

**Strategies to help vulnerable marine ecosystems survive the impact of climate change have been published by conservationists.**

Coral reefs and mangroves are being degraded by global warming, pollution and coastal developments, they said.

The authors believe limiting the human impact on the habitats will allow them to be more resilient to climate shifts.

The reports have been produced by the World Conservation Union (IUCN) and The Nature Conservancy (TNC).

Coral Reef Resilience and Resistance to Bleaching and "Managing Mangroves for Resilience to Climate Change list the range of human threats to the ecology, and the risks posed by climate change.

"The two reports give a clear message," says Carl Gustaf Lundin, head of the IUCN Global Marine Programme.

"While we cannot stop climate change in the short term, we can help tropical marine ecosystems survive," he adds.

"If reef managers and politicians follow the measures proposed in these publications, we may be able to reverse the trends."

### Warming seas

Reefs are particularly sensitive to climate change because they bleach easily if there are changes to sea surface temperatures (SSTs), the groups warn.

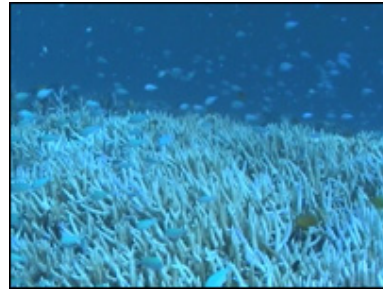
Corals get their colour from tiny single-cell plants - zooxanthellae - which provide for the reef-building creatures, the polyps.

If there is an increase in SST for a prolonged period, the zooxanthellae are driven away, the coral loses its colour, the polyps lose their food and the reef is weakened.

The reefs then become more vulnerable to other threats, such as: overfishing; pollution; creatures that eat them; sedimentation from storm surges and snorkellers; and coastal developments.

Sometimes called "the tropical rainforests of the ocean", reefs only cover 0.2% of the world's sea-floor, but contain an estimated 25% of marine species.

They also provide a source of income and food for millions of people, the authors say, delivering about \$30bn (£16bn) worth of benefits in goods and services.



Coral is sensitive to changes in sea temperature (Image: Paul Marshall/GBRMPA)

“ We need to minimise human impacts such as pollution, overfishing or unsustainable coastal developments ”

Gabriel Grimsditch,  
Coral report co-author

[Coral guide \(1.2MB\)](#)  
[Mangrove guide \(1.8MB\)](#)

To mitigate the damage to coral weakened by warming waters, the report calls for the adoption of a range of measures, such as:

- improved reef monitoring
- marine protection areas
- transplanting healthy coral to degraded reefs
- coastal and fishing management schemes



Mangroves provide shelter for spawning fish (Image: TNC)

"We need to minimise human impacts such as pollution, overfishing or unsustainable coastal developments," says Gabriel Grimsditch, one of the authors of the coral report.

"The coral reefs then have a bigger chance of coming back after bleaching and of adapting to rising sea temperatures or more acid waters," he explains.

### Managing mangroves

Although mangroves are well suited for harsh conditions, rising sea levels and deforestation threatens to undermine some of the plants' long-term survival, the authors warn.

Writing in the report, they add: "But the good news is that not all coastlines with mangrove forests are projected to experience a rise in relative sea level.

"At sites that are projected to experience rising seas, mangrove ecosystems on low relief islands and those deprived of sediment are especially vulnerable.

"In contrast, mangrove ecosystems with ample sediment supplies [or with] room to move inland are likely to survive projected rates of sea-level rise."

As well as sea-level rise, another climate-related risk is changing rainfall patterns, which can affect the forests' growth and development.

Over the past 50 years, an estimated one-third of the world's mangrove forests have been cleared for fuel, coastal developments or farming.

The main reason behind the clearance has been the emergence of shrimp farms in Indonesia and Thailand to meet global demand for the shellfish.

The report's authors, from the IUCN and TNC, highlight 10 strategies that could help protect the forests, including:

- identify and protect areas naturally positioned to survive climate change
- manage human demands on the plantations
- establish green belts and buffer zones to allow mangrove migration
- restore degraded areas that have displayed resilience to climate shifts

The reports are the first publications in a series by the IUCN on the impacts of climate change on the natural world.



Mangrove forests likely to survive should be protected, the authors say (Carolin Wahnbaeck/IUCN)