



Habitat structure and diversity patterns of seaweeds in the coastal waters of Saint Martin's Island, Bay of Bengal, Bangladesh

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ABSTRACT

Seaweeds play an important role in energy production in marine, coastal and Island ecosystems. Baseline research was carried out in Saint Martin's Island, Bangladesh in the northern Bay of Bengal, in order to demonstrate the habitat structure, diversity patterns and species co-occurrence of seaweeds. A total of 34 species were identified belonging to Chlorophyta (7 species), Rhodophyta (17 species) and Phaeophyta (10 species). Among them, eleven species were common to all three sampling zones whereas, eight were dominant species. Species richness and species diversity were both higher in the upper subtidal zone and lower in the intertidal zone. Species distribution revealed that 23 species were present in the upper intertidal zone, 29 species in the intertidal and, 24 species in the upper subtidal zone. The zonation profile of seaweeds revealed that three types of vegetation were covered in this area. The highest density of Chlorophyta (23 ind./m²) was found in the upper intertidal zone while, Phaeophyta (15 ind./m²) and Rhodophyta (9 ind./m²) were recorded at higher densities in the upper subtidal zone. The standing crops (biomass) were higher for Chlorophyta in the upper intertidal zone (78 gm/m²), Rhodophyta in the intertidal zone (35 gm/m²) and, Phaeophyta in the upper subtidal zone (65 gm/m²). Species co-occurrence revealed that 22 species were significantly correlated with each other. The community composition of Chlorophyta covered 59% of the upper intertidal zone while Phaeophyta covered 75% of the upper subtidal zone. These three groups, Chlorophyta, Rhodophyta and Phaeophyta covered the intertidal zones at ratios of 20%, 39% and, 41%, respectively. Findings of this study suggest that habitat structure of rocky substratum might significantly shape the zonation and, distribution patterns of seaweed communities in this marine ecosystem in the Bay of Bengal.

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1. Introduction

Seaweeds are a key component of marine ecosystems and a primary producer (Khan et al., 2016). Generally, they are found in attached forms on any hard substratum (e.g. rock, hard coral or, in association with mangrove roots) where intermediate levels of wave action are present (Isa et al., 2017). They play a vital role within coral reef communities by integrating its ecological functions, e.g., providing shelter, nursery grounds and, food sources

(Prathey, 2005; Fong and Paul, 2011; Prathey et al., 2011). In recent decades, global climate change and global warming have exerted negative influences on seaweeds and their associated ecosystems worldwide (Prathey et al., 2011; Harley et al., 2012). On the other hand, by their strong autotrophic nature, seaweed communities may represent useful options for climate change mitigation and adaptation (Duarte et al., 2017).

The littoral and sub-littoral zones of Bangladesh (from the southernmost part of Saint Martin's Island to the southwest part of Sundarbans mangrove forest) are very suitable for natural regeneration of seaweeds (Sarkar et al., 2016; AftabUddin, 2019). The coastal waters of Bangladesh house about 197 species of seaweeds whereas, 95 are from Rhodophyta, 46 are from Chlorophyta and, 56 are from Phaeophyta (Ahmed et al., 2008, 2009). Recent study has reported that a total of about 5,000 metric

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coast of Saint Martin's Island, Bangladesh, in the northern Bay of Bengal. The zonation profile of seaweeds revealed that vegetation of Chlorophyta was interrelated with Rhodophyta and Phaeophyta in this area. The community parameters such as species richness, evenness and, diversity showed significant variation amongst the three sampling zones from the upper intertidal to the upper subtidal zone. The finding suggests that the structure of substratum may significantly shape seaweed communities in this marine ecosystem. Based on the present study findings, we can recommend that this area would be a valuable, potential site for commercial seaweeds culture. Hence, further studies on the habitat structure and community patterns, seasonally and in a range of environmental types are needed to verify the statement.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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