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AN ASSESSSMENT OF A PATCH REEF COMMUNITY WEST OF PULAU HANTU

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ABSTRACT

A patch reef west of Pulau Hantu (designated as Hantu West) was surveyed using 100m line transects at two locations on opposite sides of the reef at the 3m and 10m depths. Although affected by early reclamation work at Pulau Hantu, and disturbed by regular weekend sport divers, the reef community appears well established. A total of 31 genera, comprising 69 species of hard corals, was recorded. Results also showed differences in live and dead coral cover between depths as well as between sites, with the highest coral cover (62.0%) at the 3m depth of the western site and the lowest coral cover (4.01%) at the 10m depth of the same site. Foliose and encrusting growth forms dominated the 3m depth of both sites. Differences in the coral community structure between the two sites existed.

INTRODUCTION

Hantu West patch reef (1° 13'N, 103° 44'E) is a small patch reef west of Pulau (=island) Hantu, located 7.5km south of mainland Singapore (Fig.1). The channel separating the patch reef from the island is 50m wide and 18m deep and experiences strong currents during tidal changes. The reef, about 250m long by 150m wide at its broadest point, has been subjected to increased sedimentation since the extensive reclamation of Pulau Hantu, from 1974 to 1976. This subsequent increase in turbidity of the waters resulted in the reduction of visibilty and light penetration over the reef. Water visibility of 1m or less are often encountered. The patch reef, particularly its eastern side, is also frequented by weekend sport divers and snorkellers.

A previous survey was conducted at the 3m depth of two sites at Hantu West as part of a study (Chou & Koh, 1986) characterising the upper reef slope communities of 4 reefs, using a similar survey technique. This paper incorporates the earlier 3m depth transect data with recent data collected from transects at the 10m depth of the same sites.

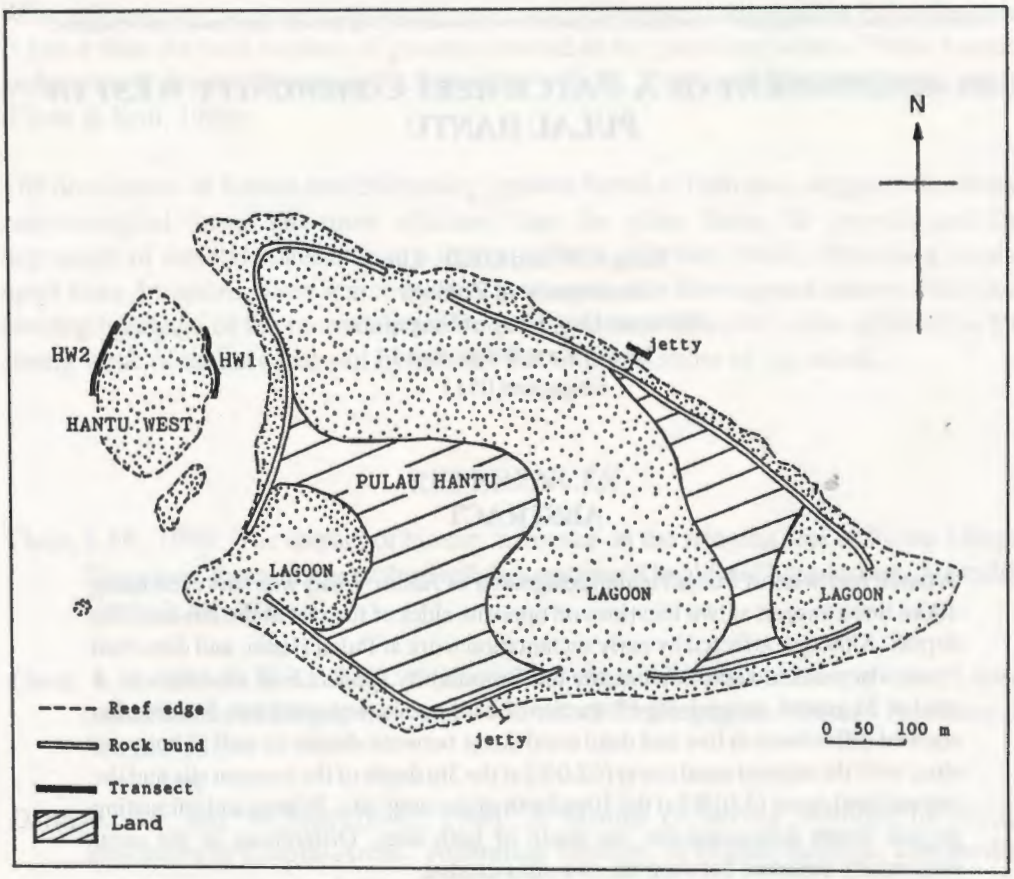

Fig. 1. Map of Hantu West patch reef in relation to Pulau Hantu showing the location of survey sites.

MATERIALS AND METHODS

The 100m line transect technique as described by Dartnall and Jones (1986) was used. It involved the laying of a graduated 100m transect tape at a fixed depth, following the contours of the reef slope. Data gathered from the transects were analysed to obtain the percentage cover of the various reef components at each site and depth. Scleractinian corals were identified using coral taxonomic guides by Veron (1986) and Wood (1983). Transects were established on the eastern (HW1) and western (HW2) sides of the patch reef (Fig. 1), along the slope at the 3m and 10m depths with reference to the reef crest. The survey was carried out using SCUBA equipment between May 1986 and April 1987.

RESULTS

The distribution of the various reef biota and abiota from the transects at the 2 sites is summarised in Table 1 and Fig. 2. The highest live coral cover (62.00%) occurred at the 3m depth of HW1 with the lowest (4.01%) at the 10m depth of the same site. Site HW1 at 10m depth also featured the highest incidence of dead coral (43.78%) and abiotic component (51.08%), which comprised mainly sand. The dead coral cover at the 3m

Table. 1 Distribution of biotic and abiotic components along 100m transects at Hantu West patch reef.

Reef Site	Depth (m)	Percentage cover (%) Live coral	Dead coral	Algae	Other fauna	Abiotic
HW1	3m	62.00	8.79	0.00	0.95	28.26
	10m	4.01	43.78	0.00	1.13	51.08
HW2	3m	35.01	10.31	0.00	10.71	43.87
	10m	13.96	35.19	0.00	1.69	49.16

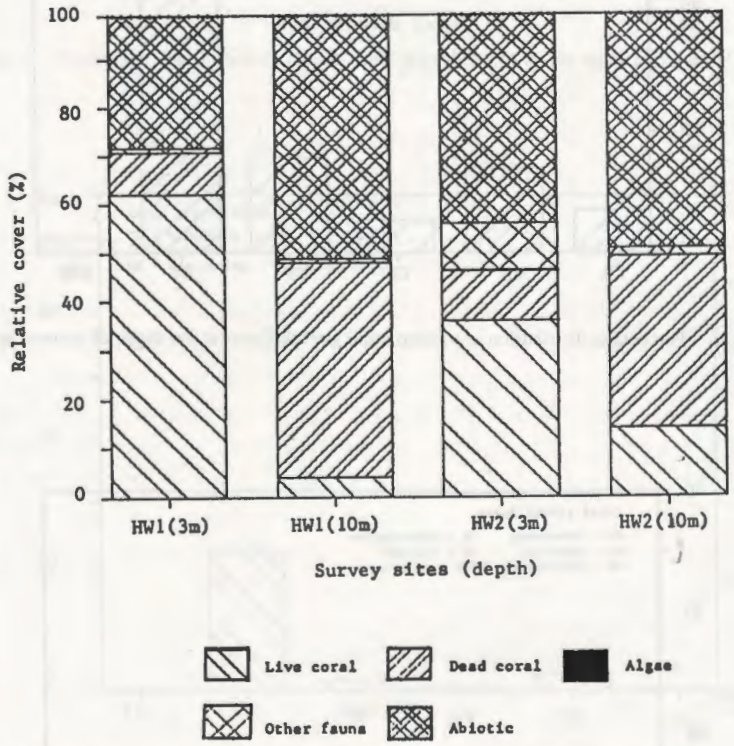

Fig. 2. Stacked bar chart showing relative proportion of various reef components at Hantu West patch reef. (HW1 = eastern site, HW2 = western site)

depth of HW1 and HW2, was 8.79% and 10.31% respectively. The abiotic cover recorded consisted mostly of sand and rubble at both sites and was found to be lowest at the 3m depth of HW1 (28.26%).

Macroalgae was recorded only at the 3m depth of HW2 where it covered 0.1% of the transect. Soft corals at the 3m depth transect of HW2, comprised the highest percentage of non-coral fauna (10.71%). Other fauna also recorded included sponges, sea urchin *(Diadema setosum)* and tunicates.

The distribution of coral growth forms along the 4 transects is presented in Figs. 3 to 6. A notable feature is the absence of *Acropora* species from all the transects. For the shallower depth (3m), corals with foliose growth forms (39.73%) were dominant at HW1, while encrusting forms were dominant at HW2 (23.52%). Along the deeper transects (10m), there was no evidence of dominance by any one growth form at HW1, while corals with massive growth forms were common at HW2.

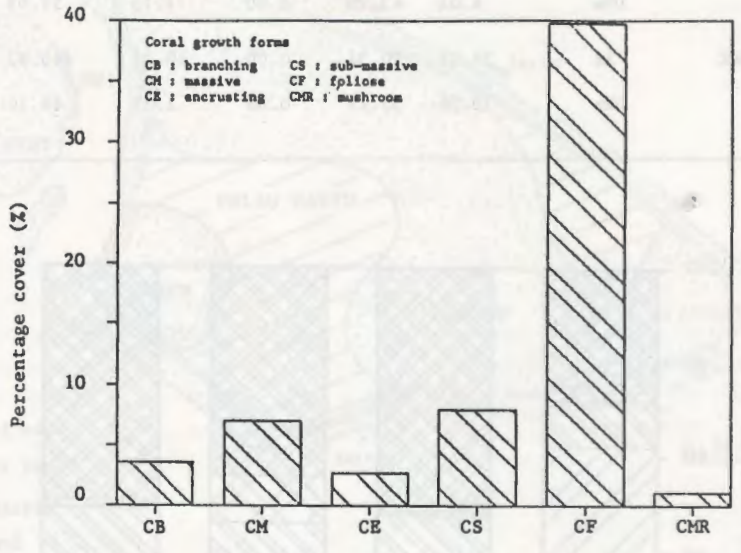

Fig. 3. Percentage distribution of various coral growth forms at 3m depth of transect at HW1.

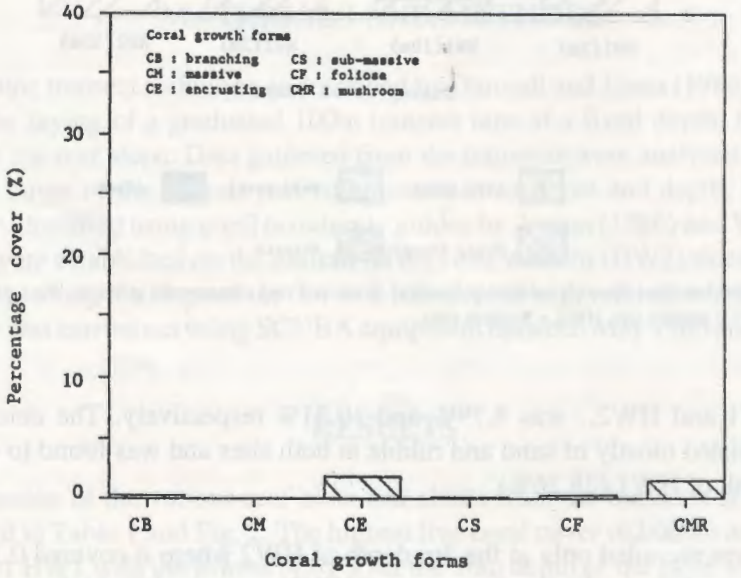

Fig. 4. Percentage distribution of various coral growth forms at 10m depth of transect at HW1.

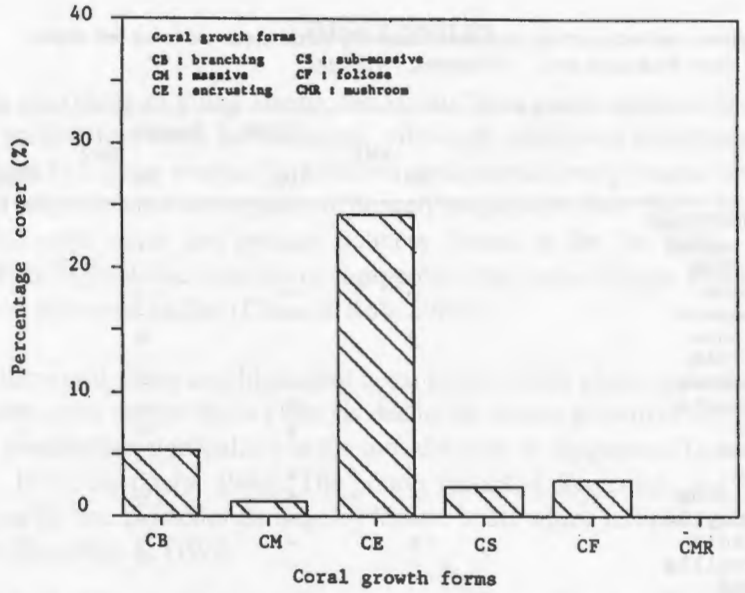

Fig. 5. Percentage distribution of various coral growth forms at 3m depth transect at HW2.

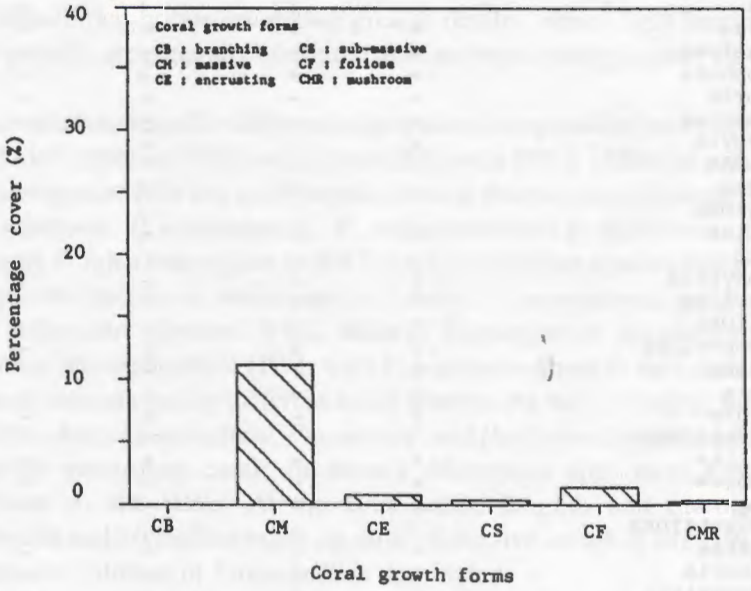

Fig. 6. Percentage distribution of various coral growth forms at 10m transect at HW2.

A total of 31 genera, comprising 69 species, was recorded at the patch reef (Table 2). Fifty-five species were found at HW1, with 43 species at the 3m depth and 17 species at the 10m depth. Thirty-two species were recorded at HW2, with 26 species at the 3m depth and 8 species at the 10m depth.

Table 2. Generic distribution of the hard coral community on the upper and lower reef slopes of Hantu West patch reef. (+ = present, - = absent)

FAMILY & Genera	SITE / Depth HW1 3m	HW1 10m	HW2 3m	HW2 10m
POCILLOPORIDAE				
Pocillopora	-	-	+	-
ACROPORIDAE				
Acropora	-	-	-	-
Astreopora	+	-	-	-
Montipora	+	-	+	-
AGARICIIDAE				
Leptoseris	-	-	-	-
Pachyseris	+	+	+	+
Pavona	+	+	+	-
FUNGIIDAE				
Fungia	+	+	-	+
Herpolitha	-	+	-	-
Lithophyllon	-	-	-	-
Podabacia	+	-	-	-
Polyphyllia	-	-	-	-
PORITIDAE				
Goniopora	+	-	+	+
Porites	+	-	+	+
FAVIIDAE				
Cyphastrea	+	-	+	-
Diploastrea	-	-	-	-
Echinopora	+	-	-	-
Favia	+	+	+	+
Favites	+	+	-	-
Goniastrea	+	-	-	-
Hydnophora	+	-	+	-
Leptoria	-	-	-	-
Montastrea	+	-	-	-
Platygyra	+	-	+	-
OCULINIDAE				
Galaxea	+	-	+	-
MERULINIDAE				
Merulina	+	-	+	+
MUSSIDAE				
Lobophyllia	+	-	-	-
Symphyllia	-	+	-	-
PECTINIIDAE				
Echinophyllia	+	+	+	-
Mycedium	+	+	-	-
Oxypora	+	-	-	-
Pectinia	+	-	+	-
CARYOPHYLLIIDAE				
Euphyllia	+	-	+	-
Physogyra	+	-	-	-
Plerogyra	+	+	-	-
DENDROPHYLLIIDAE				
Tubastrea	-	-	-	-
Turbinaria	+	-	-	-
Dendrophyllia	-	+	-	+
Total no. of genera	27	11	15	7

DISCUSSION

Due to its proximity to Pulau Hantu, the Hantu West patch reef had been affected by previous reclamation work on the island. Although additional disturbance is presently being caused by regular weekend sport divers and snorkellers (personal observation), the upper reef slope community appears to be well established. Site HW1, in particular, had the highest coral cover and species richness found at the 3m depth. This site also contained the highest live coral cover compared to the reefs of Pulau Hantu, P. Semakau and Cyrene surveyed earlier (Chou & Koh, 1986).

The low live coral cover and high dead coral cover which characterised the reef slopes of both sites at the deeper depth (10m) is due to the poorer growth of corals as a result of low light penetration, particularly in the turbid waters in Singapore (Goreau, 1963; Roy & Smith, 1971; Sheppard, 1982). The poorer record of live corals at HW1 than HW2 (Fig.2) may be due to anchor damage by leisure boats which have been observed at this site more often than at HW2.

Flat, explanate growth forms were dominant at both sites, with foliose forms at HW1 and encrusting forms at HW2. These growth morphologies may be more effective than others in gathering light in the turbid waters, and to utilise limited light for growth (Davies, 1980). Furthermore, studies on the bathymetric distribution of corals in the Ryukyu Islands showed that corals inhabiting greater depths, where light becomes a limiting factor for growth, are generally of discoid, foliose or encrusting forms (Yamazato, 1969).

There was also considerable differences in species composition between both sites. Site HW1 had many species which were absent from site HW2. Different representatives of two common genera *(Porites* and *Fungia)* found at the two sites illustrate this difference. *Porites cylindrica, P. australiensis, P. stephensoni* and *P. lichen* were found at HW2 whereas only *P. lutea* was unique to HW1, with the common species being *P. nigrescens.* For *Fungia,* the species *F. moluccensis, F. danai, F. paumotensis* and *F. repanda* were recorded at the 10m depth of HW2 while *F. klunzinger, F. fungites* and *F. scutaria* were found at the 3m depth of HW1, with *F. scabra* common to both sites. The two sites also showed dominance by different coral species. At the 3m depth, foliose corals of *Pectinia* spp., *Merulina ampliata, Pavona* spp. and *Pachyseris* spp. were dominant at site HW1, while encrusting corals of mainly *Montipora* spp. were found in highest concentration at site HW2. At the 10m depth, fungiids and encrusting corals of *Echinophyllia* and *Mycedium* made up most of the live corals at site HW1 while at site HW2, massive colonies of *Favia pallida* dominated.

This study has shown that the Hantu West patch reef is tolerating the impact of human disturbance. The community structure between the two sites of the reef is different, harbouring different coral species. This difference, as well as the decrease in coral cover and species richness with depth can be fully characterised after additional transects are performed at the reef crest and the 6m depth.

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