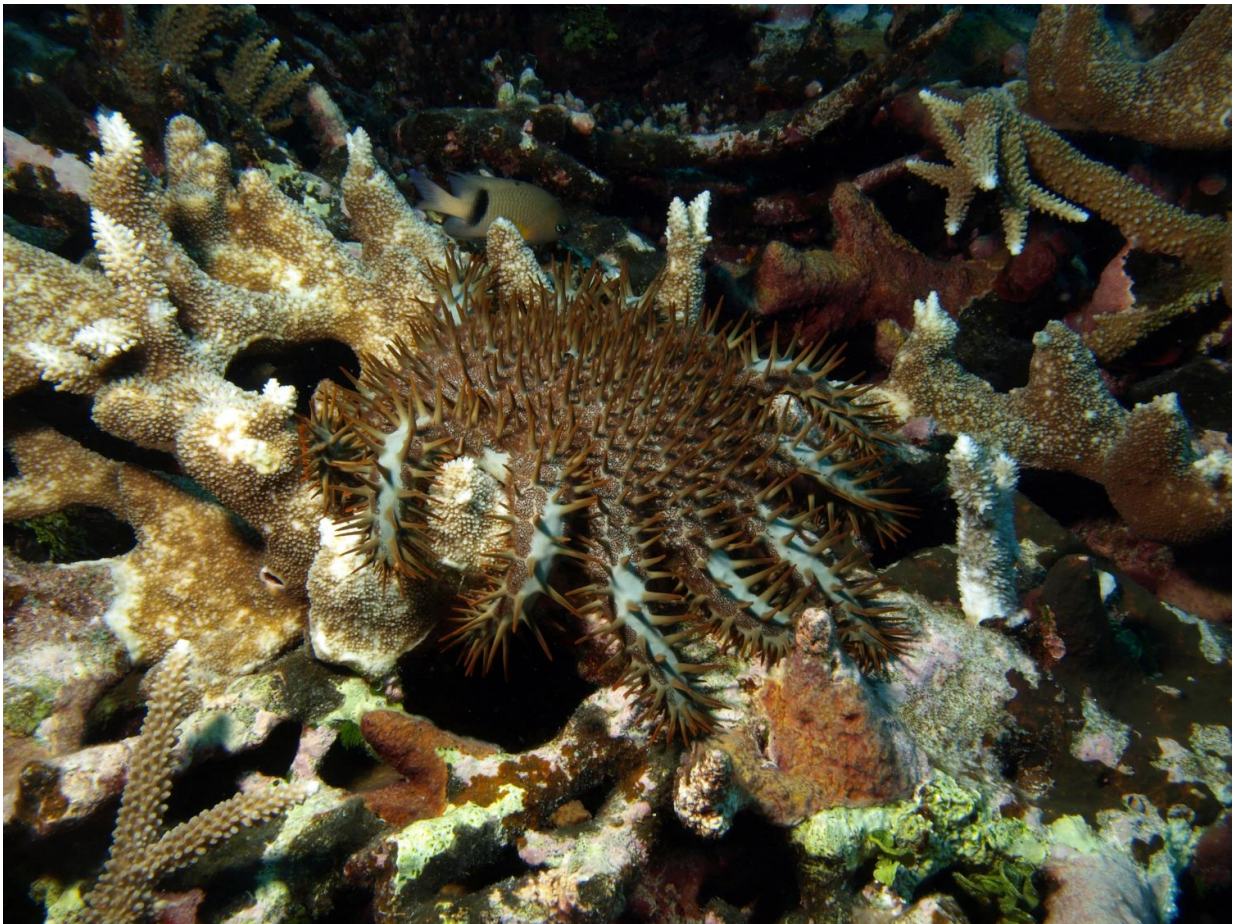


Corals most important for building reefs are now in sharp decline

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Staghorn corals are the preferred prey of predatory Crown of Thorn starfish.
Credit: Carden C. Wallace

A new study has found that the very corals responsible for establishing today's reefs are now some of the most threatened coral species due to climate change and other man-made stressors.

Professor John Pandolfi from the ARC Centre of Excellence for Coral Reef Studies (Coral CoE) at the University of Queensland (UQ) says the fast-growing, reef-building, branching *Acropora*, or 'staghorn', corals are responsible for the vast amount of modern reef growth. Although they have been around for at least 50 million years, these corals are now experiencing sharp declines in abundance worldwide.

"*Acropora* became a dominant reef builder about 1.8 million years ago," Professor Pandolfi says. "And [coral](#) reefs have been so successful ever since then due in part to its ascendance—indeed, reefs grow most rapidly when staghorns are the dominant reef-building corals."

The international study published today examined global historical sea-level data, as well as global coral occurrence data—including fossil records—dating back to more than 60 million years ago.

The researchers found that while staghorns remained highly successful throughout rapidly changing environmental conditions in the past, their populations first began declining in Australia around the time of land-use changes with European colonisation. These patterns occur elsewhere, for example in the Caribbean Sea. More recently, these corals have suffered declines in abundance due to bleaching and disease, and have been almost completely wiped out across a number of reefs throughout the world.

Yet, staghorn corals currently remain one of the most prolific reef-builders, dominant on many reefs around the world and across all reef habitats: reef flats, crests and slopes, submerged reefs, and deeper reefs. They became successful because their colonies have the highest growth

rates out of all corals, paired with an ability to regenerate when broken. Their presence is also a major factor in the ability of reefs to keep up with sea level rise—though they are sensitive to other environmental stresses, staghorns actually thrived under rapid sea level changes.

Dr. Ken Johnson, from The Natural History Museum, London explains, "These are the corals that have allowed reefs to prosper during past intervals of rapid [sea level change](#). But it seems as if staghorn corals will be compromised in providing this service in the future, even as we anticipate [sea level](#) rises over the next century."

The paper's lead author, Dr. Willem Renema from the Naturalis Biodiversity Center in The Netherlands, says staghorns provide even more benefits. "Staghorn corals contribute strongly to the structural complexity and three-dimensionality of reefs. Therefore, they play an important role in the ecosystem services delivered by coral reefs. This includes coastal protection and providing habitat for reef-associated biodiversity."

Coral reefs host more species than any other marine environment, are crucial for healthy fish populations, and, in providing coastal protection, they help dissipate up to 97% of incoming wave energy. However, in the past 20 years, coral cover has diminished by as much as 95 percent in some locations, such as the Caribbean. Coral health is compromised by [climate change](#) and local stress such as pollution and over-fishing.

So, what would a future without staghorn corals look like? "One need only look as far as the algal-dominated reefs of the Caribbean to find a future in the absence of staghorn corals," Pandolfi says.

"However, there is hope. Relieving local pressures on [staghorn corals](#)—for example, by improving water quality—helps increase their resistance to thermal stress from climate change. So by managing local

anthropogenic stressors such as sediment runoff, dredging, and other sources of pollution, we can insure that these corals will be at their best when confronting global warming."

Renema et. al., 'Are [coral reefs](#) victims of their own past success?' appears in today's issue of *Science Advances*.

More information: Are coral reefs victims of their own past success? *Science Advances*, advances.sciencemag.org/content/2/4/e1500850

Provided by ARC Centre of Excellence in Coral Reef Studies

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