

Coral Nurture Program gives reefs a fighting chance

1. Summary of impact

The Great Barrier Reef is rapidly deteriorating from ocean warming and acidification caused by climate change. Little is known about what role heat-resilient coral could have in maintaining small, high-value sites on Australian reefs.

UTS marine biologists, Associate Professor David Suggett and Dr Emma Camp, are working with tourism charter operators to out-plant coral, helping maintain coverage and diversity at selected sites, and learning ways to recognise both the species and individual corals most resilient to warming conditions.

Recognising the value of local knowledge and using existing tourist infrastructure, like boats and dive teams, means the program is not only cost-effective but is also more likely to be sustainable long term.

2. The problem

As man-made carbon emissions climb, the world's oceans warm and become more acidic, putting pressure on delicate reef systems that have taken thousands of years to evolve. Australia is not immune—in two back-to-back bleaching events in 2016 and 2017, over one-third of the Great Barrier Reef's coral died.

Reef tourism and related industries are one of the biggest employers in coastal parts of Central and Far North Queensland. As temperatures rise, future bleaching events are all but inevitable, according to Emma Camp. These put at risk not only the reef, but the livelihoods of the business operators—charters, restaurants, hotels—that depend on its health to attract tourists to the area.

3. Beneficiaries

Any efforts that assist reef survival help protect the livelihoods of tour operators and their employees. The Coral Nurture Program also specifically assists these businesses by providing the training and tools to capacity build.

It's hoped benefits for all visitors will include an enhanced understanding of the impacts facing Australia's reefs and the opportunity to see how tourism operator 'stewardship' can maintain site quality. The Coral Nurture Program is a flagship project for the Great Barrier Reef, demonstrating enhanced local-level management that is simply not possible through regional governance. Broader beneficiaries extend to local businesses that have built tools and machinery for the program.

Ultimately, Emma Camp hopes that the team's efforts will benefit the future generations who are going to inherit the reef. "If we can help sustain even a small section of it for them, it will be worth it."

4. Approach to impact

The Coral Nurture Program sets out to improve coral cover and diversity by out-planting corals that have been selected and grown in 'nurseries'. Long term, the project is working to identify which species hold the most resilience to climate change so that they can be targeted for out-planting.

"We target high-value sites, both ecologically and economically," says Suggett. "Because the charter boats are at these tourist sites on the reef everyday we have a unique opportunity to evaluate out-planting success regularly, and, importantly, to do so on a sustained and highly cost-effective basis. Without this, the cost of out-planting would become prohibitive at the scale needed."

Using a 'CoralClip®' developed by Wavelength Reef Cruises owner, John Edmondson, the Coral Nurture Program team have so far planted out more than 10,000 corals at three identified sites on the reef in this way. Another five tourism operators have since become involved, with the aim to plant out over 25,000 corals by May 2020.

Jointly funded by the Queensland and Australian Governments, the program is a first for Australia, a partnership that harnesses tourism infrastructure and resources—boats, moorings, staff and site-specific knowledge—to help scientists understand whether site stewardship can be an effective tool to boost reef resilience at high-value reef sites.

“The longer term vision is that by monitoring these sites on a sustained basis we’ll start to understand more about which corals have greater resilience to stress,” says Emma Camp.

This knowledge can then be used to support reefs in the hope that when a bleaching event does occur, the resilient corals will help maintain coverage and diversity at these local high-value sites, and ensure these beautiful but complex ecosystems can eventually recover.

5. What has changed as a result of this work?

5.1 The outcomes

Since 2018, seven coral nursery sites have been developed, and more than 10,000 coral fragments have been planted in three high-value reef sites over several months.

The Coral Nurture Program team also worked with the Great Barrier Reef Marine Park Authority to obtain a new type of permit that allows fragments that naturally break off (e.g. from storms) to be used in out-planting efforts.

The team has held workshops for representatives from the Great Barrier Reef Marine Park Authority, the Queensland government, and tour operators to demonstrate how the program sets up nurseries, collects and identifies corals, and out-plants them into selected areas on the reef.

5.2 Impact

It is still too early to determine which corals are more resilient than others. Testing of factors that may contribute to this—including coral size, their depth and the light

available to them; as well as the genetics of successful adapters and the way that their supportive micro bacteria are effected by human handling—is ongoing.

“The next, and arguably most critical, phase for the Coral Nurture Program is to leverage further funding that will enable us to track ecological change at our out-planting sites. Whilst this will take several years, we need to understand how out-planting at this scale alters the nature of coral cover and associated reef biodiversity. Can we improve the rate of natural recovery currently possible? Do we rehabilitate fully functioning reefs?” says Suggett.

If the program can successfully identify the characteristics of more resilient corals and help the long-term survival of the larger reefs of which they are part, the Coral Nurture Program methodology will be used to coordinate similar programs at different sites across the Great Barrier Reef. The researchers are also exploring how this sustainability model may translate to reef sites at other locations worldwide that rely heavily on tourism, such as the Caribbean.

The scientific data collected for the program can be used in a wide variety of locations and contribute to the knowledge base for future coral reef management, but its important to note that small-scale projects such as this are not a ‘cure all’, explains Emma Camp. “First and foremost we have to address carbon emissions—no amount of intervention is going to solve the problem if we don’t,” she says.

6. What has helped you accomplish this work?

Together, the Coral Nurture team has been able to use its combined research expertise, dive experience, and knowledge of how the local tourism industry works to ensure the success of the program in terms of both scientific rigour and obtaining local ‘buy-in’.

The low-tech but high functioning ‘CoralClip®’, invented and provisionally patented by John Edmondson, is also a vital factor in the program’s success.

“Without it the program would struggle to achieve the same level of scalability,” says Emma Camp. “It is significantly faster to out-plant coral fragments using the clip than

the epoxy traditionally used, transforming the scale and cost-effectiveness of out-planting that have been possible with traditional techniques.”

David Suggett leads the Future Reefs Program within the UTS Climate Change Cluster, which develops innovative solutions to advance Australia’s bio economy, and is part of the international body for coral reef restoration, the Coral Restoration Consortium.

Emma Camp is an ARC DECRA and UTS Chancellors’ Research Fellow and currently holds an Honorary Position with the United Nations as a Young Leader for the Sustainable Development Goals.

7. Challenges

The complex politics around global emissions and the best ways to approach the issue is one of the key challenges for the Coral Nurture Program, according to Emma Camp.

While some in the community refuse to acknowledge the existential threat to the reef that climate change poses, others are concerned that relatively small-scale and locally tailored activities like the Coral Nurture Program might divert attention away from the need to address man-made emissions.

“It’s a real art to getting the messaging balanced. That’s why we stress we’re very much about small-scale high-value sites where we can—and are—making a difference. Given the Great Barrier Reef is as large as Italy, we cannot expect coral out-planting to save it—we don’t have the capacity to do that. The only thing that will do that is to reduce the climate stresses,” says Camp.

“On the other hand, its important to acknowledge that meeting the most optimistic CO₂ emission reduction targets will leave corals close to their limits of survival—and at risk from irreversible loss—for at least the next decade,” she says.

“Consequently, small but effective steps, such as targeted out-planting can aid to buy time while we get the political landscape to where it needs to be. Particularly as we increase understanding on more heat resilient species that can facilitate building reef

resilience. As long as we don't use it as a kind of 'smokescreen' to hide the larger issues, small-scale 'restoration' can be beneficial. Of course there's still the risk a bleaching event will happen again but we still do need to do it. For me, doing nothing is not an option, because if we don't do this, we're not giving the reef a fighting chance."