

Anglers' gear, cooperation affect coral reef fisheries, study finds

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Dartmouth College and University of California, Santa Barbara scientists studying a Caribbean fishing village are shedding new light on the social and ecological factors pressuring coral reef fisheries around the world.

The research appears in the journals [Marine Policy](#) and [Ambio](#).

Marine ecosystems around the world, including small-scale fisheries, are suffering from overfishing. This trend has hurt coral reef ecosystems, where fish species play critical roles in maintaining coral health and abundance. Of particular importance are herbivorous fish that eat macroalgae that overtake reefs if not kept in check. Small-scale fisheries employ 50 million of the world's 51 million [fishermen](#) and are responsible for more than half of the annual marine catches around the globe. The majority are in developing countries where limited resources and a local dependence on fishing make effective management difficult.

Like many small-scale fishing communities around the world, the village of Buen Hombre in the Dominican Republic is trying to reconcile its fishing with the ecology on which it depends. The community's fishermen mostly capture finfish, with lower harvests of lobster, crabs, octopus and conch. Almost all fishing takes place in coral reef habitats. Fishermen use spearguns, traps, nets, handlines and boats with motors. Spearfishing is done while freediving (using only breath) or with compressors (recycled paint compressors that pressurize air to a diver through a plastic hose).

In their first study, the Dartmouth and UCSB researchers found that a mix of factors—notably improvements in fishing gear technology; expanded fishing sites; an increase in fishermen, population, tourism and fish sold to market; an economy increasingly dependent on fishing; and an increased connection between Buen Hombre and the outside world—have contributed to overfishing and the decline of the fishery.

In their latest study, the researchers analyzed the fishermen's fishing and social behavior and found that their gear choice largely determined the amount of fish caught (compressor divers have higher catches), how the fishermen divide themselves (such as by membership in the local fishermen's association) and their inability to act collectively to conserve the fishery.

"There are both causes for concern and reasons for optimism regarding the future of the Buen Hombre fishery," says co-author [Michael Cox](#), a Dartmouth assistant professor and environmental social scientist who studies community-based natural resource management and environmental governance. "If current trends continue, the fishery is expected to further decline and the reef ecosystem could crash. Shifting the fishery away from this trajectory is not an easy task. Fishermen are very dependent on the fishery and have such little economic leverage within the current market structure that they often have little power to shift their behaviors to more sustainable practices. Despite these challenges, there are several reasons for hope. First, the [coral reef ecosystem](#) has not shifted to a completely degraded state. Second, a local nongovernmental organization is establishing incentives for sustainable fishing, helping to organize fishermen, changing the dynamic between fishermen and [fish](#) buyers, working to shift the gear types used by fishermen and encouraging government participation."

Provided by Dartmouth College

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