



## Global Warming May Have Damaged Coral Reefs Forever

A recent study has shown for the first time the long-term impact of sea temperature rises on reef coral and fish communities. The results suggest that global warming may have had a more devastating effect on some of the world's finest coral reefs than previously assumed.

Coral reefs, one of the most diverse and productive ecosystems in the world, have been one of the first to exhibit major changes in response to global warming. In 1998, global warming caused Indian Ocean surface temperatures to increase to unprecedented levels, which in turn generated the loss of more than 90 per cent of the inner Seychelles coral through a process known as "coral bleaching". Coral bleaching occurs when symbiotic algae that live within the coral tissues are released from the original host coral organism due to stress. The rise in sea surface temperatures has been proven to be one potential stressor. When this happens the coral loses its pigments, leading to a bleached or completely white appearance. If the stress persists the corals can suffer extensive mortality. Empirical data of the long term effects of coral loss on other components of the ecosystem is still lacking. The long term impacts on reef fish are of particular interest because they support local fisheries and tourism, and are critical for the survival of coral reefs.

An international team of researchers surveyed 21 sites and over 50,000 m<sup>2</sup> of coral reefs in the inner islands of the Seychelles from 1994 to 2005 in order to assess changes in the coral reef ecosystem as a result of the bleaching event of 1998. This is the first study to show the long-term impact of this incident.

The results suggest that after the severe bleaching event, there was a collapse in the physical structure of the reef, which in turn resulted in profound impacts on other organisms in the ecosystem. In 2005, the average coral cover in the area surveyed was just 7.5 percent. The collapse of the reefs removed food and shelter from predators for a large and diverse amount of marine life. Consequently, the survey also revealed that species diversity of the fish community had decreased by 50 per cent in the heavily impacted sites. Reduced biodiversity results in a more fragile and less stable ecosystem. The survey showed that four fish species (a type of butterflyfish, two types of wrass and a type of damselfish) are possibly already locally extinct, and six species are at critically low levels (a type of filefish, three types of butterflyfish and two damselfish), although their decline probably started to happen soon after 1998.

The research showed very little recovery in the reef system of the inner Seychelles islands seven years after the 1998 event. Reefs have been able to recover after disturbances in continental reef systems such as East Africa and the Great Barrier Reef in Australia. The authors argue that isolated reefs such as the ones in the Seychelles, may be more susceptible to climate change, even though they escape many of the stressors impacting continental reefs.

The current study demonstrates the long-term effects of climate change on reefs and other components of the associated ecosystem. It also raises questions about the potential for recovery of such valuable marine ecosystems. More research is necessary on coral bleaching, its ecological/ecosystem impacts and their socio-economic consequences.

**Source:** Graham N.A.J et al (2006) "Dynamic fragility of oceanic coral reef ecosystems", Proceedings of the National Academy of Sciences. Published online before print May 18, 2006, 10.1073/pnas.0600693103

**Contact:** [N.A.J.Graham@newcastle.ac.uk](mailto:N.A.J.Graham@newcastle.ac.uk)

**Theme(s):** Marine ecosystems, climate change and energy

**Opinions expressed in this News Alert do not necessarily reflect those of the European Commission**