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COLONISATION AND GROWTH OF MARINE ANIMALS ON ARTIFICIAL REEFS AT BATU PENYU, TALANG-SATANG NATIONAL PARK, MALAYSIA

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SUMMARY

The artificial reefs at Talang-Satang National Park were constructed for marine conservation using concrete reef balls. Since 1998 about one thousand reef balls have been deployed around the coast of Sarawak. This is the first reef ball project in Asia and was instigated for conservation purposes. The National Park has important turtle nesting beaches, and reef balls are used to stop trawlers from trawling within the resting areas used by turtles during the nesting season.

This study focused on the presence and absence of easily visible marine life on or using the reef balls at an artificial reef at Batu Penyu within Talang-Satang National Park, and did not attempt to identify organisms to species level. It was found that reef balls are colonised by a range of marine animals and the colonisation rate is very encouraging. The reef balls were tagged for future monitoring. Future studies should include collection and identification to species level to compare the diversity of artificial reefs with natural reefs.

Reef balls appear to be successful as a basis for the growth of new coral reefs. For the purpose of conservation, decisions on the material used should be based on comparative studies of different types of artificial reefs.

INTRODUCTION

The artificial reefs at Talang-Satang National Park were created in 1998 using reef balls. Reef balls are constructed using cement with the same pH as salt water, using special mixtures and micro silica. This ensures that reef balls mimic the natural reef limestone and remain stable. Reef balls can be used to promote regeneration of damaged reef areas, to anchor mooring and marker buoys, and to create recreational SCUBA diving sites, improved fish habitat and lobster nurseries. Reef balls are also useful to stop trawling because they have sharp textured surfaces, which are capable of ripping trawler nets.

The objective of this study is to collect information on the presence and absence of marine organism living on the reef balls deployed in 1998 at Talang-Satang National Park near Batu Penyu, about two kilometres away from Pulau Talang-Talang Besar. No previous research or monitoring programmes have been done by the Forest Department on reef balls.

METHODOLOGY

Out of a total of 180 reef balls making up the artificial reef, six reef balls of each size (small, medium and large) were selected and tagged. Methods for random sampling were considered, but proved impractical when diving.

Sessile animals

A piece of wire mesh 50 cm x 50 cm was placed on the reef balls forming 25 squares each 10 cm x 10 cm. For hard and soft corals, sponges and barnacles, the proportion of squares in which they were present was recorded. Where a patch of coral was centred in one square but overlapped an adjacent square, it was only counted once.

Mobile animals

The numbers of individual sea urchins, molluscs and fish seen on or in the reef balls or using the reef balls (e.g. feeding on the surface) were recorded.

For this study only the large and easily identified animals were recorded. The observation did not count bivalves, which are encrusted with other marine life (e.g. barnacles) and difficult to distinguished separately. No specimens were taken for identification.

RESULTS

The number of sessile animals recorded is shown in Table 1. The numbers for mobile animals seen are shown in Table 2; many crabs and shrimps were seen, but it was impossible to count them properly because they fled rapidly. No cuttlefish were seen.

Table 1: Percentage of reef balls colonised and average cover

Sessile animals	% of reef balls colonised			% of 10 x 10cm squares colonised		
	Small	Medium	Large	Small	Medium	Large
Hard coral	100 %	100 %	100 %	21 %	46 %	56.7 %
Soft coral	83 %	100 %	66 %	7.3 %	32 %	16 %
Sponges	83 %	16 %	83 %	11.3 %	0.3 %	20 %
Barnacles	100 %	100 %	100 %	72 %	80 %	68 %

Table 2: Total numbers and average of invertebrates and fish per reef ball

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	Total	Average numbers per reef ball		
		Small	Medium	Large
Invertebrates				
Sea urchin	24	0.6	0.83	2.16
Lobster	4	0	0.33	0.33
Molluscs	34	4.0	0.5	1
Nudibranch	2	0.17	0	0.33
Fishes				
Butterfly fish	8	0.33	0.5	0.66
Angelfish	11	0.5	0.66	0.66
Snapper	17	0.8	0.5	1.5
Grouper	2	0.17	0	0.16
Sweetlips	2	0	0	0.33
Puffer fish	1	0	0	0.16
Parrot fish	17	0.83	1.16	0.83

DISCUSSION

Method

The method used is suitable for sessile and slow moving animals but not good for lobsters and crabs because they flee. There is also a problem of identifying early stages of growth, so only adults were recorded. Because the reef balls were tagged, it will be possible to repeat the survey in future years and track colonisation and growth. This is the first reef balls project in Malaysia, so no comparisons are available. Information from Marine Fisheries Department in Sarawak on shipwreck and tyre reef monitoring is also unavailable.

Colonisation of reef balls

The results from the study are very promising as there is visible growth of coral and other marine life on the reef balls. After two and a half years, all the reef balls studied had been colonised by hard corals, and barnacles, and most of them by soft corals and sponges. The reef balls are used by large numbers of crabs and lobsters, and typical reef fish such as angelfish and butterfly fish.

CONCLUSIONS

Reef balls can be very effective for marine conservation, as a wide range of marine animals use them, either living on them or using them for shelter or as

feeding grounds.

Although this study only looked at the presence and absence of easily visible marine life on the reef balls, this information will help in planning more detailed research in the future. Specimens should be collected and identified to species level to compare diversity with natural and other types of artificial reefs. Long term monitoring studies of the tagged reef balls would give information on the rate of colonisation and growth of marine animals. Similar studies on other types of artificial reefs, such as tyres, wrecks and building waste should be carried out for comparison.

Reef balls are also effective for preventing trawling, and are especially useful near turtle nesting beaches. More reef balls could be deployed to build reefs for recreational SCUBA diving, as they are used by attractive reef fish.

Reef balls appear to be successful as a basis for the growth of new coral reefs.

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