

World's coastal wetlands and coral reef islands face urgent sea level threat, new study shows

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Coral reef islands are losing the battle with sea-level rise, as exemplified by Beneamina, Solomon Islands, in the Pacific Ocean. Photo by Simon Albert.

Coastal wetlands and coral reef islands will struggle to grow fast enough to keep pace with rising sea levels driven by climate change, according to a new study published in [Nature](#). The study was conducted by an international team that includes a Tulane University researcher. The findings show that the future of marshes and other low-lying coastal areas depends heavily on whether global warming can be limited to less than 2 degrees Celsius (3.6 degrees Fahrenheit) as formulated by the

Paris Agreement.

A key finding of the paper is that coastal marshes, mangroves, and reef islands are unlikely to keep pace with rates of sea-level rise that exceed 7 millimeters (about one-quarter of an inch) per year. This rate is likely to occur by the year 2100 in most parts of the world in the absence of major efforts to reduce greenhouse gas emissions.

Higher rates of sea-level rise, however, are already being observed along the Gulf Coast and previous Tulane research has shown that the current rate of sea-level rise could “drown” marshlands in Louisiana, and possibly other areas along the Gulf Coast, in about 50 years.

“Collectively, these are among the most valuable ecosystems on the planet. For example, the world’s fisheries depend to a significant extent on the health of coastal wetlands and coral reefs,” said the study’s co-author [Torbjörn Törnqvist](#), the Vokes Geology Professor in [Tulane’s Department of Earth and Environmental Sciences](#).

The study ties directly into the most recent sea-level projections of the Intergovernmental Panel on Climate Change, published in 2021. The researchers found that if global warming remains below 2 °C compared to pre-industrial temperatures, these coastal ecosystems will probably survive along many of the world’s shorelines by 2100, but higher levels of warming will likely lead to widespread collapse.

“This shows the importance of the Paris Agreement that aims to keep warming within 2 °C and ideally 1.5 °C,” Törnqvist said. “Clearly, this would make a huge difference for coastal ecosystems. However, right now we are on track for 2.4 to 3.5 °C of warming by the end of this century, so a change of course is desperately needed. And this would have to happen very quickly.”

Even with global warming of 1.5 °C, some coastal zones will lose most of their wetlands by the end of the century. The Louisiana and Texas coastlines constitute one of those regions. The cascade of record-breaking heat across much of the world over the past few months shows that this level of warming may be reached within a

matter of years.

The study was carried out by a team led by Neil Saintilan at Macquarie University with colleagues based at other Australian universities, plus co-authors from Singapore, Hong Kong, the United Kingdom, and the United States. Törnqvist's contribution to this work focused primarily on developing new methods to determine wetland vulnerability to sea-level rise in the geologic past. He was funded by the U.S. National Science Foundation.