



AUSTRALIA'S BIODIVERSITY AND CLIMATE CHANGE



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

Climate change and invasive species

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 invasive species, already a key threat to Australian biodiversity, will pose an increased threat under climate change.

An invasive species is a species found, as a result of human activities, beyond its accepted normal distribution and that adversely affects the habitats it invades economically, environmentally or ecologically. Successful invasive species usually displace previously thriving native species by out-competing them for space, food, water or habitat. Invasive species are expected to become a greater risk under climate change. Climate change will cause shifts in the relative ability of invasives to compete with native species, especially if natives are also under stress from other threats.

Some invasive species will be 'winners' from climate change. For example, feral cats are known to have caused extinctions of indigenous mammals on arid islands – but not on high rainfall

ones – and hence changing rainfall patterns will most likely change the impact of cats on native mammals. Some 'sleeper' weeds will expand their range, and some new weeds may emerge. Some pathogens and their hosts will extend their range as temperatures increase.

Floods, which are expected to become more frequent and intense under climate change, provide a preview of how invasive species may respond under a changing climate.

- Exceptional floods in 1974 and 1988 allowed a weed tree from Africa and Asia, athel pine *Tamarix aphylla*, to replace dislodged river red gums *Eucalyptus camaldulensis* along 600km of the Finke River in central Australia. Prior to 1974, athel pine was hardly rated a weed at all but now rates as one of Australia's 20 worst weeds – one of the Weeds of National Significance – and is one of the major weeds of riverine environments in arid Australia. It drains waterholes, increases surface soil salinity and erosion and, unlike river red gums, provides no nectar or hollows for wildlife.

Floods benefit environmental weeds partly by stripping away competing native vegetation. Cyclones, droughts and fires – which are also



expected to increase in severity and/or frequency – benefit weeds in the same way. Increases in fuel loads due to fire-promoting introduced pasture grasses such as buffel grass and gamba grass alter fire regimes in northern and inland Australia, leading to changes in vegetation structure.

Even without extreme weather events, climate change will provide many opportunities for weed establishment wherever native plants are killed by heat or moisture stress, and for invasive animals to replace native species that are unable to adjust.

Native species can also increase in numbers and become 'invasive' in response to climate change. For example:

- In Tasmania, a sea urchin *Centrostephanus rodgersii*, spread from the mainland on sea currents changing as a result of climate change, is forming extensive degraded areas called 'barrens' in places where species-rich kelp beds once grew.

In the Australian Alps, kookaburras are hunting at higher altitudes than before, preying on alpine skinks that fail to recognise them as predators. And with less snow, swamp wallabies and red-necked wallabies are now reaching higher altitudes, placing

alpine herbfields at risk. These newcomers can pose management dilemmas because migration to new regions is considered a positive adaptive response to climate change, but in some cases they may reduce rather than enhance local biodiversity. Removing or reducing the impact of invasive species, particularly those that may benefit under climate change, is likely to be an important way of increasing resilience to threats posed by climate change. Key strategies to deal with invasive species under a changing climate include improving quarantine and biosecurity, increasing investment in invasive species control technologies and efforts (including biological control), improving tools to predict the effects of climate change on distributions of invasive species, and managing connectivity carefully to minimise dispersal of invasive species into new areas.

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 5.12 Climate change and invasive species. (Tim Low) 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.