A RECONNAISSANCE ACCOUNT OF THE RODNEY ISLAND FRINGING REEF AND ASSOCIATED MARINE COMMUNITIES, SHELBURNE BAY

P. Saenger

Centre for Coastal Management
NRCAE, P.O. Box 157, Lismore NSW 2480

INTRODUCTION

Rodney Island, lying just to the east of Round Point, consists of a basement of ferruginous black laterite covered by a red clayey loam and weathered pumice. Around the intertidal zone, the lateritic basement has been exposed by erosion and has given rise to a rocky shoreline. On its eastern side, a gravelly beach is present consisting of pumice and coral fragments while on the western side, silt has accumulated and been colonised by a mangrove fringe.

As a result of this substrate diversity, a number of diverse marine communities are present. From the field work (carried out in the area during 24 October to 1 November 1984) and on the basis of Landsat imagery, four distinct marine communities can be recognized around the island, including open shoreline mangroves; coral fringing reef; intertidal sandflats; and soft-bottom benthic communities. Each of these communities is briefly described below.

DESCRIPTIONS OF THE MARINE COMMUNITIES

Mangroves

Around Rodney Island, mangroves range in height from 2 - 10 metres. Sonneratia alba and Avicennia marina are the outer species, forming a narrow seaward zone. Stands of Rhizophora stylosa form a more or less continuous zone landward of the Sonneratia/Avicennia zone while a zone of mixed species forms the landward fringe. Several species are common in the landward fringe including Excoecaria agallocha, Osbornia octodonta, Pemphis acidula, Lumnitzera racemosa, Aegialitis annulata, Scyphiphora hydrophyllacea and Ceriops tagal.

Coral Reefs

Several fringing reefs occur in the study area, with the largest around Rodney Island.' The description of this reef is divided into the reef flat and the reef slope as the organisms of these two zones differ considerably and warrant separate description.

Reef Flat

The gently sloping reef flat consists of large areas of coral rubble interspersed with small pools and areas of living corals. The coral cover increases from approximately 10% near the landward margin to approximately 80% on approaching the reef slope. In places, particularly near the shoreline of Rodney Island, the underlying Pleistocene laterite lies at the surface and it, is covered in milky (Saccostrea amasa) and black lip (S. echinata) oysters.

The rubble areas are dominated by'algae including Chlorodesmis fastigiata, Hydroclathrus clathratus and an unidentified species of Sarsassum. The black holothurians, Holothuria atra and H. leucospilota are common on sandy rubble areas and in the shallow sandy pools amongst the coral. The middle reef flat consists of numerous micro-atolls of Favia aff. abdita, up to 1.5 m in diameter. Other hard corals, particularly towards the reef slope, include Seriatopora hystrix, Pocillopora sp., Acropora spp., Symphvllia sp. and the mushroom coral Funaia funsites. Soft corals are not abundant but sporadic patches of Sarcophyton trocheliophorum and Lobophytum sp. were observed.

Reef Slope

Around most of Rodney Island, the reef slope drops off abruptly into 6 or more metres of water. However, on the north-western side of Rodney Island, the reef slope deepens gradually and consequently a large reef slope community occurs' here. Underwater visibility never exceeded 6 m as a result of suspended particulate matter and an abundance of plankton.

The reef slope is dominated by soft corals, seawhips and hydroids.

Mean cover estimates derived during the dives were as follows: hard corals - 10%; soft corals - 60%; hydroids - 20%; algae and sand - 10%. The soft corals include Sarcophyton trocheliophorum, Dendronephthya sp., Xenia elongata, Junceela sp. and Ctenocella aff. pectinata. Hard corals include Acropora pulchra, Acropora hyacinthus, Turbinaria sp., Pocillopora sp., Platygyra sp., Lobophyllia sp., Goniopora sp., Favia speciosa, Polyphyllia sp. and Oulaphyllia sp.

Numerous algae were observed including Chlorodesmis fastigiata, Dictyota sp., Sargassum sp., Dictyopteris sp., Codium duthiae, Caulerpa racemosa, Caulerpa lentillifera, Caulerpa cupressoides, Halimeda macroloba, Bornetella nitida, Neurvmenia fraxinifolia, Lenormandiopsis lorentzii and Callophycus serratus.

According to Kraft (1984), Rodney Island is the only known collecting site for the alga Callophycus serratus in Australia, although it is known from the Philippines and New Caledonia.

In addition to the above, the following organisms were common: stinging hydroids (Lytocarpus philippinus), fire coral (Aslaeophenia cupressina), nudibranchs (Ceratosoma aff. cornigerum, Dendrodoris tuberculosa, Gymnodoris ceylonica), featherstars (Himerometra sp.), painted lobsters (Panulirus ornatus), a long thin holothurian (Synaptula sp.) and various sponges.

Fishes were abundant and the following were the most numerous: tuskfish (Choerodon schoenleinii, C. venustus), painted sweetlip (Spilotichthys pictus), cod (Epinephelus tukula, E. merra), surgeonfish (Acanthurus xanthopterus), batfish (Platax pinnatus), anglefish (Chaetodontoplus douboulayi), sweetlip emperor (Lethrinus chrysostomus, L. nebulosus), spinecheeks (Scolopsis temporalis), stripeys (Lutjanus carponotatus), fusilliers (Caesio chrysozonus), coral trout (Plectropomus maculatus), goatfish (Parupeneus indicus) and grubfish (Parapercis cylindrica). In addition a number of chaetodontids and pomacentrids were common but detailed identifications were not made.

Intertidal Sandflats

Extensive intertidal sandflats occur between Rodney Island and the mainland. The sand is predominantly siliceous, very fine and with a very low organic content, rendering it almost white. The surfaces of the sandflats are generally level although sand ripples (fine and coarse) are'discernible running parallel to the shoreline.

No macroscopic plants were found on the sandflats; two factors are likely to be involved i.e. the sandflats are mobile and exposure during low tides inhibits plant growth at least during the summer months. Plant debris such as mangrove leaf litter and stranded seagrass and algal material was common and it seems likely that this material is a source of organic matter. for, the infauna inhabiting these sand flats.

General observations showed the following macroscopic species to be commmon: Seastars (Archaster typicus), sand dollars' (Decauonale sp.)and the following molluscs: Oliva caldania, Nassarius pullus, Clypeomorus moniliferous, Clypeomorus brevis and Mactra dissimilis. All of these species are detritivores, presumably feeding on the organic matter in the sand.

In addition to this macroscopic fauna, an infauna exists which is not readily apparent. Quantitative sampling of surface sands using 200 cm^2 samples and a 1 mm sieve was carried out along a, transect across to Rodney Island. The data show that'a diverse' fauna of amphipods, isopods, gastropods and bivalves occur in the sandflats. The species diversity and abundance reach maxima in the mid to lower tide levels.

At high tide, numerous fish occur over these sandflats, feeding on the detritivorous infauna and detrital matter. The most abundant species observed include: Mullet (Liza vaigiensis), black-tipped shark (Carcharinus melanopterus), rays (Himantura uamak, Taeniura lymna, Acrobatus marinari, shovel-nosed rays (Rhinobatos batillum), flathead, (Platycephalus cf. indicus) and whiting (Sillago sp.).

soft-bottom Benthic Communities

These have been arbitarily subdivided into three, namely the seagrass areas that occur just below low water mark adjoining the intertidal sandflats, the deeper sparse seagrass/soft coral areas, and the deep areas of sand and rubble that predominate below approximately 10 metres. All three grade into each other but they are described separately below because of their different appearance.

Seagrass communities

Extensive areas of seagrasses occur in the study area extending down from mean low water. The seaward extent of these communities cannot be accurately mapped but they extend approximately to the 5 metres depth contour at low water.

Several species occur in these communities including Halophila ovalis, Cymodocea rotundata and Halodule uninervis; Halophila minor (= H. ovata) also occurs but it is confined--to the areas less than 2 metres deep at low water. These communities vary in density and are often patchy and they rarely exceed 10 cm in height . Occasional algae also occur but these are a minor component.

Seagrass/Soft coral communities

These communities occur around Rodney Island at a depth ranging from 5 - 10 metres at low water. Soft coral cover (mainly Xenia and Dendronephthya) comprises about 30% in these communities with the remaining sandy areas supporting sparse stands of seagrasses including Halophila ovalis and Halophila spinulosa. Large fan-like sponges also occur, often covered in the striped holothurian, Synaptula sp. Other conspicuous invertebrates include seastars (Protoreaster nodosus and Pentaceraster sp.), the holothurian, Bohadschia sp, and the painted lobster Panulirus ornatus.

Sweetlip emperor (Lethrinus spp.), trevally (Caranx sp.) and a burrowing goby were the only fish observed during the survey of this community.

Sand/rubble community

This community extends down from approximately 10 metres. Rubble and coarse sand comprise the substrate and except for a few species of algae and hydroids, few organisms were observed.

REGIONAL PERSPECTIVES

Shelburne Bay contains extensive seagrass beds, mangroves, fringing reefs and vast tracts of sandy heath hinterlands. The tropical climate and clear waters, the largely sandy hinterland and the large bay sheltered from the prevailing south-easterlies combine to form a coastal system unique 'in Australia. It comprises an area of primary dugong habitat, contains a sizeable population of the endangered saltwater crocodile and the rare mangrove palm (Nypa fruticans) and it supports regional crayfish and barramundi fisheries, respectively based on the fringing reefs and estuaries of the area. In addition, the offshore areas are trawled for prawns.

The Rodney Island - Round Point area comprises the eastern extremity of Shelburne Bay and on a smaller scale, displays the diversity of habitats that characterizes Shelburne Bay. Extensive sandflats and seagrasses occur in the area and a well-developed fringing reef surrounds Rodney Island while the mangrove fringe and the fig forests of Rodney Island support large numbers of Torres Strait pigeons, a species of restricted distributionin Australia.

Nevertheless, none of the marine community types found in and around Rodney Island (or in Shelburne Bay generally) are rare but the combination of all of these in a relatively confined area has produced a unique system of high scientific value.

Acknowledgements

I thank D. Norman for field assistance, and the following for identification of material: P. Davie (crustaceans), P. Hutchings (polychaetes), R. Willan (molluscs) and R. Mackay (fish).

References

Kraft, G.T., 1984. Taxonomic and morphological studies of tropical and subtropical species of Callophycus (Solieriaceae, Rhodophyta). Phycologia 23:53-71.