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**STUDIES ON LITTORAL AND SUBLITTORAL MACROPHYTES
AROUND THE MAURITIUS COAST**

BY

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ABSTRACT

Floristic composition from the intertidal lagoon, reef, and subtidal (down to 20m depth) regions, around the Mauritius coast were studied to assess its present status. This provides firsthand information on the ecological distribution of mangroves, seagrasses, and subtidal marine algae. The marine flora was represented by 127 species of seaweeds, five species of seagrasses, and 3 species of mangroves.

The greatest number of species and biomass of marine algae occurred in the intertidal and the lagoonal zones. Only a few species of seaweeds, such as Asparagopsis taxiformis, Halimeda spp, Turbinaria ornata, and coralline algae, were associated with corals in the subtidal regions. The most widely distributed marine algae were Ulva spp., Enteromorpha kylini, Cladophora saviniana, Boodlea composita, Sargassum binderi, Turbinaria ornata, Gracilaria salicornia, Hypnea cornuta, Digenea simplex, and Laurencia papillosa.

The mangroves were mainly restricted to the northeast and east coasts and Rhizophora mucronata comprises almost 100% of the vegetation. The small patches of seagrasses such as Halophila ovata, Halodule uninervis, and Syringodium isoetifolium occurred commonly in patches in the lagoons towards the northeast and east.

The poor representation of marine algae and seagrasses reflects the degradation of the marine ecosystem. The steep slopes and small tidal amplitude, have resulted in the formation of fringing mangroves along the coast.

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INTRODUCTION

Marine macrophytes contribute large amounts of organic carbon in coastal waters, which enhances the overall productivity. Seaweeds are a source of agar-agar, alginate, carrageenan and pharmaceutical compounds. Detritus rich mangrove and seagrass ecosystems play an important role in stabilization of the sea bottom and in nutrient recycling. Additionally, these marine macrophytes are also utilized as food, fodder, and fertilizer on a large scale. Calcareous algae and corals form a major source of the lagoonal sediments (Mallik, 1979, Siddiquie, 1980).

Few attempts (Price, 1971; Mshigeni, 1985; Untawale and Jagtap, 1989) have been made to understand the status of marine resources along the islands of the Indian ocean region. Very limited information is available on marine floras along the Mauritius coast (Dickie, 1875; Schmitz, 1895; Boergesen, 1940-57; Mshigeni, 1985;). With a view as to the importance of island ecosystems, the survey was undertaken to study the present status of mangroves, seaweeds and seagrasses along the Mauritius coast.

DESCRIPTION OF THE STUDY AREA

Mauritius is situated in the southern tropical belt of the Indian ocean between latitudes 19°59'S and 20°32'S and longitudes 57°18'E and 57°47'E (Fig. 1). It has an area of 1865 sq km and a coastline 205 km in length. The population of Mauritius is about a million and 97% of the total population lives on Mauritius island and the rest on Rodrigues island.

TOPOGRAPHY, GEOLOGY AND GEOMORPHOLOGY

The island of Mauritius is volcanic in origin and composed of olivine basalt to doleritic basalt (Simpson, 1950). Gradual slopes and more planar habitats could be observed towards the northeast and east coasts compared to the west and south coasts of Mauritius. The reef's algal ridge is exposed to air during extreme low tide and is located as far as 4.5 km offshore along the windward east coast and very near to shore on the leeward west coast. Coral reefs are absent off seacliffs along the south and west coast. Beach rock is mainly observed towards the south coast (at Gris Gris, Ponte Aux Roches) and mudflats towards the northeast coast (Xuxville to Pointe Lascars and Trou D'Eau Douce to Mahebourg).

Towards the south, from Souille to Le Bouchon, the coast is represented by high cliffs and the beaches are formed of coral sand and gravel, basaltic gravel and boulders, and mud.

CLIMATOLOGY

Air temperatures vary seasonally from 13.5°C during May to 32.9°C during March. Mean annual rainfall is 2100 mm and ranges from 800-4000 mm (Fig. 2A). Two thirds of the rainfall occurs during summer (November-April). Relative humidity varies from 70-99%. Daily sunshine hours vary from 10.5-13.5, while solar radiation reaching the ground during the daytime ranges between 100-200 watts m^{-2} . The global solar radiation ranges from 13-21.36 MJ $m^{-2} day^{-1}$ and the intensity of radiation remains higher during October to March (Fig. 2B).

Mauritius is located in the southeast trade wind belt. The south and southeast coasts of Mauritius are exposed to high winds and strong waves during December to March. The mean tidal range is 0.37 m, however, it reaches 0.74 m during cyclonic conditions.

MATERIAL AND METHODS

Eighteen sites covering the entire coast were selected for algal inventory studies during September to October, 1987. However, only 10 of these were studied (Fig. 1), following preliminary observations. At site nos. 3, 4, 5, 9, and 10, transects were laid from the intertidal to subtidal regions (up to 20 m in depth) for observation and collection of biota, mainly seaweeds, mangroves, and seagrasses. Length of the transect varied from approximately 500 m at Blue Baie (St. 3) to 3000 m at Trou D'Eau Douce (St. 4) and included the reef slope, reef, forereef, lagoon and intertidal zones. The intervals between sampling points varied from 100 to 500 m -- depending upon the length of the transect. Sampling was carried out by hand picking, skin, and SCUBA diving. Intertidal zones were surveyed during low tide. Quantitative data on the few dominant species were collected in triplicate by using a 1 m^2 quadrat. Biomass was expressed as $g m^{-2}$ on a wet weight basis.

Aerial photographs taken during 1967 were used to locate the mangrove areas along the coast. The ground truth and qualitative data were collected by visiting the mangrove sites. Quantitative data on mangroves and their

seedlings were taken in triplicate by using 10 m² and 1 m² quadrats, respectively. Specimens were preserved in 4% formalin and also mounted on herbarium sheets and have been deposited at the National Institute of Oceanography (C.S.I.R.), Goa, India.

Environmental parameters such as water temperature, salinity, pH and transparency, were measured by using a Celsius thermometer, a Sinar Salt Meter NS-3P pH meter and Secchi disk, respectively. Information on utilization of marine resources was sought by discussions with various authorities and local people.

ENVIRONMENTAL PARAMETERS

Air temperature, at the various study sites ranged from 21.4°C to 27.5°C while the water temperature ranged from 21.2°C to 28.2°C. The pH ranged between 8.3 to 8.7. Salinity of the lagoon water varied from 21.5‰ to 29.5‰, while overlying waters in the mangrove regions, ranged from 3.5‰ in the upstream zone to 22.2‰, along the shore. Secchi depth was observed to be 15-25 m beyond the reef, however, in the Blue Baie lagoon it was relatively low (4-5 m).

RESULTS AND DISCUSSION

During the present investigation, a total of 127 species of seaweeds (5 Cyanophyta, 34 Chlorophyta, 20 Phaeophyta and 68 Rhodophyta), 5 species of seagrasses and 3 species of mangroves were recorded, most of which were confined to intertidal and lagoonal zones (Table 1 and Fig. 3).

Seaweed species such as Ulva fasciata, U. reticulata, Enteromorpha kylini, Cladophora saviniana, Boodlea composita, Sargassum binderi, Turbinaria ornata, Gracilaria salicornia, Hypnea cornuta, Digenia simplex, and Laurencia papillosa were commonly observed along the coast. Turbinaria ornata, Asparagopsis taxiformis, and Halimeda spp. were commonly associated with coral-dominated reefs and were found in negligible quantities elsewhere. Economically important seaweed species such as Sargassum and Gracilaria were represented by 9 species each and Hypnea by 6 species. A belt of Sargassum spp. was observed at the lowest low tide mark. The highest biomass (500 wet g m²) of Sargassum was encountered at Gris-Gris, while at other sites it was negligible. Gracilaria salicornia was abundant in the rock pools and

on intertidal rocky areas. Gracilaria crassa was abundant in pool waters and from intertidal rocky areas at Gris-Gris with a biomass of 130 wet g m⁻². Drifted fronds of G. blodgetti, collected from the lagoon at Pointe Aux Piments might have come from deeper waters (Taylor, 1972). Though Hypnea was qualitatively rich (6 species) at Gris Gris, higher biomass (450 wet g m⁻²) was noted at Tombeau Baie lagoon.

The intertidal expanse was generally narrow along the entire coast of Mauritius. Most of the south and southwest coast and part of west and northwest coast, was rocky and favored seaweed growth. Sandstone was common along the beaches which supported growth of Laurencia, Centroceras and Ceramium species. Most of the seaweed and seagrass species were collected in the lagoon from sand, dead coral stones, pebbles, and rocks. Though the ecological conditions such as substratum, water transparency, and irradiance were favourable, the growth of seaweeds and seagrasses was very poor. Earlier (Boergesen, 1940-57) had reported 330 species of seaweeds from Mauritius, based on collections by Dr. Vaughan, in different seasons. The poor representation of marine algae, during the present survey, could be attributed to seasonal growth and intensive grazing of algae by sea urchins (Hodgkin and Michel, 1960; Kikuchi and Peres, 1977). However, the distributional pattern of the predominant algae was similar to that observed earlier (Hodgkin and Michel, 1960). Dense populations of Colobocentrotus atratus Linne (15-20 individuals m⁻²) and Diadema spp (4-50 individuals m⁻²) were observed in the intertidal, lagoon, on the reef, and beyond, at 20 m depth.

The biomass of Ulva reticulata was estimated to be 1800 wet g m⁻² in the lagoon and 3000 wet g m⁻² at Pointe Aux Piments. However, at Tombeau Baie, Ulva spp. showed a biomass of 280 wet g m⁻² in the lagoon. The abundances of Ulva and Enteromorpha spp. in the lagoons at Pointe Aux Piments and Tombeau Baie were correlated with organic pollutants received mostly through domestic sewage, entering in the Port Louise harbour.

Coralline algae (such as species of Jania) commonly occurred around the coast. However, species of Cheilosporum and Corallina were observed only along the south coast at Pointe Aux Roches and Gris-Gris. The encrusting coralline outer ridge appeared towards the seaward side, similar to the islands in Indo-Pacific regions (Womersley and Bailey, 1969; Littler and Doty, 1975; Jagtap, 1987). The species like Lithophyllum and

Lithothamnion have been reported (Boergesen, 1940-57; Hodgkin and Michel, 1960) to be common encrusting forms.

Small patches of seagrass beds of Halophila ovata, Halodule uninervis, and Syringodium isoetifolium were common at depths of 1-4 m in the lagoon. Halophila stipulaceae and Thalassodendron ciliatum were rarely distributed in the lagoons along the east coast. Marine algae such as Enteromorpha clathrata, Lyngbya majuscula, Phomidium sp., Oscillatoria spp., Calothrix contarenii, and Melobesia sp. were commonly associated with seagrass beds. Cyanophyta, associated with the seagrass ecosystem, serve as food for reef fishes and also enrich the environment by nitrogen fixing (Dawson *et al.*, 1955). Calothrix contarenii has been reported from the coral environments of India (Iyengar and Desikachary, 1944).

The total mangrove cover along the Mauritius coast was estimated to be about 20 km². The mangrove flora, comprised mainly of Rhizophora mucronata, was restricted to the northeast and east coasts of Mauritius (Fig. 1). Few patches of young R. mucronata were observed towards the southeast and southwest coasts at Bel Ombre and Baie Du Cap. Occasional plants of Bruguiera gymnorhiza were observed in the upstream brackish water regions of Pointe Lafayette, Trou D'Eau Douce and Ferney and Mahebourg. Acrostichum aureum was common in the upstream regions highly influenced by freshwater. Other oceanic islands closer to Mauritius have been reported to have more number of species (Untawale and Jagtap, 1989). However, almost 100% of the mangrove area along the Mauritius coast was dominated by R. mucronata, which could be attributed to its successful colonization and competitive advantage over new prospective colonizers. The height of the Rhizophora strands varied from 2-7 m and the density ranged from 0.7-1.5 trees m⁻². The seedling density was observed to be very high (20-30 individuals m⁻²). Total mangrove cover along the Mauritius coast was estimated to be about 20 km². The substratum of mangrove regions was sandy gravel, sandy clay and silty clay with pebbles and rock crevices. Relatively more rainfall, gradual slopes and protection from southeast trade winds result in more freshwater input and siltation along the northeast and east coasts of Mauritius (Fig. 2A). The occurrence of mangroves mainly along the northeast and east coasts may be attributed to more freshwater influence, more siltation due to protection of the coast, and higher humidity. Topographical features and tidal height have restricted the distribution of seedlings resulting in fringing mangroves.

Large mangrove areas were utilized by earlier settlers, mainly for fuel and are presently being reclaimed for civil development. Some of the mangrove areas have been privately utilized for farming of mullet, crab, shrimp, and seacarp. The mangrove area at Trou D'eau Douce, has been utilized for recreational purposes. Mangrove resources of Mauritius, though limited, are of great significance in protecting the shoreline during cyclonic conditions. Therefore, it is necessary to develop management policies for conservation and utilization of mangroves in Mauritius.

Dynamite fishing, overexploitation of reefs and lagoons for coral and sand (for commercial sale as souvenirs, lime production, and construction material) were commonly exercised. Lagoons are also being utilized for dumping effluents from sugar refineries and domestic sewage. Presently about 800 metric tons of coral stones and 1000-1500 tons of sand are being extracted every year from the coral environments of Mauritius (Mr. Chauveau, personal communication) for lime production. The lime production in Mauritius started during 1962, and since then, coral environments have been exploited on a large scale.

SUMMARY

The present observations indicate that Mauritius seaweeds are not abundant; however, there seems to be a great potential for economically important species such as Gracilaria, Hypnea, and Sargassum. Eucheuma species, reported (Mschigeni, 1985) from Pointe Aux Roches and from Rodrigues island of Mauritius, could be cultivated around Mauritius. Turbinaria ornata, Asparagopsis taxiformis, and Halimeda spp. form a characteristic flora in association with coral reef environments, similar to other coral environments from the Indian ocean (Jagtap, 1987; Untawale and Jagtap, 1988). An intense growth of Ulva spp. and Enteromorpha spp. in Baie de Tombeau and Pointe Aux Piments correlates with a heavy influence of organic and domestic pollution. The seagrass beds from the lagoon have been reduced to a large extent by the continuous sand removal process. The mangroves, mainly Rhizophora mucronata, occur along northeast and east coasts of Mauritius. Dynamite fishing and overexploitation of corals and sand for commercial purposes is causing severe damage to the entire coral reef, lagoons, and their associated biotas.

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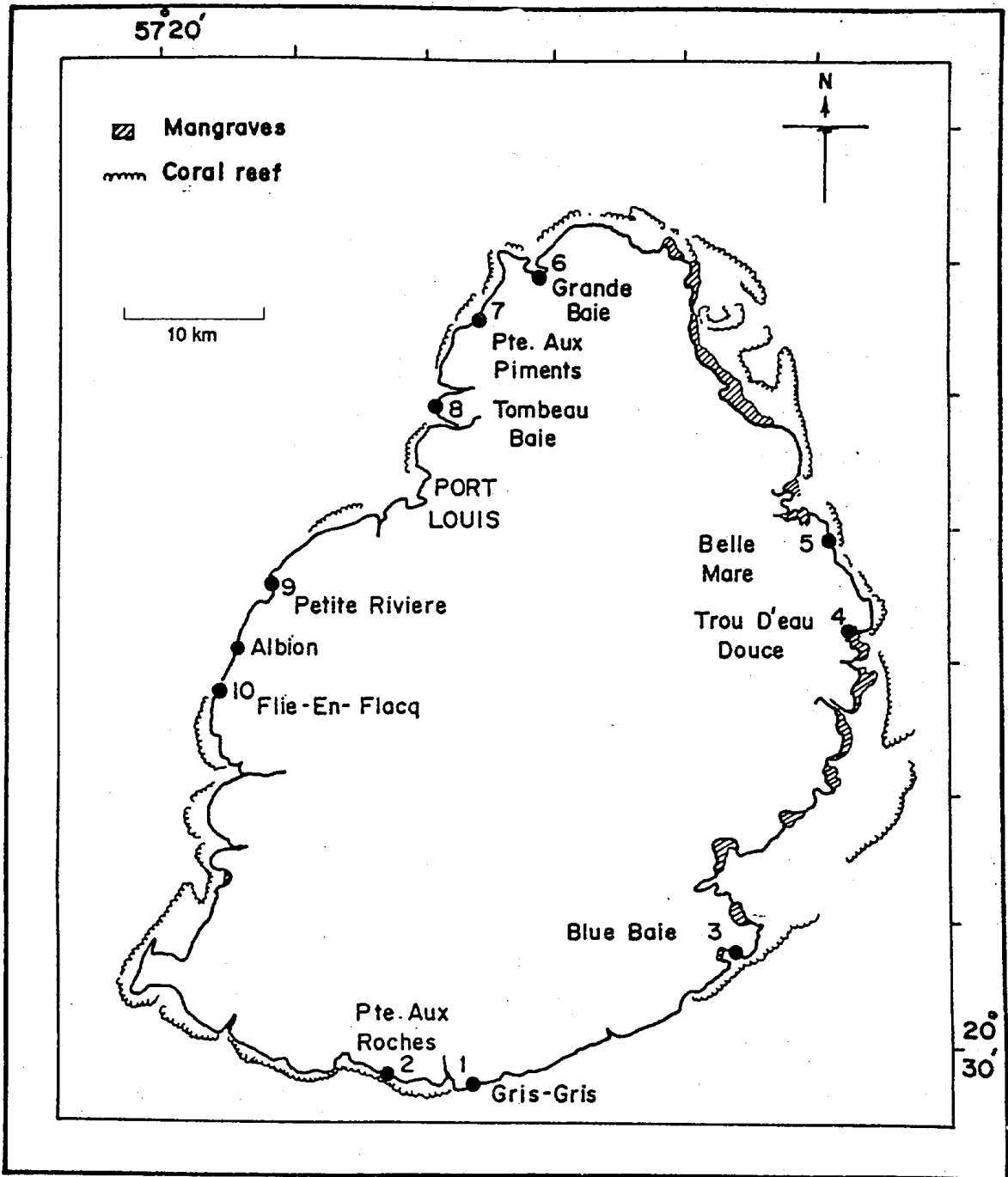


Fig. 1 Index map of Mauritius showing distribution of coral reefs and mangroves. Numbers indicate sample sites.

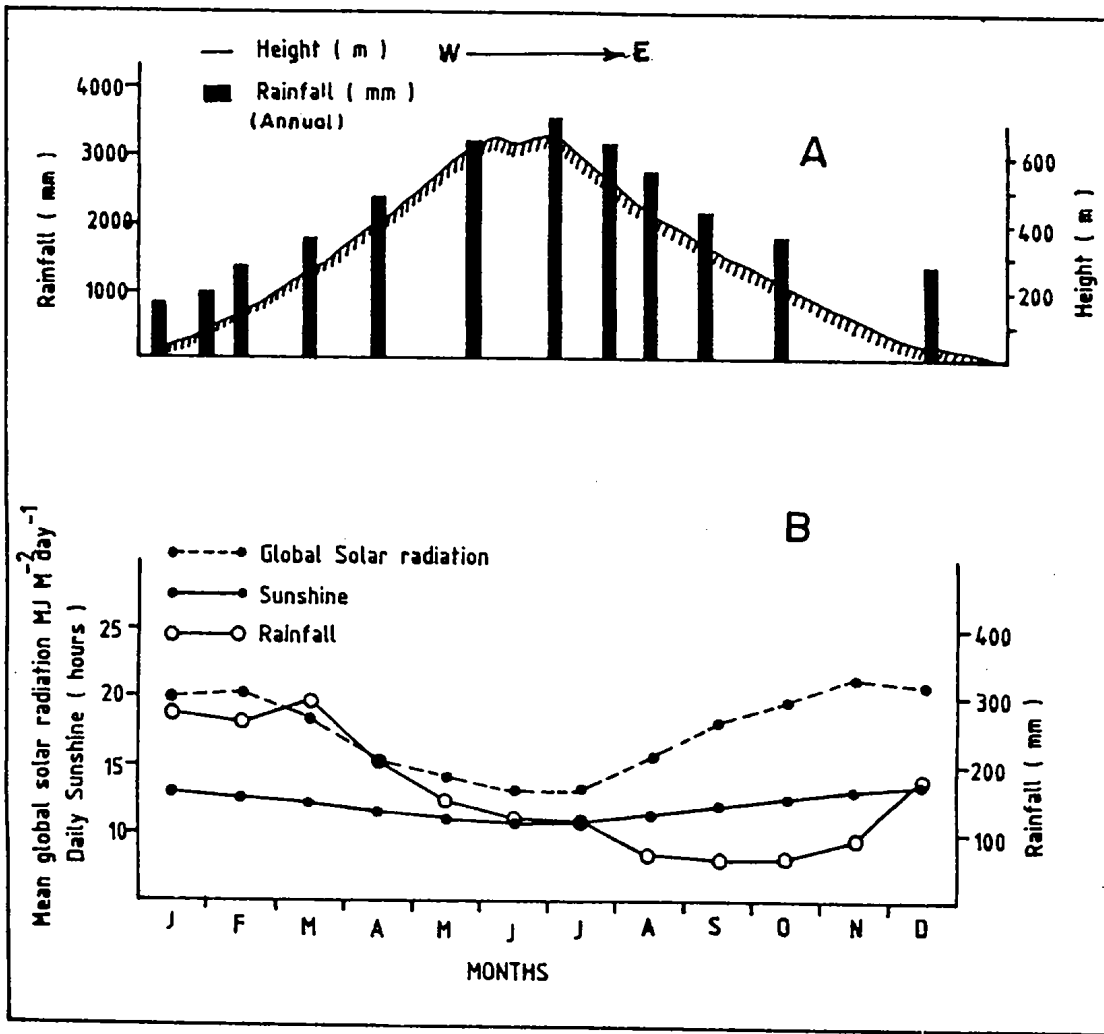


Fig. 2 Topography and climatological data of Mauritius.

LEGENDS

	<u>Ulva fasciata</u>		<u>Gracilaria edulis</u>
	<u>U. pertusa</u>		<u>G. spinuligera</u>
	<u>U. reticulata</u>		<u>G. salicornia</u>
	<u>Enteromorpha</u> spp.		<u>G. crassa</u>
	<u>Chaetomorpha antennina</u>		<u>Ceratodictyon spongiosum</u>
	<u>Halimeda</u> spp.		<u>Hypnea</u> spp.
	<u>Boodlea composita</u>		<u>Centroceros clavulatum</u>
	<u>Dictyosphaeria cavernosa</u>		<u>Digena simplex</u>
	<u>Ectocarpus</u> spp.		<u>Acanthophora spicifera</u>
	<u>Colpomenia sinuosa</u>		<u>Laurencia papillosa</u>
	<u>Padina gymnospora</u>		<u>Halophila stipulaceae</u>
	<u>Chnoospora implexa</u>		<u>H. ovalis</u>
	<u>Sargassum</u> spp.		<u>Thalassodendron ciliatum</u>
	<u>Turbinaria ornata</u>		<u>Haludule uninervis</u>
	<u>Asparagopsis taxiformis</u>		<u>Syringodium isoetifolium</u>
	<u>Gelidiella acerosa</u>		<u>Ipomea Pes-Capre</u>
	<u>Amphiroa</u> spp.		Mangroves
	<u>Cheilosporum</u> spp.		<u>Acropora</u> spp.
			Alcyonaceans.

Fig. 3. Profiles (A-F) at various localities, depicting distribution of major biota, along the Mauritius coast (A - Gris-Gris, B - Point Aux Roches, C - Petite Rivere, D - Flic-En-Flacq, E - Belle Mare, F - Trou D'Eau Douce).

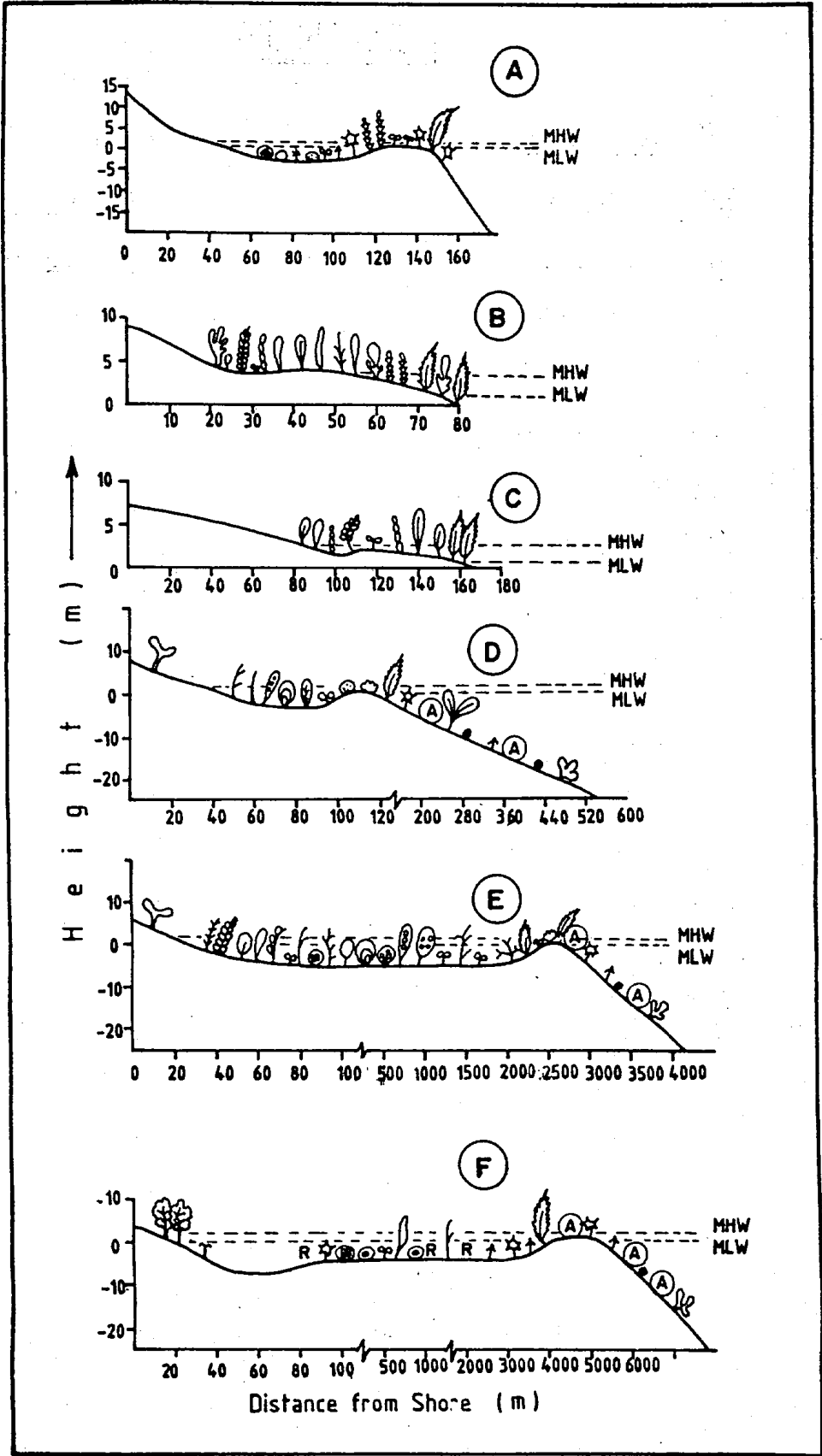


Table I
 MARINE FLORA OF MAURITIUS
 (collected during Sept.-Oct. , 1987) 1

Stations	South coast			East coast		North east coast		West coast		
	1	2	3	4	5	6	7	8	9	10
Marine algae										
Cyanophyta										
<u>Calothrix contarenii</u> (Zanardo) Bornet & Flahaut.										+
<u>Lyngbya majuscula</u> Harv. ex. Gomont				+	+					+
<u>Oscillatoria</u> sp.									+	
<u>O. sancta</u> Kutz.				+						
<u>Phormidium crosbyanum</u> Tilden							+			
Chlorophyta										
<u>Avrainvillea gracillima</u> Boerges.			+							
<u>Boergensenia forebesii</u> (Harv.) Feldm.	+	+	+							
<u>Boodlea composita</u> (Harv.) Brand	+	+			+		+			+
<u>Bryopsis pennata</u> Lamour. var. <u>secunda</u> (Harv.) Collins & Harv.		+								+
<u>Caulerpa occidentalis</u> (J. Ag.) Jaasund	+		+							

	1	2	3	4	5	6	7	8	9	10
<u>C. racemosa</u> (Forssk.) Weber-van Bosse var. <u>clavifera</u> (Turn.) Weber-van Bosse		+								
<u>C. taxifolia</u> (Vahl) C. Ag.										+
<u>Chaetomorpha antennina</u> (Bory) Kutz.		+								
<u>C. linoides</u> (Ag.) Kutz.										+
<u>C. natalensis</u> (Hering) De Toni		+								
<u>C. patentiramea</u> (Mont.) Kutz.					+					+
<u>C. vagabunda</u> (L.) Van den Hoek										+
<u>C. vaughani</u> Boerges.					+					
<u>Cladophora saviniana</u> Boerges.	+		+		+	+	+	+		
<u>C. sundanensis</u> Reinbold	+									
<u>Cladophoropsis</u> sp.										+
<u>Codium arabicum</u> Kutz.					+					
<u>C. geppii</u> Schmid.				+	†					

<u>Dictyosphaeria cavernosa</u> (Forssk.) Boerges.	+	+			+					
<u>Enteromorpha</u> sp.	+						+	+		
<u>E. clathrata</u> (Roth) J. Ag.	+		+							+
<u>E. compressa</u> (L.) Grev.			+						+	
<u>E. flexuosa</u> sp. <u>linziformis</u> Bliding							+			

	1	2	3	4	5	6	7	8	9	10
<u>E. kylini</u> Bliding Sensu Dawson	+				+	+		+		+
<u>E. linza</u> (L.) J. Ag.								+		
<u>Halimeda opuntia</u> (L.) Lamour.			+		+					
<u>H. tuna</u> (Ellis & Sol.) Lamour.	+			+	+					
<u>Microdictyon</u> sp.		+								
<u>Rhizoclonium keneri</u> Stockm.	+									
<u>Ulva fasciata</u> Dellile	+	+	+	+	+		+		+	
<u>U. pertusa</u> Kjell.							+	+		
<u>U. reticulata</u> Forssk.		+		+	+		+	+		
<u>Valonia aegagropila</u> C. Ag.						+		+		
Phaeophyta										
<u>Chnoospora implexa</u> (Hering) J. Ag.				+			+			
<u>Colpomenia sinuosa</u> (Derb. & Sol.)	+	+	+	+	+	+	+	+	+	+
<u>Dictyopteris delicatula</u> Lamour.					+					+
<u>Dictyota bartayresii</u> Lamour. Sensu Vick.	+	+		+						+
<u>D. cervicornis</u> Kutz.				+			+			
<u>Ectocarpus indicus</u> Sonder	+						+			
<u>E. mitchellae</u> Harv.		+	+						+	
<u>Hydroclathrus clathratus</u> (Bory) Howe					+					

	1	2	3	4	5	6	7	8	9	10
<u>Lobophora variegata</u> (Lamx.) Womersley	+	+		+	+	+	+		+	+
<u>Padina gymnospora</u> (Kutz.) Sonder	+	+				+		+		
<u>Sargassum</u> sp. 1	+									
<u>Sargassum</u> sp. 2	+									
<u>S. aquifolium</u> (Turn.) J. Ag.										+
<u>S. binderi</u> Sonder	+	+		+	+					+
<u>S. densifolium</u> Zan.					+					
<u>S. duplicatum</u> J. Ag.	+	+	+	+					+	
<u>S. paniculatum</u> J. Ag.		+								
<u>S. polycystum</u> C. Ag.		+				+				
<u>S. porterinum</u> Zan.	+	+					+			
<u>Turbinaria ornata</u> (Turn.) J. Ag.	+	+	+	+	+	+	+			
Rhodophyta										
<u>Acanthophora spicifera</u> (Vahl.) Boerges.		+		+				+		
<u>Agardhiella tenera</u> (J. Ag.) Schmitz								+		
<u>Ahnfeltia</u> sp.	+			+						
<u>Amphiroa anastomosans</u> Weber-van Bosse										+
<u>A. fragilissima</u> (L.) Lamour.	+									
<u>A. rigida</u> Lamour.	+			+			+			

	1	2	3	4	5	6	7	8	9	10
<u>Asparagopsis taxiformis</u> (Delile) Coll. & Harv.					+					
<u>Callymenia morelii</u> (Mont. & Mill.) Boerges.		+								
<u>Caloglossa leprieurii</u> (Mont.) J. Ag.				+						
<u>Centroceros clavulatum</u> (C. Ag.) Mont.	+	+	+	+	+	+	+	+	+	+
<u>Ceramium camouii</u> Dawson	+									
<u>Ceratodictyon spongiosum</u> Zan.				+						
<u>Champia parvula</u> (C. Ag.) Harv.				+						
<u>Cheilosporum acutilobum</u> Aresch. (Decasne)		+								
<u>C. jungermannioides</u> Rupr.	+									
<u>Coelothrix</u> sp.	+									
<u>Corallina subulata</u> Ellis & Sol.	+									
<u>C. polydactyla</u> Mont. & Mill.		+								
<u>Dasva pedicellata</u> (C. Ag.) C. Ag.				+						
<u>Desmia pulvinata</u> J. Ag.							+			
<u>Digenea simplex</u> (Wulf.) C. Ag.	+	+			+	+	+	+	+	+
<u>Galaxuara marginata</u> Lamour.		+								
<u>G. oblongata</u> (Ellis & Sol.) Lamour.		+		+						

	1	2	3	4	5	6	7	8	9	10
<u>G. obtusa</u> (Ellis & Sol.) Lamour.										+
<u>G. rugosa</u> (Lol.) Lamour.		+								
<u>G. subverticillata</u> Kjell.			+							
<u>Gelidium</u> sp.										+
<u>G. crinale</u> (Turn.) Lamour.							+	+		
<u>Gelidiella acerosa</u> (Forssk.) Feldm. & Hamel.		+		+				+		
<u>G. myrioclada</u> (Boerges.) Feldm. & Hamel.								+		
<u>Gelidiopsis scoparia</u> (Mont. & Mill.) Schmitz								+		
<u>Gracilaria</u> sp.		+								
<u>G. arcuata</u> Zan.				+			+			
<u>G. blodgettii</u> (Harv.)							+			
<u>G. crassa</u> Harv.		+	+					+		
<u>G. dura</u> (Ag.) J. Ag.								+		
<u>G. edulis</u> (J. Ag.) Silva							+			
<u>G. Millardetii</u> (Mont.) J. Ag.		+						+		
<u>G. salicornia</u> J. Ag.		+	+		+	+	+	+	+	+
<u>G. spinuligera</u> Boerges.				+				+		

	1	2	3	4	5	6	7	8	9	10
<u>Gymnogongrus</u> sp.		+								
<u>Halymenia maculata</u> J. Ag.								+		
<u>Hypnea</u> sp.				+						
<u>H. charoides</u> Lamour.	+			+					+	
<u>H. cornuta</u> (Lamour.) J. Ag.	+	+		+	+		+	+	+	+
<u>H. musciformes</u> (Wulfen) Lamour.	+	+								
<u>H. nidulans</u> Setch.			+							
<u>H. pannosa</u> J. Ag.	+	+								
<u>H. valentiae</u> (Turn.) Mont.				+						
<u>Jania adhaerens</u> Lamour.	+	+	+	+	+	+	+	+	+	+
<u>J. pumila</u> Lamour.	+									
<u>Laurencia flexilis</u> Setch.	+									
<u>L. papillosa</u> (Forssk.) Grev.	+	+	+		+		+		+	
<u>Liagora jadini</u> Boerges.										+
<u>L. valida</u> (Harv.)					+					
<u>Lithothamnion</u> sp.				+						
<u>Melobesia</u> sp.	+		+		+					
<u>Polysiphonia gorgoniae</u> Harv.				+						
<u>P. platicarpa</u> Boerges.				+						+
<u>Pseudogloiophloea</u> sp.					+					

