

Marine Flora of Andaman and Nicobar Group of Islands, Andaman Seas, India

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Introduction

Coastal vegetation such as mangroves, seaweeds and seagrasses contribute considerable amount of organic matter to the neritic waters, which forms major energy source in marine food chain. Similarly, it has great importance in nutrient regeneration processes, stabilization of seashore by enhancing sedimentation and avoiding erosion. Mangrove and seagrass ecosystems could be used for aquaculture purposes due to their productive nature. Seaweeds form important source of chemicals like halides, agar-agar, alginates and carageenan.

Coastal vegetation along the Indian coast have been explored to a large extent. However, very few attempts (Mathauda, 1957; Sidhu, 1963; Blasco, 1975; Jagtap, 1985; Dagar *et al.*, 1990) have been made to understand the marine flora from oceanic islands, especially from Andaman and Nicobar islands. Oceanic islanders having limited land resources, mostly depend upon coastal fisheries. Coastal fisheries, to certain extent, are dependent upon coastal vegetation. Therefore, marine macrophytes form an important constituent of island ecosystem. The present paper gives the account of mangroves, seaweeds and seagrasses from Andaman and Nicobar islands.

Geography and Geomorphology of Andaman and Nicobar Islands

The total coastline of these islands is about 1,960 km. and an exclusive economic zone of 5,66,554 sq. km. These islands are having N-S orientation and were formed by elevated summits of submarine range connected with Arakan Yoma of Burma (Wadia, 1975). These islands are formed of conglomerate rocks (Chengappa, 1944), with open coral reef around most of the islands. The reef substratum is composed of coral stones, debris, rocks and pebbles and support

scleractinians and alcyonaceans. Shelf deposits are mainly of marine origin (Ahmad, 1977). Low lying areas are with heavy alluvial deposits. Intertidal expanse around the islands vary from 50–1000 m. The average tidal amplitude ranges from 0.14–2.35 m.

TABLE 14.1
List of Seagrasses and Mangrove Species from
Andaman and Nicobar Islands

Name of the species	Andaman Islands	Nicobar Islands
SEAGRASSES		
<i>Cymodocea rotundata</i> Ehren et Hemp. ex Aschers.	—	+
<i>Enhalus acoroides</i> (L. f.) Royle	?	+
<i>Halodule uninervis</i> (Forsk.) Aschers.	+	+
<i>Halophila ovalis</i> (R. Brown) Hooker	—	+
<i>H. ovata</i> Gaud	+	+
<i>Syringodium isoetifolium</i> (Aschers.) Dandy	—	+
<i>Thalassia hemprichii</i> (Ehren.) Aschers.	+	+
MANGROVES		
<i>Rhizophora mucronata</i> Lamk	+	+
<i>R. apiculata</i> Bl	+	+
<i>R. stylosa</i> Griff	+	+
<i>Bruguiera gymnorhiza</i> (L.) Lamk.	+	+
<i>B. parviflora</i> (Roxb.) W. et A. ex Griff.	+	?
<i>B. sexangula</i> (Lour.) Poir	+	—
<i>Kandelia rheedii</i> W. et A.	?	—
<i>Ceriops tagal</i>	+	—
<i>Avicennia officinalis</i> L.	+	—
<i>A. Alba</i> Bl.	+	—
<i>A. marina</i> Vierh.	—	—
<i>Sonneratia alba</i> Sm.	+	+
<i>S. apetala</i> Buch. Ham.	+	—
<i>S. caseolaris</i> (L.) Eng.	+	—
<i>Lumnitzera racemosa</i> (L.) Gaertn.	+	+
<i>L. littorea</i> (Jack) Voigt	+	+
<i>Aegiceras corniculatum</i>	+	—
<i>Aegialitis rotundifolia</i> Roxb.	+	—
<i>Acanthus ilicifolius</i> L.	+	+
<i>A. ebracteatus</i> Vahl	+	—
<i>Derris heterophylla</i> Willd. Back	+	+

Name of the species	Andaman Islands	Nicobar Islands
<i>Excoecaria agallocha</i> L.	+	+
<i>Xylocarpus granatum</i> Koen.	+	?
<i>Heretiera littoralis</i> Dryand ex Aiton	+	?
<i>Nypa fruticans</i> Wurm	+	—
<i>Acrostichum aureum</i> L.	+	+
<i>Scyphiphora hydrophyllacea</i> Gaertn.	+	—
ASSOCIATE MANGROVES		
<i>Clerodendron inerme</i> Gaertn.	+	+
<i>Thespesia populnea</i>	+	+
<i>Phoenix</i> sp.	+	?

TABLE 14.2

List of Marine Algae from Andaman and Nicobar Islands

CYANOPHYCEAE

Calothrix contarenii (Zanard.) Barnett et Flahant*Lyngbya* spp (3)*Oscillatoria* spp (2)*Phormidium* sp.*Nostoc maculiforme* B. LF.

CHLOROPHYCEAE

Ayrainvillea erecta (Berk.) Gepp.*Acetabularia* sp.*Anadyomene stellata* (Wulf.) Ag.*Borgesenia forbesii* (Harv.) Feldm.*Boodlea composita* (Harv.) Brand.*Bryopsis pennata* Lamour.*Caulerpa microphysa* (Weber-Van Bosse) J. Feldm.*C. occidentalis* (J. Ag.) Jaasund*C. racemosa* (Forsk.) J. Ag. var. *macrophysa* (Kuetz)*C. peltata* Lamour.*C. racemosa* (Forsk.) J. Ag. var. *clavifera* (Turner) Weber-Van Bosse*C. serrulata* (Forsk.) J. Ag. ememi Boerg.*C. sertularioides* (Gmel.) Howe*C. taxifolia* (Vahl.) C. Ag.*Chaetomorpha linum* (Muller) Kuetz.*C. media* (C. Ag.) Kuetz.*Cladophora fascicularis* (Mert.) Kuetz.*C. patentirania* (Mont) Kuetz.*C. vagabunda* (Linn.) Van der Hock*C. sarcenica* Boergs.

- Codium arabicum* Kuetz.
C. taitense Letch.
C. geppi Schmdt.
Dictyosparia cavernosa (Forsk.) Boerg.
Enteromorpha clathrata (Roth.) J. Ag.
E. intestinalis Linn.
Halimeda discoidea Decaisne
H. opuntia (L.) Lamour
H. nana (Ellis & Sol.) Lamour
H. gracilis (Harv. ex J. Ag.)
Neomeris dumetosa Lamour
Rhizoclonium spp (2)
Spongocladia vaucheriaformis Areschong
Ulva fasciata Delile
U. reticulata Forsk.
U. rigida C. Ag.
U. lobata Kuetz.
Valonia utricularis (Roth.) C. Ag.
Valoniopsis pachynema (Mart.) Boerg.

PHAEOPHYCEAE

- Dictyota bartayresii* Lamour. Ssensu Vick.
Ectocarpus rhodochortonoides Boerg.
E. siliculosus (Dillw.) Lyngb.
Giffordia sp.
Lobophora variegata (Lamour.) Papenf.
Padina gymnospora (Kuetz.) Vick.
P. pavonica (L.) Thivy ex Taylor
Rosenvingea orientalis (J. Ag.) Boerg.
R. intricata (J. Ag.) Boerg.
Sargassum duplicatum J. Ag.
Sargassum spp (2)
Turbinaria decurrens Boerg.
T. ornata (Turn.) J. Ag.
T. ornata (Turn.) J. Ag. var. *serrata* Jaasund
T. conoides Kuetz.

RHODOPHYCEAE

- Acanthophora spicifera* (Vahl.) Boerg.
Amphiroa fragilissima (L.) Lamour.
A. rigida Lamour.
Amphiroa spp (3)
Centroceras clavulatum (C. Ag.) Mont.
Ceramium spp (2)

- Cheilosporum acutilobum* (Descne) Aresck.
Crounia sp.?
Dignia simplex (Wulf.) C. Ag.
Galaxaura oblongata Lamour
G. Subverticillata Kjellm.
G. rugosa Lamour
G. obtusata Ellis & Sol.
Gelidiella acerosa (Forsk.) Feldm. & Ham.
Gracilaria corticata J. Ag.
G. edulis (J. Ag.) Silva
G. salicornia (C. Ag.) Dawson
G. veleroae Daws.
G. folifera (Forsk.) Boergs.
G. spingularia Boergs.
G. verrucosa (Huds) Papenfuss
G. amata (C. Ag.) J. Ag.
Gigartina acicularis (Wulf.) Lamour
Gigartina sp.
Hypnea cervicornis J. Ag.
H. musciformis (Wulf.) Lamour
Halymenia venusta Boergs.
Laurencia papillosa (Forsk.) Grev.
Liagora rugosa Zanard.
Liagora sp.
Lithothamnion sp.
Melobesia sp.
Polysiphonia ferulacea Suhr. (ex. J. Ag.)
P. platycarpa Boerg.
Pterocladia sp.
Rhodymenia sp.
Spyridia filamentosa (Wulf.) Harvey
Tolypiocladia glomerulata (Ag.) Schmt.

TABLE 14.3
Comparative Account of Marine Macrophytes from India

Regions	Number of Species		
	Mangroves	Seaweeds	Seagrasses
Andaman group of islands	27 (34?)	64	3
Nicobar group of islands	27 10	105 74	7 7

Lakshadweep group of islands	1	87	7
West Coast of India	24	346	2
East Coast of India	33	302	12

Source: Subramaiah *et al.*, 1979; Untawale *et al.*, 1983; Untawale & Jagtap, 1984; Jagtap, 1985, 1987; Jagtap (in press); Dagar *et al.*, 1990.

TABLE 14.4
I. Various Estimates for Mangrove Cover from Andaman and Nicobar Islands

Reference	Area in Hectares
Mathauda, 1957	116,600
Sidhu, 1963	115,200
Blasco, 1975	100,000
NRSA Report, 1982	82,251
Savant (Personal communication, 1990)	77,769

II. Mangrove Cover from Andaman and Nicobar Islands

Regions	Area in Hectares
South Andamans	12,870
Baratang	8,519
Middle Andamans	23,100
North Andamans	29,701
Nicobar	2,455
Little Andamans	1,124
	77,769 say 78,000 ha.

Marine Flora

Mangroves: Mangroves are represented by 27 spp belonging to 17 genera. *Rhizophora mucronata* Lamk and *R. stylosa* Griff forms the dominant vegetation while *Bruguiera gymnorhiza* (L.) Lamk was the codominant species. Almost 80 per cent of the mangrove forest composed of *Rhizophora* spp. The maximum (27) number of species were recorded from Andaman islands while mangrove flora of Nicobar islands comprised of 10 spp (Tables 14.2 and 14.3). Mangrove species like *Xylocarpus granatum* Koen, *Heretiera littoralis* and *Sonneratia* spp

rarely occurred. *Kandelia rheedii* W. et A. which was recorded earlier (Jagtap, 1985) has totally disappeared from Andamans.

Various estimates have been given for the mangrove areas from Andaman and Nicobar group of islands (Table 14.4, I). The latest studies (NRSA Report, 1982; Savant – personal communication) have estimated mangrove cover of about 80,000 hectares from Andaman and Nicobar islands. Almost 96 per cent of the mangrove forest is restricted to South, Middle and North Andamans (Table 14.4, II). In last three decades about 30 per cent of the mangrove area has been reduced from Andaman and Nicobar islands, mainly for agricultural, fuel and construction purposes.

TABLE 14.5
Common Fungi affecting Mangroves from Andaman & Nicobar Islands

Name of the species	% Occurrence
Ascomycetes	
<i>Didymosphaeria enalia</i> Kohlm	10.5
<i>Lophiostoma mangrovivis</i> Kohlm & Vittal	8.5
<i>Swampomyces armeniacus</i> Kohlm & Kohlm	5.4
<i>Hypoxylon oceanicum</i> Schatz	5.4
<i>Dactylospora haliotrepha</i> Kohlm & Kohlm Hafellner	4.5
<i>Massarina Thalassiae</i> Kohlm & Kohlm	4.1
<i>Agialus grandis</i> Kohlm & Schatz	4.1
<i>Acrocardiopsis patilii</i> Borse & Hyde	3.6
<i>Lulworthia grandispora</i> Meyers	3.35
<i>Helicascus kanaloanus</i> Kohlm	2.31
Basidiomycetes	
<i>Halocyphina villosa</i> Kohlm & Kohlm	4.5
Deuteromycetes	
<i>Trichocladium achrasporum</i> Meyers & Moore Dixon	3.6
<i>Cirennalia pygmea</i> Kohlm	3.35
<i>Periconia prolifica</i> Anastasiou	3.09

Source: Chinnarnj, S (in Press).

Many of the islands from Andamans are still having mangroves at

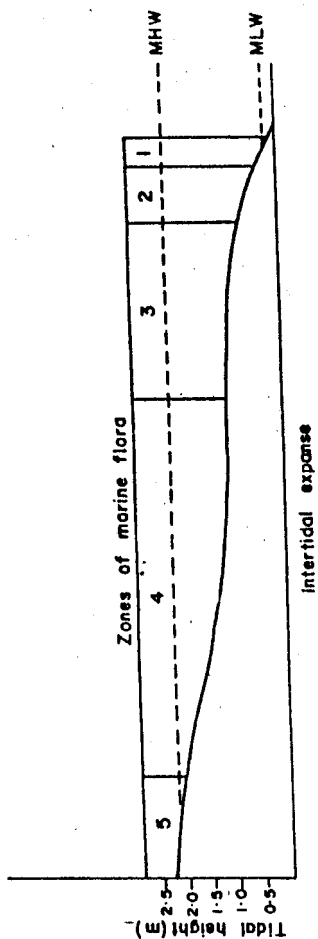
pristine glory. Presently mangrove forests have been guarded by Forest Department, Andaman and Nicobar Government, however, lack of proper management is evident. Department of Environment (Govt. of India) has proposed few sites (Great Nicobar and North Andamans) for the conservation of mangroves for Biosphere reserves. Mangrove regions have been observed to be used for mussel culture.

Marine fungi from mangrove regions: Total of 50 species (38 Ascomycetes, one Basidiomycetes and 11 Deuteromycetes) have been observed (Chinna Raj—personal communication) on the decayed mangrove wood from Andamans and Nicobar islands. Of these, nine species of Ascomycetes are recorded for the first time from India. The dominant fungi were *Didymosphaeria enalia* Kohlm, *Lophiostoma mangrovis* Kohlm, *Swampomyces armeniacus* Kohlm & Kohlm and *Hypoxylon oceanicum* Schatz (Table 14.5).

Seagrasses: Very limited information is available on the seagrasses of Andamans and Nicobar islands (Jagtap, 1985 & in press). The seagrass flora comprised of 7 species of 6 genera (Tables 14.1 & 14.3). Maximum (7) number of species were recorded from Katchal and Nancowry island of Nicobar, however, only four species were recorded from Andamans. Small patchy growth of *Halophila ovata* Gaud. and *Thalassia hemprichii* (Ehren) Aschers. were observed from Andamans. *Cymodocea rotundata* Ehren. et Hemp. ex Aschers and *Enhalus acoroides* (L.f.) Royle formed the dominant grasses from Nicobar group of islands.

Seagrasses growth was patchy and mixed due to nonuniform sandy substratum. However, *E. acoroides*, in association with *C. rotundata* and *Syringodium isoetifolium* (Aschers) Dandy, occurred in the sheltered, sandy clay swamps, at Nancowry and Katchal islands, below low tide mark. *Halophila ovalis* (R. Brown) Hooker, *H. ovata* and *Halodule uninervis* (Forssk.) Aschers., were exclusively confined to intertidal mixed zone (Fig. 14.1). *Thalassia hemprichii* and *C. rotundata* occurred from intertidal mixed zone as well as from subtidal regions. In general, the extent and species richness of seagrasses was poor as compared to extent and species richness from Lakshadweep group of island and east coast of India (Table 14.3).

Seaweeds: Total of 105 species of seaweeds have been recorded from Andamans (64 spp) and Nicobar (74 spp) islands (Table 14.2). The dominant seaweeds were *Boodlea composita*, *Caulerpa* spp, *Cladophora patentiramea*, *Dictyosphaeria cavernosa*, *Halimeda* spp, *Turbinaria* spp and *Amphiroa* spp. The marine algal flora was very



1. Turbinaria zone
2. Turbinaria ornata, Sargassum sp., Gracilaria spp., Gelidium acerosa
Halimeda spp., Dictyosphaeria cavernosa
3. Mixed zone of algae
4. Seagrass zone with mixed algae
5. Mangroves

FIG. 14.1. General profile depicting distribution of marine flora.

similar to that of Nicobar islands. The abundance of seaweeds was observed to be poor as compared to that along mainland coast and Lakshadweep islands. The poor abundance of seaweeds could be attributed to their seasonal growth. *Sargassum duplicatum* J. Ag. and *Turbinaria* spp generally occurred in the subtidal regions, below low tide mark and in the breaker zones (Fig. 14.1). Most of the other species occurred in intertidal zones. Species of *Gracilaria*, *Hypnea* and *Padina* commonly grow in the rock pools. Cyanophytes mainly occurred as epiphytic either on seagrass blades or on algae in association with seagrasses.

In general, the marine flora of Andaman and Nicobar islands is rather poorly known. Present knowledge provides meagre qualitative information on the marine flora, based on very limited observations. Andaman and Nicobar islands are less affected by environmental and industrial pollution and are expected to have rich marine biota. Following recommendations are made to understand more about the coastal vegetation from Andaman and Nicobar islands.

- (i) Seasonal observations on occurrence and biomass of seaweeds at representative sites.
- (ii) Exploration and quantitative estimation of seaweeds from subtidal regions.
- (iii) Exploration and quantitative estimation of the seagrass
- (iv) Mapping of the mangrove areas with latest satellite data (scale 1 : 50,000) for quantification and classification.
- (v) Forest inventories of mangroves.
- (vi) Conservation of mangrove areas from selected localities.
- (vii) Conservation and afforestation of rare species like *Xylocarpus granatum*, *Heritiera littoralis* and *Sonneratia* spp.

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