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Warming set to 'devastate' coral

By Paul Rincon
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Rising ocean temperatures look set to cause lasting devastation to coral reef systems, a study suggests.

An international team of researchers looked at reefs in the Seychelles, where an ocean warming event in 1998 killed much of the live coral.

The group found the oceanic reef had experienced fish extinctions, algal growth, and only limited recovery.

Details have been published in the US journal Proceedings of the National Academy of Sciences.

The 1998 event saw Indian Ocean surface temperatures rise to unprecedented levels, killing off - or "bleaching" - more than 90% of the inner Seychelles coral. Coral bleaching has been described as a vivid demonstration of climate change in action.

"[Bleaching events] are becoming more frequent and are predicted to become more severe in coming decades. They are directly linked to increases in sea surface temperatures," said lead author Nick Graham, of the University of Newcastle, UK.

'Special relationship'

Corals live in a mutually beneficial relationship with photosynthetic algae. But when sea surface temperatures at a given location rise above summer limits, the corals expel their single-celled bedfellows (possibly because the algae start producing toxins).

Algae provide corals with most of their energy and their colour - hence the term bleaching. If the high temperatures are prolonged, the corals

start to die off en masse.

Bleaching in 1998 occurred in all reef regions of the world; 16% of the world's reefs were lost in that one year, alone. But the western Indian Ocean suffered most because of an interaction between El Nino and another periodic climate phenomenon called the Indian Ocean dipole.

In the seven years since, the damaged reefs have been largely unable to reseed. Many simply collapsed into rubble and became covered in algae.

This collapse removed food and shelter from predators for a large and diverse amount of marine life. The survey showed four fish species could already be locally extinct, and six species are at critically low levels.

The survey also revealed that the diversity of fish species in the heavily impacted sites had plummeted by about 50%.

Computer models

Reduced biodiversity makes for a more fragile, less stable ecosystem.

The team says smaller fish have fallen in number more rapidly than larger species, but their decreased availability is having a more lasting effect on the food chain - and this effect is likely to be amplified as time goes on.

Moreover, the group's paper reports, the observed fall in herbivorous fish is a key concern, as they control algal spread.

The problems seem to be down to the relative isolation of coral systems in this area. An absence of nearby reefs to provide larvae which could settle and grow into new coral structures, along with the lack of favourable sea currents to transport the larvae, could be largely to blame.

In expansive continental reef systems such as the Great Barrier Reef in Australia, there exists more potential for so-called "refugia" which may escape the worst of the bleaching. In these areas, corals could survive and subsequently go on to repopulate the worst-hit areas.

But the prospects may not be so good if bleaching events become more common and more severe, the team says.

Since 1998, another three bleaching events have been recorded in the Indian Ocean and at least two in the Pacific.

"Various [computer simulations] suggest we'll be having a 1998-scale bleaching event annually within 30 years, so the outlook is pretty bleak for

how common these events will become," said Dr Graham.

Worldwide, coral reefs cover an estimated 284,300 sq km and support over 25% of all known marine species.

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