

**ABUNDANCE OF BENTHIC FAUNA IN WINTER AND SUMMER SEASONS AT
THREE WATER BODIES OF DHAKA, BANGLADESH**

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Abstract: The study was conducted on abundance of benthic fauna during winter and summer in three water bodies of Dhaka (Ramna park lake, Baldah garden pond and Naya bazar pond) from December 2011 to May 2012. More species were found in summer than winter season. A total of 15 genera of benthos were found in Ramna park lake, 7 in Baldah garden pond and 9 in Naya bazar pond. The species diversity was more in Ramna park lake than in others as the water of Ramna park lake seems to be less polluted.

Key words: Benthic fauna, Water bodies, Seasonal variation, Dhaka city.

INTRODUCTION

Benthic invertebrates are very important components of aquatic biotic communities, playing several ecological roles in wetland ecosystem functions. They play significant roles in the energy pathway and nutrient cycling (Gordon 2000) and they also constitute an important link in the aquatic food chain as food resource for fishes and other animals (Blay and Dongdem 1996 and Arslan *et al.* 2007). Most importantly, macrozoobenthos have been extensively used for the assessment of the ecological integrity and biomonitoring of aquatic habitats (Acharyya and Mitsch 2000, MRC 2010). This is because they manifest a distinct response to the changes in the aquatic environment, thus serving as promising indicators of hydrologic stress and aquatic ecosystem health in general (Nazarova *et al.* 2004). In addition, the sedentary nature of macrozoobenthos, together with their ubiquitous distribution and life cycles of measurable duration allow for both long-term and short-term analyses, and they are easy to identify with already established diversity and monitoring indices (Rosenberg and Resh 1993).

Dhaka is facing major freshwater challenges. The wetlands of Dhaka city has been squeezed to 5% only, resulting acute shortage of surface water supply (Mouhuya *et al.* 2010). Pollution has become a great threat for the existence of aquatic lives. Chemical and physical tests give information that is accurate only

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when sample is taken but the benthic invertebrates are the most commonly used bioindicators as they are usually stable in time and space, thus reflecting the changes the ecosystem had gone through (Rosenberg and Resh 1993).

In view of the increasing rate of degradation of freshwater habitats in the country through pollution and other anthropogenic disturbances, it is imperative to study their benthic macrofauna assemblages together with the abiotic conditions to broaden understanding of functional status as well as biodiversity interactions with the abiotic environments. Among others, this information would be useful in determining the ecological health of the aquatic habitats and also will facilitate their biomonitoring. This work on three water bodies in different seasons is to assess the number of benthic species and individuals, representing benthos of selected water bodies. Therefore, the present study was conducted to assess habitat quality of the lake ecosystem on different months through the variation of benthic fauna in three selected water bodies.

MATERIAL AND METHODS

Study area: The study was conducted in three water bodies of Dhaka city: Ramna park lake, Baldha garden pond and Naya bazar pond

Ramna park is located at Shahbag area in Dhaka metropolitan city. The lake was originated from a channel of the Karwan bazar river and was connected to the Turag and Buriganga river. The department of environment looks after the aspects of proper environment and protection of aquatic resources of the lake. In and around Ramna park, some renovation works were carried out between 1998 and 2001 with a view of making the lake a pollution free recreation area.

Baldah garden pond is situated at Wari in Dhaka metropolitan city. The park is enriched with different types of plants and flowers. There is a round shape pond in the middle of this park.

Naya bazaar pond is located at Naya bazaar in Dhaka city. The pond water is relatively clean and local people use it for bathing only. It is surrounded by a fence. There are many coconut trees around the pond. The pond is also used for fish culture. A sport fishers' competition is held once a year. The study was carried out from December 2011 to June 2012.

Methodology: Samples were collected from the three selected water bodies with the help of Eckman dredger. Collection of samples was done from the selected places during 05.0 am to 12.0 pm. Clay samples were preserved in container with 20% formalin. The clay was sieved using different mesh sized sieve. Droppers were used to separate the benthos. The collected samples were

preserved in properly labelled bottle containing 5% formaldehyde. The benthos spp. were identified according to Ali and Chakraborti (1992), Edmonson(1959) and Mellanby (1971), at least to the genus.

RESULTS AND DISCUSSION

The occurrence of various groups of benthic invertebrates in the Ramna park lake, Baldha garden pond and Naya bazar pond in summer and winter season are presented in Table 1. Ten types of genus were found in the Ramna park, lake, while six types in Baldha garden and nine types in Naya bazar pond. A total of fourteen different genera belonging to three phyla (Annelida, Arthropoda and Mollusca) were found from the three waterbodies. The Annelids encountered belonged to the classes Oligochaeta and Hirudinea while the insects were from the order Diptera (*Chironomus* and *Forcipumyia*) and the Molluscs belonged to the classes: Gastropoda and Bivalvia (*Melania*, *Viviparus* and *Lamellidens*).

The result indicated that the common benthic fauna in three waterbodies of the Dhaka city belonged to classes Oligochaeta, Insecta and Gastropoda (Table 1, Plate 1). The highest density of benthic fauna belonged to the class Oligochaeta and Gastropods are in moderate number but common in three waterbodies and then the insects. The main reasons of this observation that oligochaetes also feed on organic material in water and are common in environments where large amount of organic materials are present due to their ability to survive in the resultant low oxygen levels and other reducing conditions better than most other macrobenthos species (Yankson and Kendall 2001). Like oligochaetes, chironomid larvae have also been used as indicators of organic pollution because they are often abundant in environments with low oxygen where organic material as food resource is abundant (Coffman and Ferrington 1996 and Jenderedjian *et al.* 2007). As the molluscs (Gastropoda and Bivalvia) were available in all the examined waterbodies in both summer and winter, it indicated that the environment of the examined water bodies were polluted with both organic and inorganic pollution as molluscs could survive in the environments where large amount of organic and inorganic materials are present. If we compare the results of summer and winter, it was clear that the species diversity was more or less similar in both season but their density was little higher in winter than summer (Tables 1 and 2). The reason may be that in winter the water level was lower and the organic and inorganic pollution was prominent.

Table 1. Name of benthos and their number found in three water bodies (Ramna park lake, Baldah garden and Naya bazar pond) in winter and summer season

Genus name	Ramna park lake		Baldah garden pond		Naya bazar pond			
	Number of individuals		Number of individuals		Number of individuals			
	Winter	Summer	Winter	Summer	Winter	Summer		
<i>Tubifex</i>	49	-	<i>Branchiura</i>	13	2	<i>Branchiura</i>	29	3
<i>Brachidilus</i>	2	-	<i>Eiseniella</i>	17	-	<i>Eiseniella</i>	15	1
<i>Branchioda</i>	13	-	<i>Messechytrichus</i>	-	1	<i>Brachidilus</i>	-	10
<i>Lumbriculus</i>	2	5	<i>Brachidilus</i>	-	5	<i>Dero</i>	-	1
<i>Messechytrichus</i>	-	2	<i>Chironomus</i>	2	2	<i>Nais</i>	-	3
<i>Nais</i>	-	2	<i>Viviparus</i>	3	4	<i>Chironomus</i>	2	1
<i>Dero</i>	-	2	<i>Lamellidens</i>	6	6	<i>Melania</i>	1	1
<i>Branchiura</i>	-	7				<i>Viviparus</i>	5	4
<i>Glossiphonia</i>	1	2				<i>Lamellidens</i>	9	7
<i>Chironomus</i>	2	4						
<i>Forcipomyia</i>	1	-						
<i>Melania</i>	2	2						
<i>Viviparus</i>	5	5						
<i>Lamellidens</i>	12	10						
Total	89	41		41	20		61	31



Plate 1. *Benthos* spp. found during the study in three different water bodies of Dhaka city: (a) *Tubifex* sp., (b) *Mesenchytracus* sp., (c) *Nais* sp., (d) *Dero* sp., (e) *Branchiodrilus* sp., (f) *Branchiura* sp., (g) *Branchioda* sp., (h) *Lumbriculussp.*, (i) *Glossiphonia* sp., (j) *Chironomus* sp., (k) *Forcipomyia* sp., (l) *Lamellidans* sp. (m) *Melania* sp., (n) *Viviparus* sp. and (o) *Eiseniella* sp.

The total of 15 genera of benthos that belonged to 9 families were identified from the three wetlands (Ramna park, Naya bazar and Baldah garden) of Dhaka city. The different species of benthos identified during this study were previously reported from these sites. But the present study located upon the seasonal (winter and summer) variation of species abundance. In conclusion, the dominant benthos in three water-bodies in Dhaka city belongs to oligochaetes, chironomid larvae and molluscs which can be used as indicators of organic pollution (oligochaetes, chironomid larvae) and inorganic pollution (molluscs) in aquatic ecosystems (MRC 2010). Hence, occurrence of these organisms at higher densities in these lakes primarily suggests some levels of organic matter and inorganic pollutant input. A decline of organic and inorganic pollution in the Ramna park, Naya bazar and Baldah garden could increase in benthos richness and diversity would imply improved ecological conditions of the aquatic environment.

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