Distribution and Abundance of Seaweeds at Polhena Reef-Matara

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Introduction

Polhena reef is among the most valuable marine ecosystems existing along the southern coastal belt of Sri Lanka. The reef is a fringing coral reef and is highly diverse both in flora and fauna. It is well known as an ecosystem that has significant ecological and economical value. Senaratne et al. (2013) has indicated that the reef is exposed to anthropogenic activities and is disturbed to some extent. Coral reef is covered with seaweeds that belong to categories of green, brown and red. Seaweeds also play a major role as live feed, breeding grounds and as habitats for marine fauna existing in coral reef. It is also economically important as human food, animal feed, pharmaceutical, fodder, stationary and cosmetic production. Growth, distribution and abundance of seaweeds vary spatially, seasonally and with other external factors of the environment. This study was focused on the identification of seaweed species, distribution and their abundance within a selected area of Polhena coral reef with an aim of finding their value as an ecological resource.

Methodology

The study was carried out during the period May, 2013 to July, 2013. An area with a length of 3 km parallel to the shore was selected for the study and five parallel transect lines (T1-T5) were laid across the coral reef perpendicular to shore up to the sea end of the reef using colour coded nylon ropes. An equal distance was maintained between every adjacent two transect lines by using a GPS (Garmin GPS 72). Each rope was marked at each 4 m. Triplicate samples of seaweeds were collected between each and every two marks using a 50 cm x50 cm quadrat and photographs were taken at each quadrat using an underwater camera (Panasonic-Lumix FT-20). Data on species composition and percent cover of the seaweeds that were collected from each quadrat. Species were identified at the laboratory using hand lenses and a binocular microscope (SN090933909 labomed binonular) (Coppejans *et al.,* 2009). Species of seaweeds recorded in five transects during the study period was entered to a table created in Minitab-15 data sheet and Microsoft Excel data sheet. Statistical analysis was done using a Two-way ANOVA, One-way ANOVA and Turkey's Test in Minitab 15 statistical software.

Results and Discussion

The length of transects varied as 24 m (T1), 28 m (T2),35 (T3), 44 m (T4) and 40 m (T5). Hence in the present paper only the data referring to 0-20 m were analyzed for easy comparison. In total, 19 species of seaweeds (15 green, 3 brown and one red) belonging to 11genera were recorded from the reef area studied. Percent cover of seaweeds in each 4 meters is shown in Figure 1.

As depicted by the Figure 1. Highest percentage cover of seaweeds was observed in T3 followed by T2 and T1 respectively. Lowest seaweed cover was recorded in T5 up to a distance of 8 m.

Seaweed species recorded from each transect line in the selected area of the reef is shown in table 1 and the abundance of species is indicated with***-High abundance (seaweed cover >70%) , **- Moderate abundance (50-70%), and *- Less abundance (seaweed cover <20%).

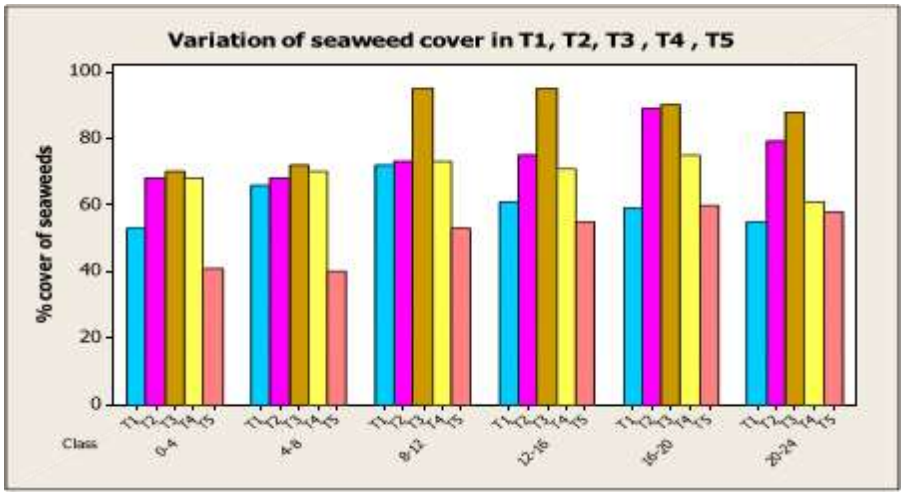

Figure1. Percentage seaweed cover in 0-20 m distance.

Table 1. Species of seaweeds recorded in five transects in the Polhena reef and their abundance (*-Low abundance (seaweed cover< 20%), ** - Moderate abundance (seaweed cover 50% - 70%) and *** - High abundance (seaweed cover >70%)).

Species	Transect 01	Transect 02	Transect 03	Transect 04	Transect 05
Ulvalactuca	**	*			
Ulvapertusa	**	*			
Ulvaintestinalis				*	*
Cladophoraprolifera	***	*			
Cladophorasocialis	***	**			
Cladophoropsissundanensis	***				***
Caulerpalentillifera	***	***		***	**
Caulerpaparvula	*				*
Caulerpamaxicana	**	*			
Caulerparacemosa		***		***	
Caulerpasertularioides		**		**	
Halimedagracilis		***	***		**
Halimedadiscoidea		**	***		*
Codiumarabicum				*	*
Dictyosphaeriaversluysii					*
Padinaantillarum	**	**	***		
Padina minor	*	**	***	**	
Canistrocarpuscrispatus					*
Acanthophoraspicifera	*				*

As shown in table 1, T3 was fully covered with brown algae; *Halimedagracilis, Halimedadiscoidea, Padinaannilarum and Padina minor*. These species are also found in T2 and T1 with less abundance. Green algae are abundant in T1 followed by T2, T5 and T4 respectively.

Species diversity in five transect lines during the period of study was calculated using Shannon's Diversity Index where $H' = -p \sum i \ln pi$, and the results are given in Table 2.

Table 2. Diversity indices of seaweeds in five transect lines during the months May, June and July.

Transect number	Diversity Index		
	June	July	August
01	1.82	2.08	2.18
02	1.93	2.33	1.94
03	1.22	1.27	1.24
04	1.52	1.54	1.46
05	1.84	2.01	1.84

The highest diversity was recorded in July in all transects but there was no significant difference ($p<0.05$). Lowest diversity was recorded in T3 where percent cover recorded a high value. This indicates that the reef in that area is getting covered with invasive species. Most abundant seaweed species in each transect line during May, June and July is shown in Table 3. *Halimeda* was the most abundant species in T3 in all three months while *Cladophorasocialis* dominated transects 1 and 5. *Caulerpa* species dominated T2 and T4 during the period of study. In August T2 became dominated by *Halimedagracilis*.

Table 3. Most abundant seaweed species in the site.

	Names of highest abundant Species in each transect line		
Transect Number	June	July	August
01	*Cladophorasocialis*	*Cladophorasocialis*	*Caulerpalentillifera*
02	*Caulerpalentillifera*	*Caulerpalentillifera*	*Halimedagracilis*
03	*Halimedagracilis*	*Halimedagracilis*	*Halimedagracilis*
04	*Caulerparacemosa*	*Caulerparacemosa*	*Caulerparacemosa*
05	*Cladophorasocialis*	*Cladophorasocialis*	*Cladophorasocialis*

The Polhena reef area showed abundance of green seaweeds compared to brown and red seaweeds. Availability of seaweeds on coral reefs are considered as showing health of the reef by some scientists (Ragan, 2012) while others believe that some seaweeds are smothering coral polyps and also killing coral animals by releasing toxic gases Zeenews, 2012). The health of the reef however, dependent upon the animals those feed on dominant species of algae. *Halimeda* species is shown to be favourable for the existence of coral reef ecosystem as a primary producer and a sediment creator (Liewellya, 2009). Other green seaweed species are also primary producers in the coral reef and may contribute greatly to the functioning of the coral reef. The present study is carried out within a short period and needs to be strengthened by a longer study to fully understand the functions of seaweeds in the coral reef.

References

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