

Initial results from scientific surveys conducted on Cambodia's fringing reefs



On the invitation of the Fisheries Administration (FiA) of Cambodia, Coral Cay Conservation (CCC) has been conducting baseline surveys of the coral reef resources around Koh Rong and Koh Rong Sanleom Islands in the Phrash Sihanouk Province. Results from these surveys indicate that hard coral cover is around 24%. Other dominant substrates were rock and rubble; potentially suitable settling grounds for coral larvae. Anthropogenic impacts were generally low but high levels of sedimentation were found at all survey sites. Macro-algal coverage was generally low and likely inhibited by high turbidity levels in the water. Coral diversity was dominated by massive *Porites* spp. and *D. heliopora* sp. Few foliose and branching coral colonies were seen. In May of 2010, the water temperatures increased to over 34°C, causing significant bleaching with prevalence levels from 31%-45% in shallow-water surveys. We recommend that stakeholders work together to develop a clear management plan that addresses the significant threats of coastal development faced by the coral reefs.

Abstract

*van Bochove, J.H., Vitlin N., Bush V. and Raines P.
Coral Cay Conservation, Elizabeth House, 39 York Road, London, SE1 7NQ www.coralcay.org *jvb@coralcay.org

Introduction

Cambodia's coastline is 435km long and includes 69 islands within the Gulf of Thailand (Touch, 1995). Coral reefs and associated seagrass beds and mangrove habitats fringe many of these islands, providing critical habitats for thousands of marine species. The islands of Koh Rong and Koh Rong Sanleom are found off the coastal Phrash Sihanouk Province. The islands are fringed by diverse shallow-water reefs that closely follow the contours of the coastline. Koh Rong Island has been designated for extensive, tourism-related development over the next 20+ years. The aim of this project is to collect accurate scientific baseline data on the current status of reef, mangrove and seagrass systems around the two islands. The project was initiated through a 3-month pilot phase and is now being continued as a longer-term project under a Memorandum of Understanding between CCC and the Fisheries Administration.

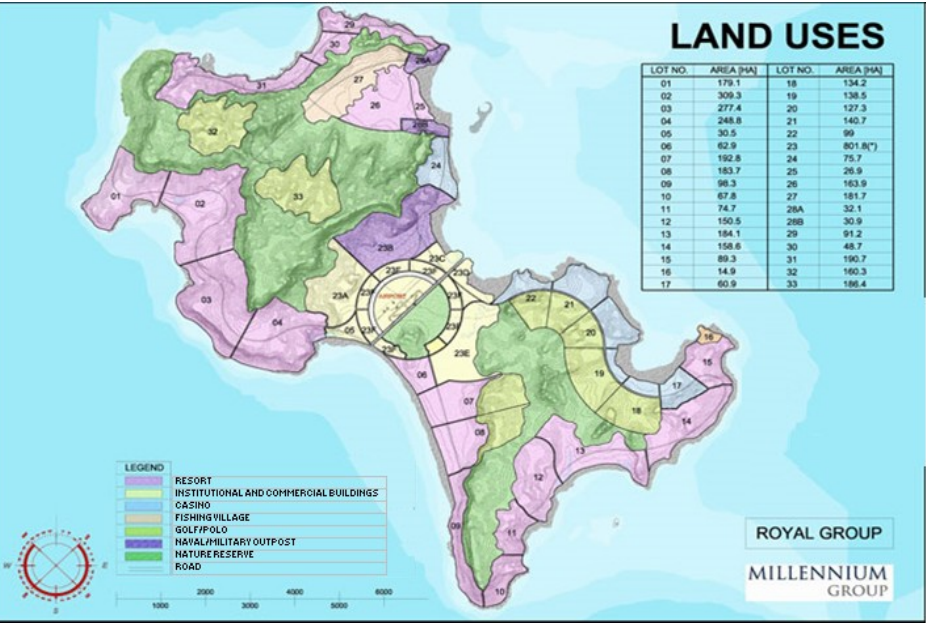


Figure 1. Proposed development plan for Koh Rong Island. Image taken from: <http://www.millenniumgroup.net>

Methods

Extended Reef Check methodology (Hodgson, et al., 2006) was used to survey 43 sites around Koh Rong, Koh Kon and Koh Rong Sanleom islands in order to quantify the abundance, diversity and composition of selected fish, invertebrate and benthic species.

Results

Anthropogenic Impacts

Coral damage was generally found to be low, however, damage from some specific anthropogenic activities was recorded.

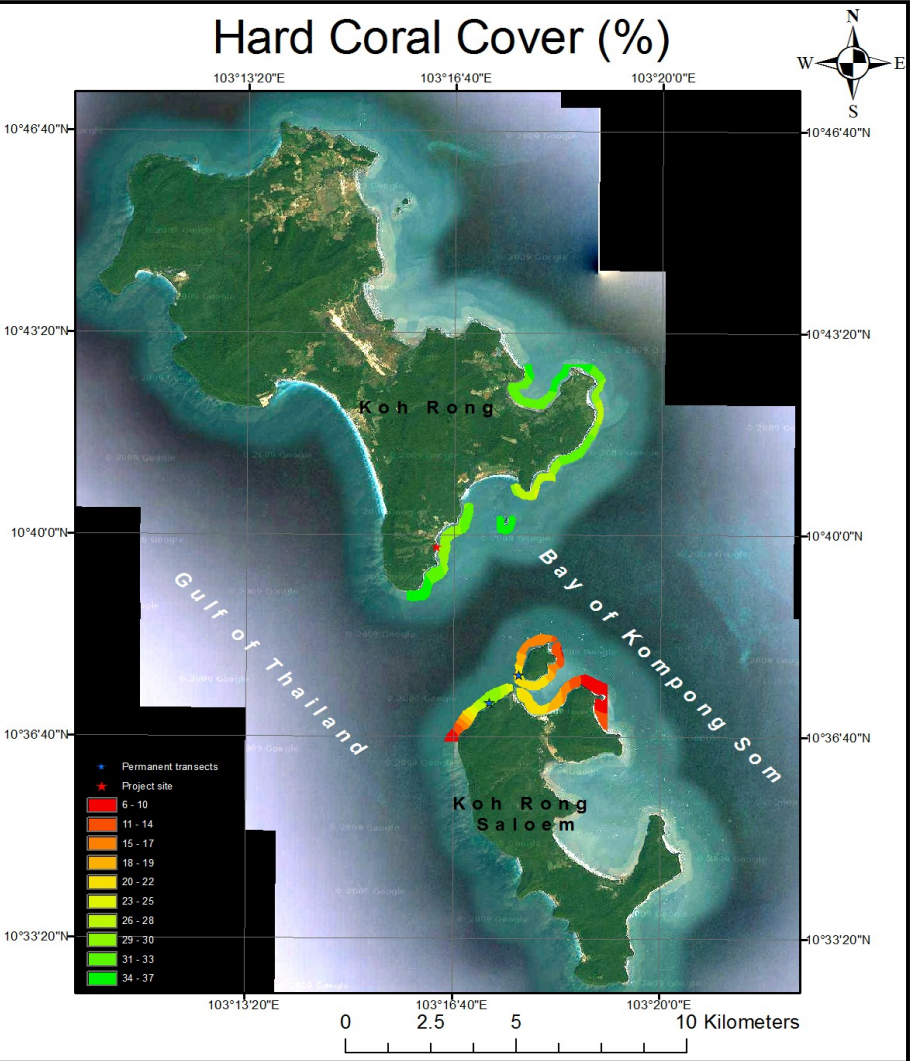


Figure 3. GIS map of hard coral for around Koh Rong, and Koh Rong Sanleom. Colours indicate percentage cover denoted by a gradient from red (low) to green (high).

REFERENCES

Hodgson, G., Hill, J., Kiene, W., Maun, L., Mihaly, J., Liebel, J., Shuman, C. and Torres, R., (2006). Reef Check Instruction Manual: A Guide to Reef Check Coral Reef Monitoring. Reef Check Foundation, Pacific Palisades, California, USA
Touch, S.T. (1995). Present Status of Fisheries in Cambodia and the Development Action Plans. The Department of Fisheries. Phnom Penh

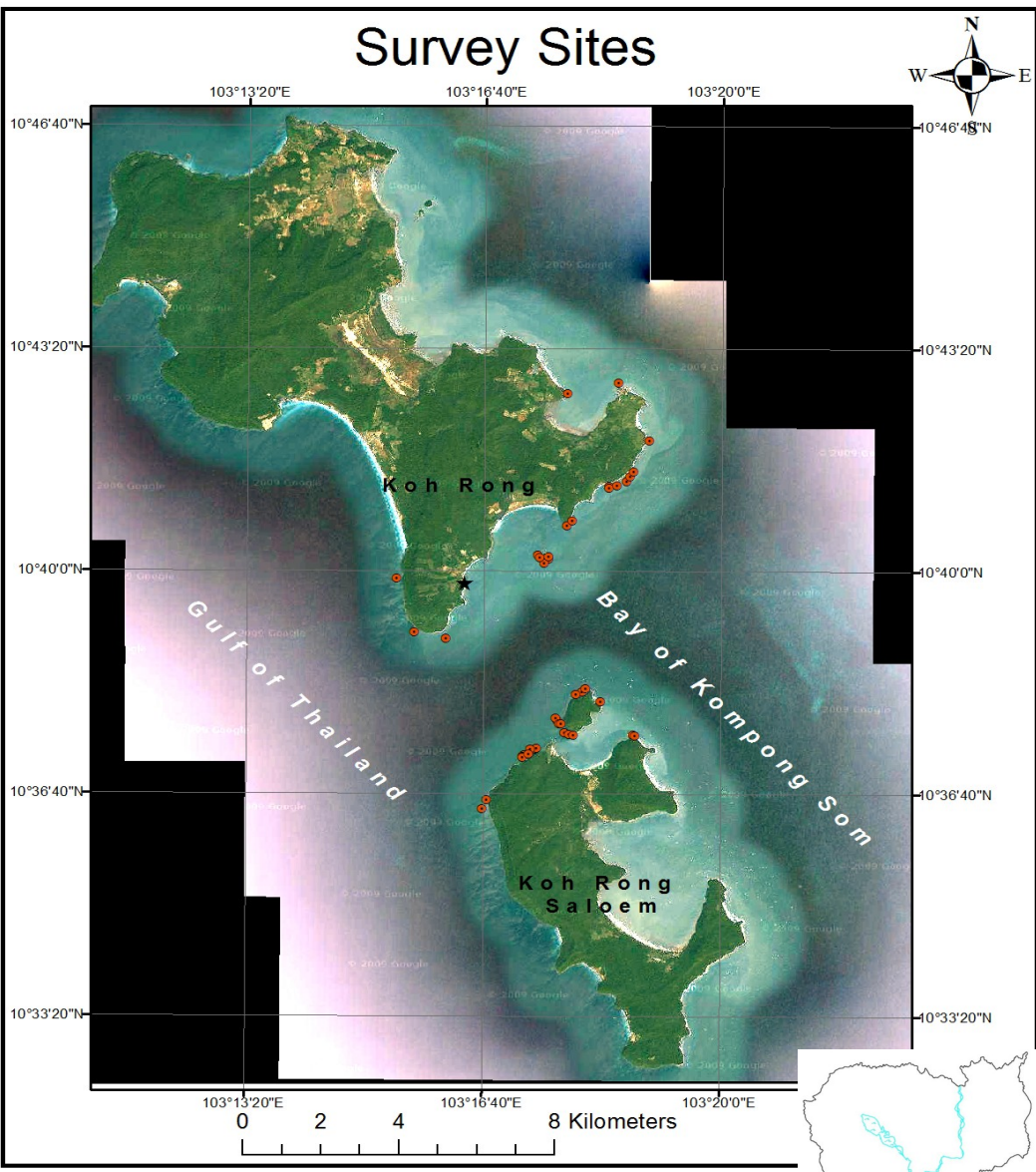


Figure 2. GIS map of the 43 survey sites around Koh Rong and Koh Rong Sanleom. The project site is indicated by the star symbol.

Coral Diversity

Hard Coral Species	% Cover
<i>Porites massive</i>	50.3
<i>Diploastrea heliopora</i>	12.9
<i>Pavona decussata</i>	6.9
<i>Favia spp.</i>	4.8
<i>Galaxea spp.</i>	3.0
<i>Favites spp.</i>	4.5
<i>Pocillopora "medium"</i>	1.6
<i>Goniopora/Alveopora spp.</i>	1.9
Brain "Small"	2.6
<i>Lobophyllia spp.</i>	2.8
<i>Podabocia spp.</i>	1.3
Brain "Medium"	0.9
<i>Echinopora spp.</i>	0.6
<i>Pocillopora "small"</i>	0.4
<i>Turbinaria spp.</i>	0.7
Brain "Large"	0.9
<i>Montipora foliose</i>	0.6
<i>Porites rus</i>	0.3
<i>Plerogyra spp.</i>	0.1

Coral species diversity was generally low and comprised mainly of massive colonies such as *Porites* massive (50%) and *D. heliopora* (13%). Branching corals were rarely encountered. Foliose corals were comprised mainly of *Turbinaria* and *Montipora* species but were rare.

Figure 4. Coral species composition as a percentage of all target coral species and groups encountered on surveys.

Discussion

Coral cover was variable between sites but generally low at most reefs. Foliose and branching corals were not commonly seen and have most likely been harvested and sold as souvenirs, removed in coral mining activities or died from high sedimentation levels. Commercially targeted families such as Snappers, Groupers and Parrotfish were generally quite low in abundance and although not expressed here, their sizes were rarely that of a mature individual. Indications of fishery related anthropogenic impacts on the reefs were generally low. Some sites had clear impacts such as anchor damage, nets and direct damage to the corals. However, the impact of greatest concern was the high level of siltation smothering the reefs and the recent mass-bleaching event. The proposed development plans for Koh Rong Island will put an enormous stress on the area's coral reef resources. Mitigation measures aimed at minimising the amount of land run-off, sewage outfall and direct impacts to the reef need to be implemented as part of the development plans.

Coral Cover and Benthic Composition

Coral cover was around 24% on average for all reef sites surveyed. High coral cover (~40%) was found around the north-western side of Koh Kon Island as well as the northern side of Koh Rong Sanleom Island (figure 3). Other dominant substrates were sand, rock and silt.

Benthic Composition

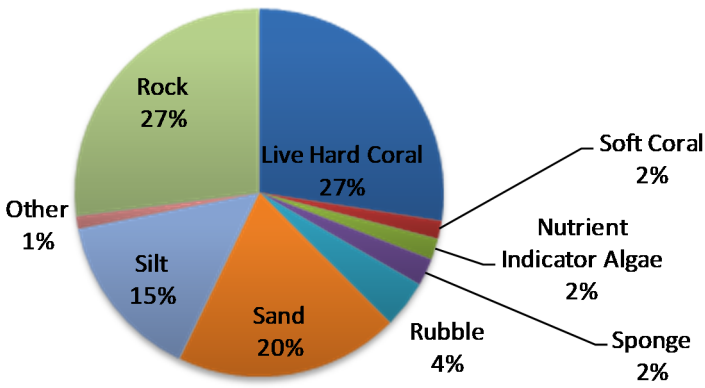


Figure 5. Composition of benthic substrates (biotic and abiotic) across survey sectors.

Coral bleaching

Initial surveys showed bleaching prevalence to be approximately 44%, with most of these colonies 100% bleached. Anecdotal observations at other reef sites indicated bleaching levels close to 100%.

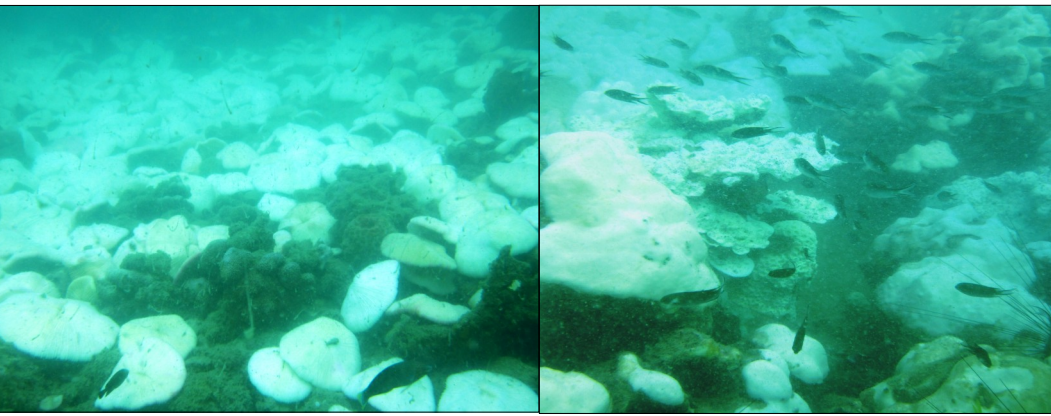


Figure 6. Images displaying the extent of bleaching on survey sites around Koh Rong and Koh Rong Sanleom. Images taken early May, 2010

Fish

Predatory fish abundances including Snappers and Groupers were low, indicating significant fishing pressure on the reefs. The same holds true for Parrotfish abundances.

Fish Abundance

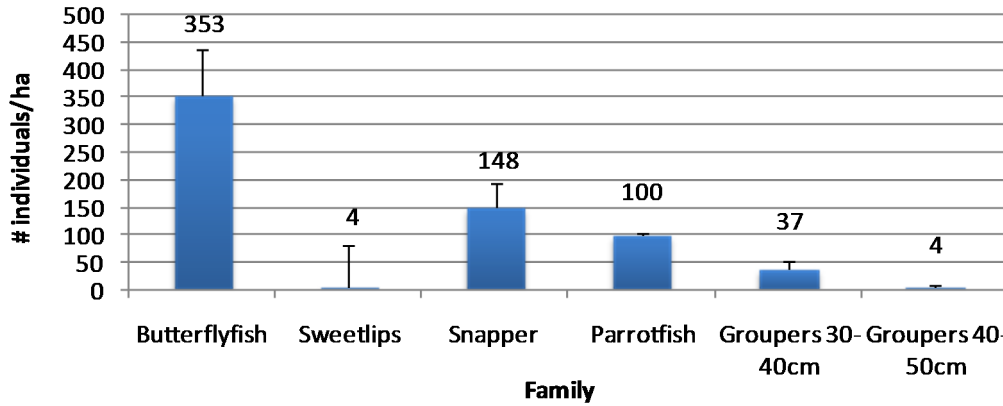


Figure 7. Densities of 5 key indicator fish families per survey sector. Error bars indicate standard

