

## Chapter 4. Threatened species protection and the sustainable use of biodiversity

*Australia is one of the world's 17 megadiverse countries, with 10% of global biodiversity, and has the second highest rate of biodiversity deterioration. While significant progress has been made in expanding protected areas, the status of many ecosystems and species continues to deteriorate. This chapter reviews pressures influencing biodiversity; the institutions, policy instruments and financing used to protect threatened species and to promote conservation and sustainable use of biodiversity; the degree to which biodiversity considerations have been integrated into sectoral policies; and the scale and pace of research, development and innovation.*

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## 4.1. Introduction

Australia has made significant progress in expanding its protected areas, increasing terrestrial protected areas to almost 20% of the territory and marine protected areas to over 36% of its jurisdiction since the last review in 2007. It has taken important steps to implement key policy frameworks, such as the Murray-Darling Basin Plan and a long-term collaborative plan for the Great Barrier Reef. The Indigenous Protected Area and Indigenous Ranger programmes are world-leading models of Indigenous engagement in biodiversity conservation. Additionally, some states and regional and local organisations are moving forward with innovative approaches to improve conservation outcomes.

However, the pace and scale of progress have not been enough to improve the status and trends of ecosystems and species. Australia is home to 10% of the world's biodiversity and has its second highest rate of biodiversity deterioration. Small initiatives and limited investment are insufficient to fully address a legacy of land clearing combined with growing pressure from population growth, expanding development, invasive species and climate change. The development of cost-effective, targeted conservation measures is severely limited by lack of data. Monitoring takes place in a patchwork across national, state, territory and local governments, making it difficult to get an overall picture of biodiversity status and trends and identify priorities for action. The revision of Australia's national biodiversity strategy offers an opportunity to develop a new collaborative national policy framework for biodiversity that identifies not only gaps but also priorities for action.

## 4.2. Pressures, state and trends

### 4.2.1. Status and trends

Australia is the world's sixth-largest country and has the third-largest ocean territory. It is also the driest inhabited continent. More than 80% of Australians live within 100 km of the coast. Only 6% of the land is arable (Australian Government, 2017a). The continent is relatively flat, with the planet's lowest average elevation.

One of 17 megadiverse countries, Australia is home to around 10% of the world's biodiversity, including more than 500 000 species of plants and animals. It has a high proportion of endemic species: more than 80% of its mammals, reptiles, frogs, marine species and flowering plants are found nowhere else (Australian Government, 2014).

Australia has a variety of ecosystems, from tropical wetlands and rainforests to eucalypt forests, a central desert and coral reefs, such as the Great Barrier Reef. It has 65 Ramsar Convention wetlands of international importance and 19 sites on the UNESCO World Heritage list (DFAT, 2017). There are two designated international biodiversity hotspots (biogeographic regions with more than 1 500 endemic vascular plant species and less than 30% of original primary habitat): southwestern Australia and the forests of eastern Australia (Cresswell and Murphy, 2017).

Most native mammals are marsupials (e.g. kangaroos, black-footed rock wallabies). The continent is also home to the world's only two types of monotreme mammals, which lay eggs instead of giving birth: the platypus and the echidna. Australia has an estimated 24 000 species of endemic plants, many of them unique sources of food and medicine.

Australia's biodiversity is of significant economic importance, supporting the livelihoods of farmers and fishers, export industries in natural oil and medicine, a strong tourism

industry and numerous recreational pursuits. It provides essential ecosystem services, such as clean air and water, plant pollination, pest control and wastewater treatment, as well as having important cultural value, particularly for Indigenous Australians (Cresswell and Murphy, 2017).

The most significant pressures on biodiversity are from land clearing and habitat fragmentation and deterioration, invasive species, climate change, fire regimes and altered hydrology. Unfortunately, many of these are worsening over time (Cresswell and Murphy, 2017). The rate of land clearing is particularly worrisome. Queensland, for example, lost over 10% of its tree cover between 2010/11 and 2014/15 (ABS, 2017c).

#### ***4.2.2. Information on the status and trends of ecosystems and species***

The lack of long-term, national-scale monitoring programmes for ecosystems, species and the pressures facing them limits the ability to comprehensively assess the status and trends of Australia's biodiversity. National-level data on the health of ecosystems and species is generally patchy, with uneven monitoring across states, ecosystems and species. There is some monitoring for 76% of threatened or near-threatened terrestrial mammals, but 61% of marine mammals are described as data deficient (Cresswell and Murphy, 2017). Lack of data means no fungal species and few invertebrates are listed as threatened (Australian Government, 2014). Of the monitoring programmes that do exist, many are limited in their extent and frequency and have no direct link to management response (Cresswell and Murphy, 2017). Monitoring of river health has decreased, and is particularly deficient in northern Australia (Argent, 2017). A 2018 national assessment of threatened species monitoring found that one-third have no formal monitoring programme, and for the remaining two-thirds, monitoring is often poorly done. Bird monitoring is better than for most species as a result of committed volunteers and non-government organisations (NGOs) such as Birdlife Australia (TSRH, 2018a).

Plans to develop a national biodiversity monitoring and reporting system in the 2010 National Biodiversity Conservation Strategy were not implemented. Other national-level initiatives, such as the River Health Program and the Wetlands Inventory, were discontinued. Funding cuts have affected biodiversity research programmes of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in recent years, as well as climate change adaptation research at the National Climate Change Adaptation Research Facility (O'Donnell and Mummery, 2017). Australia could learn from approaches that other countries, including New Zealand, have taken to develop national biodiversity monitoring systems (Box 4.1).

The national State of the Environment (SoE) report, last completed in 2016, provides a good qualitative sense of the pressures and challenges facing Australia's ecosystems and species. Quantitative conclusions are, however, limited by the lack of comprehensive national data sets. While most states and territories (except the Northern Territory, Tasmania and Western Australia) produce their own regular SoE reports, they lack long-term trend data and are not harmonised in approach or timing. Research efforts are often short term or focused on a single project, and vulnerable to shifts in financial resources driven by changing political direction. Victoria has established an independent commissioner for environmental sustainability with legislative backing to produce its SoE report every five years and make recommendations that require a government response (CESV, 2018). The commissioner's office depends on data gathering financed and undertaken by the Victorian government, however.

Work by the Australian Bureau of Statistics to build and expand estimates of environmental-economic accounts for environmental assets is making an important contribution to understanding the value of natural assets and the risks facing them (Chapter 3). The national water account is particularly useful. Accounts for the Great Barrier Reef and land in Queensland and South Australia can also be used to help drive policy change (ABS, 2017a). State of Forests Reports produced every five years provide another set of national indicators, with Regional Forest Agreements with states and territories requiring regular reporting (ABARES, 2013). Partnership with organisations such as the Integrated Marine Observing System and Terrestrial Ecosystem Research Network could help develop additional indicators. Some states are also starting to value ecosystem services. Victoria, for example, has estimated that its parks provide AUD 83 million per year in water filtration services that support drinking water supplies, food production and other industries (PV, 2018).

#### **Box 4.1. New Zealand fosters partnerships to develop national biodiversity data**

To obtain robust national and regional biodiversity data, New Zealand adopted a three-tiered approach to monitoring, designed in consultation with scientists and local councils and led by the Department of Conservation.

Tier 1 monitoring comprises a nationally consistent, systematic biodiversity monitoring programme based on an 8 km national grid. This sampling protocol builds upon a national infrastructure established to measure carbon, vegetation structure and biodiversity – the Land Use Carbon Analysis System network of vegetation plots in forests and shrublands. The Tier 1 programme focuses on the public conservation estate, but it is now in the early stages of being expanded across the remainder of the country to include council-managed and privately owned land in a partnership between central government, councils and landowners.

Tier 2 monitoring is undertaken to assess the effectiveness of management interventions on species and ecosystems. Biodiversity monitoring protocols are followed to ensure consistency in sample design using a master sample, indicator selection, measures and methods across the country.

Tier 3 monitoring involves intensive research into ecosystem dynamics, methods and tools to improve understanding and inform policy and management.

Adopting a national-level approach to monitoring supports decision making for resource allocation, helps in assessing the effectiveness of biodiversity policy management and interventions, provides information about natural variability and disturbance, and delivers valuable data for environmental reporting.

*Source:* Personal communication with New Zealand government (2018); van Dam-Bates, Gansell and Robertson (2018), “Using balanced acceptance sampling as a master sample for environmental surveys”.

Other monitoring programmes have emerged, including the government-funded Atlas of Living Australia (ALA), a collaborative partnership of organisations that have biological data and expertise, including museums, biological collections, community groups, research organisations, governments and natural resource managers. The ALA has more than 57 million records of more than 110 000 species. The number of records doubled between 2012 and 2015. The Bush Blitz, started in 2010 as a federal-private partnership, brings together scientists, Indigenous communities, local landowners, teachers, students,

and employees of the resource extraction company BHP to document plants and animals across Australia. By 2016 it had discovered more than 1 196 new species (Cresswell and Murphy, 2017). In March 2018, it was announced that the programme would continue until at least 2023.

#### 4.2.3. Natural environments

Indications are that the overall national state of biodiversity is in decline despite progress relating to some pressures, such as water use, and to certain local ecosystems or species.

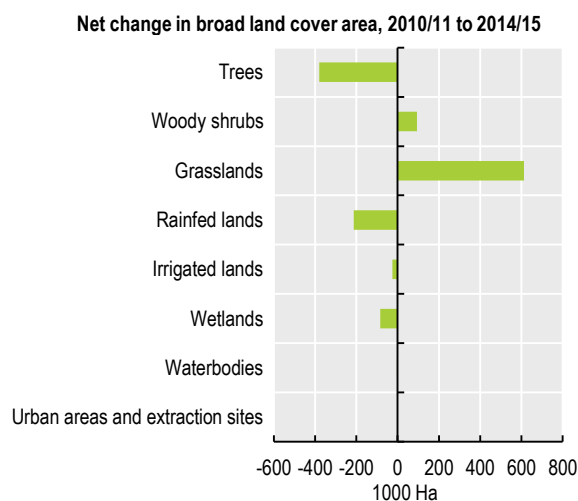
##### *Terrestrial ecosystems*

There are 81 terrestrial ecological communities listed as threatened under Australia's Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Of these, 34 are classified as critically endangered, 42 as endangered and 2 as vulnerable. The majority are found in southeastern Australia (DEE, 2018d). The focus on southeastern Australia is due to the extent of pressures in the region, but also likely related to greater study being undertaken nearer to Sydney, Canberra and Melbourne.

The quantity of vegetation and quality of habitat in terrestrial ecosystems is generally deteriorating, with variation across regions. The quality of terrestrial habitat has declined in many regions, with fewer large patches of contiguous vegetation resulting in fragmented species habitat (Cresswell and Murphy, 2017).

Experimental land accounts for the Great Barrier Reef catchments, for example, show a significant loss of trees, rainfed lands and wetlands between 2010/11 and 2014/15 (Figure 4.1). Much of the change coincides with expansion of grasslands. Livestock grazing accounts for over 80% of land use in Queensland (ABS, 2017c).

**Figure 4.1. The Great Barrier Reef catchments are losing trees, rainfed lands and wetlands, while grasslands expand**



Note: A tree is defined as more than 5 metres tall with a single stem and a shrub as less than 8 metres tall with many stems.

Source: ABS (2017), *Land Account: Queensland, Experimental Estimates 2011-2016*.

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*Inland water ecosystems*

The degree of monitoring of inland water ecosystems varies by region, as does their condition. Australia has 65 wetlands of international importance that are monitored and carefully managed, but there is no comprehensive inventory or monitoring of other wetlands that would allow for an overall assessment. Indications from waterbird surveys are, however, that the area of wetlands has declined over time (Cresswell et al., 2017). The Murray-Darling Basin (MDB) is closely monitored and is considered to be in very poor condition, showing deteriorating trends in both ecological processes and key species populations (Chapter 1; Argent, 2017). Southeastern ecosystems have uneven monitoring regimes, but are considered to be in good condition overall. The southwestern and northeastern coasts are considered to be in poor condition, with declining species populations (Argent, 2017). The status of groundwater-dependent ecosystems important to fish and aquatic invertebrates, as well as to river red gum trees, is mostly graded as poor.

*Coastal and marine ecosystems*

Most coastal and marine habitats and ecosystems near populated areas, agriculture and industry are in poor condition, with declining trends. Monitoring is limited elsewhere, and there are significant gaps in coastal data relating to small species, pollution, invasive species, recreational fishing and marine debris (Argent, 2017). Many canyons, seamounts and coral reefs are in poor condition. The Great Barrier Reef off the coast of Queensland, which is closely monitored, is particularly vulnerable to climate change and the impact of agricultural and industrial land use (Box 4.2). Estuaries and coastal floodplains have also been significantly altered, with levies, floodgates, training walls and other structures, as well as adjacent agriculture. In New South Wales, for example, floodplain, wave-dominated estuaries and deltas used to be nurseries for a range of fish species but alterations have reduced this capacity (FRDC, 2013).

Australia ranked 22<sup>nd</sup> out of 221 exclusive economic zones (EEZs) in the 2017 Ocean Health Index, with a relatively high score for biodiversity. However, the score had slipped slightly from previous years (OHI, 2017).

**Box 4.2. Great Barrier Reef under pressure**

Australia is home to the iconic Great Barrier Reef, a world heritage area that is one of the world's most diverse marine ecosystems. The reef is under significant pressure from the cumulative impact of climate change, pollution and coastal development.

Climate change is the most serious threat to the reef. Warming episodes between 2014 and 2017, combined with crown-of-thorns starfish outbreaks and severe cyclones, resulted in significant coral loss. As a result, the diversity of coral and of the species that live on the reef is declining. While coral can recover over 10 to 15 years, the increased frequency of bleaching events is not allowing enough time for recovery.

Coral is facing pressures from agricultural and industrial land use, with many areas exposed to high concentrations of suspended sediments, excess nutrients and pesticides. Improvements in reducing land-based run-off and other efforts have, however, supported gradual recovery of some species, such as estuarine crocodiles and loggerhead turtles. Species such as the dugong continue to decline.

Ongoing alteration of coastal wetlands is a risk to the life cycles of some marine species and affects their ability to filter sediments and nutrients. Unregulated recreational fishing and illegal fishing also remain of critical concern in the area.

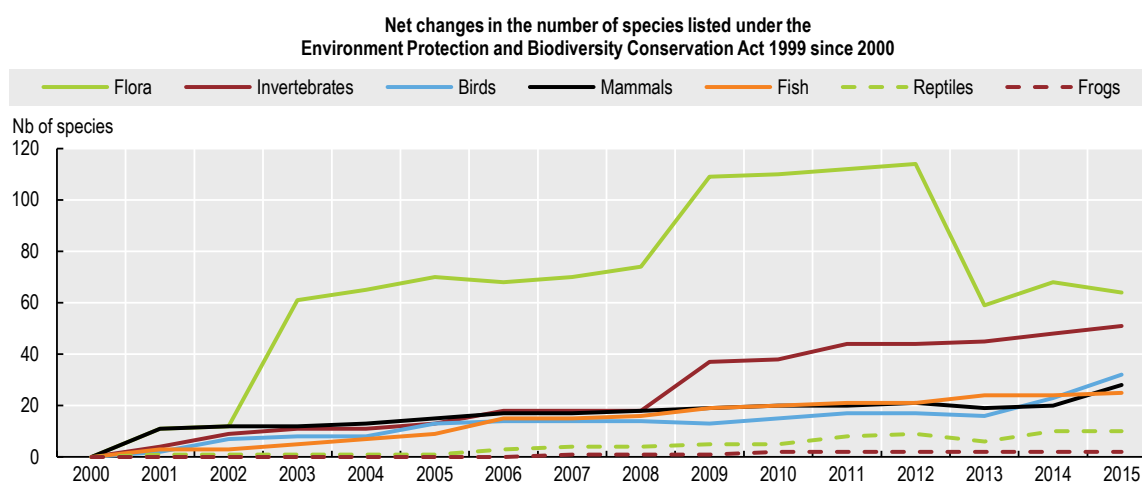
A 2014 assessment by the Great Barrier Reef Marine Park Authority found that the overall outlook for the reef was poor, even with several initiatives in place to reduce threats. One positive note, however, is the extent of monitoring that takes place in the area. The Great Barrier Reef has one of the longest-running marine monitoring programmes in the OECD, with more than 50 different publicly and privately funded monitoring initiatives. The Reef 2050 Plan is the main policy framework used to address pressures on the reef. It is to be comprehensively reviewed in 2020.

*Source: AIMS (2018), Long-term Reef Monitoring Program: Annual Summary Report on coral reef condition for 2017/18; GBRMPA (2014), Great Barrier Reef Outlook Report 2014; Hughes et al. (2017), Global warming and recurrent mass bleaching of corals; Reef 2050 IEP (2016), Advice from the Reef 2050 Independent Expert Panel; OECD (2017), Marine Protected Areas: Economics, Management and Effective Policy Mixes.*

### Flora and fauna

A 2017 study found that Australia's deterioration of biodiversity was the second highest in the world, after Indonesia, between 1996 and 2008<sup>1</sup> (Waldron et al, 2017). As of 2018, 511 terrestrial and aquatic animal species were listed as threatened under the EPBC Act, including 55 that are extinct, or extinct in the wild, and 78 that are critically endangered. The number of listed species increased for all animal taxa, except frogs (Figure 4.2). Plant species (flora) have also seen significant increases in listing, with 1 355 species in 2018 (Chapter 1). The greatest numbers of threatened species are found in southeastern and southwestern Australia (Cresswell and Murphy, 2017). Much of the increase is, however, due to improved knowledge and updates.

**Figure 4.2. Threatened species numbers are increasing, partly due to improved knowledge**



*Note: Australia State of the Environment 2011 stated that 46% of the changes in species listings occurred because of improved knowledge and 36% were due to taxonomic updates.*

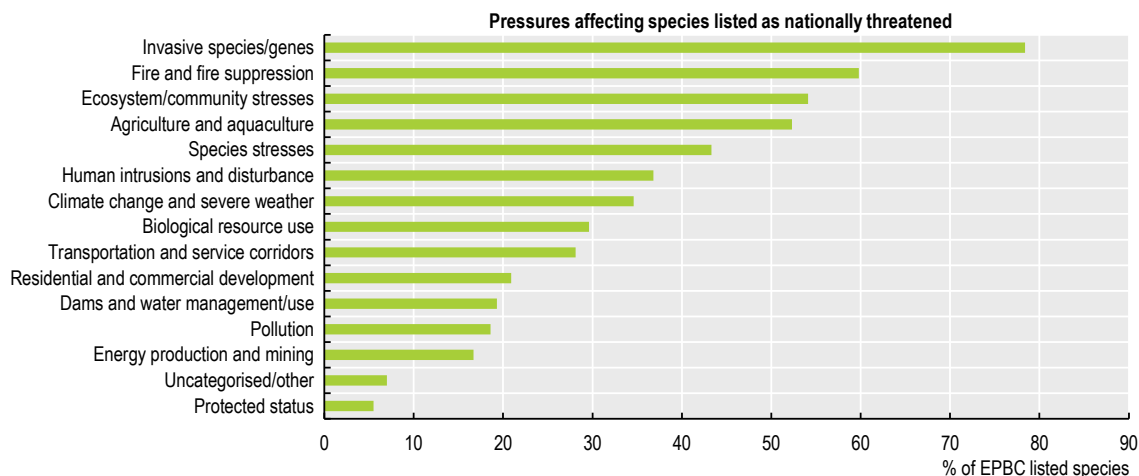
*Source: Cresswell and Murphy (2017), Australia State of the Environment 2016: Biodiversity.*

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#### 4.2.4. Pressures on biodiversity

The greatest pressures on biodiversity in Australia are those that affect habitat size, connectivity and quality, such as clearing, land use change, hydrological changes to watercourses, and pollution. Invasive species are also a significant issue, affecting most threatened species (Figure 4.3). Fire and fire suppression, as well as climate change, remain important concerns (Cresswell and Murphy, 2017).

**Figure 4.3. Invasive species, fire and fire suppression are key pressures on threatened species**



Note: Fire suppression activities often involve land clearing, and some species depend on fire. Ecosystem/community stresses include restricted geographical distribution; loss and/or fragmentation of habitat; decline in habitat quality; and habitat deterioration due to soil degradation and erosion.  
Source: Cresswell and Murphy (2017), *Australia State of the Environment 2016: Biodiversity*.

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#### *Clearing, land use and harvesting*

Clearing vegetation and reducing or fragmenting habitat through expansion of agriculture, expanded transport infrastructure, growing residential and commercial development and energy production and mining are significantly affecting biodiversity in Australia, reducing the size and connectivity of species habitat. While rates of clearing of primary forest have decreased across all states since 2008, clearing of secondary regrowth forests continues to increase significantly, particularly in Queensland. In 2016, 395 000 ha of regrowth forest was cleared in Australia, the highest level since 2007 (DEE, 2018f). Queensland relaxed its tree-clearing legislation in 2012, increasing regrowth clearing rates from 235 000 ha to 265 000 ha in 2016. New South Wales also recently changed its land-clearing regime to make it easier for farmers to undertake certain types of clearing, though it is too early to assess whether it has affected the state's downward trend in clearing rates. The loss of older trees, which have hollows needed for nesting of parrots and arboreal marsupials, and decline in the distribution of old growth forests, are of particular concern. In the Great Barrier Reef catchment, 158 000 ha of woody vegetation was cleared in 2015-16, up 45% from the previous year (QG, 2017). Recent legislation, however, aims to reduce land clearing (section 4.3.4).

Overall, agricultural land use has declined since 2005, but intensification has led to increased pesticide use and higher livestock density in some areas. Large cities continue to expand into natural areas, despite increased densification, and Australia has the highest built-up area per capita in the OECD (OECD, 2017a). A 2015 assessment found that 25%

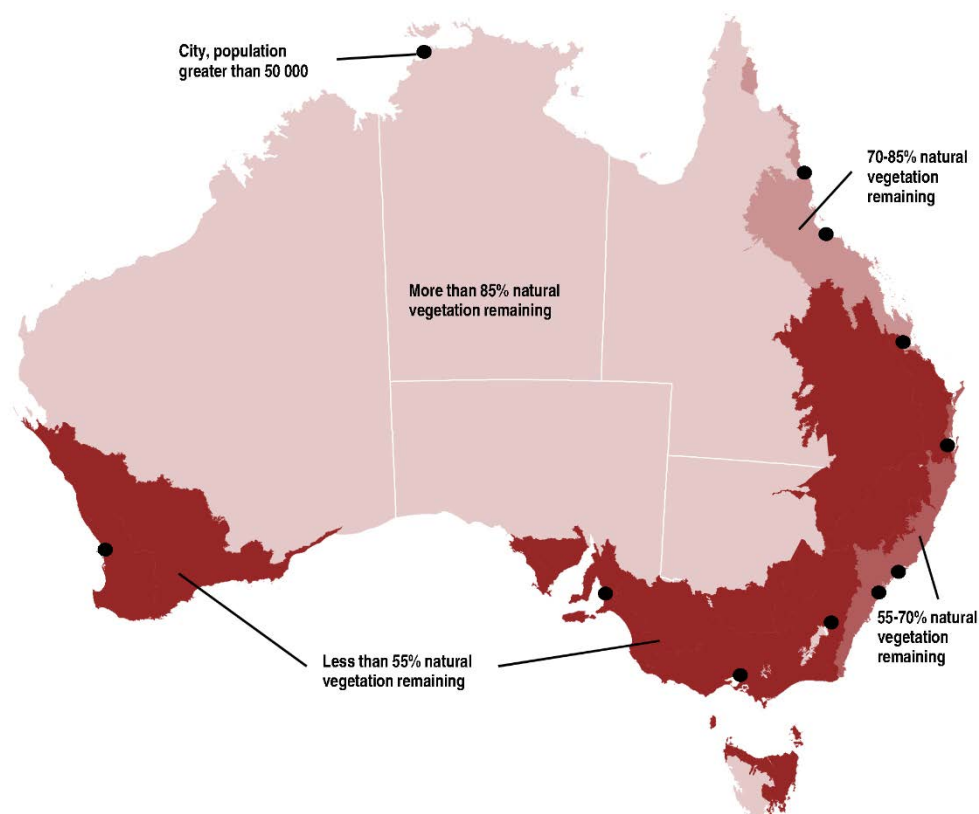


of threatened plants and 46% of threatened animals had distributions that intersected with cities (Cresswell and Murphy, 2017). Figure 4.4 shows that the percentage of remaining vegetation in Australia is lowest around urban centres and agricultural areas. With much of central Australia desert, the areas with the greatest vegetation loss are also those with some of the highest numbers of threatened species.

Livestock production is a major pressure on biodiversity: grazing affects both the diversity and abundance of small mammals and birds, and farm run-off harms water quality. Large and relatively widespread extractive industries also contribute to significant cumulative effects, particularly where there is a large concentration of mines and exploration activities. In addition to the sites themselves, a collection of roads, towns, pipelines, ports and water use supports development (Cresswell and Murphy, 2017).

Harvesting species, including timber, can directly and indirectly affect biodiversity. In Victoria, for example, harvesting of large old trees in the mountain ash forests is a key pressure on the critically endangered Leadbeater's possum (DEE, 2015b). Hunting, gathering of plant species and fishing can also affect species either directly, through overharvesting, or indirectly through disturbance if not managed carefully. Numerous state controls are in place, but variance in degrees of monitoring and enforcement can lead to localised threats to certain species (Cresswell and Murphy, 2017).

**Figure 4.4. Percentage of remaining native vegetation is low in eastern, southeastern and southwestern Australia**



Source: Based on data from Metcalfe and Bui (2017), *Australia State of the Environment 2016: Land*.

Hunting of introduced or invasive species, or overabundant populations, can in many cases be beneficial to threatened species. For example, conversion of woodland and shrubland to grassland, combined with natural factors such as water availability, can lead to overabundance of certain species, such as kangaroos. High kangaroo density can cause overgrazing and destruction of habitat for endangered species such as the grassland earless dragon, striped legless lizard and golden sun moth. Kangaroo populations have doubled since the millennium drought, leading some experts to suggest promotion of a kangaroo meat industry (Fedorowysch, 2017).

#### *Water use, coastal pressures and hydrological changes to watercourses*

While Australia has reduced water use per capita, absolute water use has grown since 2009 (Chapter 1). Urban water demand is increasing, and agriculture remains the largest water-consuming industry (Argent, 2017). Overallocation of water is a key issue in southeastern Australia, and in the MDB in particular, but is also emerging in certain areas in the north and west.

Australia has made significant alterations to rivers, streams, floodplains and wetlands that affect natural flow. Dams, diversions, levies, pumps and other structures for navigation, irrigation, water storage and other purposes have contributed to loss of habitat, loss of vegetation, riparian zone degradation, coastal estuary degradation, increased invasive species and loss of ecological function. In New South Wales, for example, most original aquatic ecosystems have had major modifications to their flow regimes (NSWOEH, 2013).

The health of coastal ecosystems is strongly linked to catchment land use and development, with pressures from tourism and recreation, extractive industries, climate change, pollution and other activities. Marine life is also significantly affected by recreational fishing and marine debris, as well as climate system variability and climate change (Cresswell and Murphy, 2017).

#### *Invasive species*

Almost 80% of threatened species are negatively affected by at least one invasive species, which can be predatory, competitors for food or space, contributors to habitat loss or degradation, or a source of disease. Invasive species include cats, rabbits, goats, rats, cane toads, foxes, camels, deer, dogs, feral pigs, garden plants, red fire ants, yellow crazy ants, European carp and water hyacinth. There are also problematic pathogens, such as root-rot fungus, beak and feather disease, and chitrid fungus in amphibians. The scale of invasive species, combined with lack of data on abundance and trends, makes effective management challenging (Cresswell and Murphy, 2017).

Predation by feral cats and red foxes has contributed the most to mammal extinction. They are key threats to endangered species such as the black-footed rock wallaby (warru) and spotted-tail quoll. The cane toad has had a significant impact on reptile species, responsible for declines in freshwater crocodile density of nearly 70% in the Daly River. Black rats have contributed to the extinction of several mammal species, including bats, native water rats (rakali) and spectacled hare wallaby. In the MDB, invasive European carp represent 58% of total fish biomass (Cresswell and Murphy, 2017; Argent, 2017).

**Box 4.3. Feral cats contribute to biodiversity loss and mammal extinction**

Cats were first introduced to Australia to kill rats on ships in the 18th and 19th centuries, and by settlers seeking to control mice and bettongs (rat kangaroos). There are now estimated to be as many as 6.3 million feral cats. As Australia is the only continent without native cats, its wildlife is particularly vulnerable to these predators.

Feral cats feed on many types of native species, including 123 types of birds, 15 reptiles, 58 marsupials, 27 rodents, 5 bats, 21 frogs and 9 medium-sized and large exotic mammals, as well as insects, spiders, scorpions, centipedes and crustaceans. They are assumed responsible for the extinction of around 20 native species and threaten many others. Cats are difficult to trap and kill, as they do not readily take bait and will not enter cage traps.

*Source: Cresswell and Murphy (2017), Australia state of the environment 2016: biodiversity; Power (2017), War on feral cats: Australia aims to cull 2 million; Legge et al. (2017), Enumerating a Continental Scale Threat: How Many Feral Cats are in Australia?*

*Fire*

While bushfires are a natural occurrence in Australia and many species are well-adapted to fire, frequency and intensity of bushfires can affect biodiversity. Bushfires and controlled fires are a significant pressure for 35 threatened and 22 near threatened mammal species (Cresswell and Murphy, 2017). Fires in northern regions are now larger, hotter and occur at shorter intervals, contributing to the decline in small mammals and bird species. Fire frequency can affect plant species, if they do not have sufficient time to reach reproductive maturity before the next fire, and aquatic species, through increased sedimentation and altered water chemistry. Controlled fires can also affect species dependent on fire, such as the Tasmanian ray flower, as well as habitat and nesting areas of other species.

*Pollution*

A variety of pollution types and sources affect biodiversity. Coastal rivers and estuaries contain pesticides, herbicides, metal and plastic debris. The state of these ecosystems has deteriorated over time, particularly in more developed areas. Micropollutants are not yet recognised as a threat, so no information on their prevalence is available (Cresswell and Murphy, 2017). Monitoring of inland and coastal waters is limited, focusing mainly on phosphorus and nitrogen. Monitoring in the MDB is more comprehensive, with water samples from 28 sites tested regularly for a range of pollutants (MDBA, 2018).

*Climate change*

Climate change is exacerbating pressures on biodiversity through increased bushfires, drought, extreme heat, cyclones, storm surges, sea level rise and floods. In arid areas, the frequency and intensity of rainfall events is expected to grow. In 2014, Queensland lost 45 000 flying foxes in one day to record heat. In Tasmania, dry weather in 2015-16 contributed to extensive wildfires. Many bird and amphibian species are particularly vulnerable to climate change (Cresswell and Murphy, 2017). The Bramble Cay melomys is now presumed extinct as a result of ocean inundation of its small coral island home.

This is the world's first mammalian extinction primarily attributed to climate change (Smith, 2016). Climate change is also devastating coral reefs (Box 4.2).

### 4.3. Institutional arrangements, governance and mainstreaming

The development of co-ordinated, comprehensive, consistent long-term biodiversity policy is challenged by the shared role between the federal government and state/territory governments, along with continually shifting political dynamics. While the central government has played a leadership role in other policy areas, such as water management, it has been reluctant to address key biodiversity pressures such as land clearing or significantly invest in efforts to manage invasive species or rehabilitate habitat.

#### 4.3.1. Strategic framework

In 2010, Australia adopted its second National Biodiversity Conservation Strategy (2010-30), replacing its 1996 strategy and fulfilling its obligations under the Convention on Biological Diversity. The strategy is an umbrella guiding framework for all levels of government, the private sector and communities. Within it are specific federal and state strategies, such as Commonwealth strategies on threatened species and pest animals. The Commonwealth-state Natural Resource Management Ministerial Council was to be responsible for the strategy and monitoring its implementation, but the council was disbanded in 2013. Its role is now played by meetings of environment ministers, meetings of state, territory and federal senior officials, and associated expert working groups.

The strategy identified three priorities for action: 1) engaging all Australians in biodiversity conservation; 2) building ecosystem resilience in a changing climate and 3) getting measurable results. Each is supported by subpriorities, outcomes, measurable targets and actions to be carried out at the national, state, regional and local levels. For the first five years, ten interim targets were established (Table 4.1).

**Table 4.1. Targets for the first five years of the National Biodiversity Conservation Strategy**

National Biodiversity Conservation Targets 2010-15	
1.	Achieve a 25% increase in the number of Australians and public and private organisations who participate in biodiversity conservation activities
2.	Achieve a 25% increase in employment and participation of Indigenous peoples in biodiversity conservation
3.	Achieve a doubling of the value of complementary markets for ecosystem services
4.	Achieve a national increase of 600 000 km <sup>2</sup> of native habitat managed primarily for biodiversity conservation across terrestrial, aquatic and marine environments
5.	Restore 1 000 km <sup>2</sup> of fragmented landscapes and aquatic systems to improve ecological connectivity
6.	Establish and manage four collaborative continental-scale links to improve ecological connectivity
7.	Reduce by at least 10% the impact of invasive species on threatened species and ecological communities in terrestrial, aquatic and marine environments
8.	Establish nationally agreed science and knowledge priorities for biodiversity conservation to guide research activities
9.	Review, across all jurisdictions, relevant legislation, policies and programmes to maximise alignment with Australia's Biodiversity Conservation Strategy
10.	Establish a national long-term biodiversity monitoring and reporting system

Source: NRMCC (2010), *Australia's Biodiversity Conservation Strategy 2010-2030*.

A review of the first five years of the strategy, released in 2016, found significant challenges in reporting progress against the interim targets and was unable to quantitatively evaluate what had been achieved at a national level (except for target 4, which was achieved). Several targets could not be clearly interpreted or easily monitored, and others were unrealistic within the timeframe. The target to establish a national biodiversity monitoring and reporting system was not achieved and measuring progress on other targets required national data sets and baselines. The review recommended clearer guidance to governments, organisations and individuals; a greater emphasis on marine and aquatic ecosystems; better links to economic and social considerations in rural and urban areas; a co-ordinated implementation plan; and improved alignment with international obligations (BWG, 2016).

In response, the Commonwealth and state environment ministers agreed to revise the strategy. A working group was established and released a draft revision, Australia's Strategy for Nature 2018-30, that was open for consultation until 16 March 2018. The revision is intended to improve the strategy's ability to drive change in biodiversity management priorities, engage a broader audience and improve alignment with international commitments. A key new feature may be an action inventory that identifies initiatives at the local, state/territory and national levels that are linked to the goals and objectives of the strategy and international obligations.

**Table 4.2. Goals and objectives of the draft Strategy for Nature 2018-2030**

Goals	Objectives
<b>Connect all Australians with nature</b>	Encourage Australians to get out into nature
	Empower Australians to be active stewards of nature
	Increase Australians' understanding of the value of nature
	Respect and maintain traditional ecological knowledge and stewardship of nature
<b>Care for nature in all its diversity</b>	Improve conservation management of Australia's landscapes, seascapes and aquatic environments
	Maximise the number of species secured in nature
	Reduce threats to nature and build resilience
	Use and develop natural resources in an ecologically sustainable way
	Enrich cities and towns with nature
<b>Build and share knowledge</b>	Increase knowledge about nature to make better decisions
	Share and use information effectively
	Effective measurement to demonstrate our collective efforts

Source: BWG (2017), *Australia's Strategy for Nature (Draft) 2018-2030*.

While the first draft revised strategy addressed some elements of the review, it lacked specificity, measurable targets and any sense of priorities relating to ecosystems, species or pressures. It provided no guidance on best practices in balancing economic, social and environmental considerations. It is also not clear how the action inventory will spur effort beyond what is being done already, or how it will link to other biodiversity-related strategies such as the Commonwealth Threatened Species Strategy. There is no financial commitment associated with the strategy to support implementation. Birdlife Australia's submission to the consultation process expresses disappointment that the strategy does not commit to improve capacity to monitor and report on trends in biodiversity or provide

increased resourcing to deliver adequate nature conservation outcomes (Birdlife Australia, 2018).

### *Threatened Species Strategy*

The Commonwealth government's 2015 Threatened Species Strategy contrasts with the draft Strategy for Nature, as it has annual specific action plans focused on priorities. The first such plan, for 2015/16, identified four key action areas: tackling feral cats, providing safe havens for species most at risk, improving habitat and undertaking emergency intervention to avert extinctions. Each action area identifies specific measurable targets. The feral cat action area, for example, contains five commitments to meet within five years: eradicate feral cats from five islands, establish ten feral-cat-free mainland enclosures, implement best practice action across 2 million ha, take action on feral cats across 10 million ha and cull 2 million feral cats (DEE, 2014).

An appointed threatened species commissioner reports annually on progress to the minister for the environment and energy (DEE, 2014). A published year one report showed that 21 of 26 interim targets had been achieved, including 7 overachieved. Lists of 20 priority mammals, 10 priority birds and 27 threatened plant species were developed, with each having at least one project under way to contribute to their recovery (DEE, 2016d).

While the strategy and commissioner have been successful in raising awareness of threatened species and pressures facing them, the scale of the strategy is not commensurate with the extent of pressures facing Australia's biodiversity. The approach is unlikely to contribute significantly to improved biodiversity outcomes unless it is broadened over time to address additional pressures and species, the commissioner is provided with greater independence from the Commonwealth government, and substantial new financial and human resources are made available to leverage partnerships for effective implementation. It also needs greater involvement of state governments to better co-ordinate actions for threatened species that cross jurisdictional boundaries. The process used to select priority species for the strategy was largely informal (ANAO, 2018). Future iterations could use a more systematic method of priority selection, drawing from approaches taken in countries such as New Zealand (Box 4.4). New South Wales, for example, used New Zealand's approach as the basis for its Saving our Species programme, though the state now uses a different algorithm to prioritise species. The New South Wales approach relies on quantitative data on benefit, likelihood of success and implementation cost, as well as a simple cost-efficiency equation (Brazill-Boast et al., 2018).

**Box 4.4. New Zealand sets priorities for threatened species and ecosystem management**

The New Zealand government consulted ecologists and the community to help identify sites that could be prioritised for ecosystems and threatened species management to meet strategic objectives and international commitments for biodiversity. Around 1 000 sites, known as ecosystem management units (EMUs), were identified during consultation, representing the full range of ecosystem types. Large, intact sites were prioritised, as they were high-quality examples of ecosystems, along with sites where restoration work had previously occurred. They vary in size from 1 ha to 50 000 ha and many include threatened species. Around 400 more MUs, important for threatened species only, were designated as species management units.

Software is used to prioritise management among MUs. Criteria for prioritisation include ecosystem type, potential conservation gain, long-term cost of intervention and whether the MU provides habitat for threatened species. Current targets for annual planning are based on prioritisation of EMUs but work is under way to also integrate prioritisation of SMUs.

Each EMU has a management plan consisting of actions to maintain and improve the condition of the ecosystem(s) and the work required to support its threatened species. The EMUs are often part of the conservation estate. For MUs on privately owned land, the Department of Conservation works with landowners to protect and preserve the sites.

*Source:* Personal communication with New Zealand government (2018).

*International commitments*

Australia has been a party to the Convention on Biological Diversity since 1993. As such, it has produced five national reports and two national strategies and action plans supporting the convention. It has not yet ratified the Nagoya Protocol on access to genetic resources and a fair and equitable sharing of benefits from their use (CBD, 2017). Australia is also a signatory to the United Nations Convention to Combat Desertification.

Australia actively implements the Convention on International Trade in Endangered Species of Wild Fauna and Flora, with stricter requirements for certain species, inclusion in the EPBC Act and enforcement by the International Wildlife Trade section of the Department of the Environment and Energy (DEE) in partnership with the Australian Border Force (DEE, 2018e). It has developed national plans of action for managing and conserving sharks and reducing incidental catch of seabirds as part of its biennial reporting to the Food and Agriculture Organization of the United Nations on the Code of Conduct for Responsible Fisheries.

Bilateral migratory bird agreements with Japan, China and Korea aim to protect and conserve migratory birds and their habitats, exchange information and build co-operation. Australia is also party to the Convention on the Conservation of Migratory Species of Wild Animals, the Ramsar Convention on wetlands and the Agreement on the Conservation of Albatrosses and Petrels. A less formal partnership has been established to foster collaborative effort on the conservation of migratory water birds and the sustainable use of their habitats in the East Asian-Australasian flyway (DEE, 2018c).

### *4.3.2. Legislative framework*

The 1999 EPBC Act is the key piece of national legislation governing biodiversity conservation and sustainable use. It applies to nine matters of national environmental significance: world heritage properties, national heritage places, wetlands of international importance, nationally threatened species and ecological communities, migratory species, Commonwealth marine areas, the Great Barrier Reef Marine Park, nuclear actions, and water resources in relation to coal seam gas or large coal mining development (added in 2013). The act also confers jurisdiction over actions that have a significant impact on the environment, where the actions affect Commonwealth land or are carried out by a Commonwealth agency (DEE, 2017c). All other biodiversity matters fall under state legislative frameworks (Chapter 2).

### *4.3.3. Institutional framework*

#### *Government*

In Australia's federalist system of government, biodiversity conservation is a responsibility shared between national and state/territory governments. The states and territories have primary responsibility for biodiversity protection and protected area management, while the national government has authority over the matters of national environmental significance defined in the EPBC Act, as well as 59 Commonwealth marine protected areas and six terrestrial national parks (DEE, 2017c). The Commonwealth government is also responsible for adhering to international agreements. There is co-ordination on environmental assessment processes and increased effort to harmonise approaches to listing threatened species. Areas of overlap and lack of co-ordination remain, however, in terms of biodiversity strategies, action plans, data collection and reporting. A 2009 independent review of the EPBC Act recommended a stronger Commonwealth role in several areas relevant to biodiversity, including regional plans, accreditation of bio-banking systems and the inclusion of vulnerable ecological communities as a matter of national significance (Hawke, 2009).

At the national level, threatened species protection and biodiversity conservation are primarily the responsibility of DEE. The Department of Agriculture and Water Resources also plays a critical role in biodiversity conservation, with responsibility for the agriculture, fisheries, food and forestry industries, as well as policies relating to water quantity and quality and pest management (including invasive species). Governance changes over the past decade do not appear to have been positive for biodiversity policy, with the issue often seen as a second-order priority and weak co-ordination across departments relating to aquatic and marine biodiversity and invasive species management.

#### *Regional and local authorities*

Regional and local authorities play an important role in biodiversity conservation and are often the implementing agencies of federal and state policies and programmes. The 56 Natural Resource Management (NRM) organisations across Australia implement the National Landcare Program (NLP) (Section 4.4.2). Local councils are also key actors in implementing state policies and programmes, in enforcing state laws and regulations, and often in managing and monitoring protected areas.



*Civil society*

Many environmental NGOs operate in Australia, working to improve biodiversity conservation efforts and reduce threats. The Australian Conservation Foundation, the Wilderness Society, Birdlife Australia and WWF Australia are some of the largest national organisations undertaking advocacy work and supporting conservation projects. In addition, the Landcare and Coastcare movements started as volunteer organisations, though they are now funded by national and state governments through NRM organisations. These two movements include over 5 400 groups nationwide undertaking hands-on projects to address land, freshwater and coastal degradation. There are also many local organisations focused on specific ecosystems, species or development projects. Committed volunteers, including retired farmers and scientists, often make significant on-the-ground progress in biodiversity conservation.

*Private sector*

Private landowners have a particularly important role to play in biodiversity conservation and sustainable use. Farmers are custodians of more than half of Australia's land area, including rivers, wetlands, wildlife corridors and native vegetation, and already manage several invasive species to protect crops and livestock. Farmers can also be a significant pressure in terms of decisions to clear land or fill in wetlands. Conservation trusts and covenants can bring privately owned land into the system of protected areas, helping to conserve critical habitats, buffer zones or corridors (Section 4.4.3). Initiatives such as Mt Rothwell in Victoria have shown the significant potential for private landowners to contribute to biodiversity conservation and rehabilitation efforts (Box 4.5).

Business may also be able to play a role by financing biodiversity conservation initiatives. BHP, for example, funded efforts to recover threatened small mammals in South Australia and has contributed to the Bush Blitz programme (Section 4.2.2). The Mt Buller and Mt Stirling Alpine Resort Management Board worked to protect threatened mountain pygmy possums in Victoria's alpine zone (DEE, 2014). There may be further scope to leverage corporate social responsibility financing to support biodiversity conservation efforts.

**Box 4.5. Mt Rothwell and Odonata demonstrate role for private sector in conservation**

Just outside Melbourne, a privately owned property is being used to bring back some of Australia's most threatened species. The 420 ha property, the Mt Rothwell Biodiversity Interpretation Centre, is surrounded by one of the country's longest predator-proof fences, keeping out feral foxes and cats. Species such as the eastern barred bandicoot, brush-tailed rock wallaby and eastern quoll have been reintroduced there, and breeding and research initiatives are under way in partnership with the state government, Zoos Victoria and the University of Melbourne. Landcare volunteers work to restore the habitat and control invasive species. Researchers are exploring the importance of genetic diversity in building species resilience.

Inspired by the success at Mt Rothwell, Odonata, a not-for-profit entity that supports the business of biodiversity, was created. To date, it has secured AUD 40 million for biodiversity initiatives. One such initiative was a sheep farm where grazing took place on remnant (remaining native) vegetation only. The first of its type in Australia, it operated using a comprehensive, master-planned model on Victoria's volcanic plains

grassland. Sheep eating native grasses ended up producing higher-quality wool, supporting the business case for the approach. Future projects would partner young people with retiring farmers and investors to develop further environment-friendly farming approaches.

*Source: Mt Rothwell (2018), About Mt Rothwell; Odonata (2018), Odonata: The Business of Biodiversity.*

### *Indigenous peoples*

Indigenous peoples play a significant role in biodiversity conservation efforts in Australia. Indigenous Protected Areas make up around 45% of the National Reserve System (NRS), and there is joint management on an additional 3%. The role of Indigenous peoples in marine protection is growing as well, with Indigenous-led collaborative governance arrangements with government agencies, commercial fishers and other interested parties. The Indigenous Ranger programme has also expanded, providing additional capacity (Box 4.6). Traditional Indigenous ecological knowledge is being incorporated into some local biodiversity monitoring efforts, but not yet systematically.

#### **Box 4.6. Indigenous Ranger programme joins traditional knowledge, conservation training**

The Indigenous Ranger programme began in 2007 in an effort to combine traditional knowledge with conservation training to improve protection and management of the land, sea and culture. Then called Working on Country, the programme not only improved environmental outcomes, but also created meaningful employment, training and career pathways for Indigenous people. In 2018, there were 831 full-time-equivalent Indigenous rangers. Funding for the programme was recently renewed until 2021.

There is significant interest in the programme, with demand for ranger positions exceeding available funding. Additional funding could support an expanded Indigenous role in improving biodiversity outcomes. A 2015 report for The Pew Charitable Trusts suggested that the programme should finance 5 000 full-time positions to manage an estimated 80 million ha of protected land.

*Source: Australian Government (2014), Australia's Fifth National Report to the Convention on Biological Diversity; DPMC (2017), Indigenous Rangers: Working on country; Pew Trusts/Synergies (2015), Working for Our Country.*

#### **4.3.4. Mainstreaming biodiversity into sectoral/other policies**

In many ways, Australia has effectively mainstreamed biodiversity into sectoral and other policies through federal, state and territory environmental assessment requirements for new large projects, infrastructure assessments that incorporate biodiversity impact, regional plans and strategic assessments that increasingly consider objectives relating to ecosystems and species, and policies for agriculture, fisheries and forestry that encourage reduced water use, reduced clearing of primary forest, and management of some invasive species.

However, the pace of population and economic growth in most of Australia requires a more complete management framework, with comprehensive and consistent local data on ecosystems, species and pressures, and co-ordinated regional plans that adequately consider the cumulative environmental effects of existing and new development on an ongoing basis. The legacy of 50 000 abandoned mine sites combined with limited surface and groundwater monitoring illustrates that a broader strategy is needed beyond assessment of new projects in isolation. National leadership on key pressures such as land clearing and offsets, combined with effective co-ordination with states and territories to identify and expand best practices, will be important to ensure development decisions are consistent with improving biodiversity status and trends.

### *Agriculture*

At the national level, the impact of the agriculture sector on biodiversity has improved in some areas, with declining land use, declining water use and a small increase in organic food production. However, the use of pesticides and nitrogen fertiliser has increased, unsustainable grazing remains a concern in Queensland and Western Australia, soil conservation practices have seen limited adoption, nutrient run-off continues to affect water quality and growing biofuel production may increase agriculture-related environmental pressures (OECD, 2017b; DEE, 2018a).

Agriculture continues to be the dominant user of both water and land, contributing to significant pressures on species habitats (Chapter 1). The MDB accounts for 57% of Australia's irrigation water use, with declines in that area (linked to the Murray Darling Basin Plan's market-based approach to water allocation) significantly influencing overall trends. Primary agricultural production accounts for 58% of land use and grazing for 93% (ABARES, 2016).

The Department of Agriculture and Water Resources plays a key role in mainstreaming biodiversity considerations into agricultural, forestry and invasive species management as well as water policies. Fortunately, economic and environmental interests can be aligned in some areas. Improving agricultural water use efficiency makes farms more resilient to drought. Invasive species pose a significant threat to crops and livestock. Some key biodiversity-relevant initiatives of the department are the Australian Pest Animal Strategy, the Australian Weeds Strategy and the Murray-Darling Basin Plan (which caps water extraction to avoid a negative impact on natural environments and watercourse functions) (Chapter 1). The Basin plan has, however, been criticised for favouring the needs of irrigated agriculture over species and ecosystems (Davies, 2018).

At the state/territory level, it is less clear that biodiversity considerations are always well integrated into agricultural policies and plans. On the one hand, Queensland's Agriculture Strategy seeks to double the state's food and fibre production by 2040, with no mention of biodiversity protection or sustainable use (QG, 2013). On the other hand, in its submission to the 2016 SoE report on biodiversity, Queensland highlighted land clearing for pasture as its greatest pressure on threatened flora and fauna (Cresswell and Murphy, 2017). In 2018 the Queensland government put in place new, stricter land clearing laws, despite fierce opposition from farmers. The laws will end wide-scale remnant clearing, protect high conservation value regenerating woodlands, extend reef riparian area protections and slow remnant thinning (QG, 2018b).

### *Fisheries and aquaculture*

Australia's commercial fishing and aquaculture industry is worth AUD 2.2 billion annually and employs 11 600 people (DAWR, 2017). Fisheries can affect biodiversity through overharvesting, by-catch, litter, abandoned nets, habitat destruction, entanglement with fishing gear and disruption of food webs. Aquaculture, for its part, can result in risk of disease, nutrient deposition and the spread of introduced species (Clark and Johnston, 2017). State governments are responsible for fishing and aquaculture in inland waters and from the shore out 3 nautical miles offshore. The Commonwealth is responsible for fisheries beyond this point within Australia's EEZ.

The 2016 Status of Australian Fish Stocks Report found 17 overfished stocks out of 232 assessed. An additional 26 were depleting while 9 were recovering (FRDC, 2016). Overfished species include school shark in southern Australia, orange roughy in southern and western Australia, and eastern gemfish and southern bluefin tuna. Certain areas also have localised overfishing, including mulloway in New South Wales, golden snapper in the Northern Territory and giant crab in Tasmania. By-catch remains a challenge, with seals, dolphins and sea lions caught in nets (FRDC, 2016). Fisheries within Commonwealth jurisdiction have shown significant improvement since 2005. Fishery status reports in 2018 show 65 stocks (68%) not overfished or subject to overfishing, out of 95 fish stocks reviewed across the 22 fisheries managed solely or jointly by the Australian government (ABARES, 2017b).

Commercial fishing faces regulatory control by all levels of government in terms of number of entrants, total catch, catch of threatened species and allowed activities and methods (including for by-catch). Aquaculture is also tightly controlled, though there have been incidents of disease and species escape. For example, aquaculture farms in Tasmania's Macquarie Harbour (part of which is in the Tasmanian Wilderness World Heritage Area) suffered from disease and lack of oxygen as the industry grew from 3 600 tonnes of fish production in 2005 to 15 000 tonnes in late 2016. The Environment Protection Authority director has since set the maximum permissible biomass at 9 500 tonnes (from 1 June 2018) to reduce the pressure on the harbour and allow for further recovery (EPA Tasmania, 2018).

Recreational fishing is increasingly popular, with catch rates for some species thought to be almost equivalent to commercial fishing, though the data on recreational catch are limited and uneven. Tasmania, for example, does not require a licence to fish recreationally and some states do not actively enforce recreational fishing restrictions. Illegal and unreported fishing also takes place, with organised criminal activity focused on high-value species such as abalone and illegally obtained shark fins (Evans and Smith, 2017).

Marine spatial planning has been used to help balance competing interests in the Great Barrier Reef and off New South Wales, and marine parks are carefully controlled. Elsewhere, however, the approach to managing coastal development is generally not well co-ordinated across local, state and national government bodies. There is little understanding, moreover, of the cumulative effect of multiple pressures on aquatic and marine ecosystems (Clark and Johnston, 2017). While some states have plans or policies covering coastal areas, implementation and enforcement are often lacking, with insufficient resources allocated. A lack of comprehensive and comparable data across jurisdictions makes it difficult to identify priorities and develop effective integrated management plans.

### *Forestry sector*

While only 16% of Australia's territory is forested, 98% of remaining forest is native species. Around 67% of native forest is privately managed on private and leasehold lands, including Indigenous-owned and/or -managed lands. Native forest production estates cover 36.6 million ha, 7.5 million of which is public. Industrial plantation forests cover an additional 2 million ha (Metcalf and Bui, 2017). The total value of logs harvested from native forests and plantations in 2010-11 was AUD 1.85 billion, and the wood and wood product sectors contribute 0.59% of GDP (DoA, 2013).

Public native forest is managed under state and territory regulatory frameworks and management plans. Management of forests on private land is regulated under various native vegetation acts. Codes of forest practice vary across states and territories, but they generally provide operational guidance for sustainable forest management practices. The area in which forest management is certified under the Australian Forest Certification Scheme or the Forest Stewardship Council is around one-third of the forest area available for commercial wood production (DoA, 2013).

Regional forest agreements (RFAs) between states and the Commonwealth are long-term plans aimed at providing sustainable management and conservation of native forests. There are currently 10 RFAs, in Victoria (5), New South Wales (3), Western Australia (1) and Tasmania (1). A comprehensive regional assessment for South East Queensland was done in the late 1990s, but no RFA was signed (ABARES, 2018a). Experts and environmental groups have criticised RFAs as giving insufficient weight to environmental considerations and the economic benefits of leaving forests intact (Wilkinson, 2018; Lindenmayer et al., 2015). The Victorian government is working on modernising its RFAs, focusing on engagement with communities, updated data collection and assessment of forest values, and renewal of RFAs and Victoria's forest management system.

Despite a continued decline in harvesting of native forests, harvesting of regrowth areas is growing and significant biodiversity concerns remain relating to local issues and practices. In Victoria, for example, there is concern about continued loss of large old trees in mountain ash forest, which provide habitat for endangered species, including the critically endangered Leadbeater's possum. Experts have called for an end to clear-felling (clear-cutting, which removes all saleable trees from a given area and burns remaining debris), and the establishment of a large protected area (Blair, Lindenmayer and McBurney, 2018). Clear-felling is the worst forestry practice for biodiversity, and alternatives are available and well developed.

### *Extractive industries*

Extractive industries continue to put significant pressure on biodiversity through expansion within or near vulnerable ecosystems, related infrastructure including roads and ports, and pollution risks associated with abandoned mines. Exploration for shale gas and tight gas is increasing, which could increase pressure on biodiversity from water use and pollution.

Mining activities in the Northern Territory, Queensland and Western Australia have also increased. In addition, offshore oil and gas projects can present particular risks to marine environments (Metcalf and Bui, 2017; Evans and Smith, 2017). New projects are subject to environmental impact assessment (EIA), but ongoing impact monitoring is limited and the cumulative effect of multiple extractive projects in a given region are generally not

well understood. The Western Australia Biodiversity Science Institute is working with the state Department of Water and Environmental Regulation to better capture biodiversity data generated from previous EIAs (DWER, 2018). This will help enhance the state's capacity to undertake cumulative EIAs. The institute estimates that leveraging past data collection could also provide savings of up to AUD 39 million per year for project proponents in terms of reduced delays and direct cost savings (WABSI, 2017). It will, however, be important to complement the use of past data with ongoing monitoring of trends.

The extent of abandoned mines and their impact on ecosystems are also of concern. Of the estimated 50 000 abandoned mine sites across Australia, only a handful have been rehabilitated (Metcalf and Bui, 2017). A 2017 report by the Australia Institute, a think tank, noted the lack of publicly available data on both operating and abandoned mines across the country. The report suggested, moreover, that current mines may continue to be abandoned, as companies have obtained permits to leave elements such as coal pits after mining is completed and environmental bonds may be insufficient to cover liability. Some companies are going beyond what is required in an effort to secure community support, but best practice on rehabilitation is not generally regulated (Campbell et al., 2017). While there is no comprehensive assessment of the impact of abandoned mines or monitoring of toxins in water bodies, toxic contamination found in Sydney's drinking water catchment that was traced to an old mine highlighted the risks to both humans and biodiversity (Miskelly, 2017). As part of a Senate inquiry into mine rehabilitation, experts have called for a national approach and data set on abandoned mines, building on the experience of countries such as Canada (Barker and McKillop, 2017).

#### **Box 4.7. Carmichael mine: Harbinger of growing role of biodiversity in development?**

The uncertain fate of a proposal by India's Adani group to develop a coal mine in central Queensland has shown the potential for influence by conservation groups and community organisations on development. The Carmichael mine, which would be one of the world's largest, is proposed for the Galilee Basin, a national biodiversity hotspot inland from the Great Barrier Reef. The basin has some of the best remaining habitats of threatened birds and lizards, including the yakka skink and ornamental snake. The mine is one of six approved in the area (none are yet operational).

Environmental groups, led by the Australian Conservation Foundation, pursued a legal challenge and a campaign aimed at Australian banks and potential foreign sources of finance to stop the project. Adani had difficulty finding financing for the mine and required transport infrastructure, but indicated in July 2018 that the project will move forward if it can finalise rail financing. With AUD 1.4 billion already spent on the venture, the company could lose a significant amount of money if the project is halted. In the future, companies may be hesitant to invest significantly before adequately addressing biodiversity and other community concerns.

*Source:* Slezak (2017), *Is this the end of the road for Adani's Australian megamine?*; IQ (2018), *Adani closing rail finance for Carmichael coal project*; ACF (2018), *Adani has finance – what happens next?*; Sibson (2017), *Adani: Australian Conservation Foundation loses appeal against \$16b Carmichael coal mine*; England (2015), *Conservation Covenants: Are They Working and What Have We Learned?*

### *Tourism*

Tourism is an important and growing economic sector in Australia, contributing 3% of GDP in 2014-15 and employing more than 550 000 people. Sector growth is more than three times that of the economy. More than 6.9 million international and 87 million domestic overnight tourists frequent Australian destinations each year. A large proportion of tourism is in biodiversity-rich coastal areas, with attractions such as beaches, rainforest walks, whale and dolphin watching, scuba diving and snorkelling. Data on tourist activities have been collected in only a few locations.

Tourism can create and exacerbate pressure on biodiversity. Tourists may trample plants, remove species, leave debris, damage or compact plants with four-wheel-drive vehicles. These as well as pollution and increased tourism infrastructure development are among the sector's effects in Australia (Cresswell and Murphy, 2017). The ecologically sensitive Great Barrier Reef is a particularly popular attraction, with tourism making a value-added economic contribution of AUD 6.4 billion each year and employing 64 000 people (Australian Government, 2014). Australia's 2009 National Long-Term Tourism Strategy does not mention biodiversity, but does recognise the importance of natural areas in attracting tourists and growing consumer demand for environmental sustainability (DRET, 2009). The new Tourism 2020 strategy does not mention environmental issues at all (TA, 2018).

The National Landscapes Programme is a partnership between tourism and biodiversity groups that work together to improve visitor experiences, support conservation and improve awareness in 16 regions offering uniquely Australian experiences. Each National Landscape has a regionally based steering committee that brings together representatives of tourism organisations and operators, protected area agencies, local councils, conservation groups, government agencies and Indigenous stakeholders (DEE, 2018b). The Commonwealth government administered the programme until 2014, then the role shifted to Ecotourism Australia with limited funding (Ecotourism Australia, 2014). The states of Victoria and South Australia have also connected to the global Healthy Parks, Healthy People initiative, which highlights the benefits of nature and biodiversity to human health.

### *Urban sprawl*

Capital cities account for most of Australia's population growth, especially in coastal areas. Australian cities have relatively low population density (e.g. Brisbane, 1 910 people per km<sup>2</sup>) compared to North America cities of similar geographical size (e.g. Houston, 9 200 people per km<sup>2</sup>), and a tendency towards urban sprawl (Coleman, 2017). Growth in the footprint of urban areas is contributing to biodiversity loss, habitat loss and fragmentation, more vehicle collisions with species and increased pollution. Pressures can be particularly strong when development is permitted within or immediately adjacent to sensitive ecosystems (Cresswell and Murphy, 2017). Perth, for example, is allowing growth both north and south along the coast. In South East Queensland, motor vehicles kill almost 300 koalas (a protected species) each year, on average (DEHP, 2017).

Cities are working to limit growth at the metropolitan fringe by encouraging brownfield and greyfield development, with some success. The federal government conducts strategic environmental assessment (SEA) under the EPBC Act to help guide development decisions, highlighting where protection is needed and the type of conditions that should be placed on whatever development goes ahead (Coleman, 2017). The Melbourne Strategic Assessment in 2009-10 was the first of its kind, aiming to

provide certainty for developers while mitigating and offsetting the impact on the environment. As part of the assessment, the Victoria government committed to establish two grassland reserves outside the Melbourne Growth Area: a 15 000 ha grassland reserve and a 1 200 ha grassy eucalypt woodland reserve. Work is under way to acquire the land for the reserves and implement management plans (DELWP, 2018). An SEA was begun for the Perth and Peel region but was suspended in April 2018. The Western Australia government is reviewing the costs, risks and benefits of the assessment to see if it is worth continuing (DPC, 2018).

### *Infrastructure*

Population and economic growth are increasing demand for infrastructure, some of which will place pressure on biodiversity through habitat destruction or disturbance, habitat fragmentation, mammal strikes, sediment re-suspension and pollution. For example, demand for land freight is expected to increase by 80% between 2011 and 2031 (both road and rail). New ports and terminals to support export growth will be needed. Investment in water infrastructure will be required to manage demand as rainfall decreases due to climate change (Infrastructure Australia, 2015).

Infrastructure Australia's 2015 audit argued that environmental considerations should form a fundamental aspect of infrastructure project selection and planning, noting that more rigorous and transparent strategic planning could minimise project-level environmental conflict (Infrastructure Australia, 2015). Australia's Assessment Framework for prioritising infrastructure projects requires consideration of environmental externalities, including effects on biodiversity (Infrastructure Australia, 2017). As with other aspects of development, Australia would benefit from a more integrated approach that considered the cumulative environmental effects of existing and new projects. Queensland's South East Regional Plan 2017, for example, integrates consideration of economic, social, environmental and biodiversity-related objectives (QG, 2017). Adequate localised data on ecosystems and species, combined with careful and balanced implementation, will be crucial to effectively integrating biodiversity into regional plans and monitoring progress.

## **4.4. Instruments for threatened species protection and sustainable use of biodiversity**

Australia has made progress in expanding protected areas, surpassing international 2020 Aichi targets for terrestrial areas (17%) and exceeding targets for marine protection (10%). However, gaps remain in terrestrial protection, with about one-third of bioregions having less than 10% protection. Queensland and New South Wales have the lowest levels of terrestrial protection. Marine protection is more comprehensive, though 96% of protected areas are within Commonwealth jurisdiction and do not address growing coastal pressures on areas under state/territory control. There has also been criticism of the degree of activity permitted in marine park management plans.

Outside of protected areas, Australian governments use a variety of conservation programmes, economic instruments and other tools for species protection and sustainable use of biodiversity (Table 4.3). The main Commonwealth programme is the NLP, which provides grants for local conservation actions. However, its funding has decreased over time. The Reef 2050 Plan for the Great Barrier Reef, on the other hand, is receiving significant investment. The most prominent use of economic instruments for biodiversity is through conservation covenants with private landholders, which provide benefits such as tax concessions, rate relief and grants in exchange for protecting land of high



conservation value. Results are mixed, however, depending on the capacity of landowners to manage protected areas and the degree to which states maintain protection.

**Table 4.3. Main policy instruments for biodiversity conservation and sustainable use**

Regulatory (Command and control) approaches	Economic instruments	Information and other instruments
Protected areas	Murray-Darling Basin Plan – water trading	National Landcare Program – competitive grants
Restrictions on trade in flora and fauna	Conservation covenants	Recovery plans for threatened species and ecosystems
Environmental impact assessment	Biodiversity offsets and bio-banking	Inclusion of biodiversity in infrastructure approvals
Commercial fishing restrictions (e.g. by-catch)	Environmental Stewardship Program	Strategic assessments and regional plans
	Fees, individual transferable quotas and grants in fisheries	Environmental-economic accounts (e.g. water, land)
	National park fees	State of Environment reports

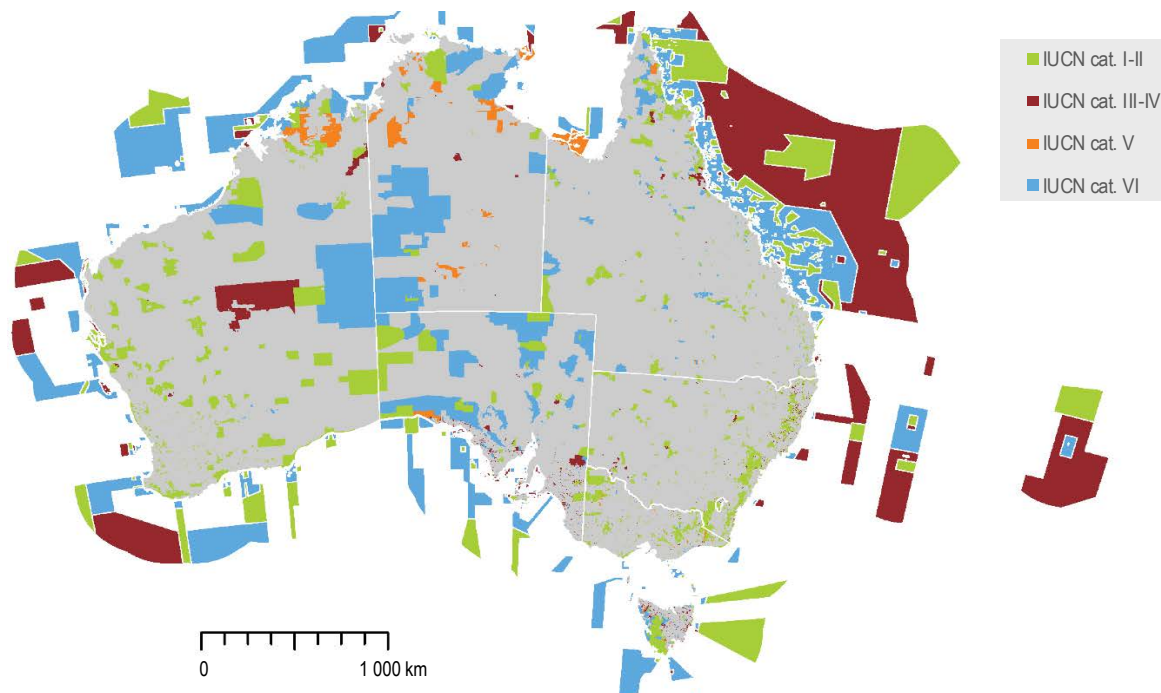
Source: Adapted from OECD (2013), *Scaling-up Finance Mechanisms for Biodiversity*.

While it is difficult to get a national picture of financing for biodiversity conservation and sustainable use, federal government funding trends are of concern. Investment on the Great Barrier Reef and exotic pests and diseases has increased, but general biodiversity funding (including for the NLP) has decreased. Efforts to seek external financing from industry or philanthropists are positive but should not replace ongoing and increased public investment.

#### **4.4.1. Protected areas**

##### *Protection of terrestrial and inland water areas*

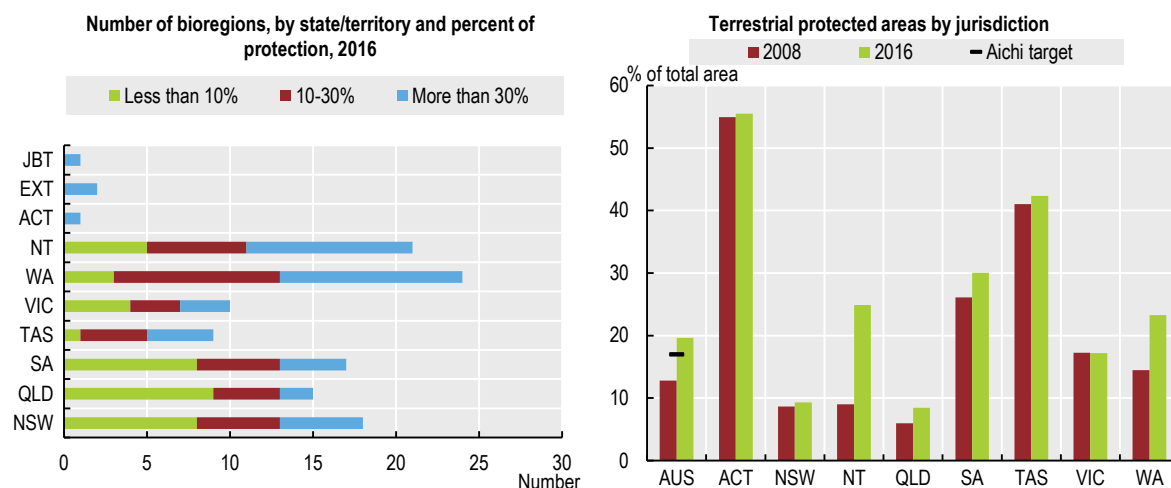
Australia's National Reserve System has grown from 10.6% of the territory in 2007 to 19.3% in 2018, exceeding the international Aichi target for countries to protect at least 17% of terrestrial and inland waters by 2020. The system currently encompasses more than 10 500 protected areas, including Commonwealth, state and territory reserves (45% of protected area), Indigenous Protected Areas (45%), protected areas run by non-profit conservation organisations (4%) and ecosystems protected by farmers (6%) (Figure 4.5). The protected areas are roughly evenly split between more restrictive International Union for Conservation of Nature (IUCN) categories (47%, I-IV) and those that incorporate sustainable use (51%, V-VI). All protected areas in the NRS are required to follow guidelines and processes for effective management, but capacity varies across regions and reserves. There is generally limited reporting of biodiversity outcomes from management of national reserves, with many focused on recreational opportunities as much as or more than conservation objectives.

**Figure 4.5. Australia has substantial protection, but gaps along coasts and in certain regions**

Source: DEE (2016), *CAPAD (Collaborative Australian Protected Areas Database) 2016: Terrestrial Protected Area Data*; DEE (2018), *Australian Marine Parks (database)*.

While total levels of protection are higher than in many other OECD countries, about one-third of bioregions have less than 10% protection. The majority of bioregions with low levels of protection are located in Queensland, New South Wales and South Australia. In contrast, Western Australia and the Northern Territory have the highest number of bioregions with more than 30% protection (Figure 4.6). The three most populous states – Queensland, New South Wales and Victoria – also have the lowest proportion of territory protected (Figure 4.6; DEE, 2016a). Queensland has, however, committed to reach 17% protection by 2030 and already increased its protected areas by 54% between 2008 and 2017. In South Australia, 60% of protected areas are under co-management arrangements.

The Strategy for the National Reserve System 2009-30 sets aspirational national targets to establish a well-managed, comprehensive, adequate and representative NRS. The strategy is to be implemented through five-year plans developed by each jurisdiction. Addressing gaps in bioregions with lower levels of protection can be challenging when there are competing land uses such as agriculture, or the land is fragmented or in poor condition. In many areas, action beyond protection is required. Restoration of ecosystems will increasingly be needed to improve the conservation status of biodiversity (Box 4.8). While the Commonwealth government ceased funding NRS expansion in 2012, AUD 15 million was announced for Indigenous Protected Areas in 2017 under the NLP.

**Figure 4.6. Queensland and New South Wales have the lowest levels of protection**

Note: Several bioregions overlap across states/territories, meaning that the total number of bioregions (89) is less than what is shown. EXT includes Christmas Island, Cocos Islands and Norfolk Island. JBT is the Jervis Bay Territory.

Source: DEE (2016), Collaborative Australian Protected Areas Database 2016: Terrestrial Protected Area Data.

StatLink  <https://doi.org/10.1787/888933889780>

#### Box 4.8. North Monjebup restoration helped reconnect habitat

In Western Australia, Bush Heritage Australia worked from 2007 to 2014 to return native vegetation and species habitat to heavily cleared landscapes. One project involved planting and seeding a variety of native flora in a cleared area in North Monjebup. The group also developed habitat debris piles to encourage the return of ground-dwelling reptiles, marsupials and native rodents. To date, it has restored over 400 ha of cleared land, supporting vulnerable species such as the malleefowl, western whipbird, Carnaby's cockatoo and tammar wallaby. The project was financially supported by wildlife corridor funding provided by the South Coast NRM.

Source: BHA (2017), *Monjebup*; SERA (2013), *Case Study: Fauna-focussed Ecological Restoration at Monjebup North, South Coast, Western Australia*.

#### *Protection of coastal and marine areas*

Australia has 36% of its marine jurisdiction and 41% of its mainland EEZ protected, far exceeding the Aichi target to achieve at least 10% protection of coastal and marine areas by 2020. In 2012, 40 new marine parks (formerly called marine reserves) were added in the north, northwest, southwest and temperate east marine regions and the Coral Sea to build on existing marine parks in the southeast, the Great Barrier Reef and Heard and McDonald islands (Figure 4.5).

Around 96% of marine protected areas are under Commonwealth jurisdiction, and therefore largely do not address coastal areas under state jurisdiction. Parks Australia manages marine parks and develops ten-year management plans that determine which activities are allowed in different zones of each park. Queensland has the second greatest

area of marine protected areas, followed by South Australia and Western Australia, (DEE, 2016b). The other states have small marine protected areas, though New South Wales proposed a new marine park in the Hawkesbury Shelf marine bioregion in 2018 that would include a network of 25 distinct sites categorised as sanctuary zones, conservation zones or special purpose zones (NSWME, 2018).

In response to concerns raised following the establishment of 40 new marine parks, including lack of consultation and scientific evidence, an independent Commonwealth Marine Reserves Review was completed in 2015. It consisted of two panels: a Bioregional Advisory Panel (BAP) to consult affected stakeholders and an Expert Scientific Panel (ESP) (DEE, 2017a). The BAP recommended changes to zoning and zone boundaries for 26 of the 40 new reserves, as well as three other reserves, to both improve overall protection and reduce the displacement of economic activities. The ESP recommended improving the information base and research and monitoring capacity by establishing a publicly available data set on baselines and benchmarks (DEE, 2017a).

A subsequent revision to management plans for 44 marine parks in the summer of 2017 increased the proportion of area falling under lower levels of protection (IUCN V-VI) beyond what was recommended by the BAP. Less restrictive categories allow for commercial fishing and other activities, subject to permitting and approvals (AMP, 2018a). The changes sparked outrage from environmental groups, and the Labor and Green parties unsuccessfully attempted to disallow the management plans in the Senate (Murphy, 2018; FW, 2018). The Commonwealth government's Regulatory Impact Statement concluded that, overall, the changes did not weaken marine environment protection (AMP, 2018b). In addition, starting over at this point would mean an even greater delay in marine protection (marine reserves were first proposed in 1998). It will, however, be important for the management plans to incorporate the research and monitoring capacity recommended by the ESP in order to support evidence-based decision making.

#### *4.4.2. Conservation programmes*

The federal, state and local governments, community groups and NGOs all have conservation programmes that target improving the conditions of species or ecosystems. Some of the larger ones include the NLP, the Reef 2050 Long-Term Sustainability Plan, and recovery plans for threatened species and ecosystems.

##### *National Landcare Program*

The NLP is the primary mechanism for Commonwealth investment in environmental conservation and sustainable land management. It is funded in two phases. The first phase, 2014-18, included programmes such as 20 million trees by 2020 and a threatened-species recovery fund. The next phase, 2018-23, will provide support for grants and partnerships with farmers, fishers and foresters to develop and implement best practices, tools and technologies; regional land partnerships for priority regional projects; community projects; Great Barrier Reef actions; Indigenous Protected Areas; and invasive species management (NLP, 2017). The second phase has also shifted to a request for tender process where applicants submit proposals and compete for grant funding. While such an approach will allow for greater efficiency and transparency in project selection, it may disadvantage smaller organisations or regions lacking the capacity to develop high-quality funding proposals. It may also be difficult to implement projects that

require ongoing funding. Invasive species control programmes, for example, generally require a long-term commitment to be effective.

A 2017 review of the NLP found that the programme had helped reduce biodiversity loss and should continue with minor adjustments to improve administrative efficiency and reporting. It further found that continued, long-term sustained funding is needed to protect the condition of natural assets and productive systems (DEE and DAWR, 2017). The government has been criticised for continual fluctuations in programme funding levels, policy direction and administrative requirements that make on-the-ground progress difficult for local and regional organisations. Performance measurement has also tended to be administrative (e.g. dollars spent, trees planted) rather than focused on biodiversity outcomes.

### *Reef 2050 long-term sustainability plan*

The Reef 2050 Plan, released in March 2015 and updated in 2018 following a midterm review, is a collaborative framework between the Australian and Queensland governments to guide management of the Great Barrier Reef in the short, medium and long term. It is also a response to World Heritage Committee recommendations on protecting and managing the reef. Key actions include preventing dumping of dredging material in the marine park, reducing water pollution from agriculture, passing new laws on turtle and dugong poaching and providing funding to help reduce marine debris.

Overall funding commitments for the initiative were AUD 1.28 billion in 2016, including AUD 716 million from the Australian government, AUD 409 million from the Queensland government and AUD 161 million from other sources (Australian Government, 2018). In April 2018, the Australian government also announced AUD 500 million to boost reef protection (DEE, 2018g). In addition to annual reports and regular progress reports, a comprehensive review of the programme will be undertaken in 2020. A 2016 progress report found 32 of 151 actions completed or in place, and a further 103 on track or under way (DEE, 2016d). The initiative could be a model framework for addressing pressures in biodiversity hotspots throughout Australia in terms of its collaborative approach, consideration of cumulative environmental effects and concrete short-, medium- and long-term actions backed by adequate funding.

### *Recovery plans for threatened species and ecosystems*

Under the EPBC Act, the environment minister may make or adopt and implement recovery plans for threatened fauna and ecological communities. Recovery plans state what must be done to protect and restore populations of threatened species and habitat, as well as how to manage and reduce pressures. Australia developed 27 multispecies recovery plans and seven regional recovery plans between 2007 and 2017. Additionally, 16 recovery plans covering 19 ecological communities were made or adopted over the period. However, less than 40% of nationally listed threatened species have recovery plans in place. Implementation of recovery plans has been limited by a lack of co-ordination with state/territory and local authorities and a lack of financing. Threatened species that do not have recovery plans have “conservation advice”, which requires consideration of the species when approvals are made under the EPBC Act, but no other action. There is little to no public reporting on the outcomes and funding of recovery plans and conservation advice.

### 4.4.3. Economic instruments

Australia has used financial incentives to encourage conservation measures by private landowners for years, with some success. There is also growing use of biodiversity offsets as a tool to leverage private sector financing for conservation projects, though the quality of the offsets varies across jurisdictions. Australia uses tradable quotas in the fisheries sector, charges for park access, and water markets (Chapter 1). Increased use of fees or taxes for use of ecosystem services such as land, or for pesticides and pollution, could help reduce pressures while providing revenue for important conservation and ecosystem restoration investments.

#### *Conservation covenants*

Conservation covenants are used by the federal government to increase protection of biodiversity and ecosystems by private land use holders. Under the covenants, landholders that protect areas of high conservation value may be eligible for tax concessions, specialist technical advice, assistance with management costs, rate relief and reimbursement of establishment costs. Ten state covenant programme providers currently administer covenants on behalf of the environment minister (Table 4.4).

**Table 4.4. Ten conservation incentive programmes operate across six states**

Conservation covenant programme	State	Features
<b>Biodiversity Conservation Trust (BCT)</b>	NSW	Established in 2017 to encourage conservation agreements and seek strategic biodiversity offsets
<b>Conservation Agreements Program</b> (Now part of BCT)	NSW	Permanent conservation of land in exchange for rate relief and tax concessions
<b>Biodiversity Banking and Offsets Scheme (Biobanking)</b> (Now part of BCT)	NSW	Creates saleable credits from land protection by landowners and developers
<b>Queensland Nature Refuge Program and Co-ordinated Conservation Areas Program</b>	QLD	Perpetual conservation of land, with compatible sustainable use, in exchange for grants
<b>South Australian Heritage Agreement Program</b>	SA	Permanent conservation of land in exchange for rate relief and tax concessions
<b>Tasmanian Protected Areas on Private Land Conservation Covenanting Program</b>	TAS	Perpetual or fixed-term conservation in exchange for rate relief, tax concessions and other benefits, or as conservation offsets
<b>Trust for Nature Conservation Covenanting Program</b>	VIC	Encourages covenant agreements and helps develop and maintain biodiversity offsets
<b>BushTender</b>	VIC	Reverse auction providing five-year agreements to those that offer the best environmental value for money
<b>National Trust of Australia Natural Heritage Covenanting Program</b>	WA	Encourages covenant agreements and establishes bushland management plans
<b>Nature Conservation Covenant Program</b>	WA	Permanent conservation of land in exchange for rate relief and tax concessions

*Source:* DEHP (2017), *Nature Refuges*; DEWNR (2017), *Heritage Agreements*; DPAW (2018), *Nature Conservation Covenant Program*; DPIPWE (2017), *Private Land Conservation Program*; ELWP (2018), *BushTender*; NTA (2018), *Covenanting*; OEH (2017), *Conservation Programs*; TFN (2017), *Landowner Support*.

As of 2011, 5 014 conservation covenants covered an area of 5.7 million ha. However, it is difficult to assess the biodiversity outcomes of the initiative, given varying measurement

and reporting requirements, a lack of benchmark data and insufficient financial resources and human capital to monitor ecosystems and species. Many landowners with covenants also lack the time to undertake required management actions, making ongoing stewardship support important to achieving biodiversity outcomes (Fitzimons et al., 2014). The Australian Land Conservation Alliance has proposed several important amendments to the tax treatment of conservation on private land to improve incentives to establish conservation covenants. For example, it prefers the Canadian approach that allows a landowner to receive a benefit for permanently protecting environmentally sensitive land as an “ecological gift” in addition to a tax deduction for the loss of land and development value. The alliance also argues that covenant land sold should be exempt from the goods and services tax, like land used for business purposes (Smith et al., 2016).

Differences between the approaches taken by state governments can influence results. Queensland, for example, has retained its power to allocate mining permits on land subject to conservation agreement. As of 2012, 273 mineral exploration permits were operating within the boundaries of 149 of Queensland’s 379 nature refuges. In the Galilee Basin – a national biodiversity hotspot – six mines have been approved, including one on the Bimblebox Nature Refuge (in addition to the proposed Carmichael mine described in Box 4.7; England, 2015). In contrast, New South Wales enables in-perpetuity or fixed-term conservation agreements that play an important role in achieving state conservation objectives given that seventy percent of the state is under private ownership or long-term lease from the Crown.

### *Biodiversity offsets*

The Commonwealth government established the EPBC Act Environmental Offsets Policy in 2012. Offsets are considered during the assessment phase of an EIA that triggers the EPBC Act, after avoidance and mitigation measures are taken. States also have offset systems, with varying requirements. There has been significant criticism of some approved offsets in terms of what is deemed “like for like”, whether the offset can be considered permanent, the decline in crediting baselines and lack of ongoing monitoring (NCC, 2016; Maron, 2015). A 2016 OECD study highlighted important lessons learned from experience with offset systems in Australia and other OECD countries (Box 4.9). Greater alignment with strategies, such as the Threatened Species Strategy and forthcoming Strategy for Nature, could also help ensure that offset systems are consistent with conservation priorities.

New South Wales established the Biodiversity Conservation Trust (BCT) in 2017 to promote land conservation and offer biodiversity offsetting services. The trust is funded with AUD 238.5 million over three years, with AUD 70 million ongoing. The BCT will support and expand the state’s network of 1 700 landholders with conservation agreements. It will also be responsible for new biodiversity stewardship agreements with landholders that wish to generate and sell biodiversity offset credits, and for securing offsets on behalf of proponents paying into its Biodiversity Conservation Fund (BCT, 2018). Previously, only major projects were required to purchase biodiversity offsets. Under the new system, all development that is likely to have a significant impact on biodiversity will be required to offset. The new approach has the potential to improve biodiversity outcomes, both by expanding the use of conservation agreements and offsets, and by establishing a centralised body selecting, supporting and overseeing landholder biodiversity projects that receive financing.

#### **Box 4.9. Lessons learned on offsets from OECD countries**

A 2016 OECD study highlighted key design and implementation features that must be considered to ensure that offset programmes are environmentally sound and cost-effective, including thresholds and coverage, equivalence, additionality, permanence, monitoring, reporting and verification, compliance and enforcement, transaction costs and stakeholder participation.

For example, Australia's system was highlighted as not having quantified indicators to determine the significance of effects on biodiversity, an important factor in EIAs. EU guidelines for environmental assessment of projects affecting its Natura 2000 protected areas use quantifiable significance indicators, such as percentage loss of habitat area, relative change in water quality and timescale for restoration of species population density.

Most OECD country offset schemes, including the Australian systems, could improve ongoing evaluation of offset sites to ensure that they are achieving specified environmental objectives within identified time frames.

*Source: OECD (2016), Biodiversity Offsets: Effective Design and Implementation.*

#### *Environmental Stewardship Program*

Under the Environmental Stewardship Program, which is administered as part of the National Stream of the National Landcare Program, participating land managers can be contracted for up to 15 years to conduct management activities to protect and enhance the condition of threatened ecological communities. Activities can include grazing management, weed and pest animal control, and maintenance of buffer zones. As of 2017 there had been seven competitive rounds allocating AUD 150 million in New South Wales, Queensland and South Australia, covering around 52 000 ha.

#### *Fishery fees, grants and quotas*

Commonwealth fishery management is financed through charges and levies on commercial fishers. State and territory governments often distribute revenue from the sale of recreational fishing licences to projects that improve fishing populations, angling opportunities and fish habitat. Examples include the New South Wales Habitat Action Grants and Victoria's Recreational Fishing Grants Program (FHN, 2018). The Australian government provides for some trading in fisheries, including tradable effort units in the Torres Strait prawn fishery and individual transferable gear units in the skipjack tuna fishery. New South Wales and Victoria also provide individual transferable quotas that are tradable for certain commercial fisheries within their jurisdiction.

#### *National park fees*

Entrance fees and concession charges for protected areas can help control use, communicate the value of ecosystem services and raise revenue to maintain and improve the area's ecological condition. Most national parks in Australia charge entrance fees, at levels varying by state. The fees only cover a small portion of the costs of operating the protected areas. Increased interest in visiting protected areas may present an opportunity for raising fees to generate additional revenue for conservation and restoration.



#### 4.4.4. *Subsidies harmful to biodiversity*

Direct and indirect subsidies or tax incentives can encourage expansion of activities harmful to biodiversity, such as land clearing for agriculture or mining, unsustainable fishing and underfunded liabilities such as polluted waterways. Australian governments have yet to make links between instruments supporting specific sectors and biodiversity outcomes. Other OECD governments have, however, begun to identify incentives harmful to biodiversity and work towards phasing them out. France, for example, released a report in 2012 identifying a variety of public measures harmful to biodiversity. The report considered direct transfers, government actions likely to deliver a revenue advantage, and failure to internalise environmental externalities, such as the cost of pollution. Measures identified included exempting industry from water charges, undercharging agricultural sources for nitrate pollution and offering grants for new homes that encourage urban sprawl (CDS, 2012).

There are several examples of measures harmful to biodiversity in Australia. The Commonwealth and state governments provide financial support for extractive industries through mechanisms such as energy tax rebates, R&D tax incentives, supportive research and development at CSIRO, exploration incentives and royalty relief (Chapter 3). Environmental liabilities associated with mining are also underfunded (Section 4.3.4). Decisions on water allocation that favour irrigated agriculture over the needs of aquatic and other species could be considered an indirect subsidy. Some states provide grants that support expanded recreational fishing, which is often not adequately monitored or controlled. Adjusting such policies would improve biodiversity outcomes while potentially freeing up or generating revenue that could be used for conservation and restoration.

#### 4.4.5. *Financing*

Commonwealth biodiversity expenditure was relatively stable between 2010/11 and 2015/16 at AUD 400 million to AUD 500 million per year (less than 0.05% of GDP) (Figure 4.7). Spending increased in 2018 with new investment of AUD 500 million for Great Barrier Reef protection, but overall expenditure remains low relative to the magnitude of funding commitments in other areas with shared federal-state responsibility, such as transport infrastructure, which is allocated AUD 70 billion from the Commonwealth between 2013/14 and 2020/21 (Australian Government, 2017b).

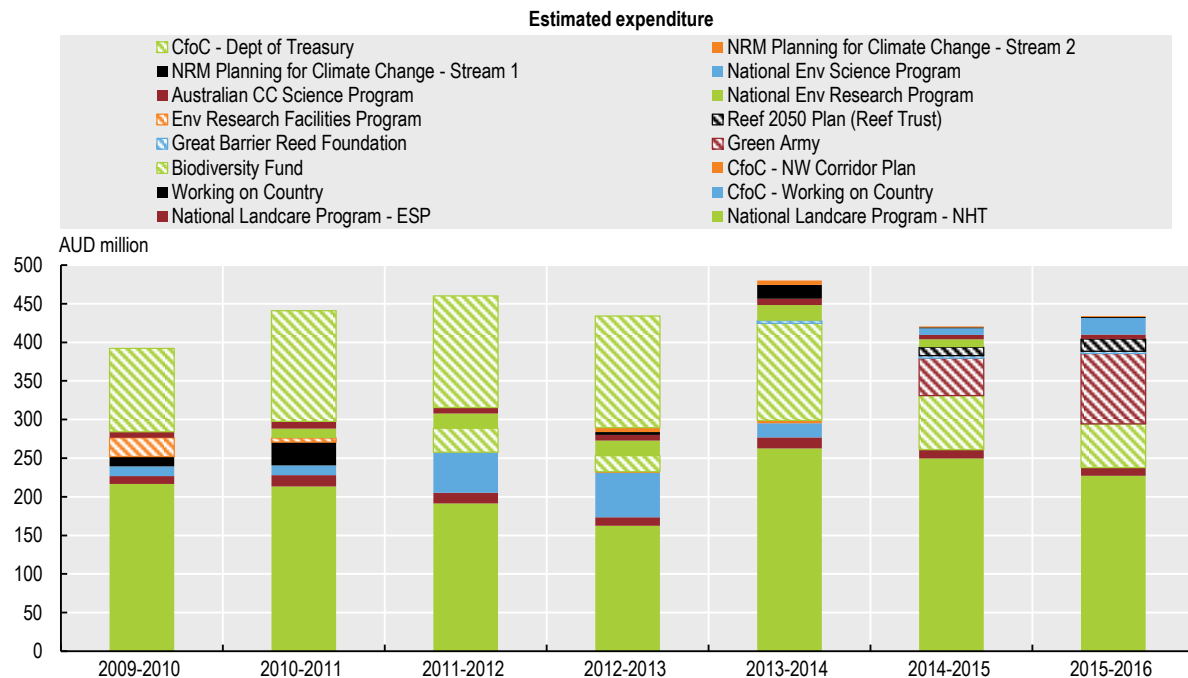
Commonwealth biodiversity programmes have changed names and objectives several times over the past decade, with successive governments. Under current plans, biodiversity funding appears likely to drop in the future. The NLP – which the government argues is the primary instrument for biodiversity conservation – has already seen average annual funding drop from AUD 400 million under the Caring for Country initiative to AUD 250 million under the first phase of the current NLP and AUD 200 million per year over 2018-23 (DEE and DAWR, 2017). The Green Army programme is not being renewed.

It is estimated that local and state government departments spend around AUD 4.9 billion per year on natural resource management, and farmers spend around AUD 3 billion per year (Martin et al., 2017). Not all this spending is directly related to biodiversity conservation, however. It is difficult to get a national picture of public expenditure on biodiversity and threatened species conservation in Australia due to the split responsibility between the Commonwealth and state/territory governments as well as biodiversity-related expenditure across several federal and state departments.

Public expenditure is only one indicator of biodiversity conservation effort. Effective regulatory and legislative environments and economic instruments can be used in ways that do not require significant additional fiscal expenditure. However, many of the actions needed to improve Australia’s biodiversity outcomes, such as improved monitoring, feral animal management and ecological restoration, require financing. The New South Wales government, for example, has allocated AUD 100 million over five years for its Saving Our Species programme.

The 2017 Threatened Species Prospectus seeks financing from business, industry and philanthropy to support the Threatened Species Strategy, but there is no indication it will raise sufficient revenue to improve outcomes. As of 2018, the initiative had generated over AUD 6 million. A review of the prospectus by the Australian National Audit Office found no documented rationale for a shift from the originally proposed mix of Commonwealth-state-private funding to a design solely targeting the private and philanthropic sectors with investment opportunities (ANAO, 2018). It is likely to be difficult to attract substantial private financing for biodiversity without providing greater public investment as leverage, or offering something else in return. One arrangement has involved Australia sharing two platypuses with the San Diego Zoo in return for an AUD 500 000 investment in platypus monitoring efforts in Australia (Borschmann, 2017). Philanthropists, however, may be more likely to donate to NGOs. In 2018, for example, a couple pledged to match every donation made to the Australian Wildlife Conservancy up to AUD 1 million in an effort to eradicate feral cats (Zhou, 2018).

**Figure 4.7. Biodiversity programmes have come and gone but overall expenditure has been fairly level since 2010**



Source: Cresswell and Murphy (2017), *Australia State of the Environment 2016: Biodiversity*.

StatLink <https://doi.org/10.1787/888933889799>

Environmental groups have expressed concern that biodiversity is seen as a low priority for government expenditure. While they support efforts to leverage financing from industry and philanthropists, they do not view it as an alternative to core public financing. New pricing instruments, or increases to or expansion of existing pricing instruments, such as park entrance fees, fishing licences and charges for clearing, could help raise additional revenue to finance enhanced conservation efforts. Stricter and expanded offset requirements could also help finance important conservation projects.

#### 4.5. Research, development and innovation

Australia is a world leader in biodiversity-related academic research and has developed several important biodiversity management innovations, yet the scale remains too small relative to the pace and magnitude of biodiversity loss. Several national, state and territory research programmes support university and NGO research that will help improve biodiversity knowledge and assessment of conservation measures, but links between research, policies and actions are often ad hoc rather than systematic. Additional emphasis on policy options, including through cross-disciplinary work with social scientists, could help improve connectivity.

The most significant investment in biodiversity-related research and development is through the National Environmental Science Program (NESP), which includes four biodiversity-relevant research hubs (Table 4.5). NESP is the current incarnation of previous research programmes, including the National Environmental Research Program and the Australian Climate Change Science Program. The investment supports important projects that will help improve knowledge of the status and trends of species and ecosystems, as well as policy approaches to manage pressures and improve outcomes. It will be important to ensure that the research results are translated into specific policy recommendations. For example, recent research supported by the Threatened Species Recovery Hub identified the top 20 birds and mammals at risk of extinction within the next 20 years. While a broader set of metrics should be used to prioritise intervention, the research will help inform decision making and highlight areas of significant pressure, such as southern Australia and islands for birds and northern Australia for mammals (TSRH, 2018b).

Australia is developing and using new technology and other innovations to improve biodiversity monitoring and invasive species management. For example, genetic barcoding is being used in the Bush Blitz project. Global advances in remote sensing, the Internet of Things, molecular genetics, drones, acoustic sensors, camera traps, online and mobile apps and other areas offer potential for larger-scale, more cost-effective approaches (Palminteri, 2018). Innovations may also provide business opportunities to entrepreneurs with technical expertise (Box 4.10). Greater emphasis could be placed on the innovation aspect of conservation in government programmes.

**Table 4.5. Biodiversity-related research programmes**

Research programme	Relevant research themes
<b>National Environmental Science Program</b>	
<b>Threatened Species Recovery Hub</b> University of Queensland (AUD 29 million 2015-21)	Taking the threat out of threatened species; Red Hot Red List; no surprises, no regrets; monitoring and management; reintroductions and refugia; enhancing threatened species policy; and using social and economic opportunities for threatened species recovery
<b>Marine Biodiversity Hub</b> University of Tasmania (AUD 24 million 2015-21)	Improving management of threatened and migratory species; supporting management decision making; understanding pressures on the marine environment; and emerging priorities.
<b>Tropical Water Quality Hub</b> Reef and Rainforest Research Centre (AUD 32 million 2015-21)	Improved understanding of impacts and pressures on priority freshwater, coastal and marine ecosystems and species; maximising the resilience of vulnerable species to the impacts of climate change; and natural resource management improvements.
<b>Northern Australia Environmental Resources Hub</b> Charles Darwin University (AUD 24 million 2015-21)	Minimising risk of land and water development; improving management of threats; practical approaches for managing threatened species; new approaches for monitoring; supporting Indigenous natural resource management; and economic values and benefits.
<b>National Climate Change Adaptation Research Facility</b> Griffith University (AUD 9 million 2014-17)	Series of climate change adaptation research plans, including on freshwater ecosystems and biodiversity, marine biodiversity and resources, and terrestrial biodiversity
<b>Great Barrier Reef Marine Park Authority</b>	Science strategy and information-needs report to guide researchers towards relevant research
<b>Commonwealth Scientific and Industrial Research Organisation</b>	Biodiversity, animals and plants, land management, sustainable agriculture, Atlas of Living Australia
<b>Australian Research Council Centre of Excellence for Coral Reef Studies</b> James Cook University (AUD 28 million 2014-21)	Sustainable use and management of coral reefs.

**Box 4.10. Australian company offers innovative approach to platypus monitoring**

EnviroDNA is using its skills in sampling design, molecular genetics and science communications to detect species from a single drop of water or speck of dust. This can help with biodiversity monitoring, threatened species conservation and management of invasive species. In Victoria, the company helped provide baseline information on the distribution of river blackfish and platypus in a rural creek prior to extensive riparian rehabilitation efforts. Traditional fish monitoring techniques had failed to detect blackfish in the upper reaches of the creek for several years. The baseline information will help the North Central Catchment Management Authority measure results of its conservation efforts.

*Source:* EnviroDNA (2018), *About*; Hodgkinson (2017), “The IoT is set to boost the planet’s biodiversity”.

## Notes

<sup>1</sup> Species that shifted to a worse IUCN red list status between 1996 and 2008.

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