

Effects of Coastal Development on Coral Reef Fish Communities in Dubai, UAE

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Synopsis

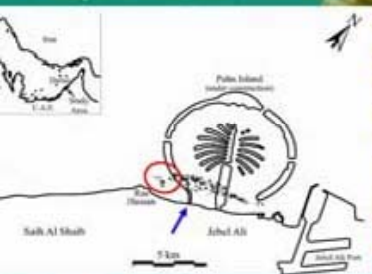
Unprecedented rates of development along tropical coastlines are causing severe degradation to coral reef ecosystems. While the effects of large-scale coastal development (i.e. dredging, coastal modification, agriculture) on coral reefs are relatively well understood, their consequences on the associated fish communities are less well known. Here we examined changes in coral reef fish communities associated with a coral reef that was adversely affected by an adjacent large-scale coastal development in Dubai, UAE.

Objectives

- Track changes in coral and fish communities
- Assess the effect of loss of live coral on fish communities

Study area

Figure 1. Study area, Dubai, UAE, Persian Gulf.



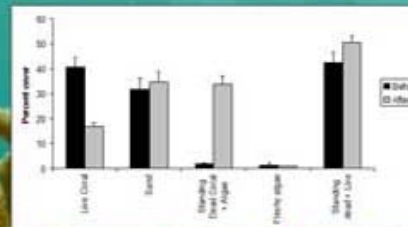
The study site was the natural reef area of Saish Al-Saib (Western side of Dubai, United Arab Emirates, Persian Gulf.) Patch reef studied shown in red. Blue arrow shows a causeway whose construction increased sedimentation in the area (impact) (Figure 1).

Methods

During each coral sampling event, 80 photo-quadrats (25 x 25 cm) were photographed and analyzed using 50 random points. During each fish sampling event, 10 transects (30 x 1 m) were visually censused. Sampling was conducted before and after construction of the causeway (Figure 1). Sampling dates were: Fall 2006 (7 months prior to construction) (fish and coral), Winter 2006 (4 months prior) (fish and coral), Spring 2007 (2 weeks prior) (fish and coral), Fall 2007 (5 months after) (fish and coral), Spring 2008 (12 months after) (fish and coral).

Results

Figure 2. Coral assessment showing percent cover of live vs. dead coral before and after the impact.



- Live coral percent cover decreased significantly (60%) (Figure 2).

- No significant differences between live coral + dead standing coral before and after the impact (Figure 2)
- Suggests that the physical structure did not change

- For fish, due to inter-seasonal variation, only values for the same season can be compared (red and blue rows in Table 1).

- Reduction in fish species: Fall: 43%, Spring: 31% (Table 1)
- Reduction in total abundance: Fall: 53%, Spring: 39% (Table 1)

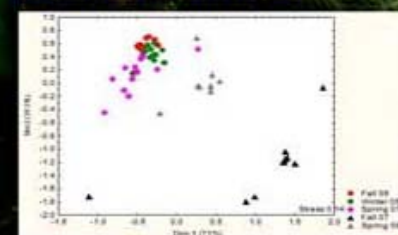
- Previously common invertivore species disappeared completely, and were replaced by one herbivorous species.

- MDS ordination shows pre- and post-impact differences to be greater than inter-seasonal variation (Figure 3).

Table 1. Number of fish species and total abundance among seasons.

Season	Species	Total Abundance
Fall 2006	14	509
Winter 2006	13	494
Spring 2007	13	205
Fall 2007	5	110
Spring 2008	9	175

Figure 3. MDS ordination of fish transects sampled before and after the impact.



DISCUSSION

An increase in sediment load from the development led to a significant loss in live coral cover within the reef; however, the physical complexity of the reef did not change. This loss of live coral led to extensive changes in the structure of the fish community associated with the reef. The results of this research suggest that reductions in live coral cover, without substantial changes in the physical structure of the reef, may have profound effects on the abundance, diversity and composition of coral-associated reef fish communities.

Acknowledgments

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