Largest-ever study of coral communities unlocks global solution to save reefs

August 12 2019

A marine scientist collects coral reef data in Fiji. The largest study ever conducted of its kind has identified where and how to save coral reef communities in the Indo-Pacific, according to an international group of scientists from WCS (Wildlife Conservation Society) and other conservation NGOs, government agencies, and universities. Credit: E. Darling/WCS

The largest study ever conducted of its kind has identified where and how to save coral reef communities in the Indo-Pacific, according to an international group of scientists from WCS (Wildlife Conservation Society) and other conservation NGOs, government agencies, and universities. The study outlines three viable strategies that can be quickly enacted to help save coral reefs that are threatened by climate change and human impacts.

Published today in the journal *Nature Ecology and Evolution*, the study involved the efforts of more than 80 authors who surveyed coral abundance on more than 2,500 reefs across 44 countries in the Indian and Pacific Oceans. The findings revealed that the majority of reefs had functioning coral communities with a living cover of architecturally complex species that give reefs their distinctive structure. After the damage caused by severe heat stress during the 2014-17 El Niño event, the authors found nearly 450 reefs in 22 countries across the Indo-Pacific that survived in climate 'cool spots' that should be prioritized for urgent protection and management.

The landmark publication also presents a conservation framework of three management strategies (protect, recover, and transform) to safeguard reef ecologies and ecosystem services into the future.

"The good news is that functioning coral reefs still exist, and our study shows that it is not too late to save them," said WCS Conservation Scientist Dr. Emily Darling, lead author of the study and leader of WCS's global coral reef monitoring program. "Safeguarding coral reefs into the future means protecting the world's last functioning reefs and recovering reefs impacted by climate change. But realistically—on severely degraded reefs—coastal societies will need to find new livelihoods for the future."

Good news on corals has become rare in the 21st Century as increasing

carbon emissions and human impacts of overfishing, pollution and unsustainable development have led to predictions of a bleak future for tropical reefs and the millions of people who depend on them. The Indo-Pacific, a hotspot of coral reef biodiversity, in particular has been devastated by periods of severe heat stress and mass coral bleaching events in 1983, 1998, 2005, 2010, and most recently in the world's longest, largest and most intense bleaching event in 2014-2017.

The study also identifies the minimum requirements to save functioning reefs. This required evaluating the impacts of 20 environmental, climatic, and human-caused stressors on reef-building corals. The authors found that higher abundances of framework corals, the species that build the backbone of coral reefs, occurred in locations with fewer climate shocks and longer recovery windows. Higher coral abundances were also found farther from coastal populations and their associated markets and agricultural impacts.

A coral study published in *Nature Ecology and Evolution* involved the efforts of more than 100 field researchers and data from more than 2,500 coral reefs across the Indian and Pacific Oceans. Credit: E. Darling/WCS

The authors' findings helped to formulate the three strategic choices of management for the reefs.

- Protect: 17 percent of coral reefs in the study's dataset had functioning coral reefs and occurred in a climate 'cool spot' during the 2014-2017 El Niño. The reefs are found in 22 countries from East Africa to South East Asia, the Coral Triangle, and the Pacific. These findings call for an international network of coral reef conservation to save the world's last functioning coral reefs.

- Recover: The second strategy is to promote rapid coral recovery where reefs (54 percent of those examined in the study) were previously functioning but have been recently impacted by the 2014-2017 coral bleaching event.
- Transform: The third strategy recognizes that some coastal societies will need to transform away from dependence on reefs that are no longer functioning (28 percent of the reefs analyzed fell into this category).

The study's findings stress that strategic local management can play a role in helping protect corals through tools such as marine protected areas or other management restrictions that reduce threats and keep coral reefs above functional thresholds. However, the authors noted that local management can complement but not replace the need for worldwide efforts to limit carbon emissions.

"Saving reefs will require combining local and global efforts, such as reducing local dependence on reef fish to maintain a reef's important functions while also reducing carbon emissions to keep warming below 1.5 degrees Celsius," said Dr. Tim McClanahan, WCS Senior Conservation Zoologist and co-author of the study.

Said Dr. Georgina Gurney from the ARC Centre of Excellence for Coral Reef Studies, James Cook University: "While coral reef sustainability depends largely on reducing carbon emissions, identifying reefs that are likely to respond—or importantly, not respond—to local management is critical to targeting development and management strategies to build the well-being of the millions of people dependent on coral reefs across the globe."

Said Gabby Ahmadia, director of marine conservation science at World Wildlife Fund and co-author of the study: "More than ever, we must consider how to manage local threats to coral reefs while keeping an eye

to future climate impacts. This study will help policymakers and conservationists make informed management decisions for coral reefs and the communities that rely on them."

More information: Emily S. Darling et al, Social–environmental drivers inform strategic management of coral reefs in the Anthropocene, *Nature Ecology & Evolution* (2019). DOI: 10.1038/s41559-019-0953-8

Provided by Wildlife Conservation Society