

NOTES ON THE RECOVERY OF THE CORAL REEF AT  
PESCADOR ISLAND, OFF MOALBOAL, CEBU,  
PHILIPPINES, FROM TYPHOON DAMAGE

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Typhoon Nitang virtually decimated the live corals on the reef flat at Pescador Island on 2 September 1984. About a year later, the bare rocky substrate had shown little recovery in terms of area covered by live corals.

Coral reefs are known to suffer destruction not only from man-induced factors but also from natural catastrophic degradation due to human causes has received considerable attention (e.g. the International Association of Biological Oceanographers-sponsored book, Human Activities Causing Damage to Coral Reefs: Knowledge and Recommendations, about to come out of the press). Stoddart (1969a) summarized the causes of catastrophic mortality of corals, including diseases, siltation, sewage, excessive rainfall and tropical storms. He reported that the major cause of catastrophic coral mortality is mechanical destruction by tropical storms during which coral colonies may be uprooted, carried upward or downward, or fragmented in situ by wave action. Although corals may survive storms, they generally succumb to resulting changes in environmental conditions (Stoddart, 1969a).

Little has been documented on reef recovery following tropical storms. Shinn (1976), using a serial photographic method, reported rapid recovery of Acropora and massive corals in Florida within five years following hurricane-caused destruction. Stoddart (1969a), however, reported that three years after the British Honduras hurricane the only corals living in any quantity were those which had survived the storm; wide reef areas were blanketed by algae, primarily Padina and Halimeda. Stephens and al. (1958) suggested that settlement of planulae is inhibited by the morbidity of debris formed by storms, and they estimated that 20-year reef recovery, which some authors (e.g. Stoddart, 1969a) believe to be underestimated.

In the Philippines, reef damage from natural forces and subsequent recovery has not been well documented. The only published recovery study available to us is that by Alcala and Gomez (1985) on dynamite-blasted reefs.

This brief note reports on the typhoon damage inflicted on the Pescador Island reef and the initial recovery during a period of 11 months following a severe storm. Typhoon Nitang, with

ated 200 kph center winds and 3 m waves, swept through the Visayas on 2 September 1984, causing great destruction along its path.

Pescador Island is a coralline island situated in Tañon Strait about 3 km off the coast of Moalboal, western Cebu. The reef surrounding the island is an oval-shaped fringing reef composed of a gradually sloping reef flat with an area of less than one hectare to a depth of five meters and a steep slope deeper than five meters. Like most pristine reefs in the Philippines, Pescador reef was a mixture of hard and soft corals and inhabited by a wide variety of invertebrates and reef fishes (Fig. 1.). The reef was dominated mostly by branching hard coral species (Acropora, Pocillopora, Millepora, Porites and Stylophora) and species of massive corals (Porites, Favia, Coeloseris and Favites).

#### METHOD

The Pescador reef was surveyed three times during a period of 11 months after the typhoon damage. To serve as a basis for estimating the areal coverage of the live corals and the various substrate types in the study area, 16 lm x 1m random quadrats (total area 16 sq m) were taken during each visit. The coral recruits were measured with a caliper. Photographs of the study area were taken with a Nikonos IV-A camera. All observations were made with the aid of SCUBA.

#### ANALYSIS OF RESULTS

##### Percentage Live Coral Cover.

Pescador reef prior to the typhoon damage had a live coral cover of 51 - 60%, falling within the category of "good" reef (Fig. 1). This assessment was based on (1) a sample of five 1m x 1m quadrats taken on 11 April 1978, which gave an estimate of 60% live coral cover (actually 23.0% soft corals and 36.3% hard corals, or 59.3%) (Marine Science Center Report, 1979, Section 1) and (2) a transect sample, which gave an estimate of 51.8% cover (12.5% soft coral and 39.3% hard coral) in 1983 (White, 1984). The moderately-high live coral cover had most likely been maintained because the reef was protected by the municipality of Moalboal.

On the first visit on 24 September 1984, three weeks after the typhoon occurrence, the rock substrate of the reef flat appeared bare (Fig. 2). All corals, except for a few surviving colonies of small massive species (Porites, Favia and Favites) and broken colonies of branching species (Acropora,



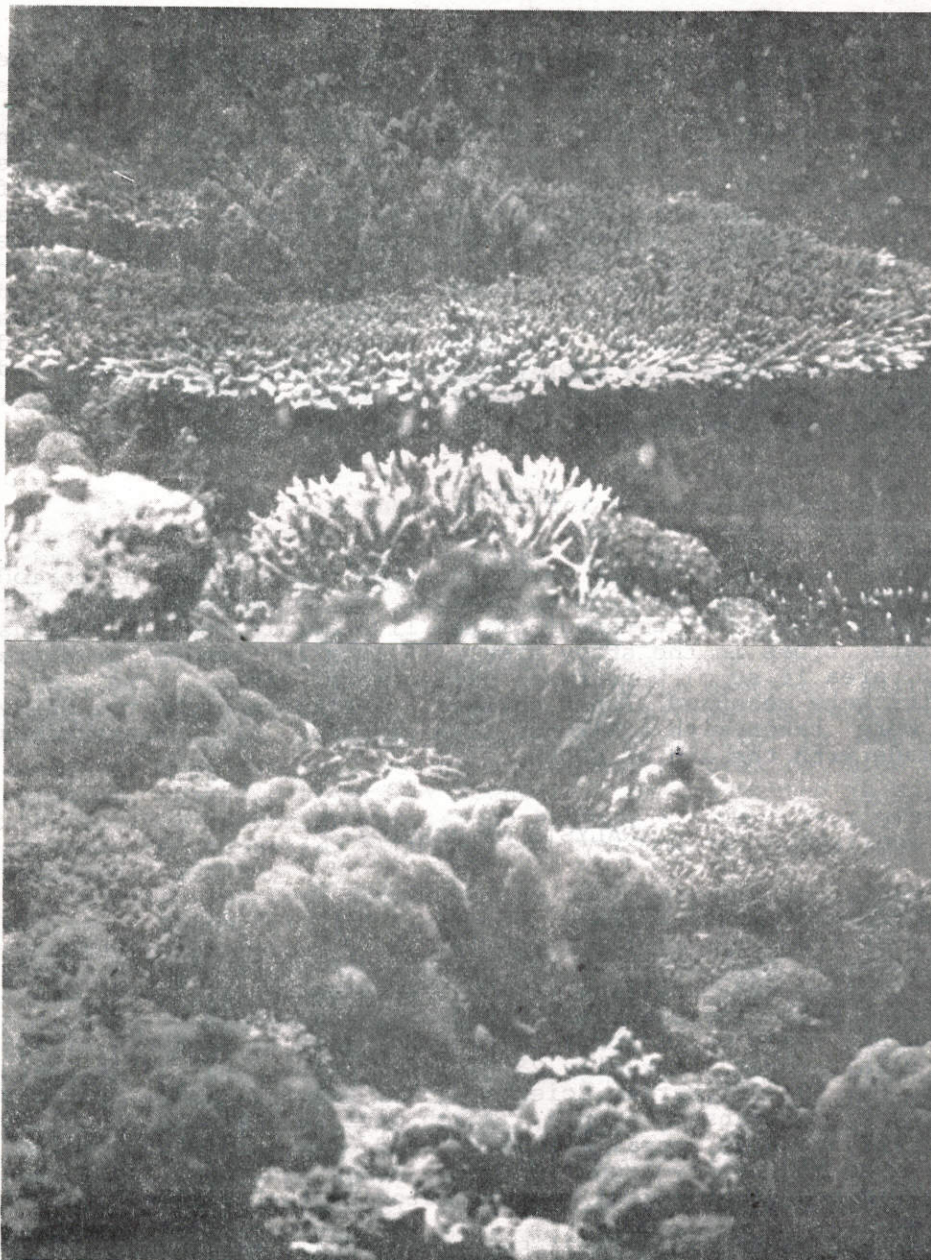


Fig. 1. Two views of the Pescador Island reef flat, showing good cover of hard and soft corals prior to typhoon damage. Pictures taken in 1978. Note abundance of small fish, many pomacentrids.



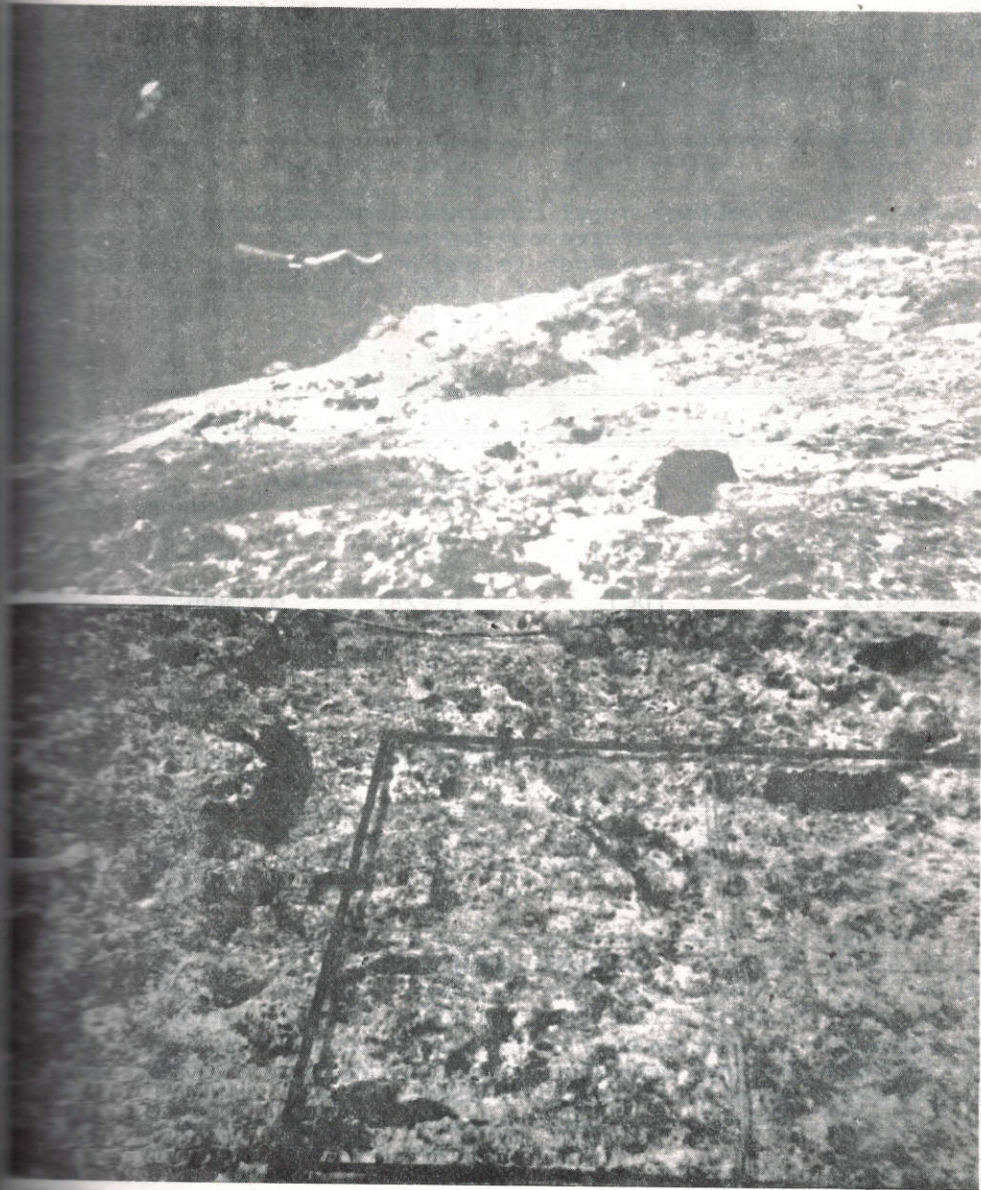


Fig. 2. Two views of the Pescador Island reef flat after damage by Typhoon Nitang, showing the rocky substrate in the same area shown in Fig. 1. A. Appearance of the reef flat on 24 September 1984. Black object is the sea cucumber *Stichopus chloronotus*. Part of the reef flat on 10 February 1985. Black objects are *Stichopus chloronotus*. Hard coral recruits are too small to be identifiable.

Pocillopora, Millepora and Stylophora), having been swept away by the force of the typhoon. Only about 4% of the area was occupied by live coral (Table 1). This percentage had not significantly increased by the next two visits in February and August 1985 (Table 1 and Fig. 2).

Table 1. Percentage areal cover of live corals and the various categories of reef substrate on the southeastern section of Pescador Island reef flat as determined by the quadrat method during the three visits. Number of quadrats per visit was 16 (total area 16 sq m).

		9/24/84	2/18/85	8/3/85
Soft Coral	[SC]	0.0	0.0	0.42
Live Hard Coral	[LHC]	4.296	5.078	8.75
Dead Coral	[DC]	13.281	12.890	7.50
Coral Rubble	[CR]	5.078	3.515	7.10
Rock	[R]	77.343	77.734	76.25
Sand	[S]	0.0	0.781	0.0

#### Coral Recruits.

Measurable hard coral recruits were observed on the second visit on 18 February 1985. Data on 40 recruits are summarized in Table 2. The mean diameters of these recruits ranged from 25 to 46 mm, and the mean areas they occupied ranged from 6 to 13 sq cm. Our data are useful in that they give a picture of the extent of recolonization after one year. Permanent quadrats have been set up for future monitoring of live coral cover.



Table 2. Summary of data on hard coral recruits on the southeastern section of the reef flat at Pescador Island, off Moalboal, western Cebu, following destruction by Typhoon Nitang on 2 September 1984.

Genus or Species	Number of Colonies	Months after Typhoon	Short and Long Diameters of Smallest & Largest Colonies (mm)	Diameter (d) in mm			Area (cm <sup>2</sup> )		
				Range	Mean ± SD		Range	Mean ± SD	
<i>Solenastrea micranthus</i>	5	5	22 x 18; 50 x 42	20 - 46	31.3 ± 11.91		3.14 - 16.62	8.58 ± 6.21	
<i>Solenastrea</i>	2	5	41 x 37; 51 x 36	39 - 43.5	46.25		11.94 - 14.86	13.40	
<i>Solenastrea</i>	18	11	14 x 12; 60 x 55	13.0 - 57.5	25.63 ± 11.52		1.33 - 25.97	6.23 ± 6.63	
<i>Solenastrea</i>	6	11	56 x 42; 20 x 14	17 - 49	30.75 ± 12.19		2.27 - 18.86	8.40 ± 6.41	
<i>Solenastrea lutea</i>	6	11	52 x 47; 18 x 16	17 - 49.5	31.50 ± 11.98		2.27 - 19.24	8.73 ± 6.29	
<i>Solenastrea</i>	2	11	53 x 29; 39 x 31	35 - 41	38.0		9.62 - 13.20	11.41	
<i>Solenastrea</i>	1	11	44 x 34	39			11.95		

Long Diameter + Short Diameter

determined by the formula: -----

2

2

d

determined by the formula: --

4

#### ACKNOWLEDGEMENTS

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