

In fight to shield coral reefs from warming oceans, U.S. and Australian experts join forces

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Marine biologists in Australia and the United States are joining forces to resuscitate two of the world's major coral reef systems along their coastlines threatened by rising ocean temperatures and extreme weather.

In their two sunshine states, Queensland and Florida, experts have turned their focus from conservation to restoration at the Great Barrier Reef and Florida Reef, where entire colonies of coral life have been bleached or killed.

Biologists working to restore both systems are sharing data and experimenting with forms of coral that appear resilient to warming waters. They have convened three major workshops in Cairns, Townsville and Miami over six months in an effort to expedite their efforts.

At least one prominent figure in the Australian biology community, the chief scientist for the Great Barrier Reef Foundation, is calling for a structured program between the National Science Foundation and the Australian Research Council that would formalize a joint effort of the two countries.

"There's no question that our methodology for coral restoration developed in America," said Peter Mumby, the chief scientist. "There's a long history of Australians and Americans working together on this, but

right now we are collaborating closely with the Americans on techniques they've developed for propagating coral."

While the focus of Australian scientists had been on conservation over many years, two consecutive mass bleaching events in 2016 and 2017 shook the community into action.

Bleaching occurs when coral expel algae in response to an increase in sea temperatures. The algae provide coral with their color, and so without it the coral are left bone white.

In the Florida and wider Caribbean reef systems, bleaching began years earlier than at the Great Barrier Reef, forcing American experts to lead the way on restoration technologies.

Experts in both countries say that the sheer scale of the Great Barrier Reef—roughly the size of Italy, or the length of the U.S. eastern seaboard—makes coral engineering a far more challenging task there, and warn that techniques being pioneered in the United States might not be directly applicable in Australia. And while the Caribbean system only hosts a handful of coral species—making the ecosystem generally less resilient—the Great Barrier Reef has over 100 species.

But Mumby said that coral experts in the Florida Keys contributed valuable insight to a \$6 million Australian research project on the biology, ethics and feasibility of large-scale coral restoration efforts. The findings of that research were recently reported to Australia's federal government, which—after elections are held this weekend—will decide how much of \$100 million in principle funding to allocate to further coral restoration efforts.

Florida-based scientists shared their findings at the Townsville workshop on the genetics of coral under stress, examining what makes for

resiliency on a biological level—critical to understanding which corals might survive consistently warmer waters, according to Mumby, who was in Fort Lauderdale for another round of meetings as recently as February.

A 2017 conference in Australia attended by prominent American scientists led to a much closer working relationship between the two countries, according to Tom Moore, the coral reef restoration program manager at the U.S. National Oceanic and Atmospheric Administration.

"There's always been great collaboration between NOAA and Australia, but historically, folks in Australia weren't working on restoration as much as traditional management," Moore told McClatchy. "They're a little bit late to the game, but they come to it very well prepared and resourced and fully engaged."

While roughly a third of all corals on the Great Barrier Reef, the largest reef system in the world, have bleached or died in the past decade, Moore says that 90-95% of corals on the Florida Reef are already dead.

"Manual work in a gardening-like way won't cut it on an ecosystem level—we're working together to figure out an industrial-scale effort," Moore added. "We're working on assisted evolution methods to create coral that's more resilient to more hostile oceans, to warmer oceans, and to diseases."

At the Agincourt ribbon reef, part of the Great Barrier Reef system off the coast of Port Douglas, healthy and vibrant coral were still visible to tourists. The largest share of Queensland's economy comes from tourism—according to state data the reef draws 2 million visitors a year and brings in \$6 billion in tourism dollars.

Tourism operators, in both Australia and Florida, have been slow to

acknowledge threats to the reef out of fear they will scare away visitors.

"We're not going to sugarcoat it—the reef is under threat, and something needs to be done," said Greg Hoare, a chief marine biologist for Quicksilver, one of Queensland's leading tourism operators. "If we suppress the idea that the reef is under threat or imperiled, people will walk away from the day thinking, 'wow, that was beautiful,' but they won't have that sort of urge to help conserve what they saw for future generations."

Hoare said that Quicksilver is conducting experiments at its [reef](#) sites with the approval of the Great Barrier Reef Marine Park focused on rehabilitation, and acknowledged that Australia had only recently shifted its focus to restorative efforts.

In one experiment, the team is operating a control site with coral growing along a meshed device at its own rate. At another nearby, in similar temperatures, they are growing coral on mesh housing pulsing with electrical currents that are meant to increase the growth rate threefold.

"We've fragmented colonies of corals that have already shown resilience," Hoare continued. "We've isolated areas that have shown resilience and are working to aid the corals in their growth."

Across the marine biology community, focus has shifted toward perfecting resiliency efforts that can be scaled up to meet the size and scope of the challenge ahead. Moore says that these "assisted evolution methods" are the world's best chance to save these ecosystems, home to one quarter of all marine life.

Mumby says that a formalized relationship between the two countries' national science foundations would appropriately elevate their strong

working ties.

"They've been able to come to the table with a lot more resources, and we will benefit from the work they're doing," Moore said of the Australians. "Reefs of the future are going to be different than today—we have to accept that. We won't win the fight everywhere. But we'll succeed in some places, with help."

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