

*Research article***Plankton Community of the Halda River, Chattogram**

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ABSTRACT

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The study was designed to know the status of plankton population of spawning ground of Halda River, Bangladesh during April to September 2017. Samples were collected from four locations [Estuary (Kalurghat), Khondokiakhal, Modunaghat and Sattarghat] by using Kemmerer water sampler and passed through the plankton net (25 µm). Total number of plankton cell was counted by using Sedgewick-Rafter(S-R) cell and expressed in cells/L. Total number of 20, 14, 19, and 20 genera of phytoplankton were recorded in Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively belonging to Bacillariophyceae (11), Chlorophyceae (3), Cyanophyta (3), Dinophyceae (2) and Pyrrophyta (1). Total number of 4, 4, 5, and 5 zooplankton genera were recorded in Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively belonging to Cladocera (2), Copepoda (1) and Rotifera (2). Among the plankton, Bacillariophyceae, Cladocera and Rotifera were the most dominant group than the others in Halda River. Total phytoplankton ranged from 39 to 68, 15 to 44, 44 to 79 and 50 to 79cell/liter in Estuary, Khondokiakhal, Modunaghat, Sattarghat, respectively. Highest number of plankton was found in Modunaghat and Sattarghat. The present research will help for future research to get knowledge about the planktonic biota and their condition in the Halda River.

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1. INTRODUCTION

Rivers play very significant roles in the development of any country. It provides many services such as fresh water supply, fish production, transportation, waste assimilation etc., along with provision of a wide array of recreation and tourism options (Hitzhusen et al., 2000). Halda River (22° 24' 59.99" N and 91° 52' 59.99" E) is South-Eastern river in Bangladesh originating from the Badnatali Hill Ranges in Ramgarh Upazila in the Chattogram Hill Tracts, flows through Fatikchhari, Hathazari, Raozan and Chattogram Kotwali Thana, and falls into the Karnaphuli River.

Halda River is the only river in Bangladesh where from fertilized eggs of major Indian carps are collected (Tsai et al., 1981). Halda River is regarded as a natural breeding ground and pure gene bank of Indian Major Carps in Bangladesh which makes this river a unique heritage of this country (Patra and Azadi, 1987). Mostly, fishermen used to collect fertilized eggs (Ali et al., 1974) of Rohu (*Labeo rohita*), Katla (*Gibelion catla*), and Mrigal (*Cirrhinus cirrhosus*) from the Halda River (Tsai et al., 1981). Plankton is the basis of primary production in all water bodies directly or indirectly (Begum et al., 2003; Hossain et al., 2006; 2007). The qualitative and quantitative

abundance of plankton indicate the productive status of water bodies (Shah et al., 2008) whether it is oligotrophic or eutrophic one. Therefore, a thorough knowledge of abundance of planktons and its quality in time and space in relation to environmental condition has become a prerequisite for fish production. Plankton is the starting point of energy transfer in the aquatic ecosystem and their well-being is of paramount importance to the overall health and integrity of the system (Ekwu and Sikoki, 2006). However, algal bloom can have negative impact on fisheries sector. So the present study was carried out to know the composition and abundance of plankton population of Halda River and to find out the potentiality of aquaculture in this river. The study may serve as early warning systems to detect the onset of algal bloom.

2. MATERIALS AND METHODS

Study area

The experiment was carried out for 6 months from April, 2017 to October, 2017 in four spawning ground Estuary Kalurghat (22°39'52.0"N and 91°88'25.0"E), Khondokiakhal (22°29'55.1"N and 91°49'01.2"E), Modunaghat (22°26'03.0"N and 91°52'21.7"E) and Sattarghat (22°30'51.9"N and 91°50'43.7"E) of Halda River to carry out experimental work of these areas.

Sample collection

Sample was collected from different spawning ground for qualitative and quantitative, study of plankton. Ten liters of water collected from each sampling area by using Kemmerer water sampler and passed through the plankton net. The mesh size of plankton net was 25µm. The collected sample (10 liters) was concentrated into 50 ml. Then the concentrated sample was preserved by using 5% formalin solution for further study.

Qualitative and quantitative determination plankton

For quantitative determination, Sedgewick-Rafter (S-R) cell was used. Sample was taken in the S-R cell and placed under microscope at 10X. Ten squares of S-R cell were counted. The number of plankton cell was calculated in the

counting plate. Then the total number of plankton cell were calculated according to Rahman (1992) and expressed in cells/L. Number of plankton, $N = \frac{A \times C}{F \times V \times L} \times 1000$

Here,

V = Volume of the S-R cell field

F = Number of field count

C = Volume of final concentration of sample

A = Total of plankton counted

L = Volume of original water

N = Number of plankton cells per liter

Data Analysis

Data were analyzed by using Microsoft excel (Microsoft 2010).

3. RESULTS AND DISCUSSION

Phytoplankton population

Phytoplankton population of experimented spawning grounds were enumerated and identified up to genera. It was composed of 20, 14, 19, and 20 genera in Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively. The number of phytoplankton species in one liter was varied from 39 to 68, 15 to 44, 44 to 79 and 50 to 79 cell/L in Estuary, Khondokiakhal, Modunaghat and Sattarghat, respectively during experimental period. Highest number of cells/L was found in Modunaghat and Sattarghat in May and July respectively (Figure 1).

Variation in genera of phytoplankton

The variation in genera of phytoplankton in four selected locations of Halda river is shown in Figure 2.

Bacillariophyceae

Bacillariophyceae was the most dominant group of phytoplankton in Halda River. Under this group 11, 9, 10, and 11 genera were identified from four spawning ground namely Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively.

Chlorophyceae

Under this group 3, 2, 3, and 3 genera were identified from four targeted spawning grounds respectively.

Cyanophyceae

Under this group 3, 1, 2, and 3 genera were identified from four spawning ground

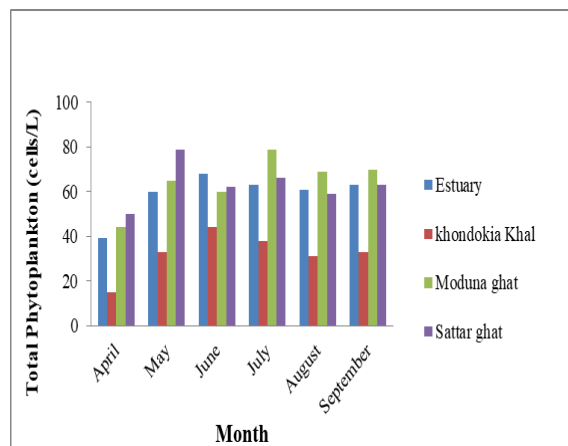


Figure 1: Monthly variation of total phytoplankton in four locations of Halda River

Dinophyceae

Under this group 2, 1, 2, and 2 genera were identified from four spawning grounds namely Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively.

Pyrrophyceae

Pyrrophyceae was the least dominant phytoplankton group in Halda River. Only one genus was identified of this class. That identified species was *Protoperdinium*.

Percent composition of different phytoplankton species

Bacillariophyceae (11) had the highest number of species than the Chlorophyceae (3), Cyanophyta (3), Dinophyceae (2) and Pyrrophyta (1). Percent composition of different phytoplankton species is shown in Figure 3. Phytoplankton population of experimented spawning grounds were enumerated and identified up to genera. It was composed of 20, 14, 19, and 20 genera of five major classes in Estuary (kalurghat), Khondokiakhal, Modunaghat and Sattarghat respectively. The number of phytoplankton species in one liter was varied from 39 to 68, 15 to 44, 44 to 79, 50 to 79 cells/l in Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively during experimental period. Highest number of cells/l was found in Modunaghat and Sattarghat in May and July

namely Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively.

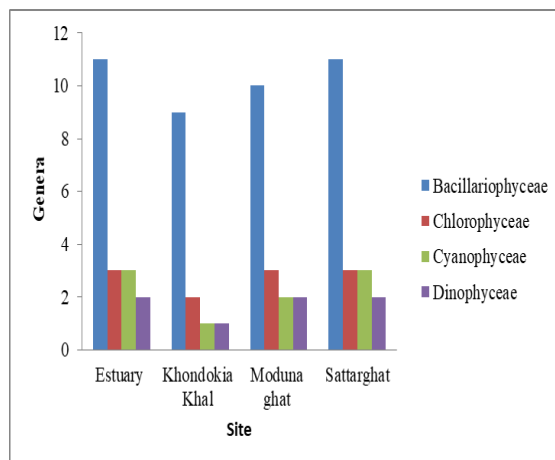


Figure 2: Variation in genera of phytoplankton in four selected locations

respectively. The present study is more similar to Razzaque et al. (1995) in Haltibeel (11.70 ± 4.60 to 47.70 ± 34.60 cells/L). The major groups of phytoplankton were identified in Meghna River by Hossain et al. (2016) namely Bacillariophyceae, Chlorophyceae, Cyanophyceae, Dinophyceae, Euglenophyceae, Myxophyceae and Xanthophyceae. Present study is more similar to this research. But the genera of Myxophyceae and Xanthophyceae were not identified.

3.2 Zooplankton population

It was composed of 4, 4, 5, and 5 genera in Estuary, Khondokiakhal, Modunaghat and Sattarghat respectively. The variation in genera of zooplankton in four selected locations of Halda River is shown in Table 1.

The Zooplankton communities in Halda River were composed of 5 genera of 3 divisions. The total number of Zooplankton ranged from a low density of 3 individuals /ml in April to 10 individuals/ml in June. A total of 5 genera of Zooplankton was identified in studied river that were more or less similar to findings reported by Hossain et al. (2016) who observed total 9 genera of zooplankton were identified from four families namely Rotifera with 2 genera, Cladocera with 3 genera, Copepoda with 3 genera and Ostracoda with 1 genus from the selected Meghna river. Saha et

al. (2002) identified 46 genera of phytoplanktons and 27 genera of Sadubeel. The most abundant phytoplankton and zooplankton were *Chorella*, *Scenedesmus*, *Spyrogyra*, *Ulothrix*, *Navicula*, *Synedra*, *Phacus*, *Closterium*, *Oedogonium*, *Cyclotella*,

Amphora, *Oscillatoria*, *Cymbella*, *Pinnularia*, etc. and *Cyclops* and *diaptomus*, *Bosmia*, *Daphnia*, *Moina*, *Brachionus*, *Keratella*, *Seda* etc. respectively which is more similar to present study.

Table 1: Variation in genera of zooplankton in four selected locations

Sampling Site	Estuary	KhondokiaKhal	Modunaghat	Sattarghat
<i>Cladocera</i>	2	1	2	2
<i>Copepoda</i>	1	1	1	1
<i>Rotifera</i>	2	1	2	2

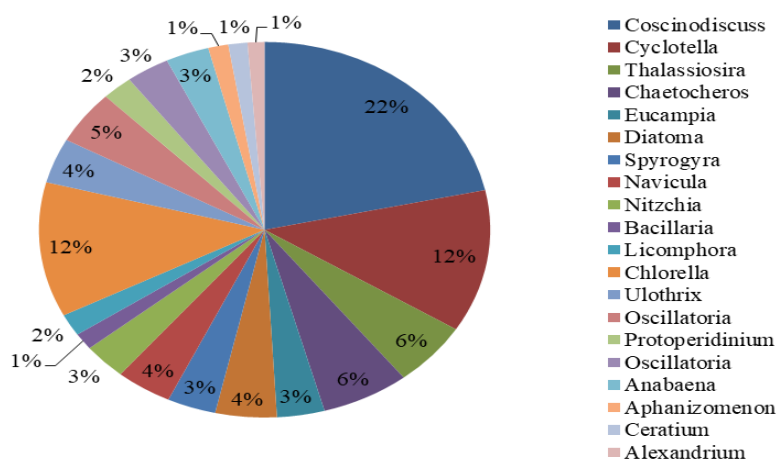


Figure 3: Percent composition of different phytoplankton species

Percent composition of different Zooplankton Species

Cladocera (2) and Rotifera (2) were the most dominant group in Halda River than the copepod (1). Percent composition of different zooplankton species is shown in Figure 4.

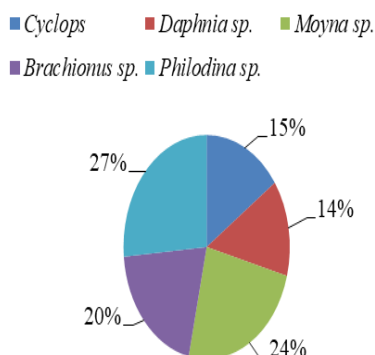


Figure 4: Percent composition of different zooplankton species

4. CONCLUSIONS

Phytoplankton is some of earth's most critical organisms and so it is vital study and understands them. Phytoplankton also forms the base of virtually every river food web. This study was conducted in the four different places of Halda River to identify phytoplankton community of the river. Among the four sampling site, plankton was more abundant in the Modunaghat and Satterghat. This research will be helpful for identifying plankton community of Halda River.

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