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Nearly All of the World's Shallow Coral Reefs Are Now Critically Endangered

If climate change continues apace, 96 percent of shallow coral reef ecosystems may collapse within 50 years, including in Australia's Great Barrier reef.



By Catrin Einhorn

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Almost all of the world's shallow-water coral reefs, famous for their riot of color and life, have now been classified as critically endangered by experts who assess ecosystem collapse.

Heat stress because of climate change is the overwhelming reason for the finding, announced Thursday by the International Union for Conservation of Nature's Red List of Ecosystems.

It was the group's first global assessment of shallow-water reef ecosystems. The scientists grouped reefs into 127 regions based on location and the unique species present.

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They found that 96 percent were critically endangered, including those in the Great Barrier Reef off Australia, the Coral Triangle in the western Pacific, the Mesoamerican Barrier Reef System in the Caribbean and Florida's reefs.

The classification means that they face an extremely high risk of collapse within 50 years. The I.U.C.N. defines collapse as the near or complete loss of living hard corals, leaving reefs unable to sustain themselves.

Shallow-water reefs support around a quarter of ocean species at some point in their life cycle, scientists estimate. Hundreds of millions of people rely on these ecosystems for fish and coastal protection.

Scientists involved in the research emphasized that the reefs are not yet lost. The finding is based on the current estimated trajectory of climate change, given global greenhouse gas emissions primarily from the burning of oil, gas and coal. If countries do more to slow warming, the outcome for reefs could improve.

"There's a small and narrowing window of opportunity here to prevent the worst outcomes if we act quickly," said Mishal Gudka, the assessment's scientific lead and a research fellow at the University of Melbourne.

If the scientists exclude the additional warming predicted because of climate change, 24 percent of the reef ecosystems would be critically endangered instead of 96 percent.

Overfishing and pollution also threaten reefs, and relieving those pressures would help make them more resilient.

Shallow-water reefs are sometimes called the rainforests of the sea because of their astounding biodiversity.

Recent years have brought a growing chorus of alarm bells from scientists about the ability of coral reefs to withstand climate change. Reef-building corals are tiny animals that create limestone structures and host photosynthesizing algae in their tissue. The algae provide the coral with most of its nourishment. But under certain stressful conditions, including too much heat, coral expels the algae in a process known as bleaching. If the adverse conditions persist for too long, coral will starve and die.

On a species level, a previous assessment found that 44 percent of reef-building corals were threatened with extinction. That analysis used data before 2023, 2024 and 2025 — the three hottest years on record — and the fourth global bleaching event, its authors have since noted.

After a searing ocean heat wave in 2023, two important species in Florida's reef, elkhorn and staghorn coral, were found to be functionally extinct there.

"Particularly in the last 10 years, we've seen a massive increase in the scale of bleaching events," Dr. Gudka said. "Every time we're getting a bleaching event, the time between them is getting shorter, and they're impacting more and more reefs each time."

Scientists are racing to find ways to help coral survive warmer oceans, for example by helping breed more heat-resilient varieties. Other proposed interventions include finding ways to shade coral reefs during intense heat waves.

Every potential tool is important to consider, Dr. Gudka said. But even if researchers make significant breakthroughs, there are major challenges in scaling them up to levels where they could replace the ecosystems being lost.

John Parkinson, a coral scientist at the University of South Florida whose research focuses on helping coral survive at higher temperatures, said the I.U.C.N. findings were in line with what he would expect.

Corals are diverse, with hundreds of species and different heat tolerances within a single species. It's critical for scientists to try to save what they can, Dr. Parkinson said, but he said their role is limited.

"In the intervention and restoration community, I think we all recognize that it's not going to matter unless climate change is addressed and greenhouse gas emissions are addressed," Dr. Parkinson said.

The coral reef announcement comes a day after a United Nations scientific report found that the United States' abandonment of its climate pledges has increased the odds that the world will warm more than previously estimated.

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