IMPACT OF MARINA CONSTRUCTION ON SCLERACTINIAN CORALS IN KAMPUNG TEKEK, TIOMAN ISLAND, MALAYSIA

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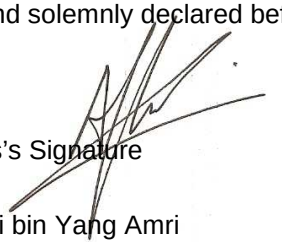
Witness's Signature  Date 18 April 2011

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Abstract

This study was conducted to determine the impacts of newly constructed marina on the adjacent coral reefs in Kampung Tekek, Tioman Island. Two study sites were chosen, consisting of the fringing coral reef adjacent to the constructed marina and a control site 3 nm south which was the fringing coral reef around Pulau Renggis (Pulau=Island). Acute and chronic impacts in two depths (shallow, <6 m and deep, 6-12 m) at the Marina site were studied. To document impacts of the construction, substrate cover percentage and environmental parameters such as sedimentation rate and sediment type were measured. In addition, changes in physiological aspects were monitored on four different coral growth forms. The acute impact study using modified Reef Check showed that there were some negative changes such as coral breakage and increased sand cover (from 6.88% to 22.50 %) and silt cover (from 0% to 16.25%). Differences in substrate cover before and after construction were detected in deep water with higher Recently Killed Corals (%) and shallow water with higher Rubble (%). The chronic impacts study showed that there was a significant difference ($F: 6.735$, $p<0.05$) in sedimentation rate between Marina site (up to mean of 23.37 mg/cm²day in Marina Shallow) and control site at Renggis (mean of 0.59 mg/cm²day). The higher sedimentation rate recorded in Marina site significantly decreased the light intensity to a daily mean of 275.15 Lux. Coral cover % was lower in Marina site (with the lowest average of 24.74 %) compared to control site (53.27 %). Comparison between shallow and deep areas in Marina site showed that Marina Deep was the most affected due to high sedimentation and its lower light intensity. Changes in zooxanthellae density and chlorophyll content of the selected scleractinian coral growth forms indicated that the corals had been under stress due to smothering by sediments in Marina site. Foliose growth form showed more changes in their physiological aspects compared to other

growth forms. Results of this study demonstrated some negative acute and chronic impacts of the marina construction to the adjacent coral reef. Therefore management programs should be improved so as to prevent or at least reduce the impacts of similar constructions at the vicinity of sensitive habitats in the future.

Abstrak

Kajian ini telah dijalankan untuk mengesan impak kepada terumbu karang yang bersebelahan dengan marina yang baru siap di Kampung Tekek, Pulau Tioman (Pulau=Island). Dua tapak kajian telah dipilih iaitu tapak terumbu karang yang bersebelahan dengan Marina dan tapak terumbu karang pinggiran Pulau Renggis yang berada 3nm selatan iaitu tapak kontrol. Kesan akut dan kronik di dua kedalaman (bahagian cetek, <6 m dan dalam, 6-12 m) di tapak kajian marina telah dikaji. Untuk mendokumen impak pembinaan, peratus litupan jenis substrat dan parameter alam sekeliling seperti kadar sedimentasi dan jenis sediment telah di ambil. Tambahan itu perubahan aspek fisiologi bagi empat bentuk tumbesaran batu karang berbeza juga telah dikaji. Kajian impak akut menggunakan kaedah Reef Check yang diubahsuai menunjukkan bahawa terdapat perubahan negatif seperti pemecahan batu karang dan peningkatan litupan pasir (dari 6.88% ke 22.50%) dan litupan selut (dari 0% ke 16.25%). Perbezaan litupan substrat sebelum dan selepas pembinaan telah dikesan di bahagian dalam yang mempunyai ‘Recently Killed Corals’ (%) yang lebih tinggi dan bahagian cetek yang mempunyai ‘Rubble’ (%) yang lebih tinggi. Kajian impak kronik menunjukkan perbezaan signifikan ($F: 6.735$, $p<0.05$) bagi kadar sedimentasi diantara tapak Marina (hingga 23.37 mg/cm²day) dan tapak kontrol, Renggis (0.59 mg/cm²day). Sedimentasi yang lebih tinggi di tapak Marina merendahkan intensiti cahaya kepada nilai purata harian 275.15 Lux. Peratusan litupan karang ditapak Marina adalah kurang (nilai purata terendah 13.74%) berbanding degan tapak kontrol. Perbandingan antara bahagian cetek dan dalam di tapak Marina menunjukkan bahawa Marina Dalam lebih terkena kesan oleh sedimentasi tinggi dan intensiti cahayanya yang rendah. Perubahan densiti zooxanthella dan kandungan klorofil bagi bentuk tumbesaran batu karang terpilih menunjukkan bahawa batu karang di tapak Marina berada di bawah tekanan

‘stress’ oleh kerana dilitupi sedimen. Bentuk tumbesaran ‘Foliose’ telah menunjukkan lebih perubahan dalam aspek fisiologinya berbanding bentuk tumbesaran batu karang yang lain. Keputusan kajian ini memperlihatkan beberapa impak akut dan kronik yang negatif terhadap terumbu karang yang bersebelahan dengan pembinaan marina. Oleh itu adalah disarankan untuk kita memperbaiki program pemantauan yang boleh menghalang atau mengurangkan impak dari pembinaan seumpama ini di masa hadapan.

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