Combining Environmental Monitoring and the Fossil Record to Support Coral Reef Management in the East Portland Special Fishery Conservation Area, Jamaica

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Global warming and human impacts continue to be devastating to coral reef systems. Jamaican reefs have been adversely affected by a variety of threats including hurricanes, coral bleaching, disease, and algal overgrowth, the impact of which has been exacerbated by overfishing and urchin mortality. Despite the dire situation, with proper protection, algal-coral phase shifts can be reversed. One area where efforts are being made to reverse this shift is the East Portland Special Fishery Conservation Area (EPSFCA). The EPSFCA is a marine protected area and "no take zone" monitored by the Alligator Head Foundation. The Alligator Head Foundation manages coral and mangrove nurseries and leads monitoring and community-driven restoration practices.

Although reefs in some parts of Jamaica, such as Discovery Bay, are well studied, few ecological studies have been extended to other regions around the island. The unique reefs of northeast Jamaica lack critical data necessary for conservation efforts; no baseline information on community composition had been done until the establishment of the Alligator Head Foundation in 2016. Reef management and protection requires information about how these reefs will respond on short, long, and geological timeframes. To obtain an ecological baseline, this project synthesizes environmental and water quality data (nutrient levels, alkalinity, temperature, and light) with community assemblage data (fish counts, benthic substrate assessments, and invertebrate counts) from EPSFCA reefs. The similarities and differences between these sites will be compared using ordinations. To address a longer timeframe, this project will use similar techniques on a nearby fossil reef to see how northeast Jamaican reefs have changed over thousands of years.

An analysis of EPSFCA reefs monitored from 2017-2022 found that many sites are distinct, but most reefs show signs of degradation (e.g., coral disease and high algal cover). Much of the variation between sites can be explained by the abundance of turf algae and the corals *Colopophyllia natans*, *Mussa angluosa*, *Dichocoenia stokesi*, and *Acropora cervicornis*. The goal of this project is to combine the EPSFCA data with environmental information to provide a road map for where conservation efforts are most likely to support the recovery of the protected area. Preliminary results from monthly sampling in 2022 and 2023 suggest that these reefs are closely tied to what is occurring on the land, with low salinities indicating freshwater input and occasional spikes in nutrient concentrations, especially during the rainy season. In addition, these reef sites are temperature stressed most of the summer.

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