NERP Tropical Ecosystems Hub Project Factsheet

Combined water quality-climate effects on coral and other reef organisms

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Project summary

This project will use complementary laboratory and field experiments to investigate the combined impacts of declining water quality (increased nutrients and sediments, and reduced light and salinity), increased sea temperature and ocean acidification on key reef species groups such as corals, foraminifera, crown-of-thorns starfish and rock-boring sea urchins.

Why this research is needed

Increasing sea temperatures, ocean acidification and reduced water quality from terrestrial run-off are likely to significantly alter marine and coastal ecosystems over the next few decades. To date, research investigating the impacts of these threats has considered each threat individually, but their interactions and cumulative impacts are as yet poorly understood and potentially more damaging than each threat in isolation. The outcomes of this research will demonstrate how management of local stressors such as reduced water quality is critical to maintaining the resilience of coral reefs to global stressors (increasing sea temperatures, ocean acidification), which are more difficult to manage.

Research-user focus

Knowledge from this project will contribute to Queensland and Australian Government policies to protect the Great Barrier Reef (GBR) from the effects of climate change and declines in water quality. The outcomes of this project will inform Reef Rescue, Reef Plan and facilitate management of the GBR by the Great Barrier Reef Marine Park Authority (GBRMPA).

Research Provider:

Australian Government | Australian Institute of Marine Science

Aquarium setup for an experiment exposing corals, crustose coralline algae, foraminifera, biofilms and sea urchins to near-future CO_2 conditions.

Corals (*Acropora millepora*) in an experiment manipulating CO_2 and salinity. Corals are mounted on Lego blocks allowing access during physiological measurements.

Photos: Andrew Negri

Outcomes

- Quantification of changes in the tolerances of key reef species to global stressors (temperature increase, ocean acidification) due to increased local stressors, (increased nutrients, increased turbidity, decreased salinity).
- Greater knowledge of the individual and synergistic effects of declining water quality and global stressors on reproduction, larval development and settlement of key coral reef invertebrates (e.g. corals, echinoderms).
- Improved understanding of how changes in availability of carbonate in seawater as a result of ocean acidification will influence skeleton formation in calcifying reef organisms such as corals.

Find this project at www.nerptropical.edu.au
Theme 2: Understanding ecosystem function and cumulative pressures
Program 5: Cumulative impacts on benthic biodiversity
Project: 5.2

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National Environmental Research Program

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Reef & Rainforest Research Centre