

The outlook for coral reefs -- often termed the rainforests of the sea -- is dire. Overfishing, pollution, damage from anchors, mining for construction materials, and over-collection for the pet trade are all over-shadowed by climate change which could decimate reefs by higher water temperatures and increasingly acidic conditions which could render many coral species incapable of forming carbonate support structures. Nevertheless a new report from the World Conservation Union (IUCN) and The Nature Conservancy says that measures can be taken to help increase the survival chances for coral reefs. The report, "Coral Reef Resilience and Resistance to Bleaching", outlines strategies for helping reefs to be better adapt to the impacts of climate change.

The key, says the report, is to reduce disturbances to reefs, leaving it healthier and more resilient to global warming.

"We need to minimize human impacts such as pollution, overfishing or unsustainable coastal development. Then the coral reefs have a bigger chance of coming back after bleaching and of adapting to rising sea temperatures or more acid waters," said report co-author Gabriel Grimsditch of the IUCN Global Marine Programme.

The report further recommends protecting particularly healthy reef sites that might serve as 'refuges' for coral species to re colonize degraded reefs in the future. It also said that better monitoring is needed to determine the severity of bleaching events.

The report notes that while coral reefs only cover 0.2% of the ocean floor, they contain 25% of the world's marine species. Reefs provide a livelihood for 100 million people and form the basis for tourism and fishing in some areas. Further, reefs protect shorelines from erosion and serve important functions for local fisheries. The report estimates that worldwide reefs are worth net benefit of \$30 billion.

But, warns the report, climate change threatens to incapacitate reefs in the future, leaving them unable to provide these ecological and economic benefits. Already 20% of coral reefs have destroyed and another 50% are facing immediate or long term risk of collapse. A report issued in 2004 warned that a 1.5 degrees Celsius rise in ocean temperatures could cause 95% of the corals on [Australia's Great Barrier Reef to die by 2050](#) while increasing ocean acidity could doom some of the ocean's smallest organisms which form the base of the marine food chain.



CORAL BLEACHING

Coral bleaching is associated with a variety of physiological stresses, the most important of which is elevated sea surface temperatures. Bleaching causes coral to expel symbiotic zooxanthellae algae living in their tissues -- algae that provide corals with nourishment. Losing their algae leaves coral tissues devoid of color, and thus appearing to be bleached. Corals can recover from short-term bleaching, but prolonged bleaching (over a week) can cause irreversible damage and subsequent death. Coral bleaching is associated with a variety of physiological stresses, the most important of which is elevated sea surface temperatures.

The first coral bleaching on record occurred in 1979. Since then, there have been six events (not counting 2005), each of which has been progressively more frequent and severe. In the El Niño year of 1998, when tropical sea surface temperatures were the highest yet in recorded history, coral reefs around the world suffered the most severe bleaching on record. 48% of reefs in the Western Indian Ocean suffered bleaching, while 16% of the world's appeared to have died by the end of 1998. 2002 was even worse: 60 to 95 per cent of individual reefs of the 110,000 square mile (284,000 square kilometer) Great Barrier Reef suffered some bleaching, while reefs in Palau, the Seychelles, and Okinawa suffered 70-95% bleaching. While most of these reef ecosystems have recovered to some degree, warmer water temperatures in the future may have a more lasting impact.

"Rising temperatures and sea-levels challenge reef managers to be flexible and adapt their approaches to make the reefs and mangroves under their care more resilient to climate change as new science and understanding emerges," said co-author Rodney Salm, Director of the Transforming Coastal Marine Conservation Program at The Nature Conservancy.

"It is high time for action," said Carl Gustaf Lundin, Head of the IUCN Global Marine Programme.