

Heat sickens corals in global bleaching event

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Death is only one possible outcome from coral bleaching caused by rising sea temperatures due to global warming. Australian scientists report that many surviving corals affected by mass bleaching from high sea temperatures on the northern Great Barrier Reef are the sickest they have ever seen.

"We measured the condition of surviving corals as part of our extensive underwater surveys of Australia's worst ever [bleaching](#) event. We found that coral bleaching has affected 93% of the Great Barrier Reef. While the central and southern regions have escaped with minor damage, nearly half of the corals have been killed by mass bleaching in the northern region," says Professor Terry Hughes from the ARC Centre of Excellence for Coral Reef Studies at James Cook University (JCU) in Townsville, Queensland.

"Normally when bleaching kills corals it is a slow [death](#), that progresses steadily when temperatures remain high," says Associate Professor Bill Leggat, also from the ARC Centre at JCU.

"The corals usually rely on mechanisms that help them fight and counteract the damage but this time, on some reefs, it looks like they have died very quickly.

Corals depend upon algae that live within their tissues. These algae, called zooxanthellae, utilise light to generate sugar and nutrients, which are transported to the coral host. It is this energy that allows corals to grow and produce reefs. The partnership between corals and the

microscopic algae (zooxanthellae) that lives in their tissues breaks down when temperatures are too high, causing [coral bleaching](#). For corals to recover they need the tissues to remain intact while the remaining zooxanthellae slowly repopulate the tissues.

"Healthy corals have between one and two million zooxanthellae per square centimetre," says Leggat. "During past bleaching events, these numbers have dropped to about 200,000 cells per square centimetre. Now we are finding in this very severe bleaching event that some corals have no zooxanthallae remaining in their tissues at all."

The scientists found that severely bleached corals had an average of only 4,000 algae per square centimetre. This amount is 500 times less than in a healthy coral and 50 times less than reported for corals that survived previous bleaching events. This profound loss of algae means that many of the corals that have bleached, have little chance of recovering, because they have no zooxanthellae left to repopulate the coral tissue.

"These corals are amongst the most damaged I have seen," says Dr. Leggat.

"For some surviving corals in the Northern Great Barrier Reef, over 50% of the coral cells are dead. In some regions the corals were so badly damaged that we were unable to study their tissue because it was rotting away."

Tragically, the ongoing damage from bleaching has been highest in the northern 700km of the Great Barrier Reef all the way up to Papua New Guinea, the most remote and - until now - the most pristine section of the Great Barrier Reef," says Professor John Pandolfi from the ARC Centre at the University of Queensland.

Given the extent of mortality and the damage observed to individual

corals it is vital to understand the recovery processes of bleached [coral](#). Even if they recover their color, scientists predict that the surviving corals will show other longer-term symptoms, including reduced growth rates and lower reproduction.

Provided by ARC Centre of Excellence in Coral Reef Studies

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