



AUSTRALIA'S BIODIVERSITY AND CLIMATE CHANGE



A strategic assessment of the vulnerability of Australia's biodiversity to climate change

The Great Barrier Reef and climate change

The Australian Government's Biodiversity Vulnerability Assessment finds that Australia's unique biodiversity is highly vulnerable to climate change. Biodiversity – all living things – underpins our quality of life, our economy and much of our national identity.

Below is an example from the Assessment about how the Great Barrier Reef's rich biodiversity will be affected under a changing climate.

The Great Barrier Reef World Heritage Area is one of the most biologically diverse regions in the world. Climate change is now recognised as the greatest long-term threat to the Great Barrier Reef, with implications for nearly every part of the ecosystem.

The Great Barrier Reef stretches 2100 kilometres from the tip of Cape York along the Queensland coast and covers close to 350,000 square kilometres.

Impacts on the Reef

Climate projections for the Reef show that sea and air temperatures will continue to increase, sea level is rising, the ocean is becoming more acidic, intense storms and rainfall will become more frequent, and ocean currents will change.

These changes will have consequences for many reef species and habitats, as well as ecosystem processes and the industries and communities that depend on the Reef. The Reef's tourism, commercial fishing and recreational fishing together contribute \$6.9 billion to the national economy per year.

Unusually warm sea temperatures have already caused serious and lasting damage to 16% of the world's coral reefs. The Great Barrier Reef has experienced eight mass bleaching events since 1979, triggered by unusually high sea surface temperatures. The most widespread events occurred in 1998 and 2002 with more than 50% of reefs bleached.

Coral reefs

Coral reefs are among the most vulnerable of all ecosystems to climate change, due in large part to the high sensitivity of corals to small increases in water temperature. When sea temperatures exceed the long term summer maximum by as little as 1–1.5°C for only six weeks, extensive coral bleaching occurs, leading to widespread coral mortality if temperatures do not return to normal levels.



A vast array of organisms depend on corals for habitat and food, and many more will be affected directly or indirectly by shifts in environmental conditions brought about by climate change.

Coral reefs, pelagic environments, coasts and estuaries, and islands and cays will be particularly vulnerable under climate change. Signs of this vulnerability are already evident, some further degradation is inevitable as the climate continues to change, but the extent of the decline will depend on the rate and magnitude of climate change, and the resilience of the ecosystem.

However, while climate change is certain to cause further degradation of the Great Barrier Reef, not all sites will be equally affected. Sites naturally resistant to climate-related stresses, and sites that could serve as climate change refugia,

warrant consideration for special protection from other threats.

The Great Barrier Reef Marine Park Authority's *Great Barrier Reef Climate Change Action Plan 2007–2011* outlines a strategic response to the threat of climate change for the Reef. It will help minimise the impacts on the Reef while also giving this international icon the best chance of coping with climate change.

The Australian Government commissioned the Biodiversity Vulnerability Assessment to help increase understanding of how to prepare Australia's rich biodiversity for future climate change. The Assessment was undertaken by an independent group of eight experts, lead by Professor Will Steffen, for the Natural Resource Management Ministerial Council.

Source: Box 5.5 Climate change and the Great Barrier Reef: impacts and adaptation. (Paul Marshall, GBRMPA) in Steffen W, Burbidge AA, Hughes L, Kitching R, Lindenmayer D, Musgrave W, Stafford Smith M and Werner P (2009) *Australia's biodiversity and climate change: a strategic assessment of the vulnerability of Australia's biodiversity to climate change*. A report to the Natural Resource Management Ministerial Council commissioned by the Commonwealth Department of Climate Change. CSIRO Publishing.

Great Barrier Reef Marine Park Authority and Australian Greenhouse Office (2007a) *Climate change and the Great Barrier Reef: a vulnerability assessment*. (Eds JE Johnson and PA Marshall). Great Barrier Reef Marine Park Authority, Townsville.