

Corals Need Seaweed-Eating Fish

Coral reefs depend on fish to eat the seaweeds with which the corals compete.

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A report published in the journal Proceedings of the National Academy of Sciences suggests that maintaining the proper balance of herbivorous fish may be critical to restoring coral reefs. The conclusion results from a long-term study that found significant recovery in sections of coral reefs on which fish of two complementary species were caged.

Coral reefs depend on fish to eat the seaweeds with which the corals compete, and without such cleaning, the reefs decline as corals are replaced by seaweeds. Different fish consume different seaweeds because of the differing chemical and physical properties of the plants.

"Of the many different fish that are part of coral ecosystems, there may be a small number of species that are really critical for keeping big seaweeds from over-growing and killing corals," said Mark Hay, the Harry and Linda Teasley Professor of Biology at the Georgia Institute of Technology.

By knowing which fish are most critical to maintaining coral health, resource managers could focus on protecting and enhancing the highest-impact species. In situations where local peoples depend on fishing, they might better sustain the reefs on which they depend by harvesting only less critical species.

"This could offer one more approach to resource managers," Hay said. "If ecosystems were managed for critical mixes of herbivorous species, we might see more rapid recovery of the reefs."

Hay and co-author Deron E. Burkpile constructed 32 cages on a coral reef. Each cage was about two meters square and one meter tall and was sealed so that larger fish could neither enter nor leave.

The number and type of fish placed into each four-square-meter cage varied. Some cages had two fish that were able to eat hard, calcified plants; some had two fish able to eat soft, but chemically-defended plants; some had one of both types, and some had no fish at all.

"For the cages in which we mixed the two species of herbivores, the fish were able to remove much more of the upright seaweeds, and the corals in those areas increased in cover by more than 20 percent during ten months," Hay said. "That is a dramatic rate of increase for a Caribbean reef."

The study provides more proof of how important biodiversity can be to maintaining healthy ecosystems.

"Species diversity is critically important, but we are losing critical components of the Earth's ecosystem at an alarming rate," Hay said. "There has been little work on the role of diversity among consumers and the effect that has on communities. This study will help add to our knowledge in this critical area."

The research was conducted at the National Undersea Research Center in Key Largo, Florida. It was supported by the National Oceanic and Atmospheric Administration, the National Science Foundation and the Teasley Endowment at Georgia Tech.