

## MARINE MACROPHYTES OF MINICOY (LAKSHADWEEP) CORAL ATOLL OF THE ARABIAN SEA

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### ABSTRACT

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Thirty-seven species of marine algae, belonging to 31 genera, 5 seagrass species and one mangrove species, were recorded from Minicoy Atoll. The predominant seaweeds observed were *Enteromorpha clathrata*, *Caulerpa* species, *Ulva lactuca*, *Halimeda gracilis*, *Padina pavonia*, *Dictyota dichotoma*, *Dictyurus purpurescens* and *Acanthophora delilei*. *Thalassia hemprichii*, *Halophila ovalis* and *Cymodocea rotundata* form the dominant flora in the lagoon area. *Bruguiera parviflora* was the only mangrove species observed in low-lying areas of Minicoy Island.

### INTRODUCTION

The Maldive and Lakshadweep Archipelagoes have previously been surveyed for marine algal resources (Barton, 1903; Newton, 1953; Hackett, 1977; Subbaramaiah et al., 1979). The Lakshadweep Sea was studied from several oceanographic aspects (Anon., 1979). However, there is not much information available on the marine algal flora of the Minicoy, except that of Subbaramaiah et al. (1979), who have recorded 38 algal species at Minicoy. This paper gives a brief account of the marine algae, seagrasses and mangrove species recorded during the oceanographic cruise (No. 104) of R.V. Gaveshani, in January 1982.

Minicoy is the southernmost (Lat. 8°18'N, Long. 73°E) atoll of the Lakshadweep Archipelago, 211 km off the western Kerala coast, India (Fig. 1). Its approximate length is 8 km, with an average width of 4.67 km. The lagoon occupies about 9.66 km<sup>2</sup> of the area (Gardiner, 1903), with an average depth of approximately 2 m and with maximum tidal amplitude of 1.57 m. The southeast coast of Minicoy Atoll is rocky and subjected to strong waves that have formed gullies. The northeast region is rich in branching corals and protected from strong wave action by harder reef. On the southeast coast, storm beach occurs, while towards the northeast, a sandy

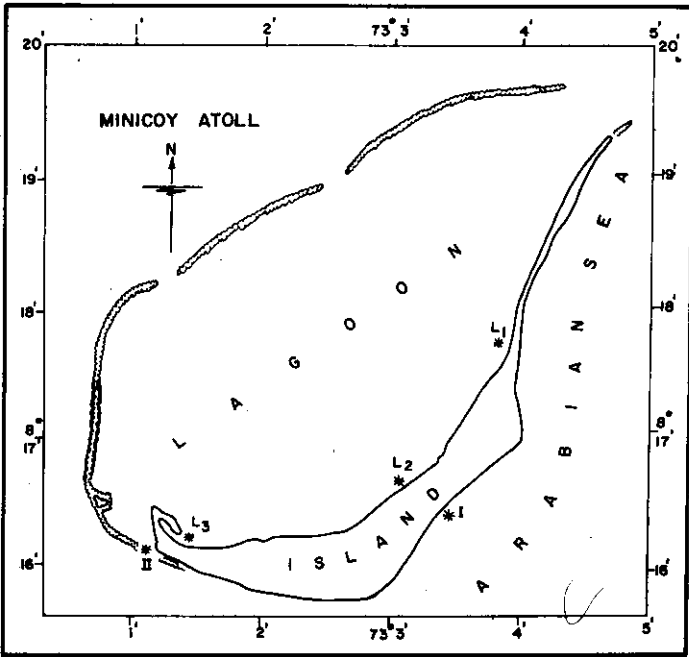


Fig. 1. Geographical position of Minicoy Atoll showing sampling stations.

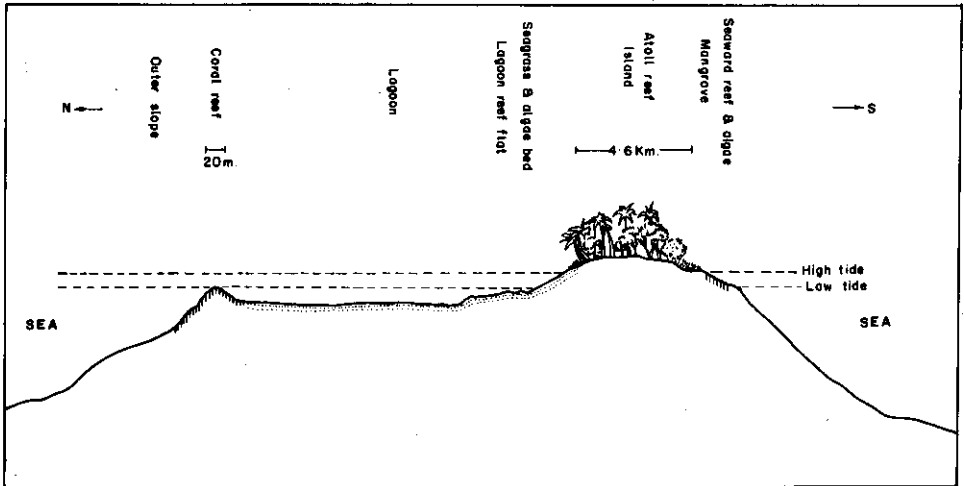


Fig. 2. General profile of Minicoy Atoll.

beach is present. Most of the Lakshadweep atolls are marked by such storm and sandy beaches (Siddiquie, 1980).

The general profile of the Minicoy atoll is given in Fig. 2. The coral reef around the island is of the fringing type and is formed of several varieties of corals (Nair and Pillai, 1969). Rocks are conglomerates and consist of

corals and nullipores which give rise to coarse sand. The substratum in the lagoon is 80% calcareous sand (fine and poorly sorted), 10% coral and 10% rocks. The average salinity of the Minicoy water during our observations was  $33.4\text{‰}$ , while pH ranged from 7.98 to 9.14. Dissolved oxygen was in the range  $3.8\text{--}7.5\text{ ml l}^{-1}$ . Phosphate concentrations were lower ( $\bar{X} = 0.44\text{ }\mu\text{g l}^{-1}$ ) than nitrate ( $\bar{X} = 0.90\text{ }\mu\text{g l}^{-1}$ ).

## METHODS

Five stations (I, II, L<sub>1</sub>, L<sub>2</sub> and L<sub>3</sub>) were selected along the atoll (Fig. 1). A qualitative survey for marine macrophytes was undertaken at all the stations. All collected specimens (dry, mounted and preserved in 4% formalin) have been deposited at the National Institute of Oceanography, Dona Paula, Goa (India).

For the granulometric analysis, the sediments were washed to remove salt and then dried. They were then sieved following the method suggested by Folk (1968). Statistical parameters were obtained following the Moment Method (Scheele and Webster, 1965) using the Fortran IX Program of an ECIL, TDC-316 computer.

## CLIMATOLOGY

The lowest air temperature ( $20.1^\circ\text{C}$ ) for Minicoy Atoll has been recorded in the month of January and highest ( $32.9^\circ\text{C}$ ) in April and May (Fig. 3).

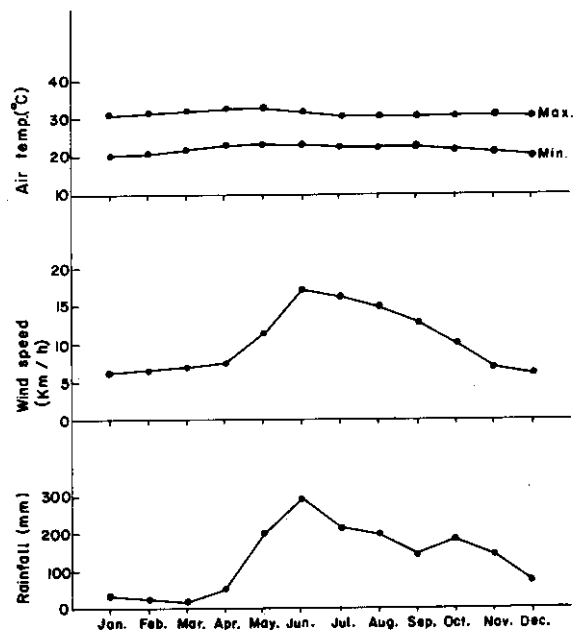


Fig. 3. Average climatological data for Minicoy Atoll during 1931-1960.

Maximum mean wind speed ( $16.3 \text{ km h}^{-1}$ ) and rainfall (293.6 mm) are observed during June. The total annual rainfall is 1588 mm during 94.4 days (June–September).

## RESULTS AND DISCUSSION

The marine vegetation of Minicoy Atoll is represented (Table I) by 37 species of algae, 5 seagrasses and one mangrove, *Bruguiera parviflora* (Roxb.) W. et A. ex. Griff. Subbaramaiah (1979) recorded 38 algae from Minicoy Atoll, but did not include 19 species of the marine algae, the seagrasses and the mangrove listed in this paper. Similarly, 20 species of marine algae reported by Subbaramaiah et al. (1974) were not observed by us.

TABLE I

Marine flora of Minicoy Atoll (collected during January 1982)

### Mangrove

Family — Rhizophoraceae

\**Bruguiera parviflora* (Roxb.) W. et A. ex. Griff.

### Seagrasses

Family — Hydrocharitaceae

\**Thalassia hemprichii* (Ehrenberg) Aschers.

\**Halophila ovalis* (R. Brown) Hook. f.

Family — Potamogetonaceae

\**Cymodocea rotundata* Ehrenberg et Hemprich

\**Halodule uninervis* (Forssk.) Aschers.

\**Syringodium isoetifolium* (Aschers.) Dandy

### Marine algae

Cyanophyta

\**Oscillatoria* spp.

\**Anabaena* spp.

*Lyngbya majuscula* Harv. ex. Gomont

Chlorophyta

\**Enteromorpha clathrata* (Roth.) Grev.

\**Ulva lactuca* Linn.

\**Chaetomorpha linum* (Müller) Kützing

\**Caulerpa serrulata* (Forssk.) J. Ag. emend Bøerg.

*C. peltata* Lamour.

*C. cupressoides* (Vahl.) C. Ag.

*C. racemosa* (Forssk.) Feldm. et Hamel.

*Halimeda gracilis* Harv. ex. J. Ag.

\**Dictyosphaeria cavernosa* (Forssk.) Bøerg.

*Boergesenia forbesii* (Harv.) Feldm.

Phaeophyta

*Dictyota dichotoma* (Huds.) Lamour.

*Padina pavonia* (L.) Thivy ex Taylor

\**Hydroclathrus clathrata* (Bory) Howe

*Sargassum* spp.

*Turbinaria decurrens* Bory

## Rhodophyta

- \**Galaxaura subverticillata* Kjellman
- G. rugosa* Lamour.
- Gelidiella acerosa* (Forssk.) Feldm. et Hamel
- \**Amphiroa rigida* Lamour.
- A. fragilissima* (L.) Lamour.
- \**Goniolithon laccadivicum* Foslie
- Jania adhaerens* Lamour.
- Gracilaria edulis* (Gmel.) Silva
- \**Hypnea musciformis* (Wulf.) Lamour.
- \**Botryocladia skottsbergii* (Bøergs.) Levr.
- \**Rhodymenia dissecta* Bøergs.
- Champia parvula* (Ag.) Harv.
- \**Polysiphonia* spp.
- \**Herposiphonia* spp.
- Acanthophora delilei* Lamour.
- \**Chondria dasyphylla* (Woodw.) C. Ag.
- Chondrococcus hornemanii* Mart.
- \**Leveillea jungermannioides* (Mart. et Hering) Harv.
- \**Dictyurus purpurescens* Bory

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\*New distribution records from Minicoy Atoll.

Most of the marine algae reported in the present study were recorded earlier (Barton, 1903; Weber Van Bosse and Foslie, 1904; Foslie, 1907, Hackett, 1977, Subbaramaiah et al., 1979) from Maldive and other Lakshadweep atolls. The marine algal crop at Minicoy, although represented by 57 species (i.e. including species described by Subbaramaiah et al., 1979), was observed to be qualitatively poor compared to those from the Maldive and other Lakshadweep atolls. Most of the seaweeds observed were growing on the coral reef. Subbaramaiah et al. (1979) observed (from December 1978 to January 1979) that the Minicoy Atoll is a rich ground for marine algae as compared to other Lakshadweep atolls, with a biomass (wet weight) of about  $1.88 \times 10^6$  kg with a density of  $350 \text{ g m}^{-2}$ .

In the present study, the predominant algae at Minicoy were *Enteromorpha clathrata* (Linn.) Link, *Caulerpa* spp., *Ulva lactuca*, *Halimeda gracilis* (Harv.) Feldm., *Padina pavonia* (L.), *Dictyota dichotoma* (Huds.) Lamour, *Hydroclathratus clathrata* (C. Ag.), *Dictyurus purpurescens* Bory and *Acanthophora delilei*. Occasionally, *Halimeda gracilis* and *Turbinaria decurrens* were observed along the open rocky shore and on the coral reef, while *U. lactuca*, *A. delilei* and *Herposiphonia* spp. were common in the lagoon. *Caulerpa serrulata* with a peculiar spiral form of thallus was very common on the coral reef, while blue-green algae like *Lyngbya majuscula*, *Anabaena* spp. and *Oscillatoria* spp. were observed in the lagoon, associated with seagrasses.

Most of the branching coral beds, which usually support good growth of seaweeds, were observed to be dead in the lagoon region. Heavy erosion was also noticed along the atoll. The Lakshadweep group of atolls is situated

along the main oil-tanker route in the Indian Ocean, which is polluted with petroleum hydrocarbons (Qasim and Sen Gupta, 1980; Sen Gupta et al., 1980). Heavy erosion and pollution may be the reasons for the death of the coral beds and poor growth of marine algae at Minicoy, apart from other environmental and biological factors like the sea urchin pest.

Seagrasses were observed growing luxuriantly in the sandy lagoon. So far, 10 species of seagrasses have been recorded from India (Santapau and Henry, 1973, Untawale and Jagtap, 1977). The seagrass distribution on the Indian coast has not been extensively studied. *Thalassia hemprichii* was the dominant seagrass in the Minicoy lagoon, while dense patches of *Halophila ovalis*, *Cymodocea rotundata* and *Halodule uninervis* were also observed. A drifted mass of *Syringodium isoetifolium* was collected along the side of the lagoon and may be growing in the deeper waters of the lagoon.

*Thalassia hemprichii* and *C. rotundata* have been reported to be the common seagrasses on the flats of Maldiva and Lakshadweep Archipelagoes (Hackett, 1977). The biomass (wet weight) of *T. hemprichii* ranged from 900 g m<sup>-2</sup> in the lagoon to 8 kg m<sup>-2</sup> in the creek, while the average biomass of *Halophila ovalis* and *Halodule uninervis* was 1.5 and 1 kg m<sup>-2</sup> (wet weight), respectively. In the creek, the *T. hemprichii* crop was dense, averaging 27 cm in height. The total area occupied by the seagrass flat was calculated to be 0.765 km<sup>2</sup>, and totalled about 2.53 × 10<sup>6</sup> kg (wet weight) at the time of sampling. It was observed that the seagrass community of this lagoon contributes most of the benthic plant biomass.

A mangrove patch of about 2500 m<sup>2</sup> was observed in the low-lying southeast part of the atoll where only *Bruguiera parviflora* was growing. Other mangroves reported from the Maldiva Archipelagoes (Hackett, 1977; Spicer and Newberry, 1979; Newberry and Hill, 1981) have not been found at the Minicoy coral atoll.

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