



The species and ecosystems that help shape Australia's national identity will change substantially as they attempt to adjust to climate change – so how and why we manage them will need to change too.



Biodiversity and Climate Change: Key Messages

The natural world is notoriously adaptable and species, ecosystems and landscapes have a long history of transforming as they experience new and different environmental pressures. Climate change is one such pressure, so our biodiversity will change as nature attempts to adjust to new conditions.

However, as revealed in AdaptNRM's biodiversity modules, a new type of analysis is highlighting that the sheer amount of change and the speed with which it might occur could challenge the way we think about and manage Australia's biodiversity.

How much change?

CSIRO has analysed the potential degree of change in species composition due to climate change – essentially the percentage of total species found in a given area that might be different in the future. For example, we have found that by 2050:

- Much of the continent, including most of Queensland's east coast and hinterland, could experience a 50% change in plant species currently living there.
- Some areas, such as the coastal sand plains around Perth, could experience as much as 80% change in the plant species that live there.
- Some ecological environments may disappear from our continent – the community of rare amphibian species currently found in the Lachlan Lakes near Mildura may no longer exist as a community anywhere in Australia.
- We may see the rise of novel ecological environments – the mammal communities of the Kimberley in northern Western Australia may be so different in the future that they don't look or function like any communities we know today.



By 2050, the plant species found in Springbrook National Park (pictured above) in south east Queensland could be 50% different to the species found living there today. Source: Talia Jeanneret

Do we need a new approach?

Given this amount of change, we need new approaches to biodiversity conservation. This is because the principles we currently use typically focus on preventing change, restoring ecosystems to a pre-European state, or focusing attention on threatened species. New principles are needed that acknowledge change, including some species loss, and guide us toward more rather than less desirable futures for our unique biota.



New principles for conservation

OPTIMISE ECOLOGICAL PROCESSES

Encourage or actively manage things like genetic diversity, landscape connectivity, and hydrological processes to maintain the services we most value and help nature adapt on its own.

MAINTAIN THE EVOLUTIONARY CHARACTER OF OUR BIOTA

Value the uniqueness of Australia's biota and work to keep it unique even as change occurs. This means preventing the dominance of non-Australian species as regional species composition changes, as well as finding ways to maintain the evolutionary processes that have shaped our species.

MAINTAIN UNIQUE REGIONAL CHARACTER

Value the contribution each region makes to national biological diversity by drawing on regional species pools for conservation management actions and maintaining regionally unique environments even as their species composition changes.

MINIMISE SPECIES LOSS NATIONALLY

Accept that some characteristic species may be lost from a region, but may be supported elsewhere in Australia in the future. Supporting a Comprehensive, Adequate and Representative (CAR) set of Australian future environments may support the widest possible range of native species.

PROMOTE CROSS-SECTORAL ADAPTATION PLANNING

Help to ensure that adaptation in other sectors, like agriculture and urban development, does not inadvertently reduce the ability of biodiversity to persist. Develop novel interventions that might assist multiple sectors at once.

From principles to actions

These principles change the way we think about what we are trying to achieve with conservation, and thus suggests we need new goals and actions. AdaptNRM's Biodiversity Adaptation Toolbox attempts to kick-start this process by linking these new principles with potential new strategic goals and management actions. For example:

- The ACT's work on connectivity restoration is shifting away from connecting specific ecosystem types and is instead simply connecting the landscape over broad scales as one way to optimise ecological processes.
- In Victoria, Corangamite CMA's cool temperate rainforests may change to a different ecological community in the future, but analyses suggest they will still be worth protecting because they will still support ecosystems unique to the region, thus helping to maintain unique regional character.
- Changing where we revegetate, like placing greater value on the western portion of Wheatbelt NRM in WA, could ensure future ecosystems are well represented, thus minimising species loss nationally.

To support these shifts, new resources are available for spatial planning that provide potential future distributions of vegetation types, as well as where revegetation, protecting climate refugia, and engaging in assisted dispersal could be most helpful under climate change.



Transforming conservation

These new principles are intended to stimulate new thinking and provide starting points for discussion. All of us (from NRM planners and policy-makers to landholders to community members) will need to consider new principles and trial novel ideas for conservation goals and actions. Ultimately, it is through these creative contributions that we will create an atmosphere of innovation and transform the way we conserve biodiversity, ensuring a unique and vibrant Australia for a changing future.

For more information

AdaptNRM's Biodiversity modules are delivered in three parts and are available online via www.adaptnrm.org:

- A summary of each guide features on the [Implications for Biodiversity](#) and [Helping Biodiversity Adapt](#) webpages
- The full guides for Implications for Biodiversity and Helping Biodiversity Adapt are available for download as PDF files on the website
- Supporting maps and datasets are located in the [CSIRO Data Access Portal](#)