+	-	-	+	+	+	+	+
Chydorus sp.	+	+	+	+	+	+	+	+	+	+	+	+
Macrothrix sp.	+	+	+	+	-	-	+	+	+	+	+	+
Scaphaloberis sp.	+	+	-	-	+	-	+	+	+	+	+	+
Moina sp	+	+	+	-	-	+	-	+	+	+	+	+
Copepoda												
Mesocyclops sp.	+	+	+	+	+	+	+	+	+	+	+	+
Thermocyclops sp.	+	+	+	+	+	+	+	+	+	+	+	+
Neodiaptomus sp.	+	+	+	-	+	+	+	+	+	+	+	+
Heliodiaptomus sp.	+	+	+	-	-	+	+	+	+	+	+	+
Rotifera												
Brachionus sp.	+	+	+	+	+	+	+	+	+	+	+	+
Lepadella sp.	+	+	-	+	+	+	+	-	-	+	-	+
Keratella sp.	+	+	+	+	+	+	+	+	+	+	+	+
Asplanchna sp.	-	+	+	+	+	+	+	+	-	-	+	+
Cephalodella sp.	+	+	+	+	+	+	+	+	-	-	+	+

Mytilina sp.	+	+	+	+	+	+	+	-	-	+	-	+
Plationus sp.	+	+	+	+	+	+	+	-	-	+	+	+
Scaridium sp.	+	+	-	+	+	+	+	-	+	+	+	+
Filinia sp.	+	-	+	+	+	+	+	+	+	-	+	+
Lecane sp.	+	+	+	+	+	+	+	+	+	+	+	+
Testudinella sp.	+	+	+	+	+	+	+	+	+	+	+	+
Trichocerca sp.	+	-	+	+	-	+	+	-	+	+	-	+
Pompholyx sp.	-	+	-	+	+	+	-	+	+	-	-	+
Ostracoda												
Cypris sp.	+	-	-	+	-	+	-	-	+	-	+	-

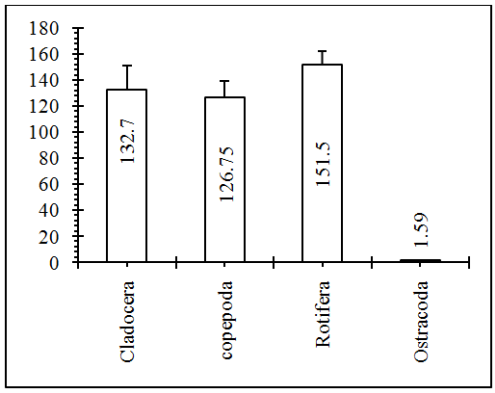

Figure 1: Mean ± Standard Error of Several Zooplankton Group

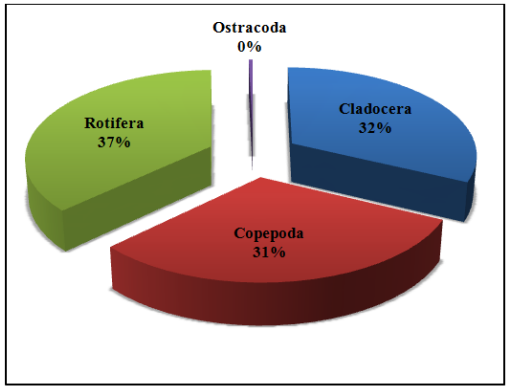

Figure 2: Percentage Distribution of Several Zooplankton Group during the Study

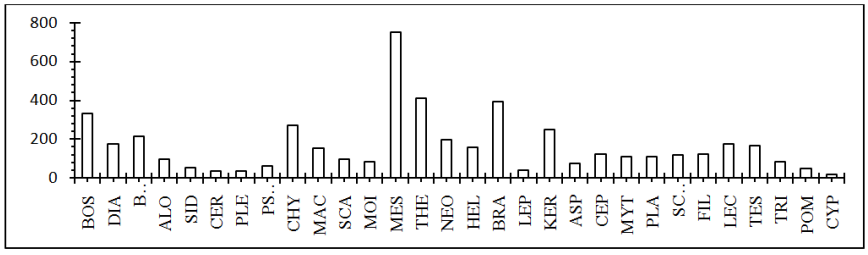

Figure 3: Abundance of Several Zooplankton Species Found in Barambaba Temple Pond during the Study Period

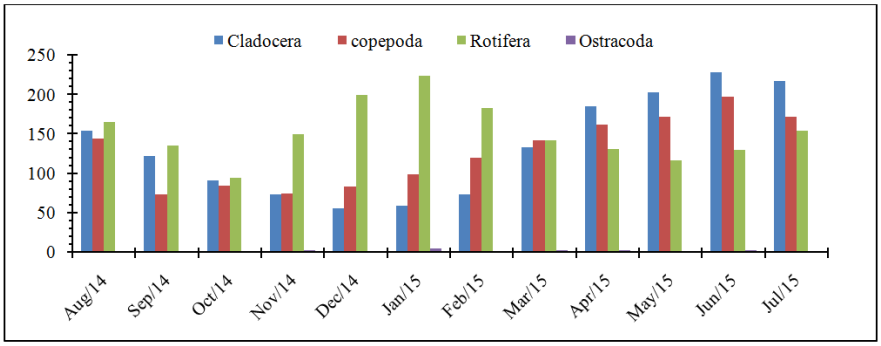

Figure 4: Diversity Ratio of 4 Zooplankton Groups Throughout the Study Period

Several zooplankton genera found during the whole study. Total 30 zooplankton genera were recorded. Available zooplankton species have been shown in Table 1. Average composition and standard error within the 4 zooplankton group

during the period has been shown in Figure 1. Percentage distributions of all the 4 zooplankton groups have been shown in Figure 2. Rotifer a found to be most dominant group as they constituted 37 % among the total identified zooplankton species. Among them *Brachionus* sp., *Keratella* sp., *Lecane* sp. and *Testudinella* sp. have been found in all season. The second highest group was found cladocera group which constituted 32% of the total population. Among them *Bosmina* sp., *Diaphanosoma* sp., *Bosminopsis* sp. and *Chydorus* sp. have been found in all the seasons during the study. Copepoda group found to be 3rd highest group having 31% among the total population. Among them *Mesocyclops* sp. and *Thermocyclops* sp. have been found in all season. In all the 30 genera belonging from the 4 groups *Mesocyclops* sp. found to be most dominant while *Cypris* sp. from ostracoda group found to be least dominant. Among all the 4 zooplankton group rotifera found to be most dominant during the winter season while cladocera were found to be most dominant group during the monsoon (Figure 4).

The fluctuations in the abundance of zooplankton groups based on the unsuitable environmental condition of several season has been recognised for 50 years (Hutchinson 1933). Species richness is also dependent on the habitat size. There is a good evidence of a positive relationship between habitat size and species richness for a number of freshwater taxa (Dickson and Cairns 1972, Colinvaux & Steinitz 1980, Holland & Jain (1981). Diversity of zooplankton has been reported by many researcher of the Barak valley region in earlier days such as Kar, D and Barbhuiya, MH. (2004), Das, U and Kar, D. (2013), Das, P and Kar, D. (2013), Narzary *et al.*(2015), and so on.

CONCLUSIONS

Diversity status of zooplankton in Barambaba temple pond indicating a good and healthy aquatic environment for fish growth as they play the main source of natural food of fishes. They also helps in recycling nutrients as well as cycling energy within the aquatic ecosystem. Zooplankton in a water body is regarded as an indicator of productivity. Hence in order to fisheries development and to increase the production level, proper and scientific management is essential in which the knowledge of water quality and natural productivity plays an important role.

REFERENCES

1. Battish, S. K. (1992). *Freshwater Zooplankton of India*. Oxford and IBH Publishing Co., Ltd. (New Delhi), India. pp. vi + 233.
2. Chakra borty, N. M. and Asthana, A., (1998). Plankton succession an ecology of a sewage treated pond in West Bengal.
3. Das, P. and Kar, D. (2013). Studies on zooplankton diversity and physico-chemical parameters of Ramnagar annua, Assam. International Journal of Current Research. Volume 5. pp 3058-3062.
4. Das, U. and Kar, D. (2013).A Comparative Study On Qualitative And Quantitative Analysis Of Zooplankton In Relationship With Physico-Chemical Properties Of Water Between Karbala Lake And Baram Baba Pond Of Cachar District, Assam. International Journal of Current Research, Volume 5.pp 3038-3041.
5. Hill, M. O. (1973).Diversity and evenness: A Unifying Notation and Its Consequences. Ecology 54: 427-432.
6. Kar, D and Barbhuiya, MH. (2004). Abundance and diversity of zooplankton in Chatla Haor, a floodplain wetland in Cachar district of Assam. Environment and Ecology, 247-248.

7. Michael, R. G. and Sharma, B. K. (1988). Fauna of India, Indian Cladocera.Department of Zoology, North-Eastern Hill University. Pub: Zoological Survey of India, Calcutta.
8. Miah, Md. F. *et al.*, (2013). Assessment of *Daphnia*, *Moina* and *Cylops* in Freshwater Ecosystems and the Evaluation of Mixed Culture in Laboratory. American International Journal of Research in Formal, Applied & Natural Sciences, 4(1), September-November, 2013, pp. 01-07.
9. Moitra, S. K. and Mukherjee, S. K., (1972). Studies on the freshwater plankton of fish pond in Kalyani, West Bengal, India Vest. Cal. Zoo. 36: 23-28.
10. Narzary, A. *et al.* (2015). A preliminary study on zooplankton diversity of Ramnagar Anua, Srikona Beel and Tapang Haor of Cachar district, Assam, India: A Project Report. JCBPS; Section B; May.2015–July.2015, Vol. 5, No. 3; 2809-2817.
11. Needham, J.G. and Needham, P.R. (1962). A guide to the study of fresh water biology. San Francisco: Holden-Day, Inc. pp 108.
12. Pennak, R. W. (1978). Fresh water invertebrates of the United States. John Wiley and Sons, New York. pp. 515.
13. Sharma, B.K. (1999). Fresh water Rotifers (Rotifera: Eurotatoria). *Fauna of West Bengal*- Part ll, i-iv, 1-609.
14. Sharma, B.K. and Sharma, Sumita (2002).Freshwater Rotifers (Rotifera: Eurotatoria). *Fauna of Tripura*, Part 4: 163-224.
15. Singh, M., (2011). Study of plankton abundance in freshwater fish pond at Malawan, Etah (U.P.). Department of zoology, Agra College, Agra (U.P.). Ind J Biol Stud Res Vol. 1 (1), pp 39-44.
16. Verma, P.K. and J.S. Dutta Munshi, (1987). Plankton community structure of Badua reservoir of Bhagalpur (Bihar). Trop. Ecol., 28: 200-207.
17. Wilson, E. O. and Peter, F. M. eds. (1988). Biodiversity. Wasington, DC: National Academy Press. An important collection of papers that launched public awareness of biodiversity and its importance.
18. Zar, J. H. (2011). Biostatistical Analysis. Dorling Kindersley (India) Pvt. Ltd., lisensees of Pearson Education in South Asia.