

Triggerfish needed to grow reefs, new research finds

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Orange-lined triggerfish. A recent study by marine scientists from WCS found that triggerfish may play a vital role in helping corals grow, specifically by keeping sea urchins in check. Credit: T. McClanahan/WCS.

A study of complex coral reef ecosystems in the western Indian Ocean found that one species of fish—the orange-lined triggerfish—may play a significant role in maintaining a reef's ability to thrive and grow, according to investigations by WCS (Wildlife Conservation Society).

Scientists working for WCS discovered that the orange-lined triggerfish (*Balistapus undulatus*)—a small but brilliantly colored predatory fish—was consistently found among corals and algae that build [reef systems](#). Triggerfish are known to reduce sea urchin species that degrade reef structure when they become too numerous, and the authors believe this relationship may explain the positive association of these fish species and reef builders.

The study titled "Similar impacts of fishing and environmental stress on calcifying organisms in Indian Ocean [coral reefs](#)" appears in the most recent edition of *Marine Ecology Progress Series*. The authors Tim R. McClanahan and Nyawira A. Muthiga studied algae, corals, fish, and sea urchins in more than 200 Indian Ocean reefs and evaluated a number of variables and alternative explanations to come to this conclusion.

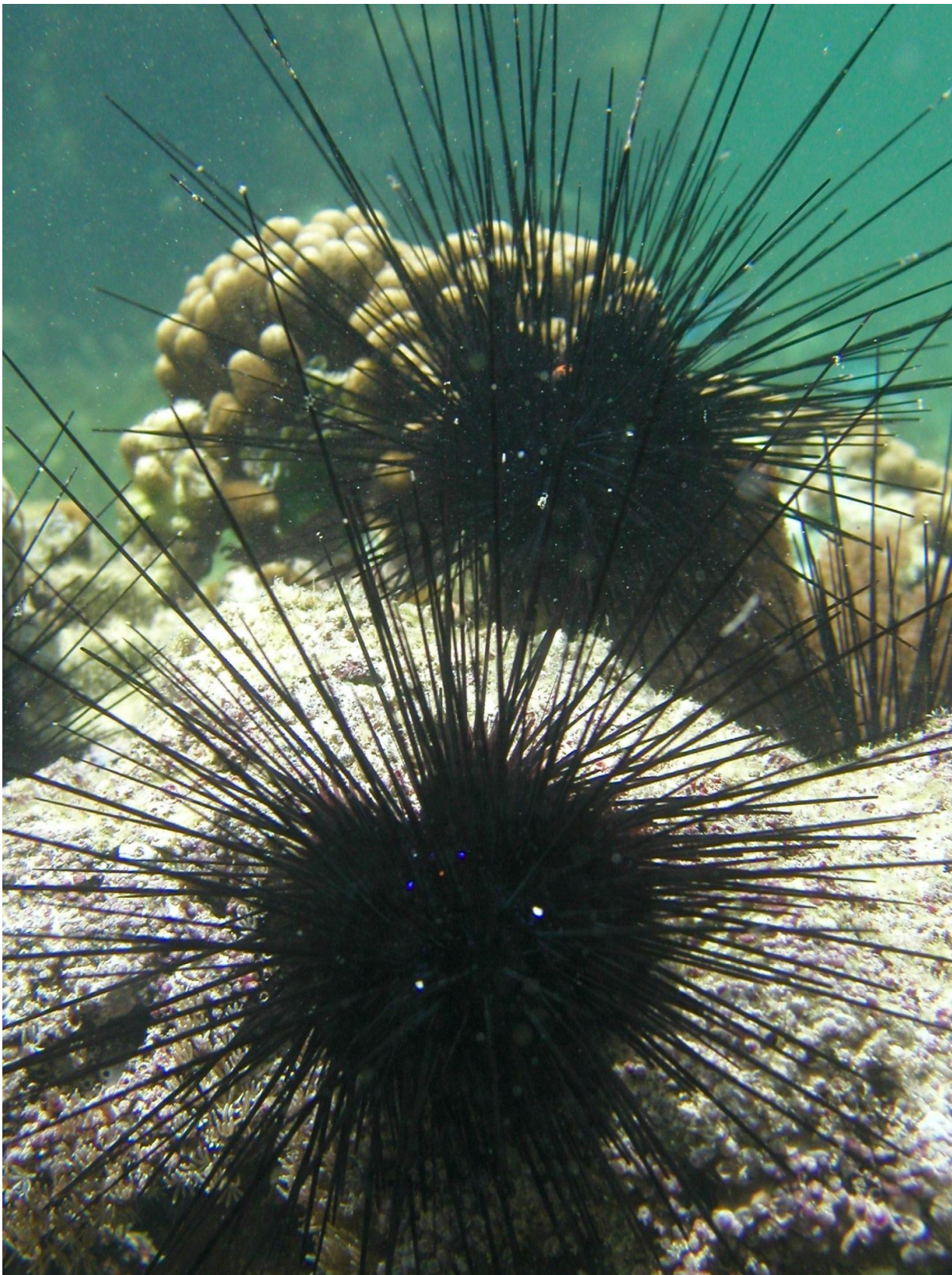
"Coral reefs are at risk in many parts of the world, so helping them survive by protecting key species could improve chances for persistence," said Dr. McClanahan, lead author of the study. "It seems that maintaining a few orange-lined triggerfish increases the ability of coral reefs to grow because they prey on reef eroding sea urchins. Consequently, a triggerfishes' choice of food indirectly contributes to a reef's ability to grow and stay ahead of rising sea levels."

The authors of the study examined nearly 30 variables relating to coral reef health, ranging from sea surface temperature and sunlight penetration data collected by US satellites since the 1980s, to numbers of animals counted while scuba diving down to 20 meters below the surface. According to the statistical results, subtle predator-prey

interactions of fish and marine invertebrates were likely to be equal to or more important than the ocean's environment in promoting reef growth. "Given the increasing bad news about hot ocean temperatures degrading reefs, it was heartening to learn that a key predator might compensate for some of the losses in reef growth," Dr. McClanahan added.

The research comes in the wake of the global rise of sea surface temperatures and coral bleaching this past year that badly damaged the iconic Great Barrier Reef and other tropical reefs in locations such as Hawai'i and the Florida Keys. Another relevant finding from this study was that historical water temperatures fluctuations were more important than sporadic hot water periods in predicting a reef's potential to grow. Consequently, not all reefs will be affected by the same stresses related to warmer temperatures, and some combination of increased management of less affected reefs and the protection of the orange-lined triggerfish were among the paper's practical recommendations. The authors stressed that correlation is not yet proof of causality, but maintain that protection for triggerfish species, which contribute very little food or income to coastal communities, would not hurt fisheries.

"Careful long-term studies of critical marine species such as triggerfish show the importance of understanding ecosystems and protecting species," said Jason Patlis, WCS's Director for Marine Conservation. "The persistence of coral reefs into the future requires good science and it needs to be followed by equally good conservation strategies and actions."



Sea urchins such as *Diadema setosum* can inhibit coral reef growth in the absence of predators such as orange-lined triggerfish. Credit: T. McClanahan/WCS.

More information: TR McClanahan et al, Similar impacts of fishing and environmental stress on calcifying organisms in Indian Ocean coral reefs, *Marine Ecology Progress Series* (2016). [DOI: 10.3354/meps11921](https://doi.org/10.3354/meps11921)

Provided by Wildlife Conservation Society

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