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Physico-Chemical Characteristics and Phytoplankton Diversity of Marjad Baor of Kaliganj Upazilla, Jhenaidah, Bangladesh

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ABSTRACT

"Marjad Baor" is the largest baor (oxbow lake) of Bangladesh with a total area of 253 hectares which is located 25 km apart from the Kaliganj Upazilla. Physico-chemical characteristics and phytoplankton diversity of Marjad Baor were studied from January, 2010 to March, 2010 at four different spots to determine the water quality of the "Marjad Baor" including its physico-chemical conditions, phytoplankton diversity and their interrelationships. Its biological significance made it one of the major Ecological Critical Areas (ECAs) which was declared by Department of Environment (DoE) in 1995. Marjad Baor provides diverse types of services such as irrigation, transportation, economic welfare of the adjacent human community and most significantly diversified biological diversity of various indigenous species. Water and phytoplankton samples were collected three times from each spot. Important physical and chemical parameters prevailing in the study area such air temperature, water temperature, transparency, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Hydrogen Ion Concentration (pH), Dissolved Oxygen (DO), Biological Oxygen Demand (BOD_5), free CO_2, carbonate (CO_3^-) and bicarbonate (HCO_3^-) alkalinity, calcium (Ca^{2+}) and magnesium (Mg^{2+}) hardness, total hardness, chloride (Cl^-) content, nitrate (NO_3^-) and phosphate (PO_4^{3-}) were analyzed. Water temperature was always less than the surrounding air temperature and varied within 3 to 5 °C. Seasonal variations of transparency was significant and varied within 54 cm to 69 cm. Mean EC value was 230 µs/cm. Mean TDS value was around 215 mg/l. The concentration of DO was within the limit of standard for fish cultivation and mean was 8.0 mg/l. Mean value of BOD_5 was 1.56 mg/l. Mean values of free CO_2, HCO_3^- alkalinity were respectively 0.05 mg/l and 6.15mg/l. The nature of water is slightly alkaline having a mean value 7.3. Mean values of calcium hardness, magnesium hardness and total hardness were respectively 4.0 mg/l, 3.50 mg/l and 93 mg/l which indicate that the water is moderately hard. Mean values of chloride and phosphate were likewise 0.82 ppm and 0.002 ppm but the concentration of nitrate was relatively high which shows the way to algal bloom. Total phytoplankton abundance was 1,09,900 in January, 2010 and 1,70,700 in March, 2010 that showing the trend of frequent phytoplankton growth. Oscillatoria sp. was the dominant phytoplankton species in the baor water which is known as the main contributor to eutrophication.

Keywords: *Marjad Baor, ecological critical area, physico-chemical characteristics, phytoplankton, eutrophication*

1. INTRODUCTION

Water is the most vital element among the natural resources and is crucial for the survival of all living organisms. Water quality depends on effluent types and discharge quantity from different types of industries, types of agrochemicals used in agriculture, seasonal water flow and dilution capability. Changes in Lake Environment can be highlighted through the study of the physico-chemical parameters of the water and the structure and composition of plankton community (Chowdhury et al., 1989). Phytoplankton has been used as an indicator of water quality (Begum and Alam, 1987; Mamun, 2006). Some species flourish in highly eutrophic water while others are very sensitive to organic or chemical wastes (Islam et al., 1967; Chowdhury and Zaman, 1999). Phytoplankton has also economic importance. Some blue green algae are capable to form sheaths of $CaCO_3$, which may build up quite extensive lime deposit (Santra and Pal, 1991; Islam et al., 1980). In April 1995, the Director General of Department of Environment, Bangladesh officially declared nearly 40,000 ha, within seven separate wetland areas, as ECAs. These are: Hakaluki Haor, Sonadia Island (4,916 ha), St. Martin's Island (570 ha), Teknaf Peninsular (Cox's Bazar to Tenaf Sea Beach; 10,465 ha), Tanguar Haor (9,727 ha), Marjad Baor (Oxbow Lake at Jhenaidah; 253 ha) and outside of Sundarbans Reserve Forest at 10 km extent (7,62,034 ha) (DoE, 2002). Although a large number of ecosystems are threatened, Government cannot declare and manage all of them as ECAs. Marjad Baor supports the livelihood of huge people from such diverse activities as fishing and transportation and materials for fuel, wood and medicine.

A number of researches have been done on physico-chemical characteristics and phytoplankton diversity. Moniruzzaman et al., 2006 gave the new records of phytoplankton (*Cryptophyceae, Synurophyceae, Cyanophyceae* and *Phacus sp.*) for Bangladesh. Islam et al., 1998; Naz, 1992 and 1998 studied on the monthly vertical occurrence of some copepods in a pond in Rajshahi city to determine the movement of zooplankton in relation to some physico-chemical factors. Chowdhury and Zaman, 2000 also carried out a study on the limnological condition of river Padma. Bhuiyan and Nessa, 1998; Rahman et al., 1982 and Islam et al., 1975 conducted research on physic-chemical characteristics and plankton diversity in different areas of Bangladesh.

Numerous studies were conducted on different issues of wetlands in home and abroad but no study was conducted on the "Marjad Baor" though it has a great importance. Thus it is essential to develop a relation between the physico-chemical conditions and phytoplankton diversity of "Marjad Baor" for conservation and wise use of wetland resources.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted at the Marjad Baor (Fig. 1), the largest Baor of Bangladesh which is under Kashthabhanga Union of Kaliganj Upazilla and is situated at the north of Chaugachha Upazilla under Jessore district and at the south – west part of Kaliganj Upazilla under Jhenaidah district. The total area of Kaliganj Upazilla is 303.53 sq. km and the area of Marjad Baor is about 253 hectares which is 25 km apart from Kaliganj Upazilla (Banglapedia, 2010). It is located between the latitude of $23^0 18'27.08''$ N to $23^0 18'40.08''$ N and between the longitudes of $89^0 04'08.24''$ E to $89^0 05'51.78''$ E. Average depth of the Baor is 6 m and there is an 8 km long approach road at the north side of it. The Baor is surrounded by 12 villages and most of the villagers depend upon the baor for their livelihoods. There are 3 sluice gates, 4 box culverts, 1 pump house, 2 fish landing centers and 15 fish sanctuaries in the baor.

2.2 Description of sampling spots

The samples were collected from four different spots. Description of sampling spots is given in Table 1 and Table 2.

Table 1: Description of Sampling Spot 1 & 2

Spot No.	Name	Description
Sampling spot - 1	Hizoltola Ghat	Located at the north-eastern part of the lake. The sampling spot is situated approximately 40 m away from the place which is exposed to various types of human interference like bathing, washing etc. The sampling spot is vegetated by numerous types of aquatic flora and algal bloom was found in the spot.
Sampling spot - 2	Nalvanga Ghat	This sampling spot is located at the north-western part of the lake. The sample was collected from the place which is used by the local people for bathing and other activities.

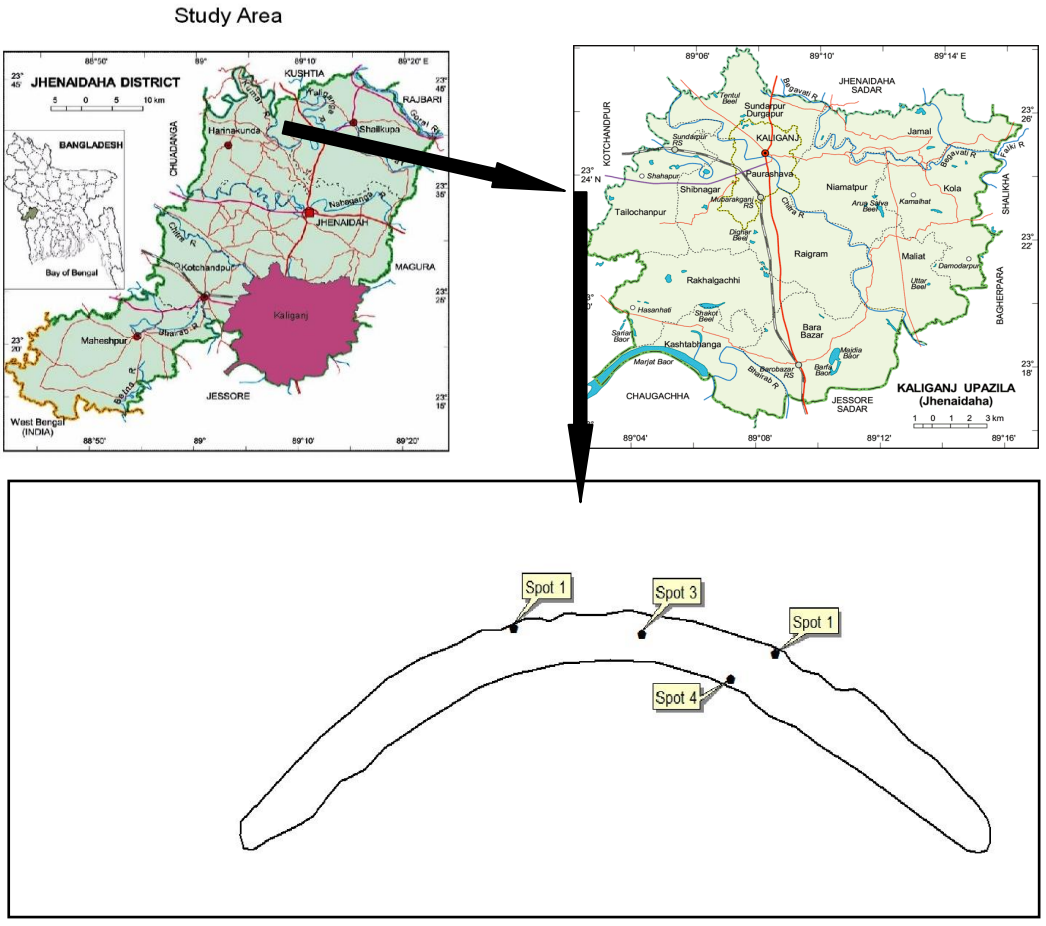

Fig 1: Study Area (Marjad Baor)

Table 2: Description of Sampling Spot 3 & 4

Spot No.	Name	Description
Sampling spot - 3	Middle portion of the Lake	This sampling spot is located at the middle of the lake. No algal bloom and submerged aquatic flora was found in the spot. Some floating aquatic floral diversity was observer in the sampling spot. Low rate of direct human interference.
Sampling spot - 4	Mirzapur	This sampling spot is located at the southern part of the lake. It is located at the opposite side of the sampling spot – 1. There are different types of submerged aquatic flora in the sampling spot. Agricultural runoff coming from cultivated lands fall here.

2.3 Collection and Analysis of Water Samples

The study has been carried out from January, 2010 to March, 2010. The samples were collected from four different spots in three terms in an interval of one month. Country boats were used to collect both water and phytoplankton samples. Water samples were collected from each spot at a depth of 35-40 cm below the water surface by using a 250 ml glass stopper bottle from four different spots of the baor for three times maintaining an interval of one month. Some water parameters were studied in the field and some were in the laboratory. For laboratory analysis the samples were kept in a dark and cool place. For the determination of physicochemical properties of the baor water, 1.5 liter of surface water was collected from each of the four spots in a plastic bottle. Sampling was usually done in the morning to evening. Standard methods (APHA, 1992) were used for analysis. Temperature was measured with a centegrade mercury thermometer and pH with a digital pH meter model HANNA instruments, pH-211. Transparency was determined with the secchi disc depth measurements. EC and TDS were measured by TDS meter (HANNA portable water proof multi range conductivity meter, HI-9635). Dissolved Oxygen and BOD_5 samples were collected in colored bottles and analyzed by a modified Winkler method (Ramesh and Anbu, 1996), free CO_2 and HCO_3^- were measured by Welch method (Ramesh and Anbu, 1996). Standard titration methods (Ramesh and Anbu, 1996) were used to determine alkanity (with sulphuric acid; Welch, 1948), hardness (with EDTA), and chloride (with 0.02 N silver nitrate; Kolthoff, 1947). Nitrate and Ortho Phosphate was measured by Spectrophotometric method (Thermo spectronic, UV–visible Spectrophotometers, Model no- Helios γ 94992304581).

2.4 Collection and Analysis of Phytoplankton Samples

The phytoplankton samples were collected from four spots, with plankton net (1 meter long, diameter of 22 cm) of No. 22 silk bolting cloth (Mesh size 0.076 mm). The concentration of collected plankton samples were 50 ml which was preserved by Transute solution (6 parts water, 3 parts ethanol and 1 part formalin) in a 100 ml glass bottle for laboratory (Quantitative) analysis (Chowdhury and Zaman, 2000). Phytoplankton was counted by Electron Microscope (Labomed D400X) and Counting Cell (APHA, 1992).

3. RESULTS

3.1 Physico-chemical Conditions of the Water of Marjad Baor

Physico-chemical conditions of the water of Marjad Baor are given in Table 3. The highest air temperature and water temperature were recorded in the month of March, 2010. Mean temperature were found to be fluctuated within 30.67±2.05 to 28±2.45. Mean water temperature were ranging from 24.67±3.30 to 27±3.27. The temperature fluctuation of these spots depend upon the atmospheric factors such as air temperature, wind flow and wind direction, duration of sunlight etc. The highest transparency was recorded in the month of February, 2010. Mean transparency ranges were ranging from 45.33±3.0 to 66.33±2.58. Transparency range was recorded low in the month of March, 2010 because of higher phytoplankton abundance. Fluctuation of transparency range of these spots depends upon the presence of dissolved solids and phytoplankton abundance. Mean EC values were ranging from 210±1.63 to 237.67±1.25. Mean TDS were ranging from 106±0.66 to 119.33±0.12. EC and TDS values were relatively high in spot – 2 and it may be because of frequent human interference for domestic and household purposes. According to WHO (1988) standard water having TDS value more than 1200 mg/l is unacceptable for any sort of domestic use and Bangladesh standard (1993) is 1000 mg/l, in this regard the baor water in the study zone is not polluted yet. Mean pH values were ranging from 7.14±0.13 to 7.63±0.15. The pH value of baor water showed slightly alkaline in nature. The highest pH value during winter possibly was due to low free CO_2, low water temperature and high alkalinity. Mean DO concentrations were ranging from 7.03±0.49 to 8.37±0.33. DO was always high in the winter season (January) because of low water temperature. Low water temperature means low respiration and low requirement of DO by the metabolic organisms. DO showed negative relationship with water temperature (r = - 0.99). Mean BOD_5 values of these spots were 1.1±0.22 to 2.37±0. BOD_5 was always low in the winter season (January) than the summer (March) because of low water temperature. Low water temperature means low respiration and low requirement of DO by the metabolic organisms and low BOD_5. Mean free CO_2 concentrations were 0.07±0.09 to 0.117±0.02. The high free CO_2 content in summer (March) was due to high temperature. High temperature means high respiration and high respiration means low DO and high free CO_2. The concentration of free CO_2 is high in spot – 1 because of high amount of decomposing materials. Mean HCO_3^- alkalinity of these spots were 126.2±1.60 to 142.9±2.57. The high bicarbonate alkalinity was recorded

in winter (January) which was possibly due to the low free CO_2 and low rainfall which cause a low volume of water causing an increase in alkalinity. The low bicarbonate alkalinity during summer (March) was possibly due to the heavy rainfall which diluted the alkalinity, furthermore production of free CO_2 exchanged by highest temperature. Mean calcium contents of these spots were 55.79±3.32 to 85.65±5.0. Calcium hardness of spot – 2 was relatively high than of other spots. This is due to the high human interference for household uses. According to WHO international (1988) the permissible limit is 75 mg/l and the excessive limit is 200 mg/ l. Mean magnesium contents of these spots were 15.40±3.03 to 23.8±2.11. Mean total hardness of these spots were 79.60±5.15 to 101.06±2.31. Total hardness is also high in the spot – 2 due to the high human interference for household uses. WHO (1988) classified drinking water on the basis of degree of hardness as follows:

Soft – 0-60 mg/l
Medium hard – 60-120 mg/l
Hard – 120-180 mg/l
Very hard – 180 mg/l and above

The above discussion based on the obtained data clearly indicates that the water of the baor is medium hard. Mean chloride contents of these spots were 7.70±0.82 to 9.56±0.78. Chloride concentration was almost same in all the spots of the Marjad Baor because the study area is non-saline area. Mean phosphate contents of these spots were 0.091±0.001 to 0.096±0.001. Mean nitrate contents of these spots were 0.66±0.21 to 1.82±0.22. Nitrate and Phosphate concentrations were high in spot – 2 and spot – 4 respectively because of washing and bathing and agricultural runoff from the adjacent agricultural fields.

Table 3: Physico-chemical Characteristics and Phytoplankton Abundance of Spot – 1, 2, 3 & 4

Parameter	Unit	Mean value (January – March, 2010)			
		Spot – 1	Spot – 2	Spot – 3	Spot – 4
Air temperature	^oC	30.33±2.05	30.67±2.05	29±2.45	28±2.45
Water temperature	^oC	27±3.27	26.30±2.87	25.30±3.68	24.70±3.30
Transparency	cm	50.67±5.0	45.30±3.0	66.30±2.58	62.70±2.87
EC	µs/cm	230.67±3.30	230.67±1.25	233.33±4.69	210±1.63
TDS	mg/l	109.5±6.4	119.33±0.12	118.30±2.65	106±0.66
pH		7.52±0.21	7.14±0.13	7.53±0.03	7.63±0.15
DO	mg/l	8.23±0.05	7.57±0.82	7.03±0.49	8.37±0.33
BOD_5	mg/l	1.3±0.08	2.37±0.17	1.10±0.22	1.37±0.21
Free CO_2	mg/l	0.07±0.09	0.08±0.08	0.12±0.02	0.02±0.02
CO_3^-	mg/l	-	-	-	-
HCO_3^-	mg/l	142.9±2.57	142.3±1.82	130.2±2.0	126.2±1.60
Ca^{2+}	mg/l	68.13	85.65±5.0	68.62±4.64	55.79±3.32
Mg^{2+}	mg/l	19.77±5.12	15.40±3.03	23.80±2.11	23.80±2.11
Total hardness	mg/l	87.90±5.12	101.60±2.31	92.42±6.64	79.60±5.15
Cl^-	mg/l	7.70±0.82	9.56±0.78	7.70±0.82	7.70±0.82
PO_4^{3-}	ppm	0.094±0.004	0.093±0.001	0.091±0.001	0.096±0.006
NO_3^-	ppm	1.65±0.4	1.82±0.22	0.66±0.21	0.82±0.01
Phytoplankton	Unit/l	43,416±8,510	36,633±8,684	48,216±7,100	56,900±9,738

- = Not Detected

3.2 Phytoplankton diversity and abundance of Marjad Baor

Monthly variations of Phytoplankton abundance and diversity are given in Table 4 and Table 5.

Table 4: Monthly Variation of Phytoplankton Abundance in Different Sampling Spots

Month	Abundance of phytoplankton			
	Spot 1	Spot 2	Spot 3	Spot 4
January (Sample – 1)	36,230	28,750	39,590	44,840
February (Sample – 2)	38,650	32,420	48,080	57,170
March (Sample – 3)	55,370	48,730	56,980	68,690
Total	1,30,250	1,09,900	1,44,650	1,70,700

Table 5: Diversity and Abundance of Phytoplankton of Spot – 1, 2, 3 & 4

Class	Species	Spot - 1		Spot - 2		Spot - 3		Spot - 4	
		Abundance (Units/l)	%	Abundance (Units/l)	%	Abundance (Units/l)	%	Abundance (Units/l)	%
Cyanophyceae	Anabaena sp.	4728	53.88	11671	44.45	18255	48.45	7101	48.37
	Nostoc sp.	15226		7232		10965		18965	
	Oscillatoria sp.	21634		24083		16346		28253	
	Lyngbya sp.	7998		12418		6567		5360	
	Gloeocapsa sp.	9378		-		-		12290	
	Aphanocapsa sp.	7463		-		-		6368	
	Merismopedia sp.	3751		-		-		4916	
	Aphanothece sp.	-		2748		3616		-	
	Nodularia sp.	-		3264		5743		-	
	Sytonema sp.	-		3670		4831		-	
	Microchaete sp.	-		2858		3761		-	
Chlorophyceae	Stigeoclonium sp.	-	16.88	3055	21.97	4021	20.97	5108	19.60
	Uronema elongatum sp.	3205		3363		2980		5907	
	Chaetophora sp.	-		2967		3906		-	
	Rhizoclonium sp.	3426		-		-		6337	
	Cladophora sp.	6669		2440		3211		-	
	Pediastrum sp.	-		3154		2705		-	
	Closterium sp.	3621		3363		5873		4489	
	Cosmarium sp.	1993		-		-		2612	
	Oedogonium sp.	-		-		-		3790	
	Staurastrum sp.	-		3176		4180		3465	
	Myrmecia sp.	3074		2626		2011		2322	
Bacillariophyceae	Synedra sp.	4637	21.87	2749	24.60	3616	23.60	6077	23.66
	Fragilaria sp.	-		2242		2951		-	
	Melosira sp.	-		2934		2416		5752	
	Navicula sp.	5952		7715		6683		7801	
	Pinnularia sp.	3905		3980		4831		5053	
	Gyrosigma sp.	6460		3242		4267		5053	
	Cymbella sp.	-		4177		6944		-	
	Cybetta sp.	-		-		-		5035	
	Nitzschia sp.	7278		2946		2430		8228	
Euglenophyceae	Euglena sp.	6409	7.37	3968	8.98	3776	6.98	8399	8.37
	Phacus sp.	-		3155		4152		-	
	Trachelomonas sp.	3192		2748		2170		5890	
Total		1,30,250	100%	1,09,900	100%	1,44,650	100%	1,70,700	100%

- = Not Found

3.2.1 Spot – 1

Quantitative analysis of phytoplankton at this spot revealed that the total plankton concentration was highest (55,370 units/l) in the month of March, 2010 and

the lowest (36,230 units/l) in the month of January, 2010 during the period of study. Algal percentage compositions of various classes are as follows: Cyanophyceae - 53.88%, Chlorophyceae - 16.88%, Bacillariophyceae - 21.87%, Euglenophyceae - 7.37%. During the period of study, Cyanophyceae was found to be the major dominant component constituting the phytoplankton population, represented by 7 genera. This was followed by Chlorophyceae (6 genera), Bacillariophyceae (5 genera) and Euglenophyceae (2 genera) respectively. Cyanophycean *Oscillatoria* sp. was the only genus which showed maximum abundance throughout the period of study and constituted 16.61% of the phytoplankton population, whereas *Cosmarium* sp. was the least recorded genus constituting 1.53% of the phytoplankton population. Another dominant genus *Nostoc* sp. constituted 11.69% of the phytoplankton population. Maximum abundance of Chlorophycean was recorded in the month March, 2010 and the minimum abundance was in January, 2010. From the study it is clear that group Chlorophyceae was dominant by at a relatively high temperature range from 29 ˚C to 31 ˚C.

3.2.2 Spot – 2

Quantitative analysis of phytoplankton at this spot revealed that the total planktonic concentration was highest (48,730 units/l) in the month of March, 2010 and the lowest (28,750 units/l) in the month of January, 2010 during the period of study. Algal percentage compositions of various classes are following: Cyanophyceae - 44.45%, Chlorophyceae - 21.97%, Bacillariophyceae - 24.60%, Euglenophyceae - 8.98%. During the period of study, Cyanophtceae and Bacillariophyceae were found to be the major dominant component constituting the phytoplankton population, represented by 8 genera. This was followed by Chlorophyceae (8 genera) and Euglenophyceae (3 genera) respectively. Cyanophycean *Oscillatoria* sp. was the only genus which showed maximum abundance throughout the period of study and constituted 11.30% of the phytoplankton population, whereas Bacillariophycean *Fragilaria* sp. was the least recorded genus constituting 2.04% of the phytoplankton population. Another dominant genus *Anabaena* sp. constituted 10.62% of the phytoplankton population which was the constituent of Cyanophyceae also. During the period of study a total of 27 genera were recorded. In the present study maximum number of Cyanophyceae were observed during summer season (March) and minimum in winter (January).

3.2.3 Spot – 3

Quantitative analysis of phytoplankton at this spot revealed that the total planktonic concentration was highest (56,980 units/l) in the month of March, 2010 and the lowest (39,590 units/l) in the month of January, 2010 during the period of study. Algal percentage compositions of various classes are following: Cyanophyceae - 48.45%, Chlorophyceae - 20.97%, Bacillariophyceae - 23.60%, Euglenophyceae - 6.98%. During the period of study, Cyanophtceae and Bacillariophyceae were found to be the major dominant component constituting the phytoplankton population, represented by 8 genera. This was followed by Chlorophyceae (8 genera) and Euglenophyceae (3 genera) respectively. Cyanophycean *Anabaena* sp. was the only genus which showed maximum abundance throughout the period of study and constituted 12.62% of the phytoplankton population. During the period of study a total of 27 genera were recorded. In the present study maximum number of Cyanophyceae were observed during summer season (March) and minimum in winter (January).

3.2.4 Spot – 4

Quantitative analysis of phytoplankton at this spot revealed that the total planktonic concentration was highest (56,900 units/l) in the month of March, 2010 and the lowest (44,840 units/l) in the month of January, 2010 during the period of study. Algal percentage compositions of various classes are following: Cyanophyceae - 48.37%, Chlorophyceae – 19.60%, Bacillariophyceae – 23.66%, Euglenophyceae – 8.37%. During the period of study, Cyanophtceae and Bacillariophyceae were found to be the major dominant component constituting the phytoplankton population, represented by 7 genera. This was followed by Chlorophyceae (8 genera) and Euglenophyceae (2 genera) respectively. Cyanophycean Oscillatoria sp. was the only genus which showed maximum abundance throughout the period of study and constituted 16.55% of the phytoplankton population, whereas Chlorophycean Myrmecia sp. was the least recorded genus constituting 1.36% of the phytoplankton population. Another dominant genus Nostoc sp. constituted 11.11% of the phytoplankton population which was the constituent of Cyanophyceae also. During the period of study a total of 24 genera were recorded. In the present study maximum number of Cyanophyceae were observed during summer season (March) and minimum in winter (January).

4. DISCUSSION

4.1 Relationship between Phytoplankton Abundance and Physico-chemical Factors

The abundance of phytoplankton was observed high in spot – 1 because of high nutrient concentration due to human interferences like washing, bathing etc. Phytoplankton abundance was found high in spring (March) might be due to the favorable conditions, such as, abundance of nutrients, optimum physical condition, favorable range of pH level, dissolved oxygen and alkalinity. From the above discussion it was found that the productivity of the baor was medium to high. The pH value in alkaline condition in the baor water was supposed to be helpful for proper growth and development of phytoplankton as well as fishes and other aquatic organisms. The high concentration of dissolved oxygen during winter was possibly due to the low temperature, low rainfall, low free CO_2 and high HCO_3^- alkalinity. Phytoplankton abundance is positively correlated with TDS, nitrate, HCO_3^- alkalinity, water temperature and air temperature. This means that, the increase of the concentration of these parameters will be

helpful for creating favorable condition for phytoplankton growth. But excessive load of these parameters will cause abnormal phytoplankton growth and algal bloom in the baor because *Oscillatoria* sp. was the dominant species in all the spots of the baor which may be the main sign of eutrophication. On the other hand low concentration of these parameters will restrict the normal condition for phytoplankton growth. Phytoplankton abundance is negatively correlated with calcium hardness which means with the increase of calcium in the baor water phytoplankton growth or abundance will decrease. Comparing to the Bangladesh standards for fish cultivation, at present the amount of calcium content is within the limit but it was found almost near to the maximum level in some spots because of anthropogenic activities.

5. CONCLUSION

In this study physico-chemical condition of the Marjad Baor was determined to find out the interrelation between physico-chemical conditions and phytoplankton abundance. The baor is characterized by the Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae of plankton population without any Xanthophyceae and Chrysophyceae. The abundance of phytoplankton is affected by the physico-chemical conditions. The physico-chemical condition of the baor water is favorable for phytoplankton growth at this time. But some of the parameters are approaching to exceed the standard. Addition of domestic wastes, agricultural runoff and other anthropogenic practices changed the natural quality of water. So the abundance of phytoplankton was found to be very poor in winter than the normal condition and high in summer which may cause eutrophication. Any significant change in the phytoplankton abundance will alter the abundance of fish diversity. *Oscillatoria* sp. was the dominant species in all the spots than Anabaena sp. which may be the main sign of eutrophication. Though it is a ECA with significant biodiversity, any significant change in the water quality of the baor could be the cause for vigorous ecological disruption. At present the management system of the baor is very poor. Marjad baor is an ECA. If the ecological condition of Marjad Baor cannot be restored as soon as possible a huge number of biological diversity will be in threatened condition. Further study is needed to get the more information for the sustainable use of natural resources of Marjad Baor and for better management of the baor to protect the valuable biological diversity which is directly or indirectly related with the economy of the fishermen community living around the boar area.

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