

ECOLOGICAL STUDY OF MARINE ALGAE ON THE LITTORAL AND SUBLITTORAL ZONE OFF MANDATIVU*

M. DURAIRATNAM AND V. RAGUNATHAMUTHALIAR

Department of Fisheries, Galle Face, Colombo-3, and Jaffna College, Vaddukotai, Ceylon

ABSTRACT

The distribution of marine algae in Ceylon is well known but hardly any work had been done to study the algal succession in any of the littoral zones adjoining our coast. It was decided to study the algal vegetation in the littoral zone on the eastern side of Mandativu every month for a period of one year with the view to determining algal succession and seasonal variation. The study was confined to a length of one mile along the coast upto a distance of a quarter mile towards the sea. The present paper deals with the marine algae growing in this area.

INTRODUCTION

A number of algological investigations have been carried out in the coastal waters of Ceylon, but most of the works were on taxonomy or on resources (Boergesen, 1936; Durairatnam and Medcof, 1954; Durairatnam, 1961 a, 1961 b, 1962, 1963, 1966). Ecological studies of marine algae of Ceylon were carried out by Svedelius (1906 a, b) and Durairatnam (1965). The aim of the present investigation is to study the vegetation of the littoral and sublittoral area of the east coast of Mandativu from an ecological point of view. The scope of the algal survey was restricted to the floristic aspect, including depth distribution and a simple presentation of the associations encountered. The survey was initiated in June 1969 and concluded in May 1970. Detailed record of the marine algae present every month is given in Table 1 and the temperature, salinity, and rainfall in Table 2. The distribution of algae is shown in Table 3.

The survey was confined to a length of 800 metres on the east coast of the island of Mandativu off Jaffna Peninsula upto a distance of 400 metres towards the sea. The littoral and sublittoral vegetation upto a depth of two meters was examined in a three to four metres broad stripe at four places along the 800 metres length of the coast investigated. The investigations were made at low tide by wading into the water or by the use of an ordinary boat where the depth was more than one metre. An ordinary knife was used to collect the algae which were mostly growing on corals, rocks, stones of various sizes, sand grains, loose pieces of shells and other algae.

DESCRIPTION

The growth of marine algae off Mandativu was at its best during the South West monsoon from April to October and the littoral region get exposed during the low tides up to a distance of 100 metres. But during the North East monsoon no part of the littoral region is exposed. During high tide the water rises upto a

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maximum of one metre. The range of water temperature is small being 27.8°C to 30.5°C and does not appear to have much effect on the growth of algae in the area investigated. The salinity ranges from 30‰ to 36.7‰ and the changes affect the growth of certain algae growing in the littoral zone upto a distance of 100 metres, especially the algae growing in pools which are three to ten metres in diameter and a depth of half to one metre.

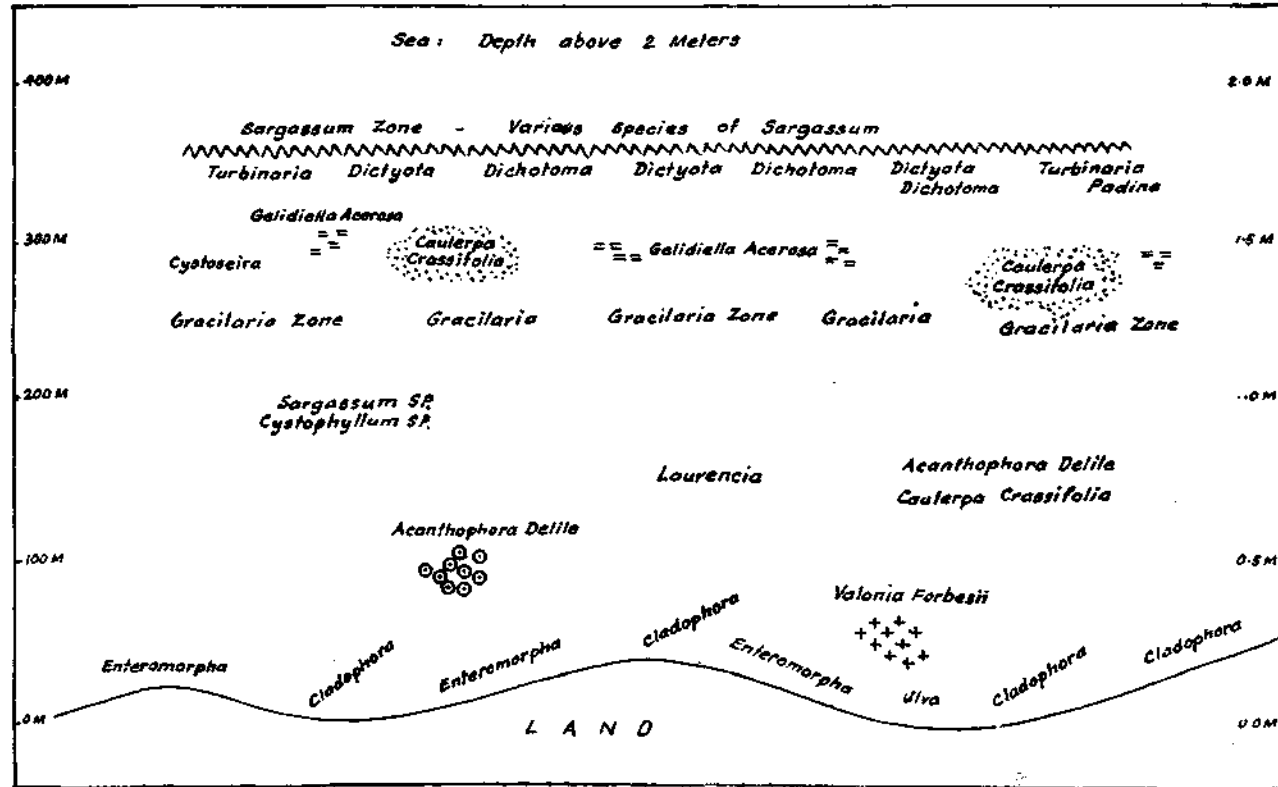
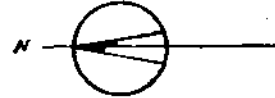
TABLE 1. The monthly variation of marine algae along the littoral region of Mandativu East

SPECIES	1969						1970					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
CHLOROPHYCEAE												
<i>Ulva lactuca</i> Linnaeus	C	R	R	A	R	R	—	—	R	—	R	R
<i>Ulva reticulata</i> Forsskal	A	A	A	A	C	C	R	R	R	R	R	C
<i>Enteromorpha compressa</i> (L.) Greville	A	A	C	R	R	R	R	R	R	R	R	R
<i>Chaetomorpha crassa</i> (Ag.) Kuetz.	A	A	R	—	—	—	—	—	—	R	R	C
<i>Chaetomorpha aerea</i> (Dillw.) Kuetz.	C	C	R	—	—	—	—	—	R	R	R	C
<i>Cladophora aegagropila</i> (Sibogae) Reinbold	C	C	C	R	R	—	—	—	—	R	R	C
<i>Cladophora fascicularis</i> (Mert.) Kuetz.	A	A	C	C	R	R	R	R	R	C	C	C
<i>Codium adhaerens</i> (Cabr.) Agardh.	—	R	—	—	—	R	R	—	—	—	—	—
<i>Codium jeppel</i> Schmidt	R	R	—	—	—	R	R	—	—	—	—	—
<i>Halimeda opuntia</i> (L.) Lamouroux	—	—	—	—	—	—	—	—	—	—	R	C
<i>Caulerpa crassifolia</i> (Ag.) J. G. Agardh	A	A	A	C	C	—	—	R	R	C	A	A
<i>Caulerpa verticillata</i> J. Agardh	—	R	R	—	—	—	—	—	—	—	—	—
<i>Caulerpa peltata</i> (Turner) Lamouroux	—	C	C	R	R	R	—	—	—	R	C	A
<i>Boergesenia forbesii</i> (Harvey) Feldmann	A	A	C	R	R	—	—	—	R	R	R	R
PHAEOPHYCEAE												
<i>Hydroclathyrus clathratus</i> (Bory) Howe	R	R	—	—	—	—	—	—	—	—	—	R
<i>Stoechospermum marginatum</i> (Ag.) Kuetz.	R	R	R	—	—	—	—	—	—	—	R	R
<i>Padina commersonii</i> Bory	R	R	R	R	C	A	A	C	C	A	C	R
<i>Dictyota dichotoma</i> (Huds.) Lamouroux	A	A	C	C	C	C	R	R	R	—	—	—
<i>Dictyota atomaria</i> Hauck	—	—	R	—	—	—	—	—	—	—	—	—
<i>Cystophyllum muricatum</i> (Turner) J. Agardh	A	A	C	C	R	R	R	R	R	R	R	A
<i>Cystoseira triquetra</i> (L.) J. Agardh	A	A	R	—	—	—	—	—	—	—	—	C
<i>Turbinaria ornata</i> J. Agardh	A	A	A	R	C	C	C	R	R	R	R	C
<i>Turbinaria conoides</i> Kuetzing	A	A	A	C	A	C	C	R	R	R	R	R
<i>Sargassum</i> sp.	A	A	A	A	A	A	A	C	C	C	C	R
RHODOPHYCEAE												
<i>Liagora pulverulenta</i> C. Agardh	—	R	R	R	—	—	—	R	R	—	—	—
<i>Gelidiella acerosa</i> (Forssk.) Feldmann & Hamel	R	C	A	A	C	R	C	A	A	A	A	A
<i>Jania natelensis</i> Harvey	R	R	R	R	R	R	R	C	A	A	A	C
<i>Chondrococcus hornemanni</i> (Mert.) Schmitz	A	C	R	—	—	—	—	—	R	C	C	C
<i>Hypnea musciformis</i> (Wulf.) Lamouroux	A	R	C	R	R	R	R	C	A	C	R	R
<i>Hypnea pannosa</i> J. Agardh	—	—	—	—	—	R	R	C	A	A	C	—
<i>Gracilaria crassa</i> (Harvey) J. Agardh	A	A	C	R	R	R	R	R	R	R	A	A
<i>Gracilaria edulis</i> (Gmelin) Silva	R	R	A	R	R	R	R	R	R	R	R	R
<i>Schnaia furcellata</i> (Turner) Bivonia	R	—	—	—	—	—	—	—	—	—	R	R
<i>Dasya naccarioides</i> Harvey	—	—	R	—	—	R	R	R	R	R	R	—
<i>Acanthophora delile</i> Lamouroux	A	A	A	A	A	C	C	A	A	A	R	R
<i>Laurencia paniculatea</i> Agardh	A	A	R	R	R	A	C	R	R	A	C	R
<i>Laurencia ceylanca</i> J. Agardh	—	—	—	—	R	R	—	—	—	A	C	—

A = Abundant; C = Common; R = Rare; and — = Absent

MANDATIVU EAST

The Area under Survey - June 1969 - May 1970.
Area: Nearly 800 Meters along the coast
and about 400 Meters towards the Sea.



Reference

- + + + ... Valonia Forbesii
- Brown Algae - Sargassum
- ⊙ ⊙ ⊙ ... Acanthophora Delile
- == ... Gelidiella Acerosa

Boergesonia forbesii (Harvey) Feldmann: These were found attached to stones or rocks by means of rhizoids. These are club shaped, bladder like, siphonaceous structure growing singly or in clusters 2.5 to 5 cms in height. They were found growing in the zone which is exposed during the low tides of the South West monsoon. In February young plants start growing on the rocks and sand. New plants are also seen in March. From April to July they were found in abundance growing luxuriantly in patches and crowding in a particular place. They were rare in August and September and completely disappeared from October to January.

Ulva lactuca Linnaeus and *Enteromorpha compressa* (L) Greville along with *Cladophora fascicularis* (Mert.) Kuetz.: These are common species throughout the year in rock pools, damp rocks, and corals. *Ulva lactuca* Linnaeus are abundant in September, while *Enteromorpha compressa* (L) Greville and *Cladophora fascicularis* (Mert.) Kuetz. are abundant in June and July. Luxuriant growths were observed on the north east and south east sides near the coast and towards the sea. Young growing plants were observed in abundance in October.

Ulva reticulata Forsskal: This is common throughout the year and was found growing luxuriantly on other large algae like *Sargassum*, *Cystoseira*, *Cystophyllum* and *Turbinaria* in abundance from June to September.

Caulerpa crassifolia (Ag.) J. Agardh: They were found growing attached to rocks and sand, stolon creeping and cylindrical, assimilators erect, two inches in height, pinnules opposite and flat attached by rhizoids, growing alone or mixed in deeper waters. The plant start growing in February on rocks and sand and become fairly abundant in March. They are found in abundance growing luxuriantly alone or mixed in particular places from April to July. They decrease in August and September. New plants were found coming up towards the sea in patches. The stolons were prostrate and profusely branched. They were absent from November to January.

Caulerpa peltata (Turner) Lamouroux: These were found growing in clusters attached to sand or rocks. Stolons prostrate, much branched with numerous peltate branchlets. Stolons 10 to 12 cms in length attached by numerous rhizoids with flat top peltate branchlets. They were found growing towards the sea. Growth begins in June and patches of dense clusters were observed. They gradually diminish from July to September and completely disappear in October.

Caulerpa verticillata J. Agardh: These were found in the exposed areas close to the coast growing on sand or rocks, stolons creeping or cylindrical. The uppermost part of the erect growing shoot has two whorls of leaves of which the uppermost is young consisting of round swellings. They were found only in June and July.

Padina commersonii Bory: These were found growing on rocks and corals. Plants were erect with several clusters arising from the base. They occurred throughout the year and were found in abundance in November and December when the salinity was low.

Turbinaria ornata J. Agardh: These were found attached to rocks by a thin expanded disc with numerous long incurved fibres. Numerous fronds arise from the base and reach a height of 50 cms.

Turbinaria conoides Kuetzing: These were attached to the substratum by means of rhizoids and reach a height of 50 cms. The rhizoids are branched and densely crowded together. These two plants were found growing together. Plants start growing in March and reach maturity in June. They were found growing luxuriantly from June to December and were rare in January and February.

TABLE 2. The monthly variation of water temperature and salinity along the littoral coast of Mandativu East

Months		Temp. of water (°C)		Salinity (‰)	
1969	July	29.1			
	August	30.3	35.8	no rain	35.1 heavy showers
	September	27.9			36.2 no rain
	October	29.1			33.7 heavy showers
	November	28.1			30.5 heavy showers
	December	29.9			30.6 heavy showers
1970	January	27.8			30.0 few showers
	February	28.8			31.2 few showers
	March	29.8			31.3 slight rain
	April	30.5			34.7 no rain
	May	28.3			33.8 slight rain
	June	27.8			33.1 slight rain

Cystophyllum muricatum (Turner) J Agardh: These were found in sheltered areas and bear muricate processes throughout and reach a height of 30 cms. They bear numerous prominent vesicles and a few receptacles on the upper branches. Plants in the deeper areas were stunted. They were found in abundance from May to July. They occurred in small quantities throughout the year.

Cystoseira triquetra (L) J. Agardh: These were found growing in clusters and were found in abundance in June and July. It was common in May but rare in April and August. They grow in the sheltered areas and reached a height of 30 cms or more.

Sargassum sp.: They were found in abundance from June to December and formed a distinct zone about 400 metres from the shore. They exhibited luxuriant growth. They were also found in the sheltered areas close to the coast. Young plants were observed from January to May. Mature plants reach a height of 60 cms or more.

Gelidiella acerosa (Forsskal) Feldmann and Hamel: They were found growing on rocks and corals in the intertidal zone mostly about 400 metres from the shore. Plants are rigid, wiry and cartilaginous reaching a height of 9 cms. This is an algae of economic importance as agar is extracted from it. They were found in abundance from January to September towards the sea and exhibited luxuriant growth. They were rare from October to December probably due to low salinity.

Jania natelensis Harvey: They grow in clusters, the fronds being 4-8 cms in height. They were found in beautiful clusters all over from February to April. They occurred throughout the year but were rare in other months being negligible in October.

Hypnea musciformis (Wulf) Lamouroux: The plants were found epiphytic on larger algae usually entangled and attached by means of tendrils and spreading up to about 18 cms. They were found growing vigorously and in abundance in February and July. During the other months they were common or rare.

Gracilaria crassa (Harvey) J. Agardh : These plants occur in sheltered area near the coast as well as towards the sea. The plants are thick cartilaginous and have a sinuated thallus with small narrow constrictions here and there. They were abundant near the coast in April and towards the sea from June to September. They occurred throughout the year but were rare during the other months.

Gracilaria edulis (Gmelin) Silva: Plants grow in tufts, several branches arising from the base of the plant. They were found growing on rocks and corals as well as on the sea grass *Thalassia*. This is a plant of economic importance as agar is extracted from it. Plants were found in abundance in August and September. In the younger stages they were found in patches towards the sea in July and August. During the other months they were rare.

Acanthophora deliie Lamouroux: Plants erect and cylindrical reaching a height of 15 cms with spines on the main stem and attached to the substratum by means of rhizoids. This is one of the most dominant algae of the area growing along with *Gracilaria crassa* (Harvey) J. Agardh. They were found in abundance growing very luxuriantly in sheltered areas near the coast and towards the sea. Except in April and May when they were rare.

Laurencia paniculata (Agardh) J. Agardh: These plants reach a height of 5-6 cms and were found in abundance in March, June and November growing luxuriantly in the deeper areas towards the sea. They were found throughout the year.

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