



CAN-025-Surviving Climate Change- Great Barrier Reef

How do we save coral reefs?

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Barrier Reef coral genetically altered in hope of surviving climate change



Coral species from different climes being mixed as a form of 'assisted evolution' to see if it will help them adapt more quickly to rising sea temperatures

Just 1C to 2C of further warming in areas of the reef already under pressure could push it beyond what it can recover from.

Photograph: Dan Dennison/AP

The Australian government's marine research agency is looking to genetically alter species of coral to help them cope with rising sea temperatures, as new modelling showed the coverage of living corals on the [Great Barrier Reef](#) could decline to less than 10% if warming continued.

Scientists at the [Australian Institute of Marine Science](#) have partnered with the Hawaii Institute of Marine Biology to look at how "assisted evolution" may help corals more quickly adapt to climate change. These studies are some of the first conservation-based, non-commercial uses of genetic modification.



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A [study](#) modelling the prospects of the reef using a decade of data found there was a “very high likelihood” of coral cover plummeting below 10%, with corals replaced by sponges and algae as temperatures increased.

This would take the Great Barrier Reef beyond what previous suggested was a key “tipping point” that would threaten the reef’s ability to recover and grow. Such a reduction, the study suggested, could occur with just 1C to 2C of further warming in areas of the reef already experiencing pressure from other impacts such as fishing and pollution. This amount of warming is virtually locked in due to the current amount of greenhouse gas emissions.

“The Great Barrier Reef used to be one of the more pristine examples of reefs globally, but it has suffered a decline and will continue to do so if action isn’t taken,” said report co-author Jennifer Cooper, a James Cook University PhD student who worked on the study with scientists from the UK and the US

“Our model showed that reducing the impact of other human threats to the reef, such as overfishing and pollution, did mitigate coral decline. However, if temperature increases more than 2C the benefit of lowering threat levels may not be enough to stop further coral loss.

“This suggests that climate change, and more specifically sea surface temperature increase, is an important driver of change on the reef.”

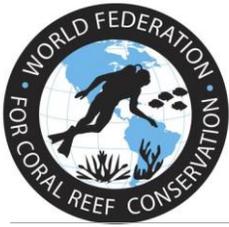
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The stark warning on the reef’s future prospects follows a period of decline that has seen [coral cover drop to 14%](#) – half of what it was 30 years ago. Climate change, pollution and a plague of coral-eating starfish have been identified as the main causes of the deterioration.

Aims is now looking at radical new ways of helping Great Barrier Reef corals deal with the rapid rate of warming and acidification of the oceans.

Initial work has begun at the Australian institute’s [sea simulator](#) in Townsville, Queensland, where different types of coral were picked shortly before their annual spawning and matched via IVF to create new hybrids. Scientists reared the coral larvae and then settled them to assess their growth into juveniles.

[Coral](#) from the central part of the Great Barrier Reef has been crossed with coral from the colder reaches of the southern reef to see if the resulting hybrid was more resilient in higher temperatures. Scientists are also looking at whether they can alter the microbial communities, the algae that live within coral tissue, so they can adapt to climate change.



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It is hoped the research can speed up the evolutionary process so that corals can cope with the almost unprecedented rate of warming in the oceans. While corals can adapt to different temperatures, it usually takes thousands of years before they can evolve within gradually changing climates.

Dr. Madeleine van Oppen, a senior principal research scientist at Aims, told Guardian Australia: "We can create genetic diversity and new genetic variations, and then let natural selection pick and do the rest."

"We are trying to accelerate the process of what happens in nature, to help them to cope better. This is theoretically possible.

"We want to spend the next five years experimenting, to find out which manipulations work best. It's an important area to invest in. We need these methods available in case we want to implement them. If we don't, we may be too late if the situation does get bad.

"The health and coral cover of the reef has declined over the last decade, it's a great concern."

Scientists are increasingly looking at new ways to mitigate the impact of warming seas, such as [shading corals](#), in case emissions are not radically cut to stave off the worst of climate change.

Unesco's world heritage committee will consider whether to list the reef as "in danger" in June. On Monday, the Australian government [submitted a report to Unesco](#) that argued the listing was not justified due to its efforts to reverse the reef's decline.

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The only thing necessary for the triumph of evil is that good men do nothing"....Edmund Burke