Daily grind shapes coral death

June 4 2014, by Joanna Wheatley

(Phys.org) —The corals that build spectacular structures, like the Great Barrier Reef, can be killed in many different ways. Over the past few decades, the focus has been on extreme and rare events, such as tropical cyclones, thermal bleaching and outbreaks of the coral-eating crown-of-thorns starfish. However, a new study published in *Ecology Letters* raises important implications for policymakers to not ignore day-to-day reef

death in environmental planning.

"We found that a coral's physical strength is really important for how it survives the daily rigours of living on shallow-water reefs," says lead author Dr. Joshua Madin of Macquarie University. "Strong currents and large waves occur quite frequently on the reef, not just during cyclones, and if you think about the enormous area of reef out there, death caused by water motion during the typical summer storms or other periods of strong winds and high waves far outweighs death caused by very rare extreme events, like cyclones."

The most important finding was that physical forces have a strong signature on coral death during normal conditions. This "background" mortality, although traditionally understood to be important, has fallen off the radar in recent times due to a focus on occasional extreme disturbances, which tend to only affect local areas for short periods of time.

"The effects of bleaching or cyclones are dramatic and worrying given climate change predictions, but our study shows day-to-day mortality is vital and cannot be ignored," says co-author Dr Maria Dornelas, of the University of St Andrews in Scotland.

The study involved painstakingly tracking hundreds of coral colonies every year at Lizard Island on Australia's Great Barrier Reef. The "top-heaviness" of a coral colony proved a very important determinant of survival on the reef, especially in wave-swept habitats. Coral species that grow upwards and outwards with small attachment points, like a tree, tend be knocked over when they grow larger, whereas those that grow more robustly, in the shape of a mound, very rarely get knocked over.

The study also found that corals with similar shapes tend to have similar chances of dying as they grow larger. "This greatly simplifies our job as

ecologists because we can make predictions based on a few simple and easily measured features of corals rather than having to get to know each species intimately," says co-author Professor Sean Connolly, of the ARC Centre of Excellence for Coral Reef Studies at James Cook University.

More information: "Mechanical vulnerability explains size-dependent mortality of reef corals," *Ecology Letters* 2014, Joshua S Madin, Andrew H Baird, Maria Dornelas and Sean R Connolly, doi: 10,1111/ele.12306

Provided by Macquarie University