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Abundance, Diversity and Distribution of Phytoplankton in Coastal Water Adjacent to St. Martin's Island, Bangladesh

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ABSTRACT: The purpose of this study was to ascertain the composition, abundance, and distribution of phytoplankton in the coastal waters of the Bay of Bengal, Bangladesh (BoB) adjacent to the St. Martin's Island. Samples were collected from 14 stations on low tide during the day time from March 13 - 19, 2020. In the present investigation, a total of 62 diatoms and 6 dinoflagellates were identified. Among diatoms, most dominant species were contributed by the genera *Coscinodiscus* followed by *Chaetoceros*, *Thalassiosira*, and *Thalassionema.* Among dinoflagellates, four species of *Ceratium* and one species from each of *Dinophysis* and *Gonyaulax* were identified. The cell count of total phytoplankton varied from 87,500-437,500 in d/m^3 of sea water and the highest phytoplankton was found at station 4. *Coscinodiscus* was the most dominant genus of the centric diatoms in all the stations and its abundance ranged from 25,000-100,000 in d/m^3. The highest number of *Coscinodiscus* was found at station 4. The result of this study showed that phytoplankton composition and their abundance varied from one station to another. But not much difference was observed among the ranges of physicochemical factors. Water temperature, salinity, pH and dissolved oxygen ranged from 26.5-27.17°C, 32.09-33.76 ppt, 8.16-8.20, and 5.85-6.12 mg/l, respectively. The species richness factor and the diversity index factor as determined with the help of generic abundance which revealed the ranges from 1.51-4.93 and 1.52-2.22, respectively. The ranges of salinity and temperature recorded in the present investigation are quite consistent with the optimum ranges reported for marine habitats. The qualitative structure of phytoplankton shows similarities with other studies carried out in the BoB at different times. However, variability in the population density of phytoplankton in different studied stations may not be responsible for different water quality parameters rather than oceanic currents and tides.

Keywords: Phytoplankton, Abundance, Physicochemical factors, Coastal water, St. Martin's Island, Bay of Bengal

INTRODUCTION

The Bay of Bengal (BoB), a semi-enclosed tropical marine ecosystem, is situated in the south of Bangladesh. It is a vast realm teeming with coral ecosystem of coastal and deep ocean environments, and the responses of marine life to anthropogenic activities. BoB harbors phytoplankton as the primary synthesizer of all organic materials in its estuaries and seas. These all in-turn connects the aquatic food chain of the sea and aid directly and indirectly in the formation of zooplankton, fish, and other living organisms (Castro and Huber, 2003). Phytoplankton is the determinant of fish production and a significant biological element in fish stock fluctuation, contributing more than 40% of global carbon fixation (Kankal and Warudkar, 2012) and thereby lowering the global warming factor. It is estimated that phytoplankton produces roughly 80% of total atmospheric O_2 in some places, and hence is responsible for the O_2:N_2 balance in the air (Castro and Huber, 2003). In addition, phytoplankton flora can be used to indicate the quality of water, which might be otherwise affected by the anthropogenic activities e.g., domestic wastes, industrial discharges, nutrient enrichment processes, etc. (Vitousek et al., 1997; Carter et al., 2005).

Knowledge on marine phytoplankton in Bangladesh is still sparse. However, there have been a few publications on it from the north-eastern coast of the BoB and Karnafuli estuary (Islam and Aziz, 1975, 1977). Ahmed et al. (2010) and Aziz et al. (2012) studied phytoplankton diversity from the south-western coast of Bangladesh. The seasonality of coastal phytoplankton was also studied by Rahaman et

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al. (2013). Though a qualitative study of marine phytoplankton was carried out by Aziz (2005), this is in number very little when compared with the studies of phytoplankton from the freshwater habitats of Bangladesh (Islam and Khatun, 1966; Islam et al., 1991; Islam and Alfasane, 2002, 2003; Islam and Irfanullah 2003, 2005). St. Martin's Island, situated in the extreme southern fringe of the main territory of Bangladesh is the only coral island. The island has tremendous attraction to the tourists for visiting purposes. As a result, the coastal boundary of the island as well as the adjacent marine open waters is strongly affected by the anthropogenic activities. The fisheries and tourism sector of the island contributes 33.6 million USD/year to the local economy. Fisheries, a key economic sector, are generating annual direct use values of 13 million USD/year (Rani et al., 2020). Data on phytoplankton can aid in fishery and marine resource management and planning, as well as the preservation of ocean biogeochemical cycles. So, the main goal of this study was to determine the abundance and distribution of phytoplankton in the coastal waters of the St. Martin's Island so that the knowledge regarding the phytoplankton species and abundance can be used in the improvement of the mariculture of this important island.

MATERIALS AND METHODS

Study Area

In Bangladesh, St. Martin's Island, Teknaf, Cox's Bazar is also known as *'Narikel Jinjira'* which is located in the northeastern part of the BoB between 20°34´ and 20°39´ N and 92°18 and 92°20´ E (Figure 1). Myanmar's border (Arakan coastal plain) is barely 4.5 kilometers distant to the east, while the BoB is to the west and southwest. The current research was conducted in the coastal water adjacent to the St. Martin's Island (Figure 1).

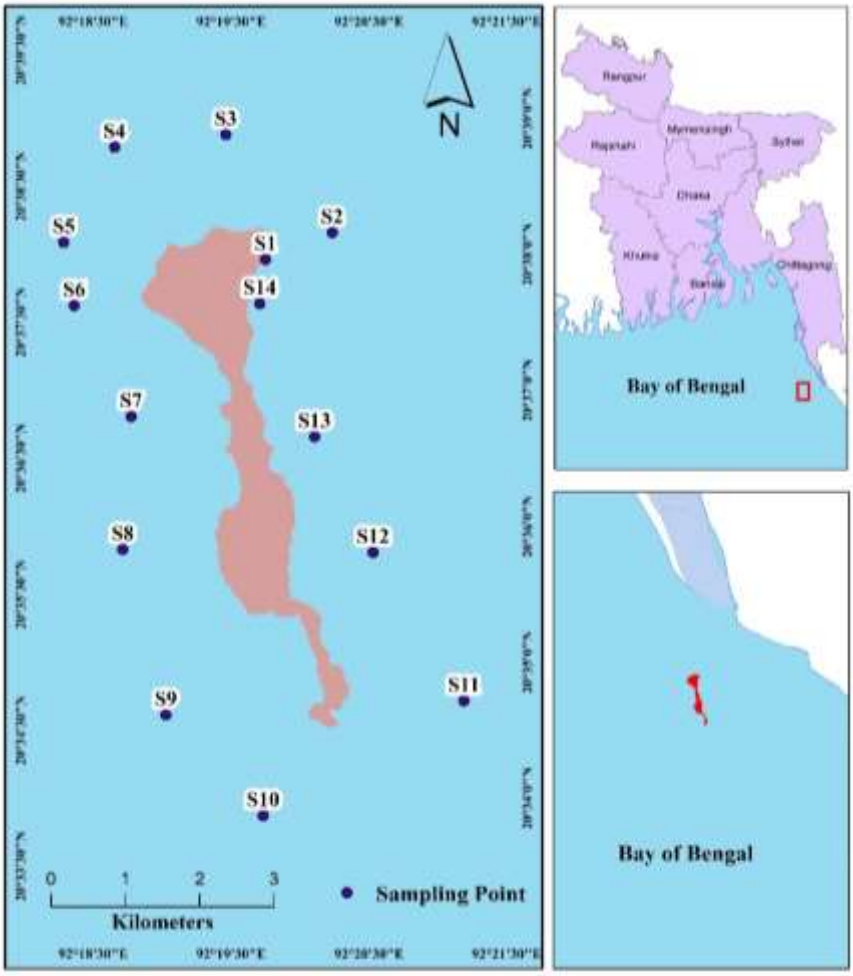


Figure 1: Showing the Sampling Stations in the Adjacent Marine Area of St. Martin's Island and the Location of the Island in the BoB

Sampling

A total of 14 sampling stations (Station 1-14) were fixed to collect the samples for the present investigation (Figure 1). The sampling stations were visited from 13-19 March, 2020 and one sample from each station was collected. So, at the end there were 14 samples from 14 stations but on different dates covering the time period as mentioned (Table 1). Samples were gleaned from the stations during low tide and between 7:30 and 10.00 AM.

Table 1: Sampling Stations with Date and Time of Collection and the GPS Values

Station No.	Date	Time	Latitude	Longitude
1	13/03/2021	7:28 am	20.6326923	92.3291468
2	13/03/2021	8:02 am	20.6359811	92.3372028
3	14/03/2021	8:18 am	20.6479894	92.3243359
4	14/03/2021	8:34 am	20.6464468	92.3108763
5	15/03/2021	8:56 am	20.6347993	92.3047317
6	15/03/2021	9:30 am	20.6270468	92.3059843
7	16/03/2021	9:26 am	20.6134481	92.3128833
8	16/03/2021	9:50 am	20.5971542	92.3118536
9	17/03/2021	9:30 am	20.5768836	92.3170856
10	17/03/2021	9:56 am	20.5645229	92.3288508
11	18/03/2021	9:24 am	20.5785989	92.3531412
12	18/03/2021	10:02 am	20.5967917	92.3421398
13	19/03/2021	9:33 am	20.6109784	92.3350769
14	19/03/2021	10:06 am	20.6315248	92.3289363

At each station the samples of phytoplankton were collected after passing 20 L of sea water through a 20 μm mesh phytoplankton net. The concentrate was decanted in a 250 mL plastic vial and preserved by adding Lugol's solution with gentle shaking. The samples were sealed, labeled with date and time and packed to transport. At the time of phytoplankton sample collection, *in situ* measurements of some physicochemical water quality parameters were also carried out. The surface water temperature was measured with the help of a mercury centigrade thermometer. The pH of water was measured using a portable digital pH meter (HANNA, pHep, Romania). The salinity and DO were measured using a refractometer and a portable digital DO meter, respectively (Agriculture Solutions, WL0020-ATC; HACH, HQ30d, USA). After collection of all the samples they were given an icepack and transported to the laboratory, Department of Oceanography, University of Dhaka within 24 h. The analysis was started immediately and completed within the next 72 h.

Analyses of biological parameters

A drop of plankton concentrate was placed onto a glass slide and covered with a coverslip. The preparation was then viewed via a student-microscope (Novel, N10E, China) to identify the genus and species. The organisms were identified using Tomas (1997); Hasle and Syvertsen (1997); Davis (1955) and Ahmed et al. (2009). The phytoplankton density was determined by using a Sedgewick Rafter Counting Chamber (S-R) with the help of student microscope at a magnification of 400×. The S-R cell was in rectangular chamber (50 × 20 × 1 mm) having 1000 mm^2 area and 1000 mm^3 in volume. On the grids of the cell, 1 ml of concentrated sample was obtained. The cover slip was positioned diagonally across the cell which prevented the formation of air bubbles in the cell. To ensure a valid count, over filling of the SRCC was avoided. From each mount of S-R, the population density of phytoplankton was quantified based on genera. The final density of phytoplankton was counted by using the following formula.

Number of organisms (m^{-3}) = $(C \times V_1) / (V_2 \times V_3)$

where,

C= number of organisms counted,

V_1 = Volume of concentrated sample (ml),

V_2 = Volume of sample counted (ml),

V_3= Volume of filtered water by the plankton net (m^3).

By using the data on counting, Species richness (D_f) was applied to determine the quantity of genera in the sample. The method of Margalef (1958) was used to calculate species richness in the sample.

Species richness, $D_f = (S-1)/\ln(N)$

where,

S = number of genera in a sample

N = total number of genera

Shannon-Wiener index (H) was used to evaluate the generic diversity in a sampling station. The following equation is used to calculate the Shannon-Wiener index:

Shannon-Wiener index, $H = -\sum P_i \times \ln (P_i)$ and $P_i = n/N$

where,

n = total number of individuals in a sample

N = total number of individuals

All the diversity calculation were performed considering the population density at genus level. However, with the help of literature and by observing the morphology, 68 species of phytoplankton were preliminarily identified from the study area. The species are listed in Table 3.

Analysis of Data

The data were digitized in the XL sheet (Microsoft excel, version-19) and then tables and figures were generated and drawn using international units of measurements.

RESULTS

Water quality parameters

The water temperature ranged from 26.50-27.17°C. During the study, the maximum temperature was recorded at station 7, while the lowest temperature was measured at station 1. During the sample collection, the maximum and minimum DO levels were 6.02 mg/L and 5.83 mg/L at station 6 and station 1 respectively. The salinity concentration of the water ranged from 32.09 - 33.76 ppt, and the pH of the water ranged 8.16 - 8.22.

Table 2: Water Quality Parameters in the Sampling Stations Around the St. Martin's Island.

Station No.	Sample No.	Temperature (°C)	Salinity (ppt)	pH	DO (mg/L)
1	1	26.50	32.09	8.16	5.83
2	2	26.62	32.69	8.20	5.91
3	3	26.71	32.76	8.19	5.98
4	4	26.80	32.71	8.16	5.98
5	5	26.79	32.70	8.14	5.97
6	6	27.01	32.76	8.17	6.02
7	7	27.17	32.98	8.19	6.00
8	8	27.09	33.62	8.20	6.01
9	9	27.07	33.69	8.22	5.97
10	10	27.03	33.76	8.21	5.98
11	11	26.77	32.76	8.19	5.96
12	12	26.71	32.59	8.18	5.88
13	13	26.64	32.55	8.16	5.87
14	14	26.57	32.10	8.17	5.84

Abundance, diversity and distribution of phytoplankton

A total of 68 phytoplankton species under 22 genera were identified from 14 different sampling stations (Figure 2). From the recorded phytoplankton community, 62 species belonged to diatoms and 6 to dinoflagellates. In the community, the dominant genera were: *Coscinodiscus*, *Chaetoceros*, *Thalassiosira*, and *Thalassionema*. Among dinoflagellates, four species of *Ceratium*, one species from each of *Dinophysis* and *Gonyaulax* were recorded (Table 3 and Figure 3). The density of total phytoplankton in the community varied from 87,500-437,500 ind/m^3 and the highest value was found at station 4. *Coscinodiscus* is the most dominant in all the stations and the cell density of it ranged from 25,000-75,000 ind/m^3. Highest number of *Coscinodiscus* population was found at station 4.

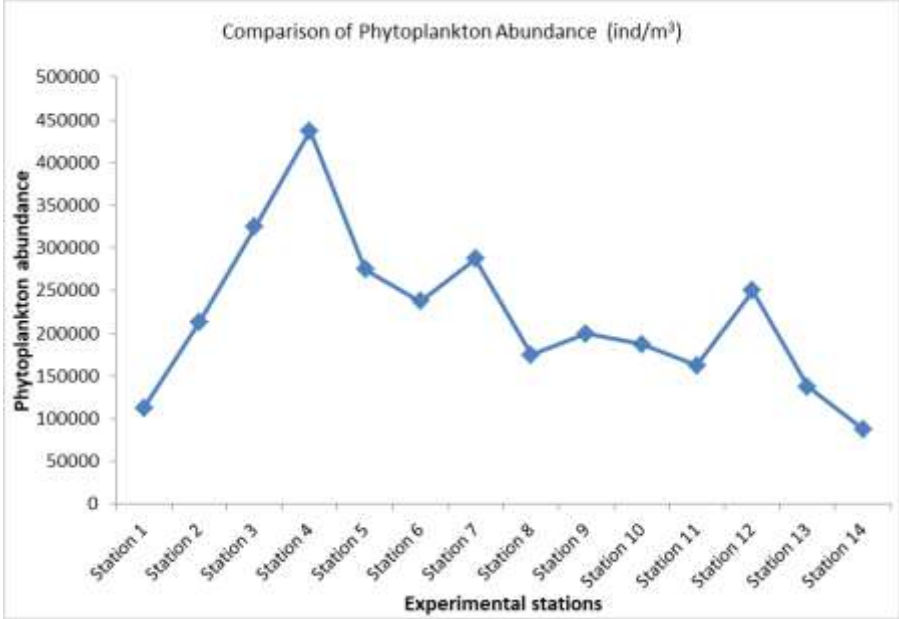


Figure 2: Comparison of Phytoplankton Abundance in All Sampling Stations.

Table 3: Phytoplankton Species Recorded from the Sea Water Adjacent to the St. Martin's Island.

Class	Genus	Species	No. of species
Bacillariophyceae	*Bacteriastrum*	*Bacteriastrum furcatum* Shadboldt	1
	Banquisia	*Banquisia belgicae* (Van Heurck) Paddock	1
	Coscinodiscus	*Coscinodiscus radiatus* Ehrenberg *C. marginatus* Ehrenberg *C. granii* LFGough *C. jonesianus* (Greville) Ostenfeld *C. centralis* Ehrenberg	5
	Chaetoceros	*Chaetoceros neglectus* Karsten *Ch. coarctatus* Lauder *Ch. pseudocurvisetus* Mangin *Ch. constrictus* Gran *Ch. decipiens* Cleve *Ch. lorenzianus* Grunow *Ch. tenuissimus* Meunier *Ch. danicus* Cleve	8
	Detonula	*Detonula pumila* (Castracane) Gran	1
	Ditylum	*Ditylum* spp. *Ditylum brightwellii* (T. West) Grunow in Van Heurck	4
	Eunotia	*Eunotia* sp.	1
	Filodrillia	*Filodrillia delicatula* Laseron	1
	Gyrosigma	*Gyrosigma* spp.	3
	Lauderia	*Lauderia annulata* Cleve *Lauderia* sp.	2
	Nitzschia	*Nitzschia acicularis* (Kuetzing) W.Smith	1
	Noctiluca	*Noctiluca scintillans* (Macartney) Kofoid & Swezy	1
	Odontella	*Odontella sinensis* (Greville) Grunow *O. mobiliensis* (J.W. Bailey) Grunow	5

		Odontella spp.	
	Palmeria	*Palmeria hardmaniana* Greville	1
	Planktoniella	*Planktoniella* sp.	1
	Rhizosolenia	*Rhizosolenia formosa* H. Peragallo *R. castracanei* H. Peragallo *R. terperei* H. Peragallo *R. imbricata* Brightwell *R. robusta* G. Norman *ex* Ralfs *Rhizosolenia* spp.	10
	Thalasiothrix	*Thalasiothrix* sp.	1
	Thalassionema	*Thalassionema bacillare* (Heiden) Kolbe *T. frauenfeldii* (Grunow) Tempère & Peragallo *T. nitzschioides* (Grunow) Mereschkowsky *T. longissima* Cleve & Grunow *Thalassionema* spp.	9
	Thalassiosira	*Thalassiosira gravida* Cleve *Th. australis* M. Peragallo *Th. pseudonana* Hasle & Heimdal *Th. punctigera* (Castracane) Hasle *Th. Proschrinae* Makarova *Th. oestrupii* (Ostenfeld) Proshkina-Lavrenko *ex* Hasle	6
Dinophyceae	*Ceratium*	*Ceratium furca* (Ehrenberg) Claparèdem & Lachmann *Ce. Tripos* (OF Müller) Nitzsch *Ce. Macroceros* (Ehrenberg) Vanhöffen *Ce. Trichoceros* (Ehrenberg) Kent	4
	Dinophysis	*Dinophysis tripos* Gourret	1
	Gonyaulax	*Gonyaulax scrippsae* Kofoid	1

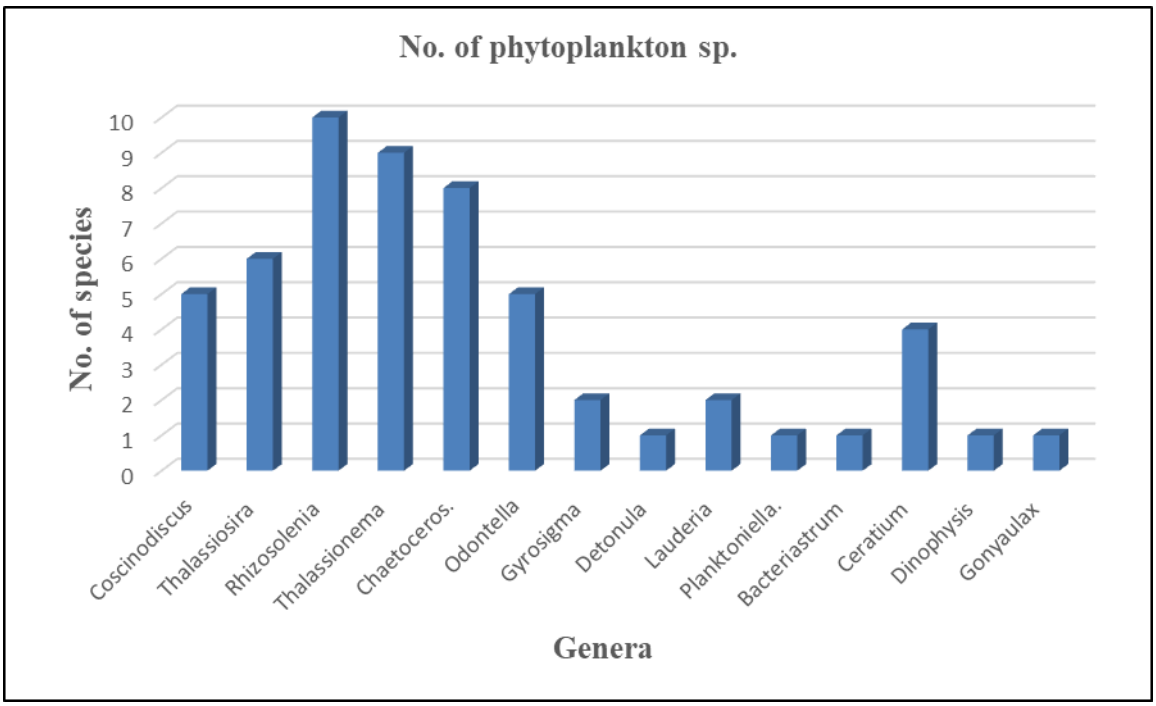


Figure 3: Comparison of Phytoplankton Species

Table 4: Phytoplankton Population Density (ind/m^3) at Generic Level from Different Stations

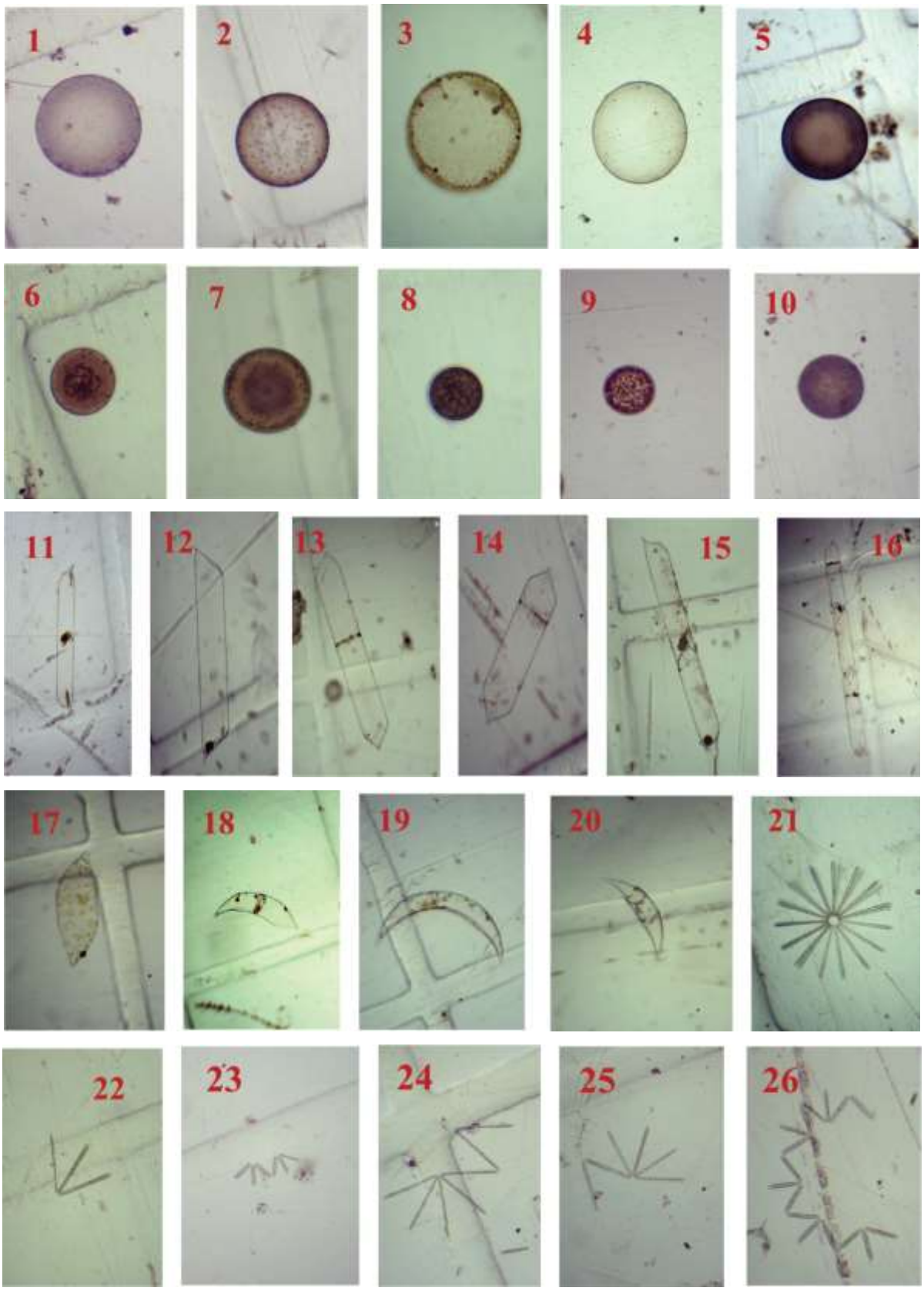
Genera	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12	Station 13	Station 14
Coscinodiscus	25000	50000	75000	100000	62500	50000	75000	37500	62500	50000	50000	50000	37500	25000
Thalassiosira	12500	12500	25000	25000	37500	12500	37500	12500	25000	-	12500	25000	25000	12500
Rhizosolenia	-	-	-	25000	12500	12500	12500	25000	12500	12500	12500	12500	-	-
Thalassionema	12500	12500	12500	37500	25000	37500	25000	25000	-	25000	25000	25000	25000	-
Chaetoceros.	-	37500	25000	25000	37500	25000	37500	25000	25000	12500	37500	37500	12500	12500
Odontella.	12500	12500	12500	25000	12500	25000	12500	12500	12500	-	-	12500	12500	-
Gyrosigma.	-	25000	25000	12500	-	-	12500	-	-	-	12500	-	-	12500
Detonula.	-	-	-	12500	12500	12500	12500	12500	-	-	-	12500	-	-
Lauderia		-	12500	25000	-	-	12500	-	12500	12500	-	-	-	-
Planktoniella	12500	12500	-	12500	12500	12500	12500	-	12500	-	-	12500	-	12500
Bacteriastrum	-	-	-	12500	-	12500	-	-	-	12500	-	12500	-	-
Ceratium	-	-	12500	25000	25000	-	-	-	12500	-	-	12500	-	-
Dinophysis	-	-	12500	25000	12500	-	-	-	-	12500	-	-	-	-
Gonyaulax	-	25000	-	12500	12500	12500	-	-	-	12500	-	-	-	-
Others	25000	50000	62500	100000	87500	75000	62500	37500	50000	37500	25000	62500	25000	12500

Phytoplankton richness and Shannon-Wiener Index

The results of diversity and richness calculation showed that station 1 has the lowest species richness (1.51) while the station 4 showed the highest richness of species (4.93) (Table 4). On the other hand, station 3 showed the lowest diversity index (1.46) and the highest was shown by station 4 (2.41). It means the carrying capacity of phytoplankton population at station 4 is higher compared to the other studied stations (Table 5).

Table 5: Phytoplankton Richness and Shannon-wiener Index.

Experimental stations	Total no. of genus	Cells/m^3	Species richness D_f	Shannon-wiener index (H)
1	5	75000	1.51	1.56
2	8	187500	2.65	1.93
3	9	212500	3.03	1.46
4	14	375000	4.93	2.41
5	11	262500	3.79	2.22
6	10	212500	3.41	2.15
7	10	250000	3.41	2.05
8	7	150000	2.27	1.86
9	8	175000	2.65	1.87
10	8	150000	2.65	1.91
11	6	150000	1.89	1.63
12	10	212500	3.41	2.15
13	5	112500	1.52	1.52
14	5	75000	1.52	1.56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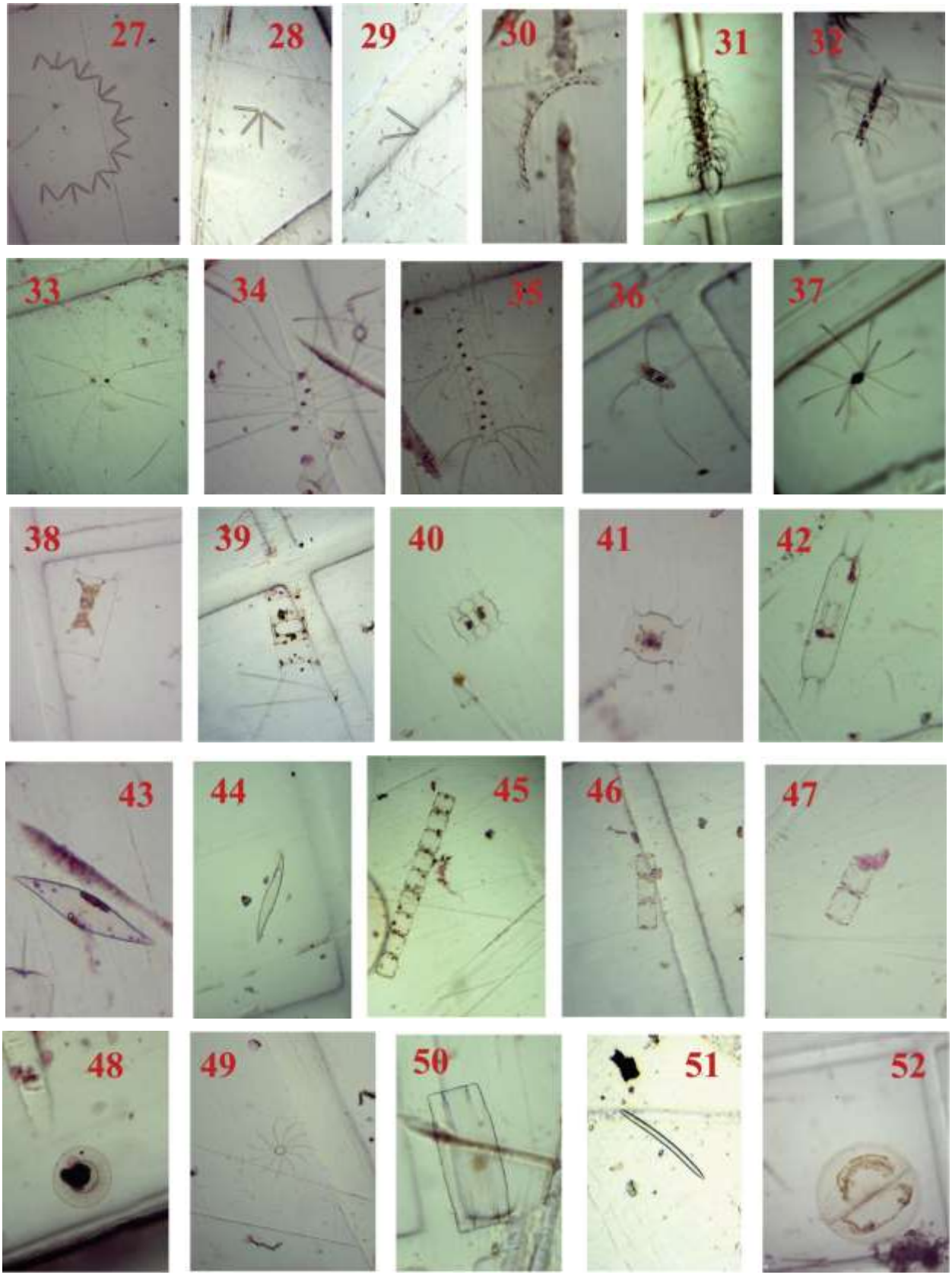
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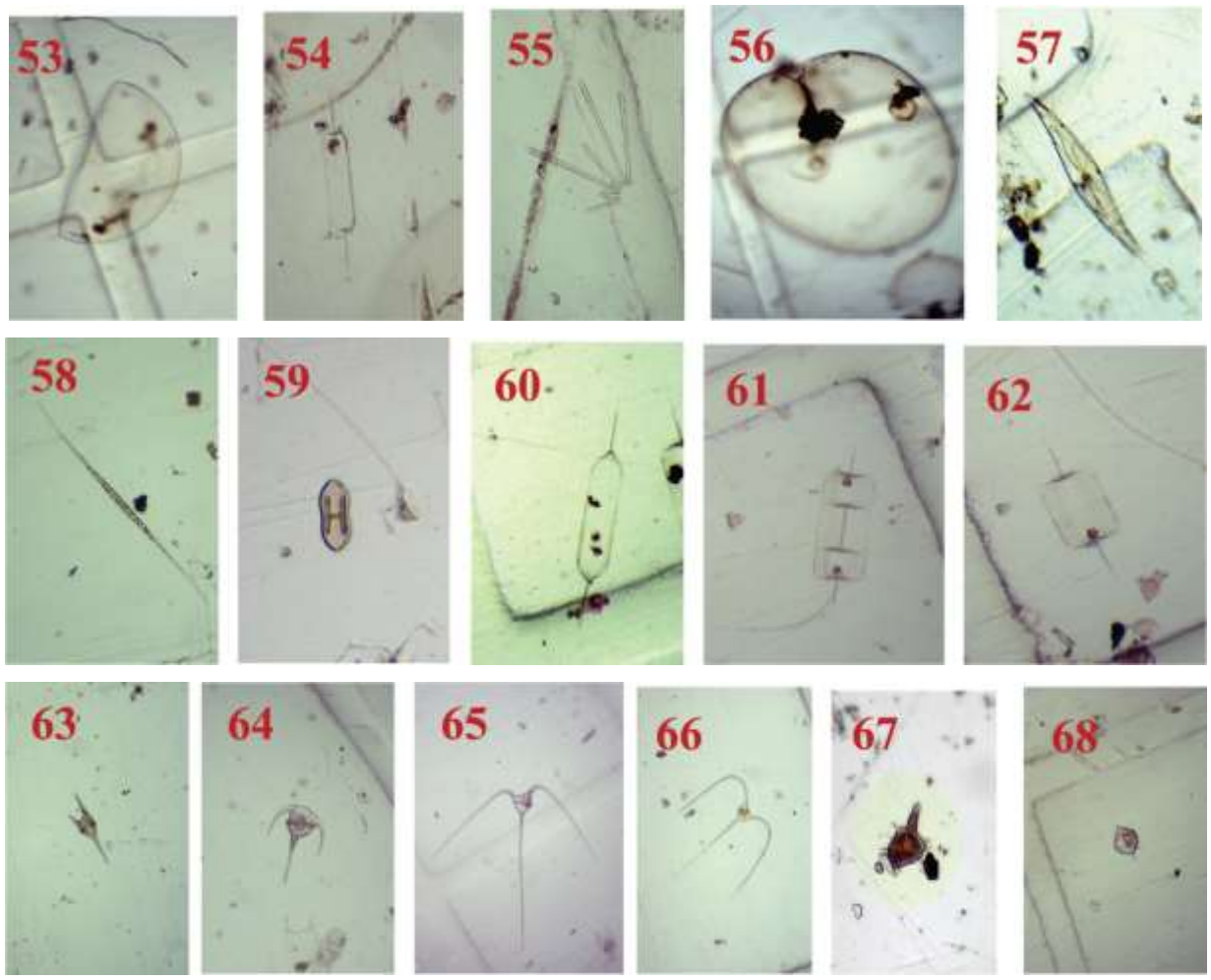

Figure 4 (1–26)*:* 1) *Cosinodiscus radiatus*, 2) *C. marginatus*, 3) *C. granii*, 4) *C. jonesianus*, 5) *C. centralis*, 6) *Thalassiosira gravida*, 7) *Th. australis*, 8) *Th. pseudonana*, 9) *Th. punctigera*, 10) *Th. proschrinae*, 11) *Rhizosolenia formosa*, 12) *R. castracanei*, 13) *Rhizosolenia* sp., 14) *R. terperei*, 15) *R. imbricata*, 16) *Rhizosolenia* sp. (0.4x) 17) *R. robusta*, 18) *Rhizosolenia* sp., *19) Rhizosolenia* sp., *20) Rhizosolenia* sp., *21) Thalassionema frauenfeldii*, *22) T. bacillare*, *23) T. nitzschioides*, *24) Thalassionema.* sp. 25) *Thalassionema* sp., *26) Thalassionema* sp.,

Figure 5 (27-52): 27) *T. longissima*, 28) *Thalassionema* sp., 29) *Thalassionema* sp., 30) *Chaetoceros neglectus*, 31) *Ch. coarctatus*, 32) *Ch. pseudocurvisetus*, 33) *Ch. constrictus*, 34) *Ch. decipiens*, 35) *Ch. lorenzianus*, 36) *Ch. tenuissimus*, 37) *Ch. danicus*, 38) *Odontella sinensis*, 39) *Odontella. sp.*, 40) *Odontella* sp., 41) *O. mobiliensis*, 42) *Odontella* sp., 43) *Gyrosigma* sp., 44) *Gyrosigma* sp., 45) *Detonnula pumila*, 46) *Lauderia annulata*, 47) *Lauderia* sp., 48) *Planktoniella* sp. 49) *Bacteriastrum furcatum*, 50) *Banquisia belgicae*, 51) *Eunotia* sp., 52) *Thalasiosira oestrupii*,

Figure 6 (53-68): 53) *Palmeria hardmaniana*, 54) *Ditylum* sp., 55) *Thalasiothrix* sp., 56) *Noctiluca scintillans*, 57) *Gyrosigma* sp., 58) *Nitzschia acicularis*, 59) *Filodrillia delicatula*, 60) *Ditylum* sp., 61) *D. brightwellii*, 62) *Ditylum* sp., 63) *Ceratium furca*, 64) *C. tripos*, 65) *C. macroceros*, 66) *C. trichoceros*, 67) *Dinophysis tripos*, 68) *Gonyaulax scrippsae*

DISCUSSION

In this study a total number of 68 species of phytoplankton were identified from the Saint Martin's Island. From the recorded phytoplankton community 62 diatoms and 6 dinoflagellates were identified. Phytoplankton is mainly predominated by diatoms followed by dinoflagellates. Among diatoms, the most important species belonged to *Coscinodiscus*, *Chaetoceros*, *Thalassiosira*, and *Thalassionema*. Among dinoflagellates, 4 species of *Ceratium* and 1 species of each from *Dinophysis* and *Gonyaulax* were recorded. A total of 128 species of phytoplankton have been reported from Bay of Bengal of the coast of Bangladesh. Among them, 64 species of Bacillariophyceae and 10 species of Dinophyceae

were recorded from the North-eastern Bay of Bengal by Islam and Aziz (1975). In addition, Aziz and Islam (1979) had recorded 22 species of marine dinoflagellates from the Bay of Bengal. When the qualitative records of phytoplankton from the BoB is compared, it could be seen that in the present investigation the species hierarchy follows a pattern of *Rhizosolenia* > *Thalassionema* > *Chaetoceros* > *Thalassiosira* while the pattern exhibited by the study of Islam and Aziz (1975) is *Chaetoceros* > *Rhizosolenia* > *Melosira* > *Ditylum*. *Rhizosolenia* and *Chaetoceros* appeared to be the dominant forms of phytoplankton in both the studies. The findings from Islam and Aziz (1975) seems to coincide with this study done in the adjacent waters of the St. Martin Island. Some other findings of phytoplankton are 61 genera in the lower Meghna river estuary (Sharif, 2007), 134 phytoplankton species in Sundarbans Mangrove Forest (Rahaman, 2013) and for the first time in coastal waters around Rushikulya estuary 149 phytoplankton species was reported (Baliarsingh, 2015).

In the present study, qualitatively, highest number of species was yielded by *Rhizosolenia* (10) followed by *Chaetoceros* (9), *Thalassionema* (8), and *Thalassiosira* (6).

Among diatoms, species of *Consinodiscus, Chaetoceros, Thalassiosira, Pleurosigma* and *Thalassionema* were predominant. Among dinoflagellates, two species from each of *Ceratium, Protoperidinium,* and one from each of *Prorocentrum, Noctiluca* and *Gonyaulax* were found. Station 4 hosted most of the genera that were found in the coastal waters of the island. The Margalleff species richness and the Shannon's diversity index of the studied stations ranged from 1.51-4.93, and 1.52-2.22. Motwani et al. (2014) reported ranges of the same indices as mentioned before, as 0.44-4.64, and 0.098-3.28, respectively in the north eastern Arabian Sea. From this observation it could be said that the upper limit of the species richness value is quite consistent with that recorded for the present study. The maximum value of species diversity (3.22) recorded by Motwani et al. (2014) is lower (2.22) than that recorded for the present investigation. The physicochemical parameters recorded in this station were 26.8ºC temperature, 32.71 ppt salinity, 8.16 pH and 5.98 mg/L DO. Islam and Aziz (1975) studied the phytoplankton along with the physicochemical parameters of water from the north eastern BoB and recorded the range of surface water temperature from 29.5-30.5 ºC. In their study the salinity, DO, N_2 and phosphorus ranged from 20-30 ppt, 2.26-5.00 mg/l, 19-21 µg/l and 166-180 µg/l, respectively. However, in the St. Martin's Island, Hossain and Islam (2006) reported sea surface temperature 26.0 ºC and salinity 27.5 ppt while the optimum values for these two parameters were reported as 20-30 ºC and 32-37 ppt, respectively. The values for water temperature and salinity recorded in the present investigation are in consistent with the reported optimum for the sea water. Thus, it appears that the habitat studied is an ideal marine in nature and the species recorded were also characteristic to the habitats. It can be speculated that such combination of parameter values creates a favorable condition for most of the genera found in these waters but both extensive and intensive research needs to be undertaken considering the course of currents, tides and the concentration of nutrients.

CONCLUSION

This study contemplates comprehensive assessment of the marine water adjacent to the St. Martin's Island of Bangladesh and studies on the influence of the marine environment including biophysical aspects on these resources. The various phytoplanktons in the surface water of the island can be used as indicator of productivity, water quality, marine currents and climate modification. A total of 68 phytoplankton species were recorded from 14 different sampling stations. The total phytoplankton abundance varied from 87,500-437,500 ind/m^3 and highest phytoplankton abundance was found at station 4. *Coscinodiscus* sp. is the most dominant in all the stations and the cell density of it ranged from 25,000-100,000 ind/m^3. The results thus obtained show that phytoplankton composition and their abundance vary in the sampling stations. The phytoplankton quality and quantity recorded from the studied stations are quite consistent with other studies carried out so far in the Bay of Bengal, Bangladesh. The species richness and diversity index have similarities with those recorded elsewhere. The ranges for water temperature and salinity obtained in the present investigation fall within the optimum values quoted for sea water. The value of pH and dissolved oxygen recorded in the study stations are consistent too with other studies carried out in this part of the Bay of Bengal. However,

from the present study no single factor could be found as responsible for the variability of phytoplankton population distribution.

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