Regular coral larvae supply from neighboring reefs helps degraded reefs recover

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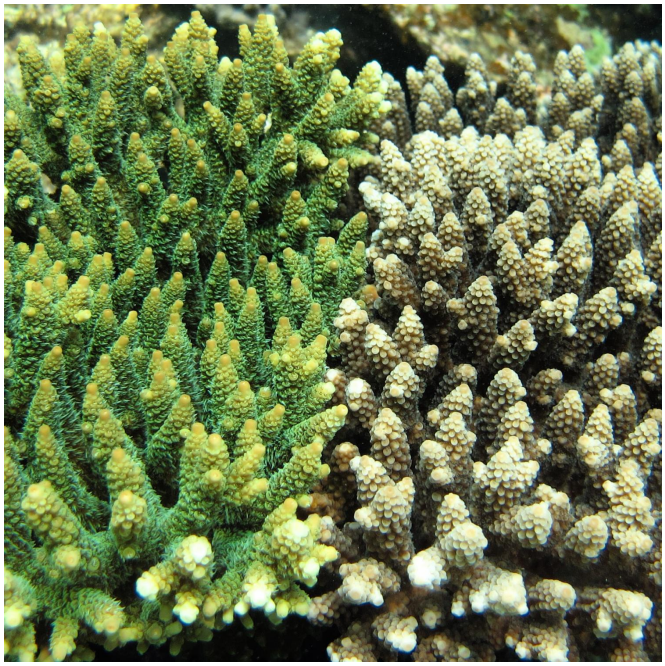

Acropora corals are one of the major reef builders in Indo-Pacific reefs. Credit: Dr Christopher Doropoulos

For reefs facing huge challenges, more coral larvae doesn't necessarily translate to increased rates of coral recovery on degraded reefs, a new Queensland study has showed.

The study, published today, was led by former University of Queensland School of Biological Sciences researcher Dr Christopher Doropoulos, now of CSIRO Oceans and Atmosphere, and involved collaboration with CSIRO, the University of Queensland, and Griffith University.

"Overall, our research shows that excessively high or low densities of coral larvae do not contribute to reef recovery," said Dr Doropoulos.

"When larval supply is too low, corals tend not to attach to the reef because they have aggregative behaviour; they prefer to colonise in groups.

"On the other hand, when larval densities are extremely high, the post-settlement survival of corals is low because internal feedbacks regulate populations so they don't grow in excess."

The researchers used both laboratory and field studies to investigate how differing coral larval densities and habitat complexity influenced larval survival, settlement and post-settlement success.

They found recovery of coral populations was optimal where there are consistent supplies of coral larvae from neighbouring, healthy reefs, to areas of disturbed reefs with low abundances of competing seaweeds, and cryptic spaces for tiny corals to hide and grow.

Thus, Dr Doropoulos said a network of well-connected reefs with abundant herbivorous fish populations was needed to maintain long-term reef resilience.

"Coral colonisation involves three distinct life-history stages," he said.

"Firstly, corals are transported as tiny larvae following mass annual spawning events.

"Secondly, the larvae transition from the water column to undergo metamorphosis and settle on to the reef, after which time they can no longer swim.

"Finally, the minute corals need to defend themselves against predators and competitors to grow and survive into colonies that build coral reefs .

"Each of these three stages is considered a 'recruitment bottleneck', so quantifying how well corals can transition through each stage is key to understanding how well reefs can recover following a disturbance."

UQ Marine Spatial Ecology Lab PhD student Nicolas Evensen said colonisation by tiny coral larvae was a key process that promoted reef recovery after degradation.

"The findings will be important for future reef management," Mr Evensen said.

"The recolonisation of coral larvae is a key attribute of reef resilience, and is becoming increasingly important with the cover of reef-building corals declining globally."

The research is published in *The Royal Society Open Science*.

More information: Christopher Doropoulos et al, Density-dependent coral recruitment displays divergent responses during distinct early life-history stages, *Royal Society Open Science* (2017). DOI: 10.1098/rsos.170082

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