



# AUSTRALIA'S BIODIVERSITY AND CLIMATE CHANGE



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

## Kakadu – A climate change hotspot

**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 Kakadu National Park, located in the seasonal tropics of Australia's Northern Territory, will be affected under a changing climate.**

The World Heritage-listed Kakadu National Park is at high risk from climate change. The changes include, for example:

- Increasing carbon dioxide and changing fire regimes (impacting savanna and rainforest communities)
- Rising sea level and the resulting saltwater intrusion into freshwater wetlands
- Increased incidence of severe storms and coastal storm surge
- Exacerbation of the impact of invasive weeds, feral animals and diseases.

### Carbon dioxide and fire regimes

The savannas, which by area make up the largest part of Kakadu, are at first glance apparently intact, maintaining a woody component (dominated by *Eucalyptus tetrodonta* and *E. miniata*). However the woody component of the savannas in recent times has thickened, possibly as a result of elevated atmospheric carbon dioxide, which favours the growth of some woody species, whilst other species have declined due to high fire frequencies. Climate change projections include increased temperatures or shifts in the timing and intensity of monsoonal rainfall. This, in conjunction with the spread of fire-prone weeds such as gamba grass, will likely enhance future fire risk and influence the structure and species composition of savanna and rainforest communities.

### Rising sea level and increased storms

The extensive wetlands of Kakadu support a rich and spectacular biota, including vast flocks of magpie geese, which congregate in their millions



to feed on *Eleocharis* chestnuts growing on the floodplains of the Alligator Rivers system. However the nature of these wetlands is threatened by the sea level rise associated with increasing temperatures. About 20cm sea level rise occurred during the last century. At least double that amount, and potentially more than 1 metre due to accelerated melting of polar icesheets, is predicted by 2100. Rising sea levels, in combination with increased frequency of intense tropical storm surges, will increase the regularity and severity with which saline flows penetrate the low-lying freshwater wetlands. This will favour species that can tolerate saline conditions. At the mouth of the Mary River to the west of Kakadu, extensive earthen barrages have been built in an attempt to alleviate the damage caused by saltwater intrusion.

### **Invasive weed and feral animal species**

A complex network of low-lying natural drainage channels, enlarged or cross-connected by movement of feral animals such as Asian water buffalo and pig, means that even a few

tens of centimetres of additional sea level rise may be sufficient to degrade or eliminate a large fraction of the floodplain communities. Beyond their impact in facilitating saline intrusion of the wetlands, these feral species help to spread weed species such as introduced pasture grasses and mimosa, which compete with native plants for space and nutrients.

Climate change will also increase the relative ability of invasive species to compete with indigenous species, especially where native species are also under stress from feral species, changing habitat quality and altered fire regimes. Kakadu inevitably faces a tangled web of feedback loops associated with the multiple impacts of 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 experts, led by Professor Will Steffen, for the Natural Resource Management Ministerial Council.

Source: **Box 5.9** Kakadu: a climate change hotspot. (Barry W Brook) 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.