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Tracking the Silent Decline of U.S. Virgin Islands' Coral Reefs Through Microbes

A detailed seven-year study shows how microbes signal the alarming decline of coral ecosystems in the Caribbean.

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“Coral reef ecosystems in the Caribbean are ghost towns of the habitats that they were 50 years ago,” a new research study begins. The study, published on Thursday in the Environmental Microbiology journal, found that tracking the health and concentration of specific microbes in the waters surrounding coral reefs could provide a valuable indicator of the overall health of the reef ecosystem.

Conducted by a team of five scientists on published on April 4, the study (available [here](#)) focused on tracking conditions at eight coral reefs off the coast of St. John over seven years, to examine the impact of hurricanes and stony coral tissue loss disease (SCTLD), two major reef stressors.

The seawater surrounding the chosen reefs, all but one of which are located within the boundaries of the Virgin Islands National Park, was sampled 11 times between 2016 and 2022. Surveys of the seabed were also conducted over the years.

The findings were sobering. On average, the reefs being studied lost over 1% of coral cover per year, while algae levels increased by over 4% annually. The disturbances caused by the passage of the 2017 hurricanes and later by the emergence of SCTLD in 2020 led to an increase in the concentration of ammonia in the water surrounding the reefs. Increasing ammonia levels have then resulted in the decline of one type of bacteria and proliferation of a different microorganism in ways that researchers believe is an indicator of microbialization of the reefs, “which is a mechanism that hastens reef decline” according to the study.

The relative levels of these microorganisms could prove to be a simple metric by which to glean valuable information about reef water and habitat quality, researchers found, providing an early indicator of the presence of SCTLD.

“As reefs experience increased algal growth and future disease disturbances, incorporating these dominant primary producers into ecosystem models and management plans is critical,” the authors of the study say, arguing that the presence and relative concentration of the smallest members of reef ecosystems is an important indicator of the overall health of the habitat.