

Climate change and coral bleaching

December 2005

The Intergovernmental Panel on Climate Change (IPCC) in 2001 reported an overwhelming scientific consensus that the Earth's climate is warming and the effects on the world's ecosystems can already be seen.

Coral reefs are among the most sensitive ecosystems and large-scale coral bleaching events, driven by unusually warm sea temperatures, are affecting every major coral reef ecosystem on the planet.

The effects of coral bleaching are pervasive and potentially devastating to ecosystems, as well as to the people and industries that depend upon it. The frequency and severity of these large-scale disturbances is predicted to increase as temperatures continue to warm under global climate change.

Climate change, together with other stressors caused by human activities, are resulting in unprecedented pressure on coral reefs. Climate change and coral bleaching have been identified as among the most serious threats to coral reefs worldwide, including the Great Barrier Reef, in the recent report *Status of Coral Reefs of the World: 2004*.

Understanding the effects and implications of coral bleaching, and identifying strategies to reduce stress and mitigate impacts, are urgent challenges for the conservation and management of coral reefs worldwide.

GBRMPA management response to coral bleaching

Every summer brings the risk of widespread coral bleaching on the Great Barrier Reef. The Great Barrier Reef Marine Park Authority's (GBRMPA's) Climate Change Response Programme implements a Coral Bleaching Response Plan for the bleaching-risk period between December and April each year. This Coral Bleaching Response Plan enables the GBRMPA to:

- Provide early warnings of a major coral bleaching event
- Measure the spatial extent of mass coral bleaching events
- Assess the ecological impacts of mass coral bleaching events
- Communicate and raise awareness about coral bleaching and climate impacts on the Great Barrier Reef
- Evaluate the implications of coral bleaching events for management policy and strategies.

The Great Barrier Reef Coral Bleaching Response Plan has the following three main components:

- 1) Early Warning System - which includes monitoring sea surface temperatures and weather conditions (Figure 1).

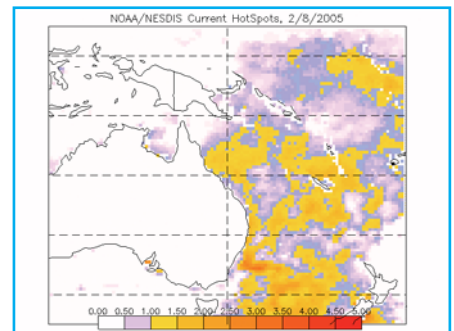


Figure 1: National Oceanic Atmosphere Association hotspot map.

- 2) Bleaching Assessment and Monitoring Programme - involving in-water ecological surveys (Figure 2).



Figure 2: GBRMPA staff undertaking surveys as part of the Coral Bleaching Response Plan.

- 3) Communication Programme - communicating knowledge about coral bleaching.

The GBRMPA is committed to improving knowledge about the effects of climate change on the Great Barrier Reef. To achieve this, the GBRMPA is involved in collaborative research projects with leading Australian and International organisations including JCU, UQ, AIMS, BoM, CSIRO, NOAA and IUCN.

Managing for resilience

To ensure coral reefs have the best chance to cope with coral bleaching, the GBRMPA aims to enhance coral reef resilience and reduce human activities that result in a degraded reef system. Pressure from terrestrial run-off, over-fishing and losses in biodiversity will affect the ability of coral reefs to tolerate and recover from stress caused by coral bleaching. By minimising these pressures through strategies such as zoning and the *Reef Water Quality Protection Plan*, the GBRMPA aims to maximise the prospects for the Great Barrier Reef under climate change.

How can I help?

The immense size of the Great Barrier Reef means everyone has a role in protecting the reef. Whether you are a tourism operator, recreational or commercial fisher, researcher, student or even one-time reef visitor, you can help efforts to monitor and measure the spatial extent and severity of coral bleaching on the Great Barrier Reef.



BleachWatch is a coral bleaching monitoring programme run by the GBRMPA. BleachWatch plays a vital role in detecting the onset of bleaching, and is an important part of the GBRMPA's efforts to measure and understand coral bleaching.

Many regular reef visitors already play a key role in the GBRMPA's ability to detect the early signs of coral bleaching through weekly BleachWatch reports submitted during the summer season. GBRMPA provides these reef users with a monitoring kit (Figure 3), and participants receive specially



Figure 3: BleachWatch Kit.

prepared monthly reports on bleaching conditions at their site. The GBRMPA encourages regular reef visitors to get active and sign up for BleachWatch. One-off reef visitors can also play a role by keeping an eye out for signs of coral bleaching and reporting observations online at www.gbrmpa.gov.au.

BleachWatch also relies on participation from Coastwatch and charter flight operators who can detect and report mass bleaching of reefs they may regularly fly over. The aerial component of BleachWatch is also the most effective method for obtaining a synoptic overview of where bleaching is occurring over the full spatial extent of the Great Barrier Reef Marine Park.



Figure 4: Aerial image of a bleached reef.

Further Reading

Coral bleaching on the Great Barrier Reef

<http://www.aims.gov.au/pages/research/reef-monitoring/reef-monitoring-index.html>

<http://www.reef.crc.org.au/publications/brochures/index.html>

<http://www.aims.gov.au/pages/search/search-coral-bleaching.html>

<http://www.reef.crc.org.au/publications/explore/feat37.html>

About climate change and coral reefs

<http://www.ipcc.ch/>
(see section 5.3 of "Climate Change 2001, Impacts, adaptation and vulnerability" for specific reference to the Great Barrier Reef)

<http://www.greenhouse.gov.au/impacts/publications/risk-vulnerability.html>
"Climate Change: Risk and Vulnerability".