Thriving reef fisheries continue to provide food despite coral bleaching

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Catch of herbivore species from a trap fisher in Seychelles. Credit: James Robinson

Reef fisheries can continue to provide food and income despite corals

being lost to climate change, according to new research conducted in the Seychelles.

The unexpected results of a 20-year study into reef fisheries published in the journal *Nature Ecology and Evolution* this week showed fisheries being maintained despite extreme coral bleaching. Remarkably, rapid proliferation of fishes with low dependence on corals led to catches remaining stable or even increasing.

But the results also showed fishing success was 'patchy' and more dependent on fewer species.

Around six million people fish on coral reefs. Each year their catch—estimated to be between 1.4 and 4.2 million tonnes—provides a critical source of food and income for many millions more. But climate change-driven coral bleaching events, caused by warming seas, are damaging coral habitat and depleting fish biodiversity, which has sparked fears that these vibrant ecosystems will no longer support productive fisheries.

A Lancaster University-led study set out to test this, using 20 years of fish abundance, catch and habitat data to assess the long-term impacts of climate-driven coral mass mortality and changes in artisanal coral reef fisheries in the Seychelles.

As part of their study they looked at more than 45,000 daily fishery landing records from 41 different sites. They also conducted 960 underwater surveys at 12 locations.

Seychellois coral reef fisher returning with catch. Credit: Nick Graham

After the mass coral bleaching event in 1998, which caused substantial loss of coral habitat across Seychelles, reef fish catches have either remained the same and even increased. Although many reefs became overgrown with seaweeds, increases in algal-feeding fish communities such as rabbitfish are enabling local fishers to continue harvesting food.

Dr. James Robinson of Lancaster University's Environment Centre said:

"Bleaching in 1998 caused mass coral mortality, habitat collapse, and shifts to seaweed dominance on some reefs, and so we expected the fishery to be in decline. But we overlooked the potential for algal-

feeding fish to benefit from higher algal productivity."

"With coral bleaching events becoming more frequent and more intense as the climate warms, the unexpected news was that these fisheries continued to provide benefits for people."

Calvin Gerry of the Seychelles Fishing Authority, a co-author of the study, said: "We focussed on the inshore trap fishery in this study, as it is an important sector in Seychelles, and a common gear on coral reefs globally."

"Most of the fish from the trap fishery are sold and consumed locally, rather than exported internationally. Therefore, changes to this fishery have potential to influence both fishers and consumers domestically."

Parrotfish species, which is fished in Seychelles and increased in abundance after coral bleaching. Credit: Tane Sinclair-Taylor

The study focused on short- and medium-term impacts of climate change. But the researchers have warned that these fisheries may be more unpredictable and variable than before because the fishes contributing to catches were much more patchily distributed.

Declines in healthy coral habitat reduced the diversity of species in catches, and fishers were more reliant on a few highly productive rabbitfish species.

Professor Nicholas Graham of Lancaster University, a co-author of the study, added: "Although we saw that after coral bleaching the average fish catch rose or remained stable, fishing success was patchy. After bleaching, catches became either much larger or much smaller than the average."

"These data from the Seychelles forewarn of changes likely for coral reef fisheries in other countries. While the news for fishers is better than we might expect, the algal-covered reefs are in marked contrast to the complex coral habitats which once hosted myriad and diverse coral reef fishes."

While the rabbitfish boost was shown to give fishers a few years of respite from the effects of widespread coral bleaching, the authors caution that the longer-term outlook for reef fisheries remains uncertain.

More information: James P. W. Robinson et al, Productive instability of coral reef fisheries after climate-driven regime shifts, *Nature Ecology & Evolution* (2018). DOI: 10.1038/s41559-018-0715-z

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