



AUSTRALIA'S BIODIVERSITY AND CLIMATE CHANGE



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

The vulnerability of Australia's biodiversity to climate change – Overview

The Australian Government's Biodiversity Vulnerability Assessment finds that Australia's unique biodiversity is highly vulnerable to climate change and that to help protect our biodiversity we need to act now to reduce greenhouse gas emissions.

What is biodiversity?

Biodiversity – all living things - underpins our quality of life, our economy and much of our national identity. Well functioning ecosystems are essential to a range of key services such as clean water and air, storage of carbon, and production of topsoil.

Plants, animals and microbes also dispose of wastes, generate and recycle nutrients, control pests and diseases, pollinate crops, and provide a genetic store from which we can benefit in the future.

What does climate change mean for biodiversity?

Mass extinctions are likely without urgent action to reduce greenhouse gas emissions. However, even with global action to reduce greenhouse gas emissions, we are committed to a changing climate for the rest of this century and beyond. This is likely to include a global average temperature rise of nearly 2°C or more above pre-industrial levels.

Rates of extinction of species are likely to increase as the global average temperature rises by just 1.0 or 1.5°C above pre-industrial levels, and will almost surely accelerate sharply as temperature rises beyond 2°C.

Many of Australia's most species-rich areas are also highly vulnerable to climate change. These include many of Australia's most valued and iconic natural areas such as the Great Barrier Reef, south-western Western Australia, the Australian Alps, the Queensland Wet Tropics and the Kakadu wetlands.

Climate change poses severe challenges for natural ecosystems, both as a direct threat and by heightening the existing stresses living things face, such as degradation of habitat and landscapes through vegetation clearing, introduced pest animals and weeds, highly modified and overcommitted water resources, changed fire regimes, widespread use of fertiliser and other chemicals, urbanisation, mining and, for some species, over-harvesting.

Changes to biodiversity as a result of climate change are already evident, including:

- Shifts in genetic composition
- Changed migration patterns of some birds
- Altered lifecycles of some species and reduced reproduction rates in others



- Expansion of some vegetation types at the expense of others
- Changing fire regimes in southern Australia, leading to changes in species composition
- Mass coral bleaching events triggered by high sea surface temperatures

Many of the most important impacts of climate change on biodiversity are indirect. For example, the major threats to the Kakadu wetlands from climate change arise from an intersection of effects due to saltwater intrusion into freshwater wetlands from rising sea level and greater storm surges, increased relative growth rates of some species from carbon fertilisation, changing fire regimes, and competitive advantages enjoyed by some invasive weed and feral animal species. Efforts at climate change adaptation to enhance the conservation of Australia's biodiversity are thus unlikely to succeed unless they effectively deal with the effects of climate change on these other stressors.

The case for action

To avoid an escalating loss of biodiversity and ecosystem services as climate shifts, changes to management and policy need to be implemented. Five key issues for policymakers have been identified in the assessment. These are:

- We need to adapt and reform the way we manage biodiversity to meet existing and new threats;

- There should be a national process to agree upon a new national vision for, and approval of, biodiversity management;
- We need to renew public and private investment in our natural environment (our life support system);
- We need to build agile and innovative governance arrangements for biodiversity conservation;
- Strong emissions mitigation action globally and in Australia is vital to stay within the capacity of biodiversity to adapt.

We need to support our biodiversity to deal with the impacts that are already 'locked in' due to the greenhouse gases already in the atmosphere, and to the further impacts from future emissions. There is a limit, however, to the rate and magnitude of climate change that our biodiversity can deal with. There is ultimately no substitute for rapid and deep cuts in global emissions of greenhouse gases.

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, led by Professor Will Steffen, for the Natural Resource Management Ministerial Council. Three products make up the Assessment - a full report, a technical summary and a summary for policy makers.

Source: 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 Australian government. CSIRO Publishing.