

INTRODUCTION

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Biological diversity, or biodiversity, is the variety of all life forms: plants, animals and micro-organisms, the genes they contain and the ecosystems and ecological processes of which they form a part. Biodiversity is dynamic, changing through time as a result of natural evolutionary processes.

Australia supports such a rich diversity of life that it is classified as one of twelve megadiverse countries on Earth; collectively, these countries account for 75 percent of total global biodiversity. Queensland supports the greatest levels of Australia's continental biodiversity. Its diverse landscapes include arid dunefields, open grasslands, wetlands, coral reefs, sand islands and rainforests. They support more than 1000 ecosystem types, habitat for approximately 89 percent of Australia's known freshwater fish species, 58 percent of its frog species, 55 percent of its reptile species, 79 percent of its bird species, 65 percent of its mammal species and 47 percent of its vascular plant species. (In this chapter, the term 'landscapes' encompasses both landscapes and seascapes.)

Humans have probably been part of the Queensland landscape for at least 60 000 years. In the past 200 years, intensive agricultural, pastoral and urban developments have substantially altered this landscape. Native ecosystems have been cleared, fragmented and modified through altered fire regimes, introduced species, grazing pressures, harvesting and pollution. These pressures, alone or in combination, have contributed to losses and declines in Queensland's biodiversity.

The international Convention on Biological Diversity and Australian instruments — the National Strategy for the Conservation of Australia's Biological Diversity, the Intergovernmental Agreement on the Environment, the National Strategy for Ecologically Sustainable Development and the National Forestry Policy Statement — all stress the importance of conserving biodiversity. These and other strategies and policies are implemented through many interdependent government programs and legislative requirements.

This chapter examines the pressures on Queensland's biodiversity as well as its current condition, or state, and reports on society's responses to the pressures and state. Regular reporting on pressure and state indicators could identify trends that can be used to guide future management. For many indicators, insufficient data are available at present to provide any clear trends.

SCOPE

Biodiversity can be understood, conserved and managed at a range of spatial and temporal scales. A hierarchy incorporating the regional, ecosystem, species and genetic levels of biodiversity is recognised in Queensland and provides an integrated, systematic and holistic framework for the protection and management of biodiversity in the State. The importance of this approach has been affirmed in the *Nature*

Conservation Act 1992, the first Queensland legislation to define biodiversity at the four levels.

- Regional diversity is the diversity of the landscape components of a region and the functional relationships that affect environmental conditions within ecosystems.
- Ecosystem diversity is the diversity of the different types of communities formed by living organisms and the relations between them.
- Species diversity is the diversity of species.
- Genetic diversity is the diversity of genes within each species.

Planning for the protection and management of biodiversity begins at the broad regional landscape level, represented by biogeographic regions, or bioregions. Terrestrial bioregions are based on broad landscape patterns and are distinguished by combinations of climate, geology, landforms, vegetation, plants, animals and land use. Similarly, marine bioregions are recognised on the basis of biological and physical characteristics.

Thirteen terrestrial bioregions are identified in Queensland (figure 7-1). The national Interim Biogeographical Regionalisation of Australia, or IBRA (Thackway and Cresswell 1995), incorporates the Queensland bioregions but identifies parts of seven as small extensions of bioregions in New South Wales, South Australia and the Northern Territory. In addition, under IBRA, the Brigalow Belt has been divided into two bioregions. The marine environment in Queensland is divided into 14 bioregions under the Interim Marine and Coastal Regionalisation for Australia (IMCRA Technical Group 1998).

Where data exist, this chapter will report on ecosystem, species and genetic diversity at a bioregional level. This allows assessment of biodiversity from both a statewide and a bioregional perspective. In most cases, data are provided for Queensland's 13 terrestrial and 14 marine bioregions and, where applicable in a national context, for the 20 IBRA bioregions. Pressures on biodiversity are assessed in terms of their impacts on regional, ecosystem, species and genetic diversity.

VALUES OF BIODIVERSITY

Biodiversity is essential in the maintenance of all life on Earth, and scientists have long acknowledged that the preservation of biodiversity is, by definition, vital for an ecologically sustainable society. The maintenance of healthy, functioning ecosystems and ecological processes is essential for clean air and water and fertile soils. Apart from the ecological benefits, biodiversity provides essential biological resources and socio-cultural benefits for humans (table 7-1).

Humans derive all their food and many medicines and industrial products from biodiversity; its loss could mean the loss of new strains of agricultural crops and agents for biological control of pest species. Maintenance of biodiversity is critical for many of Queensland's industries; forestry, agriculture,

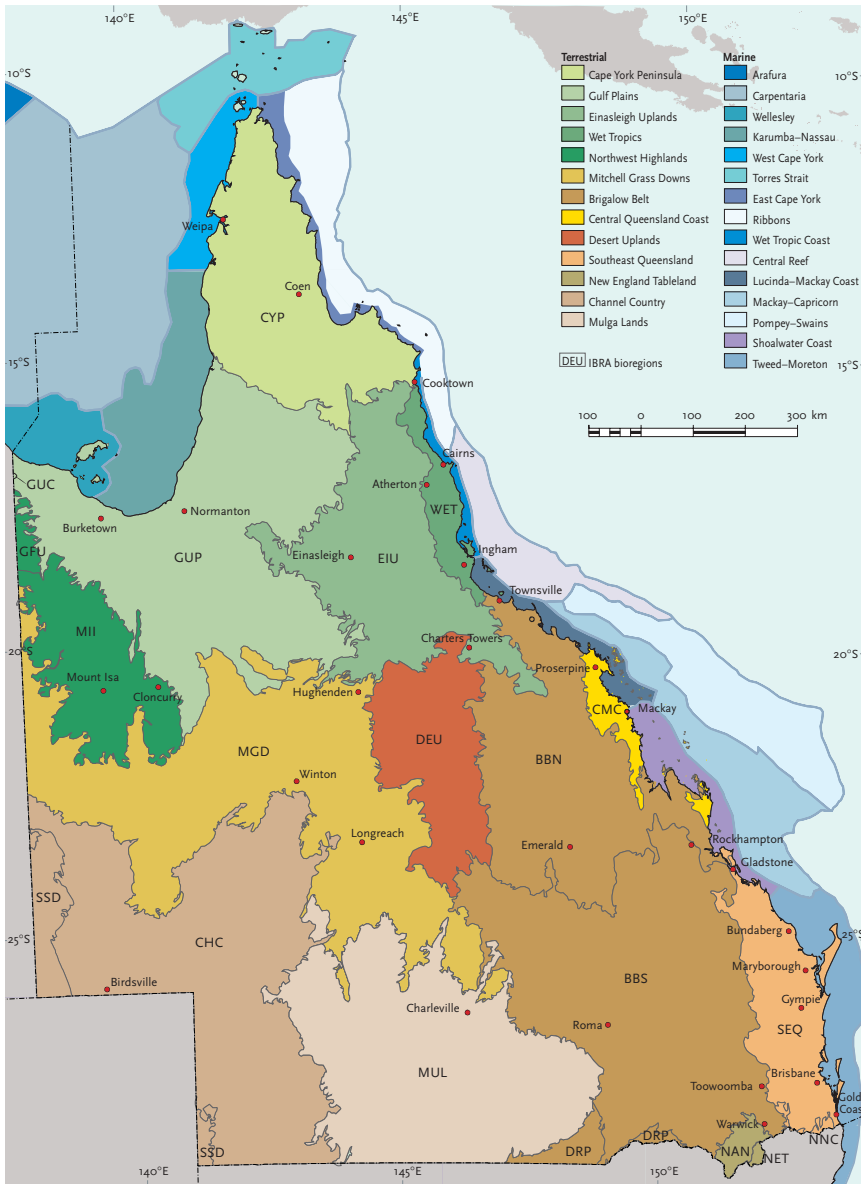


Figure 7-1 Queensland terrestrial and marine bioregions support a great diversity of ecosystems, habitat for many thousands of species. (For list of IBRA bioregions, see table 7-14.)



Arid Queensland landscape, Simpson Desert National Park



Coral cay, Great Barrier Reef



Masked boobies, on Raine Island

Table 7-1 Values of the biological environment and benefits obtained from it

Ecosystem services	Biological resources	Social benefits
Protection of water resources	Food	Cultural values
Regulation of atmospheric processes	Medicinal resources	Aesthetics
Soil formation and protection	Wood and industrial products	Recreation
Nutrient storage and cycling	Ornamental plants	Education
Pollution breakdown and absorption	Breeding stocks, population reservoirs	Income
Contribution to climate stability	Resistance to certain pests	
Maintenance of ecosystems		

(Source: DEST 1993)

fisheries and tourism contribute significantly to the State's economic development. Fisheries resources, for example, support commercial harvesting valued at \$300 million (Zeller 1998). About 6000 tourism jobs depend largely on the State's national parks. Visitors to these parks spend more than \$600 million in association with their visits: the total direct and indirect output effect in the Queensland economy is about \$1.2 billion (Kinhill Economics 1998).

The conservation of biodiversity is a cornerstone of ecologically sustainable development (ESD). A fundamental principle of ESD is that biodiversity belongs to the future as well as to the present and that no generation has the right to deplete it.

Aesthetic and ethical arguments can also be made for conserving biodiversity. The natural environment contributes to the emotional wellbeing of society and offers many recreational benefits. It has great spiritual, economic and social significance for Aboriginal and Torres Strait Islander peoples, and is central to the maintenance of their cultural identity. Many people also put forward moral reasons for conserving biodiversity: they hold that all species have an innate right to exist.