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Successional dynamics of macroalgae and corals on patch reefs in San Salvador, Bahamas
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This research focused on assessing successional responses of patch reef macroalgal and coral communities to an experimental disturbance. Succession is the process by which ecological communities become re-established following a disturbance. This project sought to evaluate how quickly macroalgae recovers after a disturbance and the effect that has on corals. Data were collected on the island of San Salvador, Bahamas. Five pairs of control and experimental 1m² plots were established on patch reefs located at Dump Reef on the island of San Salvador on January 2019. Experimental plots had as much macroalgae removed as possible (~ 60% overall); control plots were not altered in any way. Photos were taken of all the plots before and after the experimental disturbance (removal of algae), and then again five months later in May. The photos were analyzed using image analysis to assess the percent cover of macroalgae and coral, with a software called CPCe, and analyzed statistically to assess successional changes. The experimental disturbance resulted in an ~ 50-60 % increase in bare space. After five months, there was no significant difference in bare space among the treatments. A non-metric multidimensional scaling analysis showed that the community structure from the experimental plots was very similar to the control plots, but there was still some variation among treatments. After the removal of algae and the five months had passed, the brown algal species *Lobophora variegata* recovered, and there was no significant difference in percent cover between treatments. *Microdictyon marinum* increased in both treatments, suggesting a seasonal change throughout the reef and not just among treatments.

Five months after removing the macroalgae from the experimental plots, it was evident that the macroalgae had grown back and that the benthic community was similar to how it was before the experimental disturbance. However, the structure of the community suggests that the succession is still not finished, as there is still some variation among treatments. It can also be argued that the growth rate of macroalgae is too fast and does not allow time for coral recruitment, outcompeting corals for space. Given that the most abundant species was *Lobophora variegata* we can argue that its abundance may be negatively affecting the corals. Morrow et al. (2017) showed that *Lobophora variegata* has allelochemicals that negatively affect the growth of corals.

Although various species appeared after the removal of algae in the experimental plots, the most abundant were *Lobophora variegata* and *Microdictyon marinum*. After the removal of algae, there was not any new recruitment of corals, and the succession was algal dominated with little/no change in coral abundance. The rapidity of the macroalgal succession suggests that disturbances may not provide opportunities for corals to re-establish themselves in open space as that open space is quickly taken by macroalgae.

References:

Morrow K, Bromhall K, Motti C, Munn C, Bourne D. 2017. Allelochemicals produced by brown macroalgae of the Lobophora genus are active against coral larvae and associated bacteria, supporting pathogenic shifts to vibrio dominance. Applied and Environmental