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Distribution Pattern of Marine Seaweeds in the Manapad Coastal Region

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Abstract: Seaweed known was macroalgae are among the most important primary producers and act as ecological engineers on rocky coasts of the world's oceans. They are primary producers, shelter, nursery grounds and food source for marine organisms. Seaweed are not only of high ecological, but also of great economic importance. The present study deals with the distribution of seaweed, during the sea shore survey conducted in the Manapad coastal region of Tuticorin district, Tamilnadu. During the study period, a total of 20 species of seaweed were recorded. Among them *Sargassum* sp., *Padina* sp., *Gracilaria* sp., *Gelidium* sp., *Hypnea* sp., and *Amphiroa* sp., were present throughout the study period**.**
Keywords: Distribution pattern, *Sargassum* species, *Padina* species, *Gracilaria* species, *Gelidium* species, *Hypnea* species, *Amphiroa* species, Gulf of Mannar, Macroalgae.

INTRODUCTION

Seaweeds are considered as ecologically and biologically important component in the marine ecosystems. Seaweeds make a substantial contribution to marine primary production and provide habitat for near shore benthic communities [1, 2]. Seaweeds or marine algae have long made up a key part of the Asian diet and are also consumed in other parts of the world, such as in Ireland and Wales. Seaweed has often been used as a food for people who are sick and has been credited with health-giving properties.1 Today, seaweed supplements for human use are usually considered to be sources of iodine or minerals but may offer other therapeutic benefits. Seaweeds are key space occupiers of rocky shores and interact with other organisms and hence play a key role in overall coastal biodiversity. They are found on rocks in the intertidal zone as a giant underwater forest.

Seaweeds grow abundantly along the Indian coastline particularly in rocky shore regions; rich seaweed beds occur around Visakhapatnam in the eastern coast, Mahabalipuram, Gulf of Mannar, Tiruchendur, Tuticorin and Kerala in the southern coast; Veraval and Gulf of Kutch in the western coast; Andaman and Nicobar Islands and Lakshadweep [3-5]. Seaweeds are under threat in developing countries, where they are being disturbed by a variety of human activities. Increasing concern on destruction of seaweed resources and alterations in the diversity of various life forms makes it necessary the studies on the taxonomy and species diversity for a better management of marine algae. Although systematic studies on marine algae and their distribution are known from different coastal parts of India, not much published information are available about the seaweeds of Manapad coastal region, hence the distribution and diversity of seaweed species of Manapad coast is presented in this paper.

MATERIALS AND METHODS

The investigation was carried out at Manapad coast (8°22′39″ N and 78°3′8″E) Gulf of Mannar in the southeast coast of India (Fig. 1). The study area is situated on the distal end of Gulf of Mannar Biosphere Reserve. The rocky shore of Manapad inhabits an astonishing biodiversity, representing nearly almost all the invertebrate phyla and urochordates. Hard rocky bottom of this area greatly supports the algal diversity and provide suitable shelter and feeding ground for grazers. Field surveys were undertaken to the selected sampling stations of the Manapad coastal region. The algal samples were collected during the study period by detaching a portion from the seaweed , keeping it in polythene bags with fresh seawater and transported to the laboratory for further studies.

The seaweeds were identified using the taxonomic keys provided by Umamaheswara Rao [6], Desikachary *et al.*, [7, 8] and Krishnamurthy [9], and the nomenclature was updated using Appeltans *et al.*, [10].

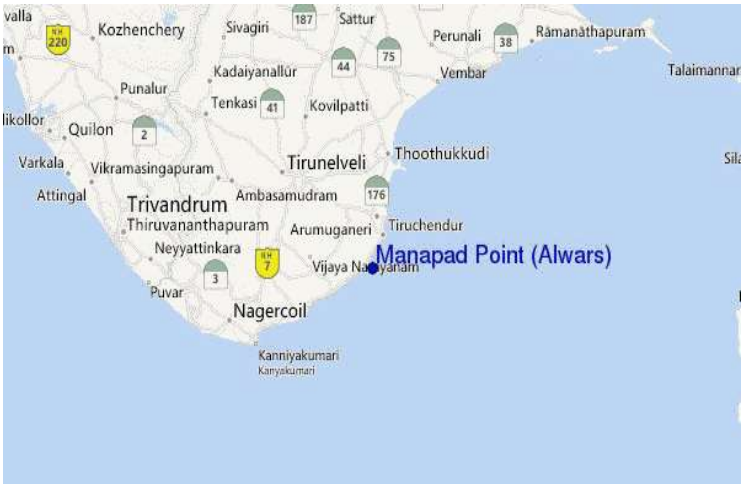

Fig: Gulf of Mannar in the southeast coast of India

RESULTS

A total of 20 species of seaweeds were collected from Manapad Coastal region in Tuticorin district. The substratum consisted of sand, mud, rock pebbles and/or sand-mud mixture. The seaweeds generally occurred on the rocks and pebbles. In the Manapad region, out of 70 stations sampled in 3 transects, vegetation occurred only in 22 stations at depths ranging from 11.5 to 18m. The vegetation comprised 20 species of marine algae and one seagrass. Of these 4 species belong to Chlorophyceae, 5 to Phaeophyceae and 19 to Rhodophyceae. The dominant and widely distributed species were *Gracillaria*, *Padina*, *Sargassum*, *Gelidium*, *Hypnea*, and *Amphiroa* species.

Gracilaria is a genus of red algae (Rhodophyta) notable for its economic importance as an agarophyte, as well as its use as a food for humans and various species of shellfish. Various species within the genus are cultivated among Asia, South America, Africa and Oceania. *Sargassum* is a genus of brown (class Phaeophyceae) macroalgae (seaweed) in the order Fucales. Numerous species are distributed throughout the temperate and tropical oceans of the world, where they generally inhabit shallow water and coral reefs, and the genus is widely known for its planktonic (free-floating) species. While most species within the class Phaeophyceae are predominantly cold water organisms that benefit from nutrients upwelling, genus *Sargassum* appears to be an exception to this general rule. Any number of the normally benthic species may take on a planktonic, often pelagic existence after being removed from reefs during rough weather; however, two species (*S. natans* and *S. fluitans*) have become holopelagic—reproducing vegetatively and never attaching to the seafloor during their lifecycle. The Atlantic Ocean's Sargasso Sea was named after the algae, as it hosts a large amount of *sargassum*. *Padina pavonica* can occur as small clusters or mats covering several centimeters [11]. Individuals reach dimensions of 22cm high x 37cm wide, which each blade measuring up to 12cm wide [11, 12]. Little information exists concerning factors that affect age and lifespan of *Padina pavonica*. However growth and mortality of populations is likely tied to nutrient levels, temperature, salinity and predator abundance.

Gelidium grows best where there is rapid water movement, which is in the eulittoral and sublittoral zones. Depending on the species, it can be found in water from 2 to 20 m in depth. *Gelidium* prefers rocky areas with steep slopes, and is rarely found on muddy or sandy bottoms (compare *Gracilaria* below). It prefers partial shade and may be bleached by full intensity light in tropical latitudes. It usually grows best at 15-20°C, but can tolerate higher temperatures. It can survive in low nutrient conditions and some species adapt to low or high salinity. *Gracilaria* cultivation is widespread, and several methods are used. It can be grown vegetatively (i) in open waters on the bottom of bays, estuaries or reef flats; (ii) on lines, ropes or nets; (iii) in ponds; or (iv) in tanks. It has also been grown from spores, involving an alternation of generations and the need for nursery tanks to allow the germlings to grow before planting them out into the sea. The first three methods, (i) to (iii), are the most widely used ones. The genus *Hypnea* species includes approximately 54 species, which are abundant in intertidal and subtidal zones of tropical and warm temperate waters. This genus is distinguished by brownish-red or greenish-yellow branched thalli with short lateral branchlets. *Hypnea* structure is complicated by a high degree of morphological plasticity, which results in evident differences among individuals of the same species. Molecular and ultrastructural data can be useful in species taxonomy not only to distinguish species of the same genus, but also to differentiate *Hypnea* from other genera. *H. cervicornis* thalli were cylindrical, brownish-red, and approximately 500 µm in diameter, with alternate spiral branching at angles of 45°–90° with approximately 4 ramifications per centimeter. Some

branches were highly curved at the tip, resulting from abrupt abaxial bending.

***Amphiroa* has the following characters;**

Thallus habit: erect, attached by a crustose endophytic base on other calcareous algae. Size: 2.5-6cm high. Branching: dichotomous (dichotomy angle min. 30°-45°); branch junctions usually not coinciding with intergenicula, branches lying on different planes. Intergenicula: often with annular tiers, mainly on upper parts (up to 2.5-4.5mm high, 0.4-0.6mm in diameter). Genicula: 2 rows of medullary cells (150-180mm long) with imbricate cell walls. Colour of living specimen: more or less light violet, sometimes white in well-lit sites. Color of dried specimen: violettopink. Medulla: 2 rows of long cells: 70-l00 (120)µm long and (40) 50-70 (110)µm alternating with 1 row of short cells: 15-40µm long (in young branches 1 row of cells 65-80µm long x 8-15µm in diameter). Cortex: up to 100µm thick, cells 5-9 (13)µm long. Epithelial cells: 5-11µm in diameter. Cell connections: secondary pit-connections.

Fig-1: Gracilaria species

Fig-2: Padina species

Fig-3: Sargassum species

Fig-4: Gelidium species

Fig-5: Hypnea species

Fig-6: Amphiroa species

DISCUSSION

Studies on the diversity and distribution of seaweeds in Indian waters were carried out by several authors [13-22]. Southeast coast of India is a unique marine habitat characterized by a high biodiversity. During the present survey the seaweed vegetation was found on pebbles and rocky substrata. The present survey also reveals the presence of about thirty three algal species as against 20 sp in the shallow water in Manapad region. But the species composition of the algal flora in the deep water region is entirely different from that of shallow water except for a few common species. *Dictyota dichotoma, Sargassum licifolium, Amphiroa fragilissima and Hypnea musciformis* [23].

These seaweeds have a very great importance in medical field for treating many complicated diseases. They can also be used as a raw food substance. From this we conclude that seaweeds are abundant in Manapad coastal region. The present study could be useful as new baseline record for future biomonitoring

studies in this coast. Further systematic studies on the seaweed resources may provide useful data for the conservation of marine algal resources in this region.

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