E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(6): 166-169

www.fisheriesjournal.com
Received: 21-09-2018
Accepted: 22-10-2018

Md Masum Billah
Institute of Marine Sciences and Fisheries, University of Chittagong, Chittagong, Bangladesh

MA Kader
Institute of Marine Sciences and Fisheries, University of Chittagong, Chittagong, Bangladesh

Syed Shoeb Mahmud
Institute of Marine Sciences and Fisheries, University of Chittagong, Chittagong, Bangladesh

Abdulla-Al-Asif
(1) Department of Fisheries and Marine Bioscience, Faculty of Biological Science and Technology, Jessore University of Science and Technology, Jessore, Bangladesh
(2) Department of Aquaculture, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh

Abdullah Al Mamun Siddiqui
Institute of Marine Sciences and Fisheries, University of Chittagong, Chittagong, Bangladesh

Correspondence
Md Masum Billah
Institute of Marine Sciences and Fisheries, University of Chittagong, Chittagong, Bangladesh

Diversity and distribution of seaweeds in Saint Martin Island, Bangladesh

Md Masum Billah, MA Kader, Syed Shoeb Mahmud, Abdulla-Al-Asif and Abdullah Al Mamun Siddiqui

Abstract
This present investigation conducted on diversity and distribution analysis of the sub-littoral seaweed flora collected from January to June, 2007 from north part and south part of the Saint Martin Island, Bangladesh has revealed the presence of 37 seaweed taxa, 11 under Chlorophyceae, 14 under Phaeophyceae and 12 under Rhodophyceae. The distribution, diversity and abundance of seaweed flora fluctuate due to temperature, locations and species composition variations in Saint Martin Island.

Keywords: Abundance, diversity, distribution, seaweeds, Saint Martin Island

1. Introduction
The floral groups are exemplified by three assemblages of primary producers, the seaweed, sea grasses, and the mangroves [1]. Macro benthic algae are significant factor of the marine ecology. These types of flora reveal vast diversity in size, color, form, and formation of life and they are tremendously rich in marine ecosystem. As stated by a very coarse approximation there is more than 17,000 species of sea flora and among them 95% species of them are algae [2]. Up to the present time, numerous researches for the exploitation of seaweed in technologically advanced republics have been completed about biomass and standing crop. More recently Faveri *et al*. [3] studied the chronological variations of seaweeds in Southern Brazil and its possible reasons. Hay and Villout [4] studied the seasonality of *Undaria pinnatifida* population in New Zealand waters. Jagtap [5] defined the marine flora of Nicobar clutch of islands in Andaman Sea. Ballesteros [6] considered periodic growth and production of deep-water population of *Halimeda tuna* in the Northwestern Mediterranean. Pedrini *et al*. [7] conveyed the marine algae of Trindade Island, Brazil. Basson *et al*. [8] also testified the benthic flora of Bahrain. Chock and Mathieson [9] computed the standing crop and biomass dissimilarity of estuarine seaweed at Cedar point, Dover New Hampshire Maine, UK. Comparable studies have also been accompanied in other areas of the world such as, North Carolina [10], India [11], Dodger channel of Canada [12] and Central Puget Sound Washington, U.S.A. [13]. Josselyn and Mathieson [14] have stated the biomass deviation of particular estuarine macrophytes at North temperate estuary, Falmouth Massachusetts, USA. Bangladesh coast is 710 km long, facing the Bay of Bengal in the south. Bangladesh is a developing country; the marine resources like seaweeds are under threat due to variety of pollutants. There are above 4500 industries located in Chittagong at different sites. According to an estimate all these industries contribute approximately 99% of the total industrial pollution beside the contamination from oil waste discharge. Chittagong port brings enormous number of ship for trade material export-import and ocean going vehicle dispose oil, garbage and wastage to the sea area which is also nearly adjacent with Saint Martin Island, Chittagong. The intertidal and drifted seaweed flora of these areas, especially the St. Martin's Island is rich. So far, 197 species of seaweeds (of them 95 are red, 46 greens and 56 brown) have been recorded [15, 16, 17, 18, 19, 20]. The present investigation covers the status of the submerged seaweeds, while the species diversity, distribution and abundance of submerged seaweeds of the Saint Martin Island are also revealed.

2. Materials and methods

2.1 Study location and periods

Seaweeds species were collected from Saint Martin Island during January to June, 2007 from two locations; southern part and northern part. The northern part of island was coordinate with 20°38'09.0"N 92°19'34.3"E and the southern part of island was coordinate with 20°35'28.5"N 92°19'53.5"E.

2.2 Sample collection and preservation

Samples are collected from island once a month. The samples were then preserved in sea water with 5% formalin, and individual seaweed as herbaria, deposited in the central laboratory of Institute of Marine Science, University of Chittagong.

2.3 Data collection

Collected samples were sorted manually, and then identified by the help of floral chart; after that, species were counted and thus data collection process was taken place.

2.4 Data analysis

Entire collected data were précised and inspected cautiously and documented. Afterward assortment of data, these were revised and notched. In conclusion, significant tables were prepared in accordance with the objectives of the study. Data presented mostly in the tabular form because it is simple in calculation, widely used and easy to understand. Data were analyzed using the Microsoft excel 2007.

3. Results and Discussions

3.1 Monthly distribution of sea grass species

There are three major class found in Saint Martin island namely; Chlorophyceae, Phaeophyceae and Rhodophyceae. It was found that, Phaeophyceae sea weed group is the most dominant group; on the other hand, Chlorophyceae had the minimal presence among three groups found in the study period. January, February and March were the most precious month for growth of sea weed and their abundance. It was found Phaeophyceae at the month of March showed the higher number of species (14 species); along with total number of species were also mostly abundant in the month of March. Whereas, with the increase of temperature the number of species in all classes were decreasing and at the end of the June the total number of sea weed species were 18 (Table 1). These present study is more or less similar with the study of several research work [21, 22, 23, 24].

Table 1: number of species found in island (Month wise)

Name of Class	January	February	March	April	May	June	Total
Chlorophyceae	11	10	11	8	7	5	52
Phaeophyceae	13	12	14	11	9	7	66
Rhodophyceae	11	10	12	9	7	6	55
Total	35	32	37	28	23	18	173

3.2 Species distribution in North part of island

Phaeophyceae was the most abundant class which is belongs to the Northern part of the island. Comparatively, species distribution is high in north than the Sothern part of Saint Martin Island (Figure 1).

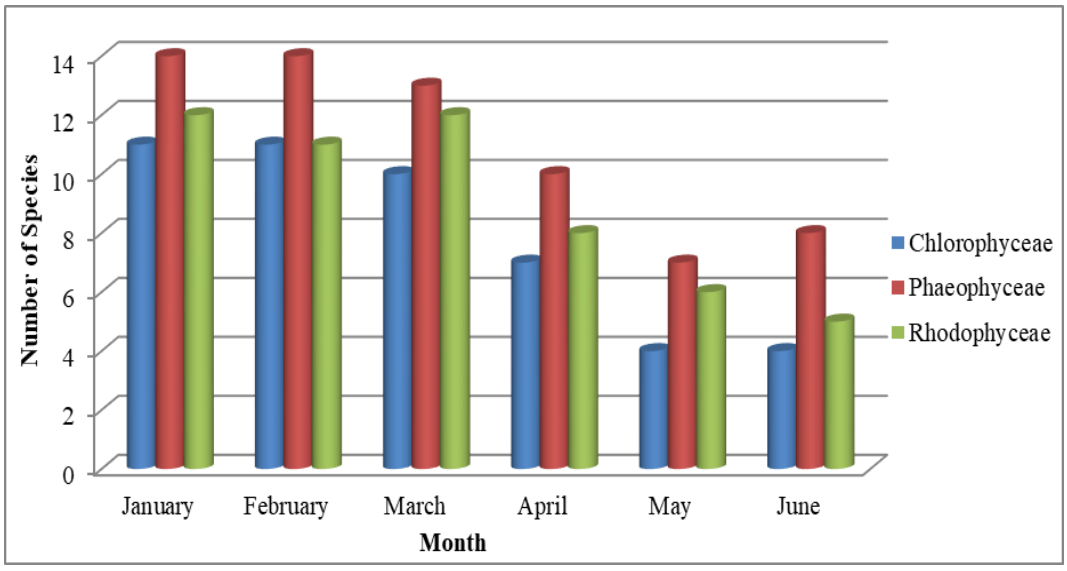

Fig 1: Species abundance in North part of Island

3.3 Species distribution in South part of island

It was found that, Phaeophyceae and Rhodophyceae's species were the competitively similar in availability in southern part of island. It was also appeared that, the species distribution were decreased in number at the month of April, May and June while it was higher in the previous months due to fluctuations of temperature (Figure 2).

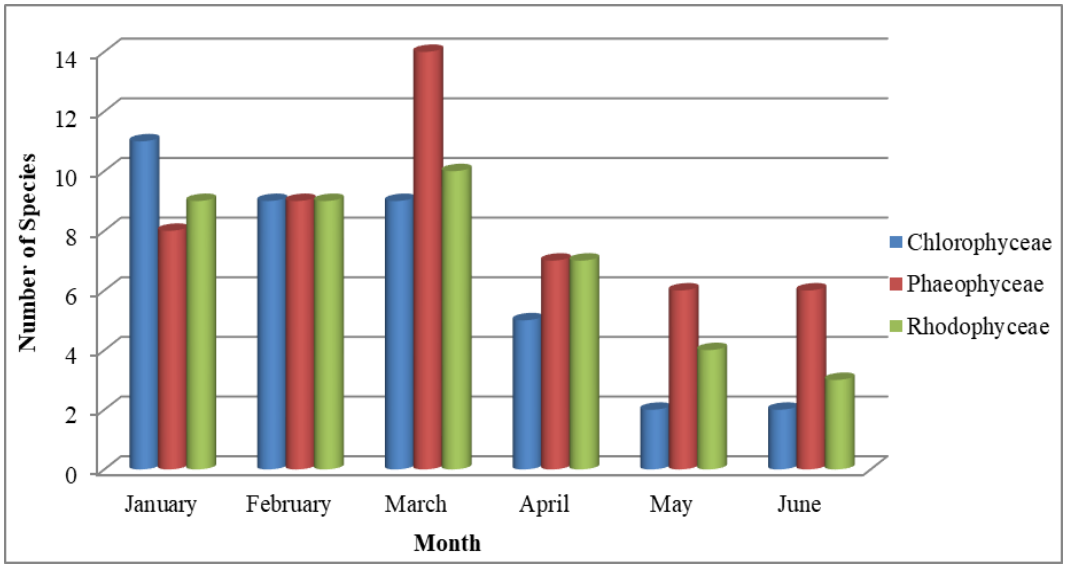

Fig 2: Species abundance in South part of Island

3.4 Diversity and abundance of sea weed

It was found that, class Chlorophyceae had 5 order belongings 5 family, 5 genus and 11 species; in that mean time, class Phaeophyceae had 3 order belongings 3 family, 6 genus and 14 species; while class Rhodophyceae had 6 order belongings 9 family maintain 10 genus and 12 species. The abundance varied from time to time and places; (+) sign remark the intensity of abundance of different species of sea weed. Such kind of study was conducted by Qari [21].

Table 2: Species diversity and abundance of sea weed in Saint Martin Island, Chittagong

Class	Order	Family	Genus	Species	Abundance
Chlorophyceae	Cladophorales	Cladophoraceae	*Cladophora*	*Cladophora prolifera*	+++++
	Codiales	Codiaceae	*Codium*	*Codium geppei*	++++
	Siphonales	Codiaceae	*Avrainvillea*	*Avrainvillea amadelpha*	+++
	Caulerpales	Caulerpaceae	*Caulerpa*	*Caulerpa cactoides*	++++
				Caulerpa chemnitzschi	++++
				Caulerpa chemnitzschi var. *occidentalis*	++++
				Caulerpa racemosa var. *clavifera*	+++++
				Caulerpa sertularioides	++++
				Caulerpa taxifolia	++++
	Caulerpales	Udotiaceae	*Halimeda*	*Halimeda discoidea*	+++
				Halimeda opuntia	+++++
Phaeophyceae	Dictyotales;	Dictyotaceae	*Dictyota*	*Dictyota atomaria*	++++
				Dictyopteris australis	+++
			Padina	*Padina tenuis*	++
				Padina pavonica	+++
				Padina gymnospora	++++
			Pocockiella	*Pocockiella variegata*	+++++
			Spatoglossum	*Spatoglossum variabile*	++++
				Spatoglossum asperum	++++
	Dictyosiphonales	Chnoosporaceae	*Chnoospora*	*Chnoospora implexa*	+++++
	Fucales	Sargassaceae	*Sargassum*	*Sargassum coriifolium*	+++++
				Sargassum olygocystum	+++++
				Sargassum swartzii	+++++
				Sargassum tenerrimum	+++++
				Sargassum pallidum	+++++
Rhodophyceae	Nemalionales	Chaetangiaceae	*Galaxura*	*Galaxura fastigiata*	++++
	Cryptonemiales	Coralliniaceae	*Jania*	*Jania ungulata*	+++
	Gigartinales	Hypneaceae	*Hypnea*	*Hypnea musciformis*	+++++
	Bonnemaisoniales	Bonnemaisoniaceae	*Asparagopsis*	*Asparagopsis taxiformis*	++++
	Ceramiales	Dasyaceae	*Dasya*	*Dasya corymbifera*	++++
				Dasya pedicellata	++++
		Rhodomelaceae	*Gracilaria*	*Gracilaria spinuligera*	+++
			Neurymenia	*Neurymenia fraxinifolia*	++++
		Delesseriaceae	*Vanvoorstia*	*Vanvoorstia coccinea*	+++++
	Cryptonemiales;	Grateloupiaceae	*Halymenia*	*Halymenia floresia*	++++
				Halymenia floridana	+++
		Squamariaceae	*Peyssonnelia*	*Peyssonnelia polymorpha*	+++++

N.B.: Ascending of (+) sign remarks more availability of species.

4. Conclusion

The species distribution and abundance denotes the availability of marine flora especially, sea weed species found in Saint Martin Island. Although sea weed bearing some medicinal and food value but proper check of availability and biodiversity measurement along with conservation could lead this bio-component to the sustainable status in Bay of Bengal. This research team, only investigate the diversity and distribution of sea weed, any further research approach could be conducted to study the other feature of this bio flora.

5. References

1. Trono GC. Jr. Diversity of the seaweeds flora of the Philippines and its utilization. Hydro bio logia. 1999; 398:1-6.
2. Chapman VJ, Chapman DJ. Seaweed and their uses. Chapman and Hall London. New York, 1980.
3. Faveri C, Scherner F, Farias J, Oliveira EC, Paulo A, *et al*. Temporal changes in the seaweed flora in Southern Brazil and its potential causes, Pan- American. Journal of Aquatic Science. 2010; 5:350-357.
4. Hay CH, Villouta E. Seasonality of the Adventive Asian Kelp *Undaria pinnatifida* in New Zealand. Bot Mar. 1993; 36:461-476.
5. Jagtap TG. Marine flora of Nicobar group of islands in Andaman Sea. Indian Journal of Marine Science. 1992; 21:56-58.
6. Ballesteros E. Seasonality of growth and production of a deep-water population of Halimeda tuna (Chlorophyceae, Caulerpales) in the northwestern Mediterranean. Bot Marine. 1991; 34:291-301.
7. Pedrini AG, Goncalves JEA, Fonseca MCS, Zau AS, Lacorte CC. A survey of the marine algae of Trindade Island, Brazil. Bot Marine. 1989; 32:97-99.
8. Basson PW, Mohamed SA, Arora DK. A survey of the benthic marine algae of Bahrain. Bot Marine. 1989; 32:27-40.
9. Chock JS, Mathieson AC. Variations of New England estuarine seaweeds Biomass. Bot Marine. 1983; 26:87-97.
10. Peckol P. Seasonal occurrence and reproduction of some marine algae of the continental shelf, North Carolina USA. Bot Marine. 1982; 25:185-190.
11. Gaur K, Ramakrishna T, Subbaraju DP, Murthy MS. Ecological studies on *Ulva lactuca* L. from Veraval, India. Hydro bio logia. 1982; 89:89-94.
12. Whyte JNC, Englar JR, Saunders RG, landsay JC. Seasonal variation in the biomass, quantity & quality of agar from the reproductive and vegetative stages of *Gracilaria* (*Verrucosa* type). Bot Marine. 1981; 24:493-501.
13. Thom RM. Seasonality in low intertidal benthic marine algal communities in Central Puget Sound Washington, USA Bot Marine. 1980; 23:7-11.
14. Josselyn MN, Mathieson AC. Seasonal influx and decomposition of autochthonous macro phytes litter in a north temperate estuary. Hydro bio logia. 1980; 71:197-208.
15. Ahmed ZU, Begum ZNT, Hassan MA, Khondker M, Kabir SMH, Ahmad M, Ahmed ATA, Rahman AKA, Haque EU (eds.) Encyclopedia of Flora and Fauna of Bangladesh. Algae, Chlorophyta (Aphanochaetaceae-Zygnemataceae). Asiatic Society of Bangladesh, Dhaka. 2008; 3:812.
16. Ahmed ZU, Khondker M, Begum ZNT, Hassan MA, Kabir SMH, Ahmad M, *et al*. (eds.). Encyclopedia of Flora and Fauna of Bangladesh. Algae, Charophyta-Rhodophyta, (Achnanthaceae-Vaucheriaceae). Asiat. Soc. Bangladesh, Dhaka. 2009; 4:543.
17. Aziz A, Islam S. Marine algae of the St. Martin's Island, Bangladesh. VII. *Acrochaetium nurulislamii* sp. nov.and new records of *Acrochaetium* (Rhodophyceae). Bangladesh Journal of Botany. 2009; 38(2):145-151.
18. Islam S, Aziz A, Chowdhury AH. Marine algae of St. Martin's Island, Bangladesh. VIII. New records of Red algae (Rhodophyceae). Bangladesh Journal of Botany. 2010; 39(1):87-96.
19. Aziz A, Rahman MT. Marine algae of the St. Martin's Island, Bangladesh. XI. Red algae (Rhodophyceae). Bangladesh Journal of Botany. 2010; 39(2):161-168.
20. Aziz A, Rahman MT. Marine algae of the St. Martin's Island, Bangladesh. XII. New records of Red and green algae. Bangladesh Journal of Botany. 2011; 40(1):41-45.
21. Qari R. An Assessment of Seaweeds Diversity and Distribution at the Beach of Nathia Gali, Karachi, Pakistan Journal of Marine Science Research and Development. 2017; 7:228.
22. Aziz A, Towhidy S, Alfasane MA. Sublittoral seaweed flora of the St. Martin's Island, Bangladesh. Bangladesh Journal of Botany. 2015; 44(2):223-236.
23. Palanisamy M, Yadav SK, Murthy GVS. Distribution and Diversity of Seaweeds at Thikkodi Coast, Kerala, South India. Botanical Survey of India, Southern Regional Centre, Coimbatore - 641 003, Tamil Nadu, India, 2015.
24. Bhagyaraj I, Kunchithapatham VR. Diversity and distribution of seaweeds in the shores and water lagoons of Chennai and Rameshwaram coastal areas, South-Eastern coast of India. Biodiversity Journal. 2016; 7(4):923-934