

The importance of ecological processes for terrestrial biodiversity conservation in Tasmania - summary

The flora, fauna and ecosystems (i.e. the biodiversity) of Tasmania are notable for several reasons. Many of the species are endemic (unique) to Tasmania, many of them having gone extinct on mainland Australia. Tasmania features ancient species with origins in the supercontinent Gondwana.

Substantial changes to the natural environments of Tasmania have occurred since European settlement, including:

- widespread clearing and modification of native vegetation,
- alterations to aquatic systems (e.g. large dams),
- introduction of weeds, pests and diseases,
- pollution of the marine environment.

These changes to the natural environment have contributed to a decline in biodiversity, which is exemplified by the listing of more than 670 species on the State's threatened species list (under the *Threatened Species Protection Act 1995*).

Tasmania has one of the highest percentages of protected areas in the world, however more than 40% of these reserves provide only limited protection for the natural environment (e.g. they allow grazing, mining or off-road vehicles). Furthermore there is a massive disparity in areas of reserves between different regions of Tasmania. Conservation planning in Australia is based on the concept of 'bioregions' – regions which are defined by ecological characteristics such as climatic zones, landforms and the distribution of species and vegetation types. Six of Tasmania's nine bioregions have less than 10% of their area protected in reserves dedicated for nature conservation.

A major review of Tasmania's biodiversity, published in the academic journal *Pacific Conservation Biology*, attempts to identify the key ecological processes which sustain Tasmania's biodiversity. The paper looks at the *key ecological processes* and phenomena that make irreplaceable contributions to preserving the unique biodiversity of Tasmania. It also assesses the current trends in, and *threats* to, these processes, and finally identifies *gaps in knowledge* that limit the effective management of these processes for conservation. This is a

departure from the traditional asset-based approach to conservation (where species and vegetation types are mapped and quantified) to a process-based approach. This recognises that the conservation 'assets' are all interlinked and dependent upon large scale processes, such as movement of water, energy, organisms and genes.

Ecological processes can be described as: *The interactions and connections between living and non living systems, including movements of energy, nutrients and species.* Or in more poetic lay terms: *The natural machinery that connects living and non living things and keeps nature healthy.*

These ecological processes encompass a diverse variety of processes all of which are important to the complex functioning of ecosystems. The complexity of ecosystems is what makes them generally resilient and adaptable to change. Natural ecosystems provide essentials for human existence such as clean water, oxygen, food and recycling of nutrients.

The Tasmanian experts adopted a framework of eight key ecological processes:

1. strongly interactive species
2. hydro-ecology
3. long-distance biological movement
4. ecologically appropriate disturbance regimes
5. climate change and variability
6. coastal zone fluxes
7. maintaining evolutionary processes
8. variation of plant productivity

[need to add some brief explanations and examples for each]

Recent trends are towards declining resilience to change or increasing ecosystem *stress* in some key ecological processes. While some of these problems are beyond the immediate influence of local policy makers, others are clearly receptive to better management necessary to maintain the nexus between the process and good biodiversity outcomes.

World-wide the integrity of broad scale ecological processes and adequate levels of **landscape connectivity** have been repeatedly shown to be essential for sustaining biodiversity. The capacity of plants and animals to migrate over the full altitudinal range of Tasmania's mountains has been important to their long term survival. It

is essential therefore to maintain or restore connected native vegetation and other habitat which will permit this movement in the future.

This paper considers the under-valued environmental services that essential ecological processes provide for all Tasmanians particularly in the face of the emerging impacts of climate change.

A key conclusion of the review was that current protected natural habitats almost certainly are insufficient in extent and diversity to sustain populations of all species into the future.

Progress is required on four broad fronts, ensuring ecological processes are properly considered through:

- the application of modern reserve planning principles;
- expanding the existing reserve system;
- reducing all current *threatening processes* in the landscape across Tasmania; and
- managing the 'matrix' (i.e. the landscape outside reserves) in an ecologically informed and appropriate way.

There is growing interest in landscape-scale conservation activities, such as the ***Linking Landscapes*** project in the north east of the state, ***BioLinks*** in the Huon/Kingborough region, as well as initiatives by the ***Tasmanian Land Conservancy*** and ***Greening Australia***. These are delivering positive outcomes in weed control, biodiversity conservation and catchment management.

Comprehensive biodiversity inventory is an essential foundation to good decision making but is inadequate in Tasmania at present. Current knowledge and monitoring of key ecological processes is generally inadequate for effective conservation and adaptive management. Even in the twenty first century, much basic knowledge of native organisms in their ecosystems is lacking.