

Ecology And Zooplankton Diversity of a Wetland at Jhenidah District-Bangladesh

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Abstract

Wetlands are the most dynamic ecosystem play a vital role in indigenous fish production which is a main source of protein of rural population ultimately helps socioeconomic condition of the adjacent areas of inhabitants. Zooplankton is regarded as primary consumers of the water bodies and constitute the food source of fish and other animals..Attention has been given to the water body of Kotchandpur Baor and the growth, distribution and abundance depend on the status of water body. The work has been carried out during one year period from June 2011- May2012 in different seasons viz. monsoon, post monsoon and pre monsoon respectively in order to asses water quality parameters and zooplankton diversity. During the investigation, zooplankton diversity was observed high in the wetland. Rotifers were the most dominant group followed by Cladocera, Copepoda. Protozoa and Ostracoda during the investigation. There is a high density of zooplankton in monsoon than compare to other seasons indicate good water quality and less pollution load.

Keywords: Ecology, water quality, Zooplankton, Seasonal variations

I. INTRODUCTION

Bangladesh is low riparian country which is very rich in natural waters in the shape of rivers, reservoir, lakes, floodplain, canals and oxbow lakes. The open water resources such as rivers, estuaries and lakes expected as 1.77 billion hectares (DoE 2001).

Zooplankton plays significant role in nutrient recycling, energy transfer in the food web, Beside these it has a great role in energy transfer of organic matter from primary producer to secondary consumer (Krishnamurthy et al 1979).Zooplanktons were small bodied animals with low power of locomotion and passively carried by water currents and winds. These were used as food for fishes and good indicator for detecting and monitoring pollution (Shivashankar and Venkataramana 2013).Generally plankton diversity are distributed throughout the world and biological diversity is critical for existence and progress of humanity. Biological diversity supplied resources for food, energy and raw materials (UNESCO, 1996)

Wetlands play very important role in maintaining biodiversity, supply drinking water, ground water recharging, pollution abatement etc. The information regarding the faunal diversity of wetlands in south western part of Bangladesh is very scanty. A number of studies has been carried out on faunal diversity of different wetlands such as Sharma and Sharma (2008), Khan(2002 and 2003) .the aim of the paper was to estimate the species diversity of zooplankton in relation to water quality.



Fig. 1: map

Courtesy: Joydia Baor, Google earth(<http://fwow.biogspot.com>.)

II. MATERIAL AND METHODS

The work is the outcome of limnological analysis which was undertaken from June 2011 to May 2012.

A. Sampling Sites:

Three sampling sites were selected for the analysis of water quality and zooplankton. These were Bhabanipur, Balaramnagar and Joydea. Water samples were collected at regular intervals on monthly basis at 8.00 to 9.30 am from the different stations of the study area. pH, temperature were measured on the spot by Hanna device (pH meter) and mercury thermometer. DO was measured according to Wrinklers method. Rest of the parameters were measured in the laboratory as described by APHA1989.

For the study of zooplankton, samples were collected on monthly basis for a period of one year i.e. from June 2011 to May 2012. 50 L of water was passing through conical shaped plankton net by towing and filtering of bolting silk mesh size No.25. Filtered water sample was immediately preserved in 5% formalin and was reserved aside in the laboratory for settling at the bottom of the pot. Supernatant plankton free water was released and dense samples were taken for investigation.

Identification of different groups of zooplankton was done under a microscope with different magnifications using keys and monographs of Adoni (1985), Edmondson (1959,1974). Beside these, the specific books and literature were used for the identification of different groups of zooplankton viz Victor and Fernando, 1979, Reddy, 1994, Dhanapathi, 2003 and Michel and Sharma, 1988.

B. Result and Discussion:

Table -1: identified different groups of zooplanktons are shown in different seasons of the year.

Rotifera

Serial no	name	PM	MON	POM
01	<i>Brachionus quadridantatus</i>	+	-	+
02	<i>Brachionus putulus</i>		+	- -
03	<i>Brachionus rubens</i>	+	+	-
04	<i>Brachionus candatus</i>	-+	-+	+
05	<i>Brachionus forficula</i>	-	+	+
06	<i>Brachionus angularis</i>	-	+	+
07	<i>Brachionus falcatus</i>	+	-	+
08	<i>Brachionus calicyflorus</i>	-+	-	-
09	<i>Polyathra spp.</i>	+	+	-
10	<i>Rotaria spp.</i>	-	+	+
11	<i>Trichocera ratus</i>	+	+	+
12	<i>Trichocera cylindrica</i>	-	-	+
13	<i>Trichocera similis</i>	+	+	-
14	<i>Lecane bula</i>	+	+	-
15	<i>Lecane luna</i>	-	-	+
16	<i>Lecane unguolata</i>	-	-	+
17	<i>cephalodela</i>	+	-	+
18	<i>Enentrum sp.</i>	+	+	-
19	<i>Keratella quadrata</i>	-	+	-
20	<i>Keratella tropica</i>	-	+	+

C. Protozoa:

Serial no	name	PM	MON	POM
01	<i>Euglena gracilis</i>	+	+	-
02	<i>spirogyra,</i>	-	+	+
03	<i>paramecium,</i>	+	-	+
04	<i>Diffusia</i>	-	+	-
05	<i>Euglena sp.</i>	+	+	+

D. Cladocera:

Serial no	NAME	PM	MON	POM
01	<i>Alona rectangula</i>	+	+	-
02	<i>Alona quadrangularis</i>	-	+	+
03	<i>Alonella sp.</i>	-	-	+
04	<i>Bosmia sp.</i>	+	+	-

05	<i>Daphnia similis</i>	-	+	+
06	<i>Daphnia micrura</i>	-	+	-
07	<i>Daphnia carinata</i>	+	+	+
08	<i>Daphnia pulex</i>	+		+
09	<i>Moina micrura</i>	+	-	+
10	<i>Polyphemus sp.</i>	-	+	-

E. Ostracod:

Serial no	name	PM	MON	POM
01	Cypris	+	+	-

F. Copepoda:

Serial no	name	PM	MON	POM
01	<i>Mcrocyclops varicans</i>	+	+	-
02	<i>Mesocyclops hyalinus</i>	-	+	+
03	<i>Mesocyclops leuckarti</i>	-	+	+
04	<i>Paracyclops fimbriatus</i>	+		-
05	<i>Heliodiaptomus</i>	-	+	+

Note: PM-premonsoon,MON-monsoon, POM- post monsoon.

The diversity of zooplanktons among different seasons viz. premonsoon,monsoon and post monsoon was tabulated in table 1.The species which were identified during investigation grouped into rotifera ,cladocera,protozoa,copepod and ostracoda. .20 species belong to Rotifera,10 species of Cladocera and 5 species of Copepoda,5 species of protozoa and one species belong to ostracoda were tabulated No previous work has been done so far earlier. Attempt was done to make a comprehensive list of zooplankton status of this water body.

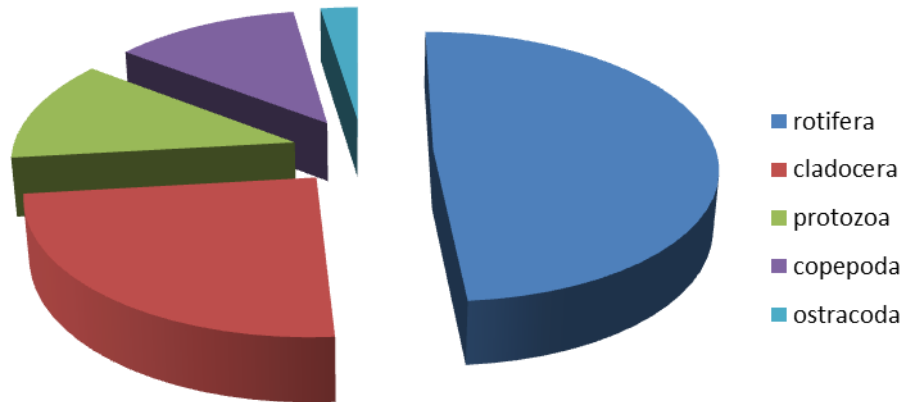


Fig. 2: showing the percentages of species diversity of zooplankton.

Rotifera occupied 48.78%,cladocera 24.39%, Copepoda 12.19%, Protozoa 12.19% and Ostracoda2.43%..The most assorted genera were Brachionus comprising 60%,followed by Trichocera 15%and Lecane 15%, Keratella 10% and Polyathra,Rotaria,Cephalodella and Encentrum5%.Most of the zooplankton species were common and universal distribution in nature. The most frequent rotifers were Lacene bulla.All species were recognized by Bonsom. Rotifers showed the highest species richness in monsoon.Among cladocera ,Daphnidae includes four species and Clydoridae was the dominant group of report taxa includes three species and genera.Of copepods, 11 species of cyclopoides have been recored in Thailand and Bangladesh(Patra and Azadi,1987). This findings were showed similarities with the findings of Debnath etal 2014.Much more studied needed to be carried out this actual number of fauna. Further study will provide more information regarding zooplankton structure of Bangladesh..

Available aquatic plants are common i.e. Trapanatus, Eichhornia crussipes,Hydrilla verticellata, Utriculariaflexuosa, Lema trisula, Pristula salvinia, Nymphaea sp., Nymphoides sp., Azolla, pinnata sp. And sagitaria sp. Aquatic plants were grouped into floating, rooted submerged and emergent.extra effort will be needed to carry out comprehensive details of zooplankton. Life of an aquatic body depends on physical,chemical and biological characteristics of water.The parameters like ph,Do,alkalinity and nutrients are important for the production of plankton (Sivakumar, and . Kareppasmy, 2008). Temperature is the critical parameters which influences all abiotic parametes of an ecosystem. The growth ,distribution and abundance of biota largely depend on the range of temperature. The lowest temperature is estimatrd15o C in winter and highest 34.5 o C in summer. The pH of the water body showed slightly alkaline in nature. The range of pH 6 to 8.5 is considered as safe limit.the permissible limit for

free Co₂ is 10 mg/l. Increase in the amount of Co₂ is related to the increase of pollution.. Do is essential for every animal for respiration and metabolic activities. Alkalinity of an water body is the capacity to neutralize acid. Nitrates and phosphate are the nutrients of an aquatic body. Excessive amounts of nutrients give rise to huge production of algal bloom lowers the levels of Do. According to Patra and Azadi 1997, the negative relationship observed between zooplankton and water quality parameters like temperature, pH and free Co₂. The presence of lower levels Do reflects the pollution of an aquatic ecosystem, the range of Do indicates less pollution load.

Factor	Range	Mean±S.D.
Water Temperature	15-34.5	24.75±5.6
pH	7.2-7.9	7.00±0.22
FreeCO ₂	6-21	13.58±5.59
Alkalinity	9-45	22.10±6.37
Hardness	21 -61	35.32±14.16
Phosphate	0.09-0.56	0.30±0.154
Nitrate	0.24-0.54	0.32±0.086
DO	5-8.5	6.20±0.80

The observed results showed that it has moderate range of dissolved oxygen, low level of CO₂, lower concentration of nutrients and other biotic factors

Zooplanktons are considered as good ecological indicators of waterbodies (Gajbhiye and Desai 1981). The investigation of zooplankton considered as an important part of limnology, since they represent the transitional level between the primary producers and consumers.. Studies on the long-term fluctuations in the abundance of plankton are therefore important in relation to the conservation of aquatic resources. The abundance of zooplankton used for food of larval fish is considered to be one of the prime factors that conclude production of commercial fish (Cushin, 1978; Kane, 1993).

III. CONCLUSION

From the above study, it is concluded that the Joyde lake possesses large variety of zooplankton species. Beside these, large number of macrophytic population provide shelter, niches and food for aquatic animals. The pattern of zooplankton diversity indicates tropical characteristics of lake reported by Khan 2003. Invasion of water hyacinth creates major problems in aquaculture and hampered the zooplankton diversity, richness and abundance (Luken and Thieret, 1997)

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