Species Composition of Intertidal Marine Macroalgae inSan Francisco-Canaoay, San Fernando, La Union, Philippines

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Abstract*—The Philippines occupy the north of coral triangle, a huge area overlapping the Indian Ocean and the Pacific Ocean, and is famous for its extremely rich marine biodiversity. The taxonomical study of seaweeds started on the year 1750 and towards the end of the 20th century[1]. In Ilocos Sur, a comprehensive study on the marine benthic algae was made by Domingo in 1988.In this study, he reported 103 species, with 91 species reported for the first time for the province[2].As to this date, no taxonomical study made in San Francisco-Canaoay. This study used site description, Exhaustive Line Transect Method.The macroalgae recorded in San Francisco-Canaoay in the open area of the coastlines includeone genus&sevenspecies of Phaeophyta, one genus&one species of Chlorophyta, and one genus &nine species of Rhodophyta. The larger number of Rhodophyta can be attributed to the presence of abundant nutrients in the area and the luminosity of light of 35, 000 Lux value, which was favorable for the photosynthetic macroalgae.The specimens identified,58% were Phaeophyta, 34% were Chlorophyta, and 8% were Rhodophyta.There were more red algaes (Rhodophyta) in the open area due to the nature of these plant-like protists to thrive in running water with many nutrients. The number of brown algaes (phaeophyta) are not affected by the conditions of the water because of their toughness as compared to the aforementioned nature of red algaes[3].***

Keyword— intertidal marine, macroalgae.

I. INTRODUCTION

San Francisco-Canaoay San Fernando, La Union coordinates: 16° 36' 0" North, 120° 18' 0" East. The average temperature is 27°C and the intensity of light was 35, 000 Lux valueduring the sampling period. It was high tide on the date of August 27, 2016 and the area was experiencing the southwest monsoon (habagat) on the day of collection. The collection started at 0600 hours up to 1500 hours. There werenumerous species of macroalgae along the shoreline such as*Halimeda stuposa, Halymenia durvillei, and Halimeda stuposa.*The specimens found were scattered along the sand brought by strong waves.

Macroalgae (seaweeds) have ecological importance in local folks of San Francisco-Canaoay.The folks collect certain species of Sargassum (brown algae) as a source of livelihood. These are dried and grinded and are used to fertilize plants. Some use it as raw materials to make body soaps and hand lotions.

The seaweeds *Eucheuma, Gracilaria* and *Sargassum* are red-to-brown grasses of the sea that provide food for man. Aside from being consumed as food, these are utilized as raw materials in the manufacture of industrial products such as alginate, agar and carrageenan. They contain protein which help fight premature aging of the skin by restructuring collagen and generating elasticity, skin suppleness which in turn reduces and softens wrinkles. They also contain beta-carotene to help slow skin aging, treat acne and irritated skin, as well as eczema problems. It is also used as detoxifier when eaten or applied to the skin [4].

The objective of this study is to determine the species composition and identification of marine macroalgae in the open and close coastlines of the intertidal zone of Canaoay-San Francisco, San Fernando, La Union.

II. MATERIAL AND METHODS

Exhaustive sampling was done every 5m x 100m line transect. Photos were taken from all the macroalgae; preserved seaweeds were place in bottles with 100% Formaldehyde diluted with sea water (97% seawater, 3% Formalin). Plant pressing wasdone for preservation and identification of the specimens collected. For proper identification of the specimens, Field Guide and Atlas of the Seaweed Resources of the Philippines by Trono, GC, Jr.[5], was used. For further verification,expert phycologists, Ken Joseph Clemente of UST Graduate School, and Dr. Paciente A. Cordero were consulted.

Lux Meter was used to determine the sunflect temperature in the site area. Global Positioning System (GPS) Navigation Device was used to determine the coordinates of the area.

Site Description

Open area of sampling: The site was an open sea, facing the West Philippine Sea. It was sandy and strong waves occurred during strong winds. There were regular rises and falls of the water that a sea current wave can drown a person swimming on it if not familiar to the place. Waves observed were 3-4ft. high and many Sargassum were seenfloating in the sea. Some *Sargassum sp*. could withstand the strong waves, while some were carried out along the shoreline. Phaeophyta (brown algae) and Rhodophyta (red algae) were the renowned species that seem adaptable in strong current of sea water. ***Sargassum***were generally epiphytic in this area of sampling.

Closed area of sampling: The place has numerous coral stones and minerals substrate. There were many limiting factors observed, like competition of space, since waves were not as high as compared to the open area. In the crevice rock formations, there were substrates for Chlorophyta and Phaeophyta, however they were heavily epiphytic due to limited flowing of water in some areas. Many sea grasses like *Thalassia hemprichii* are found in this area.

Fig. 1: (A) Map of the Philippines, (B) Satellite Map of the San Francisco-Canaoay of the sampling.

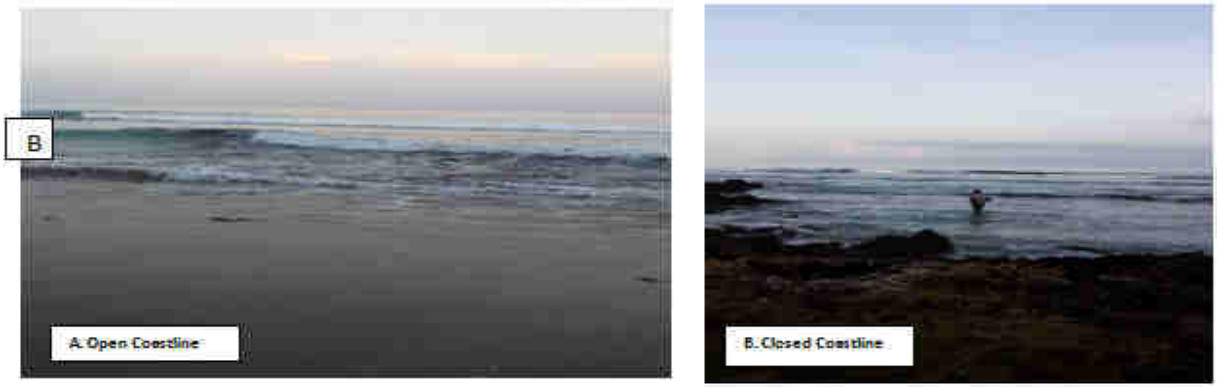


Fig.2:The occular view of the sampling sites for seaweeds collection. (A) The open sampling site facing the west Philippines sea, and (B) The Closedsampling area, rocky shoreline affecting the intertidal area.

Table.1: The Checklist of Macroalgae in Open and Closed Coatline of San Francisco-Canaoay San Fernando La Union

Open Coastlines	Closed Coastlines
Phaeophyta	**Phaeophyta**
1. *Sargassum aquifolium* 2. *Sargassum cristaefolium* 3. *Sargassum oligocystum* 4. *Sargassum piluliferum* 5. *Sargassum sp.1* 6. *Sargassum sp.2* 7. *Sargassum sp.3*	1. *Padina australis* 2. *Sargassum aquifolium* 3. *Sargassum crassifolium* 4. *Sargassum polycystum* 5. *Sargassum oligocystum* 6. *Sargassum sp.* 7. *Hormophysa triquetra*
Chlorophyta	**Chlorophyta**
8. *Halimeda stuposa*	8. *Cladophoropsis vaucheriaeformis* 9. *Halimeda opuntia var opuntia* 10. *Halimeda stuposa*
Rhodophyta	**Rhodophyta**
11. *Amansia glomerata* 12. *Galaxaura divaricata* 13. *Halymenia durvillei* 14. *Halymenia maculata* 15. *Meristotheca coacta* 16. *Plocamium sp.* 17. *Pterocladiella capillacea* 18. *Tricleocarpa cylindrica* 19. *Tricleocarpa fragilis*	11. *Gelidiella acerosa with* *12.* epiphyte*Jania adhaerens)*
Phaeophyta: 1 genus and 7 species *Chlorophyta: 1 genus and 1 species* *Rhodophyta: 1 genus and 9 species*	*Phaeophyta: 1 genus and 7 species* *Chlorophyta: 1 genus and 3 species* *Rhodophyta: 1 genus and 2 species*

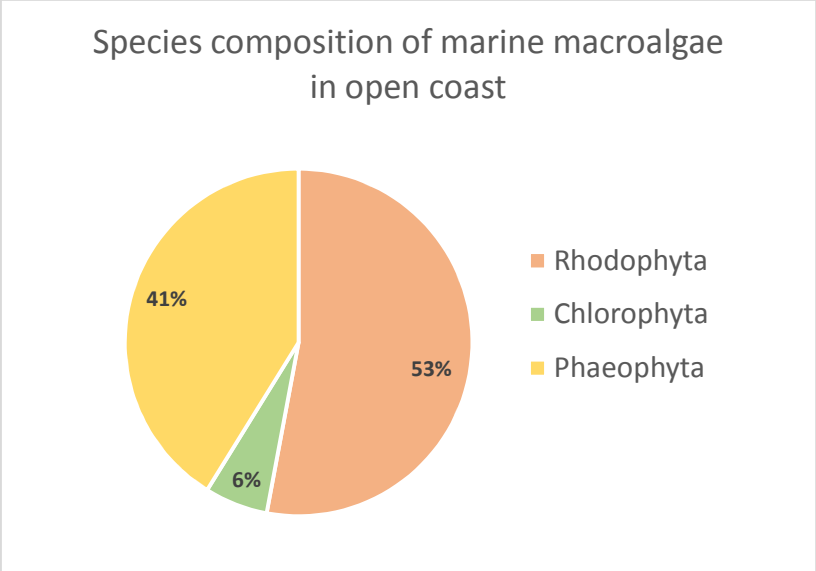


Fig.3A: Species and composition in the open coastline

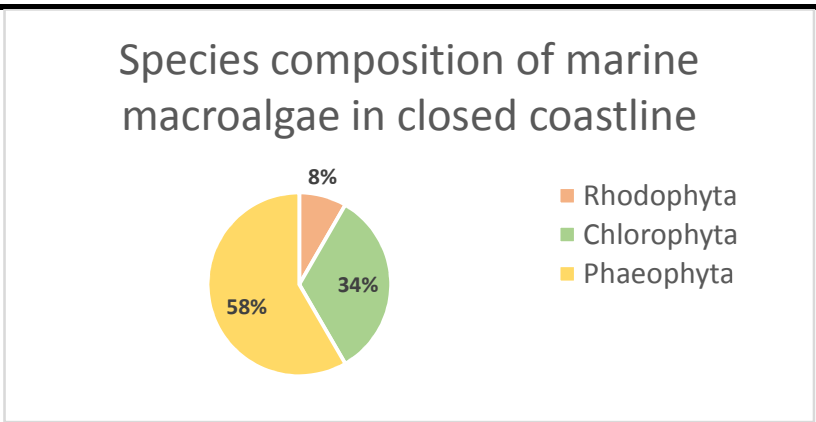


Fig.3B: Species and composition in the closed coastline

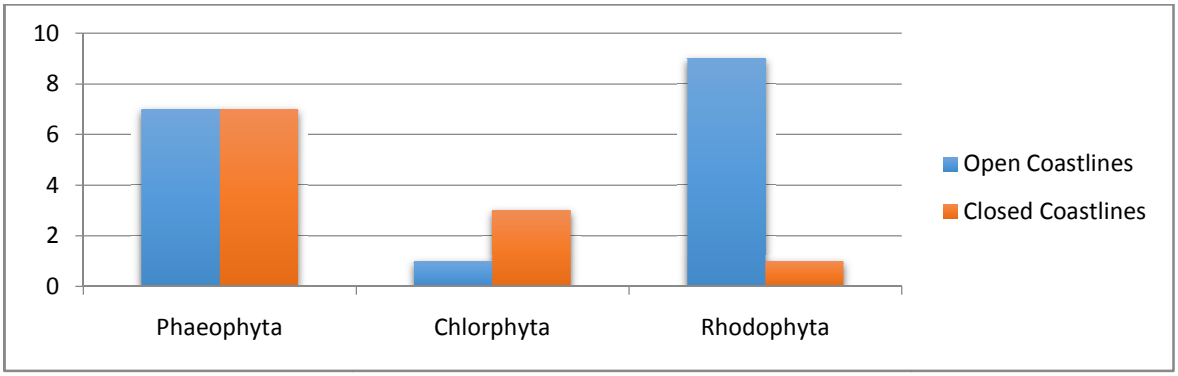


Fig.4A: Comparison of Species Composition in Both the Open and Closed Coastlines

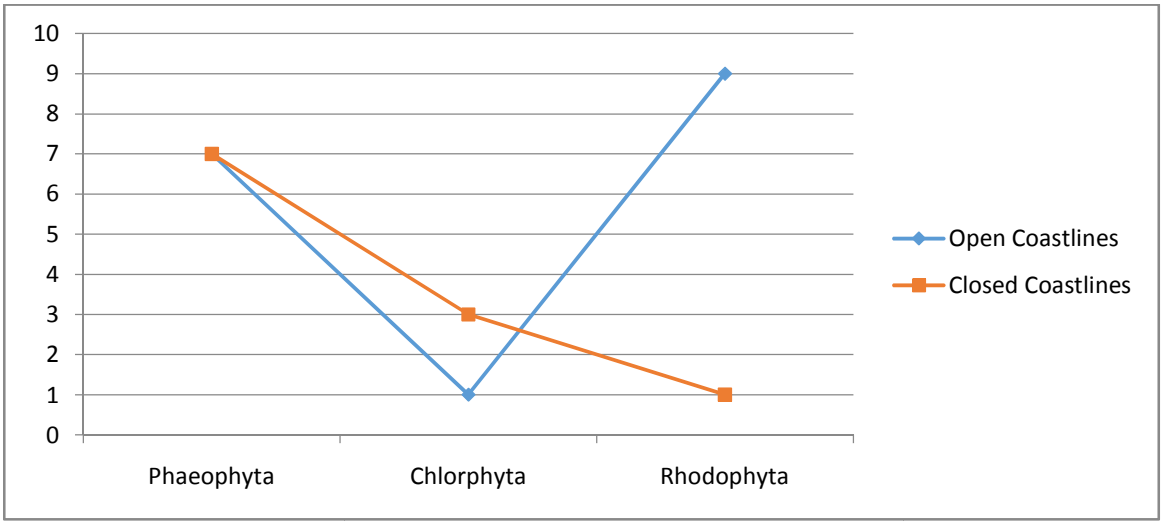
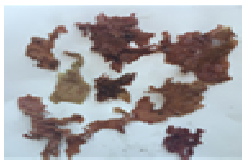


Fig.4B: Comparison of Species Composition in Both the Open and Closed Coastlines

III. RESULTS AND DISCUSSION

In an open area of sampling, there were 1 genus and 7 species of Phaeophyta,1 genus and 1 speciesof Chlorophyta, and 1 genus and 9 species of Rhodophyta. This was because of nutrients present in the area, and also the luminosity of light 35, 000 Lux value, which was favorable for the algae. 53% are Rhodophyta, 41% are phaeophyta and 6% are cholorohyta.

In the closed area of sampling, there are 1 genus and 7 species of Phaeophyta, 1 genus and 3 species of Chlorophyta which were found on sandy crevices of coral stones, and1 species of Rhodophyta (with 1 epiphyte Jania adhaerens), in the area of water with strong waves. Of the specimens identified, 58% were Phaeophyta, 34% were Chlorophyta, and 8% were Rhodophyta.

 *001. Amansia glomerata*	 *002. Meristotheca coacta*	 *003.Sargassum sp.1*	 *004. Halymenia durvillei*	 *005.Pterocladiella capillacea*
 *006. Sargassum cristaefolium*	 *007.Sargassum sp.3*	 *008Tricleocarpa fragilis*	 *009Galaxaura divaricata*	 *010.Sargassum aquifolium*
 *011.Sargassum piluliferum*	 *012.Plocamium sp .*	 *013. Tricleocarpa cylindrica*	 *014. Sargassum oligocystum*	 *015. Halymenia maculata*
 *016.Sargassum sp 2*	 *017. Halimeda stuposa*			

Photographs of of Macroalgaecollected at San Francisco-Canaoay, San Fernando, La Union

Fig. 5A: Open coastlines

Photographs of macroalgae identified using the Field Guide and Atlas of the Seaweed Resources of the Philippines by Trono, GC, Jr., [6]. Verified by Ken Joseph Clemente of UST Graduate School, and Dr. Paciente A. Cordero.

 *001. Sargassum crassifolium*	 *002. Sargassum aquifolium*	 *003.Cladophoropsis vaucheriaeformis*	 *004. Gelidiella acerosa (with epiphyte Jania adhaerens)*	 *005. Sargassum polycystum*
 *006.Padina australis*	 *007. Sargassum oligocystum*	 *008.Halimeda macroloba*	 *009. Sargassum sp.*	 *010. Hormophysa triquetra*

11. Halimeda opuntia var opuntia

Fig.5B: Closed Coastlines

Photographs of macroalgae identified using the Field Guide and Atlas of the Seaweed Resources of the Philippines by Trono, GC, Jr**., [6].** Validated by Ken Joseph Clemente of UST Graduate School, and Dr. Paciente A. Cordero.

IV. CONCLUSION AND RECOMMENDATION

The number of species recorded in the open coastlines of San Francisco-Canaoay include 7 species of Phaeophyta (Brown Algae), 1 species of Chlorophyta (Green Algae), and 9 species of Rhodophyta (Red Algae). For the closed area of the site, there were 1 species for Phaeophyta, 1 species for Rhodophyta, and 3 Chlorophyta.

There were more red algaes (Rhodophyta) in the open area due to the nature of these plant-like protists to thrive in running water with many nutrients. Red algae contain pigments that allow themto cope with low light intensities and are often found growing under larger seaweeds. The number of brown algaes (phaeophyta) are not affected by the conditions of the water because of their toughness as compared to the aforementioned nature of red algaes [7].

It is recommended that further studies along the site of San Francisco-Canaoay and its neighboring coastlines be made. The use of dry and wet sampling methods for a 12-month period must be utilized for better biodiversity record.

It is recommended too that the residents and the tourists in the area be educated on how to protect the habitat of these macroalgae as they serve as structural habitat for other marine organisms and help in establishment and maintenance of coral reefs.

It is also recommended that additional research be made for the use of the seaweeds for body soap and hand lotion-making and for other economic benefits, especially for the residents of the locale.

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