

New evidence highlights threat to Caribbean coral reef growth

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A tourist snorkles over coral reef off Mansuar Island in eastern Indonesia's Papua region. Coral reefs in the Caribbean are producing less than half of the key ingredient that makes their calcium skeleton compared to pre-industrial times, scientists said on Tuesday, describing the findings as "extremely alarming."

Coral reefs build their structures by both producing and accumulating calcium carbonate, and this is essential for the maintenance and continued vertical growth capacity of reefs. An international research team has discovered that the amount of new carbonate being added by Caribbean coral reefs is now significantly below rates measured over recent geological timescales, and in some habitats is as much as 70% lower.

Coral reefs form some of the planet's most biologically diverse ecosystems, and provide valuable services to humans and wildlife. However, their ability to maintain their structures and continue to grow depends on the balance between the addition of new carbonate, which is mostly produced by corals themselves, set against the loss of carbonate through various erosional processes. Scientists have long known that [reef ecosystems](#) are in decline and that the amount of

live coral on reefs is dwindling. But the paper, published on DATE TBC in *Nature Communications*, is the first evidence that these [ecological changes](#) are now also impacting on the growth potential of reefs themselves.

Professor Chris Perry of the University of Exeter, who led the research, said: "Our estimates of current rates of reef growth in the Caribbean are extremely alarming. Our study goes beyond only examining how much coral there is, to also look at the delicate balance of [biological factors](#) which determine whether coral reefs will continue to grow or will erode. Our findings clearly show that recent ecological declines are now suppressing the growth potential of reefs in the region, and that this will have major implications for their ability to respond positively to future [sea level](#) rises.

"It is most concerning that many [coral reefs](#) across the Caribbean have seemingly lost their capacity to produce enough carbonate to continue growing vertically, whilst others are already at a threshold where they may start to erode. At the moment there is limited evidence of large-scale erosion or loss of actual reef structure, but clearly if these trends continue, reef erosion looks far more likely. Urgent action to improve management of reef habitats and to limit global temperature increases is likely to be critical to reduce further deterioration of reef [habitat](#)."

The team was funded by the Leverhulme Trust (UK), through an International Network Grant. It included scientists from James Cook University and The University of Queensland in Australia, from The University of Auckland in New Zealand, Memorial University in Canada, and the University of Maine in the USA. They examined rates of carbonate production across 19 reefs in the four Caribbean countries of the Bahamas, Belize, Bonaire and Grand Cayman.

They discovered that declines in rates of carbonate

production were especially evident in shallow water habitats, where many fast growing branching coral species have been lost. The study compared modern day rates with those measured in the region over approximately the last 7,000 years. In key habitats around the Caribbean, the findings suggested that in waters of around five metres in depth, reef growth rates are now reduced by 60-70% compared to the regional averages taken from historical records. In waters of around 10 metres in depth, the rates are reduced by 25%.

The study also suggests that these key habitats must have a minimum of around 10% living coral cover to maintain their current structures. The amount of cover varies between sites, but some are already below this threshold and are therefore at risk of starting to erode. Given that previous studies have shown that [coral](#) cover on reefs in the Caribbean has declined by an average of 80 per cent since the 1970s, this raises alarm bells for the future state of reefs in the region. These changes have been driven by human disturbance, disease and rising sea temperatures, and are only expected to intensify as a result of future climate change.

Provided by University of Exeter

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