

# Section 1

## Setting the scene

The next five chapters introduce the general principles that will help you to assess, plan and implement a natural area restoration project. These chapters provide:

A brief introduction to some of the concepts used to describe a natural area (Chapter 1);

An outline of some important causes of damage to natural areas and their effects (Chapter 2);

An introduction to the concept of resilience of natural areas and how to assess how resilient your project site is (Chapter 3);

How you will use this information to prepare a program of natural area restoration (Chapter 4);

Some more complex theories used to select, manage and restore natural areas. (Chapter 5) If you are a beginner don't feel you have to read this now!

The practical application of these general principles follows in the subsequent sections:

Section 2: Your site

Section 3: Organising your project

Section 4: Working on your site

Some people like to set the general scene first before assessing their particular site (the way this book is written) but many like to find out about their site before looking at the regional context. You can read Section 1 or Section 2 first—simply decide what is most comfortable for you.



## Chapter 1

# Describing natural areas

This chapter introduces some basic ideas that allow you to place your project area in the wider Australian context and to understand the natural processes operating within the area.

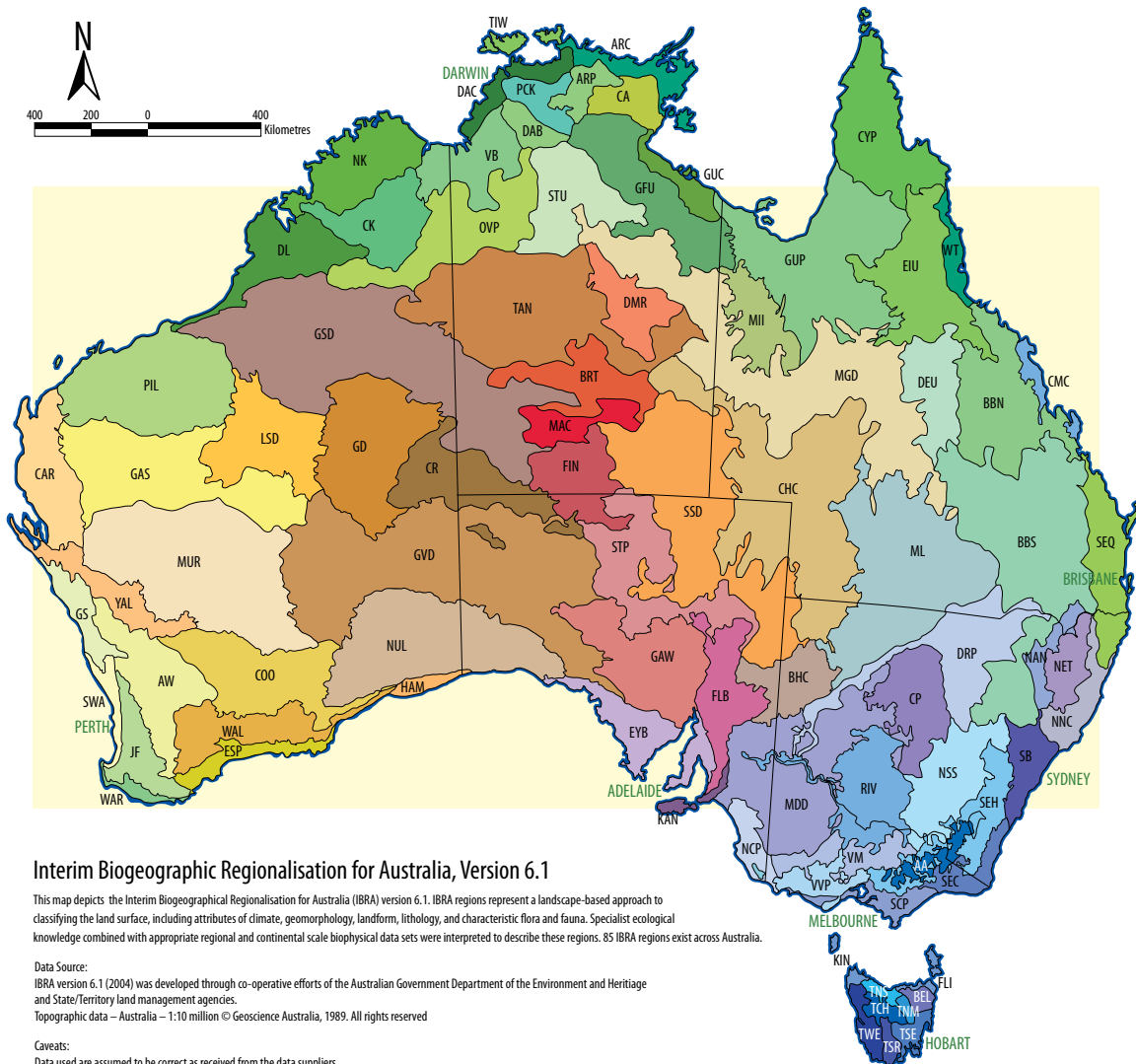
“Large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features and plant and animal communities.”

### A sense of place: Bioregion

Australia has such a diverse range of landform, climate and vegetation that it has been divided into 85 bioregions. These are defined as:

These bioregions cross state boundaries and are the reporting units for the status of native ecosystems. The description of your bioregion will give you important background information such as how well the different ecosystems are conserved in the region.

- AA Australian Alps
- ARC Arnhem Coast
- ARP Arnhem Plateau
- AW Avon Wheatbelt
- BBN Brigalow Belt North
- BBS Brigalow Belt South
- BEL Ben Lomond
- BHC Broken Hill Complex
- BRT Burt Plain
- CA Central Arnhem
- CAR Carnarvon
- CHC Channel Country
- CK Central Kimberley
- CMC Central Mackay Coast
- COO Coolgardie
- CP Cobar Peneplain
- CR Central Ranges
- CYP Cape York Peninsula
- DAB Daly Basin
- DAC Darwin Coastal
- DEU Desert Uplands
- DL Dampierland
- DMR Davenport Murchison Ranges
- DRP Darling Riverine Plains
- EIU Einasleigh Uplands
- ESP Esperance Plains
- EYB Eyre Yorke Block
- FIN Finke
- FLB Flinders Lofty Block
- FLI Flinders
- GAS Gascoyne
- GAW Gawler
- GD Gibson Desert
- GFU Gulf Fall and Uplands
- GS Geraldton Sandplains
- GSD Great Sandy Desert
- GUC Gulf Coastal
- GUP Gulf Plains
- GVD Great Victoria Desert
- HAM Hampton
- JF Jarrah Forest
- KAN Kanmantoo
- KIN King
- LSD Little Sandy Desert
- MAC MacDonnell Ranges
- MAL Mallee
- MDD Murray Darling Depression
- MGD Mitchell Grass Downs
- MII Mount Isa Inlier
- ML Mulga Lands
- MUR Murchison
- NAN Nandewar
- NET Narcoorte Coastal Plain
- NET Northern Kimberley
- NSC NSW North Coast
- NSS NSW South Western Slopes
- NUL Nullarbor
- OVP Ord Victoria Plain
- PCK Pine Creek
- PIL Pilbara
- RIV Riverina
- SB Sydney Basin
- SCP South East Coastal Plain
- SEC South East Corner
- SEH South Eastern Highlands
- SEQ South Eastern Queensland
- SSD Simpson Strzelecki Dunefields
- STP Stony Plains
- STU Sturt Plateau
- SWA Swan Coastal Plain
- TAN Tanami
- TCH Tasmanian Central Highlands
- TIW Tiwi Cobourg
- TNM Tasmanian Northern Midlands
- TNS Tasmanian Northern Slopes
- TSE Tasmanian South East
- TSE Tasmanian Southern Ranges
- TWE Tasmanian West
- VB Victoria Bonaparte
- VM Victorian Midlands
- VVP Victorian Volcanic Plain
- WAR Warren
- WT Wet Tropics
- YAL Yalgoo



### Interim Biogeographic Regionalisation for Australia, Version 6.1

This map depicts the Interim Biogeographical Regionalisation for Australia (IBRA) version 6.1. IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna. Specialist ecological knowledge combined with appropriate regional and continental scale biophysical data sets were interpreted to describe these regions. 85 IBRA regions exist across Australia.

Data Source:  
IBRA version 6.1 (2004) was developed through co-operative efforts of the Australian Government Department of the Environment and Heritage and State/Territory land management agencies.  
Topographic data – Australia – 1:10 million © Geoscience Australia, 1989. All rights reserved

Caveats:  
Data used are assumed to be correct as received from the data suppliers.

## Ecosystem

Your site is part of an ecosystem. These ecosystems are communities of living things (plants, animals and micro-organisms) together with the non-living components in which they are set.



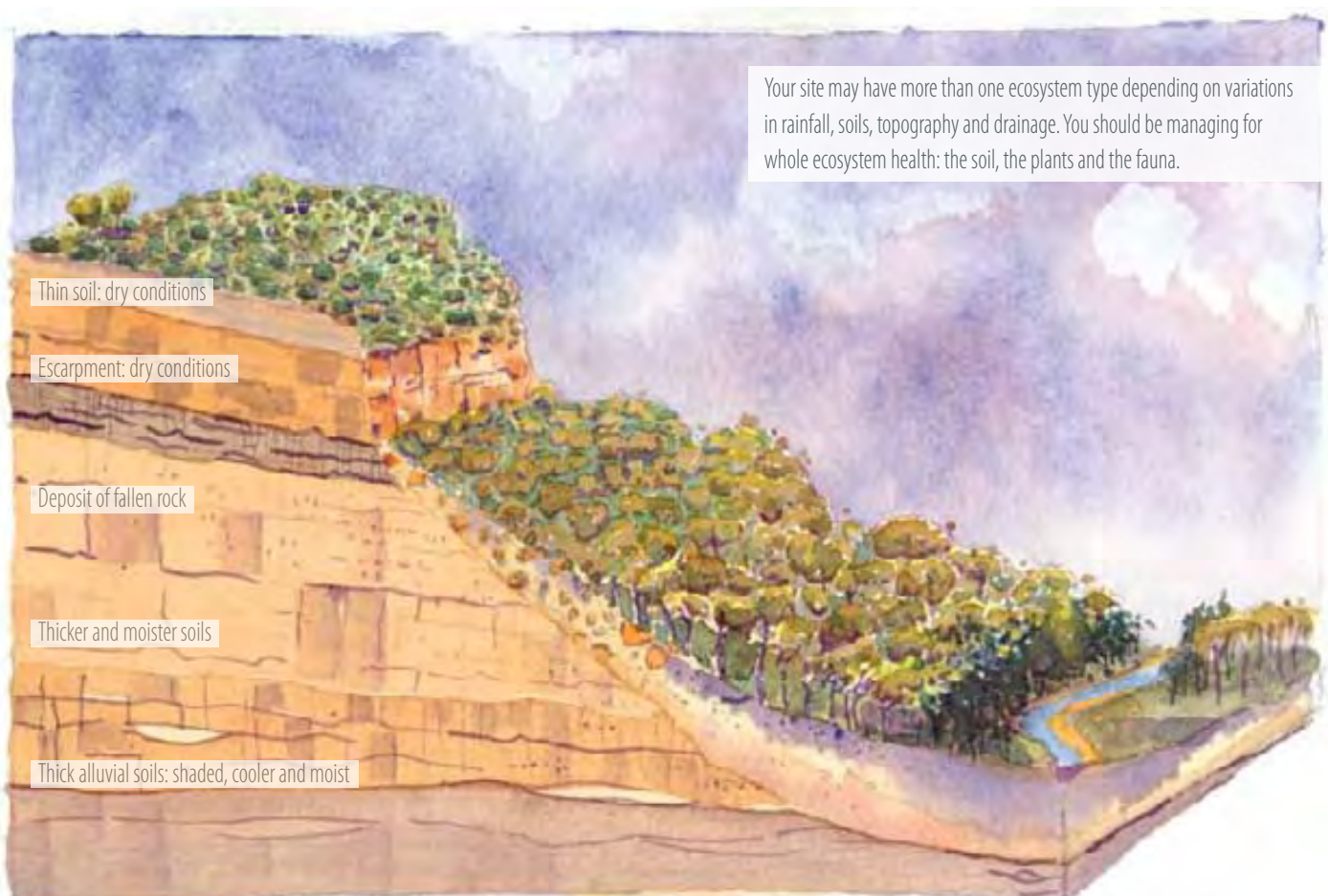
Ecosystems change with physical factors such as drainage. Some animals will use both ecosystems but animals such as yabbies will be confined to the swampy ecosystem.

Understanding the link between the physical and biological factors means you have a better chance of success with your project. Many projects go wrong when people adopt a simple solution – solutions are rarely simple.

### Ecosystem processes are those that keep the world functioning and include the interlinked processes of:

- Energy capture and energy flow through the ecosystem from plants to herbivores and carnivores
- Decomposition
- Nutrient (mineral) cycling
- Carbon cycling
- Water cycling

Ecosystems may include a number of ecological communities, or plant communities such as forests, woodlands, heaths and swamps. Particular ecological communities may have special legal protection under state and federal government legislation.





Catchments are used to manage and educate the public about natural areas.

Courtesy of Willoughby City Council.

In some parts of Australia there are conservation management networks (CMNs) that help coordinate activities for particular ecological communities. Examples include the Grassy Box Woodland CMN in New South Wales and the Gippsland Plains CMN in Victoria. The CMNs are particularly useful as they focus on ecological communities that are not adequately represented in the formal reserve system, for example national parks and nature reserves. CMNs include all land tenures and land uses.

### Catchment/watershed

What broad catchment is your site in? The catchment is simply the area from which the creeks, rivers and ground water derive their water, therefore its boundary is the surrounding hills. It is normally named after the major river draining the catchment. Is your site high in the catchment so that what you do will affect areas further downstream or is it well down the catchment and sediment, salinity, weed seeds and nutrients are washing in from higher upstream?



Revegetation on the small creeks in the upper part of the catchment will affect water quality downstream. Some Landcare groups are based on catchments.

Catchment authorities have been set up across Australia to coordinate ecosystem restoration and management priorities at a broad, regional level.

Within the larger catchments are contained smaller sub-catchments, often named after the creek that flows within that valley.

### Government regions

Place in the landscape can be identified at local government and state levels. Funding, strategies and general support for projects will vary with different governments and over time. Legal requirements also vary (Chapter 12).

### Variety and change

Your site will have a variety of plants and animals but this mix will naturally change over time, even if the site is healthy.

### Biodiversity

Biodiversity is all the variety of life: the different plants, animals and micro-organisms, their genes and the ecosystems of which they are a part. Biological diversity is considered at three levels:

- **genetic diversity** – the variety of genetic information contained in all microorganisms, plants and animals. Genetic variety occurs within one species
- **species diversity** – the variety of species
- **ecosystem diversity** – the variety of habitats, natural communities and ecological processes.

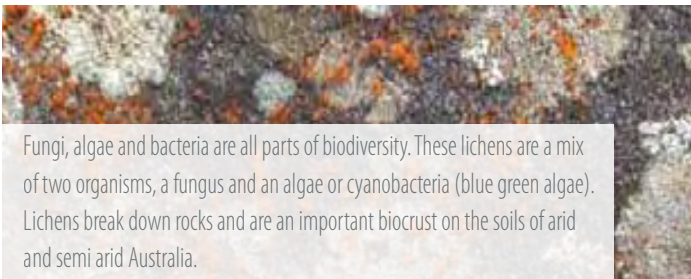
Australia is home to more than one million species of plants and animals, many of which are found nowhere else in the world (endemic). The importance of conserving our biodiversity is recognised at an international level by the listing of natural areas including the Wet Tropics and Greater Blue Mountains as World Heritage sites.

We need to manage whole ecosystems and the variety of ecosystems in which a species may occur. There is a National Strategy for the Conservation of Australian Biodiversity 1996 and most states and local councils have a biodiversity strategy (for example the NSW Biodiversity Strategy 1999).





Biodiversity in this ecosystem includes the herbivorous Swamp Wallaby and flies. They are both required for the rapid release of nutrients back into the soil. Photos 24 hours apart.



Fungi, algae and bacteria are all parts of biodiversity. These lichens are a mix of two organisms, a fungus and an algae or cyanobacteria (blue green algae). Lichens break down rocks and are an important biocrust on the soils of arid and semi arid Australia.



### Biodiversity provides:

#### Ecosystem services

- Clean air
- Carbon storage
- Clean water
- Regulation of water flow
- Soil production and protection
- Nutrient storage and cycling
- Salinity control
- Pest control (particularly insects and other invertebrates)
- Pollination – commercial crops as well as native plants
- Fruit dispersal
- Provision of beauty and recreational opportunities

#### Immediate commercial benefits

- Honey production
- Fisheries
- Kangaroo harvesting
- Wildflower industry
- Tourism

#### Mental and physical health

- Relaxation
- Recreation

#### Future welfare

- Food production
- Clean air and water
- Medicines
- As yet unknown foods, fibres, antibiotics, adhesives

### Our survival depends on biodiversity.



## Habitat

Habitat provides somewhere for animals to shelter, feed and breed. Natural areas have a large number of animals because of the huge range of habitats. If you have the habitat, there is a chance you will have the animals.



The Trapdoor Spider's habitat is the soil where it helps aerate the soil and control insects such as moths, beetles, grasshoppers and crickets.



Even a small roll of bark on the ground can provide protection for a lizard from a hungry hunting cat.



The habitat of the Golden Orb-weaving Spider is large spaces between trees and branches where its web traps aerial insects. Different predators will also feed on the spiders depending on the spider's size and location.



Weeds such as Blackberry and Lantana provide a retreat from predators and a safe nesting site for many small birds.



## Succession

Succession involves directional change over time, whether following a disturbance or by the long absence of disturbance. The classic idea of succession (facilitation) is the ordered change from one community to another with the earlier species making the site better for later species.



On the edge of rock platforms the successional pathway, which may have taken thousands of years, is often laid out as a series of zones. The lichen and moss covered rock gives way to a narrow band of sedges. As the soil deepens and the organic matter increases, shrubs occur, followed by trees.

In Australia this ordered progression is not very common away from rock shelves, wetlands, coastal dunes and rainforests. There are many models to explain community changes and in many parts of Australia change can be fairly disordered, with colonisation determined by the species of seed that falls on the site (the seed rain).

Primary succession occurs on bare sites with no soil or where the community is entirely absent—when seed rain is all-important. Secondary succession occurs on sites with soil present and where components of the previous community remain after the disturbance. In this case the successional pathway will depend on what plant material (seeds, tubers, bulbs, lignotubers) is stored onsite as well as the seed rain.



Colonisation of this landslide has been a haphazard affair depending on seed from the surroundings arriving in a suitable place for establishment. Gum trees and wattles are colonising the bare surface at the same rate as herbs and small shrubs.

Succession can also involve ‘inhibition’, which is very common when dense swards of grass such as the introduced Kikuyu prevent establishment of shrubs and trees. In some revegetation projects it is easier to plant trees first (with weed control around them) and then wait until factors such as leaf litter, shade and root competition suppress weedy or pasture species. Native grasses and shrubs may then be able to become established, whether naturally or by active revegetation.

Invasion of weed species on a site may also follow a successional sequence, with weeds that flourish in open sunny areas growing after the disturbance and a group of weeds that prefer more shaded and stable conditions following later.



The absence of fire can change a tall forest to a closed forest (rainforest) and, in reverse, a fire burning through a rainforest can alter it to a tall forest for many decades.



Trees have been planted and fenced off from stock but no natural tree seedlings will establish due to competition with grass and weeds.

Change is a normal part of natural areas:

- In the absence of fire, a tall east coast forest can change to a closed forest (rainforest) and, in reverse; an intense fire burning through a rainforest can allow tall forest species to dominate for many decades.
- Frequent fires may maintain grassland for decades but fewer fires may allow trees and shrubs to establish and form woodland.
- Drought can alter a wet heath into woodland or forest and a series of wet years can flood the woodland and kill the established eucalypts, returning the area to a wet heath.
- Inland wetlands can change from grass or sedgeland to shrub dominated communities (lignum swamps) and woodlands depending on the flood regime. Extreme floods, once every hundred years or so, may kill well-established trees.

**At any particular time the native plant community is a creation of:**

- weather events such as storms
- the fire regime
- drought
- flood
- other natural factors, such as insect outbreaks
- human disturbances such as logging and clearing
- the fauna.

## Resources

### Books

See Resources in the Introduction to this book.

- The National Committee on Soil and Terrain 2009  
*Australian Soil and Land Survey Field Handbook*, CSIRO Publishing.

### Internet

- Department of Environment and Climate Change NSW [www.environment.nsw.gov.au/bioregions/BioregionOverviews.htm](http://www.environment.nsw.gov.au/bioregions/BioregionOverviews.htm)
- Department of the Environment, Water, Heritage and the Arts <http://www.environment.gov.au/parks/nrs/science/bioregion-framework/index.html>
- National strategy for the conservation of Australia's biological diversity, 1996 [www.environment.gov.au/biodiversity](http://www.environment.gov.au/biodiversity)
- The NSW biodiversity strategy 1999 [www.nsw.gov.au](http://www.nsw.gov.au)

