

Chapter 5: Climate change and the environment

Overview

Climate change is the largest threat to Australia's environment and represents one of the most significant challenges to our economic sustainability. Failure to address this threat would have severe consequences for weather patterns, water availability in cities, towns and rural communities, agricultural production, tourism, infrastructure, health and Australia's unique biodiversity. The social and economic consequences of failing to act would be severe.

As Australia will be one of the countries that are hardest and fastest hit, we must be part of an effective global response. Thirty-two countries are currently operating emissions trading schemes and others are in the process of introducing them. There is a clear global consensus that this is the best way to tackle climate change, and we need to be part of the global solution.

Early action via the Carbon Pollution Reduction Scheme (CPRS) will allow strong long-term economic growth and employment by steadily transforming the economy. Delaying action would impose on future generations the need for a sharp, more costly adjustment task.

Market-based mechanisms like the CPRS achieve large-scale reductions in greenhouse gases at least cost. The CPRS will provide businesses and consumers with the incentives to adjust their behaviours, and will include financial assistance to help them adjust. The CPRS will also be enhanced by a range of complementary measures that support the transition to a low pollution future.

5.1 Climate change

If climate change is not addressed, the consequences for the economy, water availability and Australia's unique environment will be severe. A transformation to a low-pollution economy is required, with prompt action through the CPRS achieving this transformation at least cost.

Success in addressing the economic and fiscal challenges of an ageing population would be hollow if we cannot also move to an environmentally-sustainable economy.

5.1.1 Climate science

The consensus view is that global warming is unequivocal and human activities are very likely responsible for most of the observed warming over the last 50 years.¹

Unmitigated climate change would be likely to result in significant species extinctions, threats to food production and severe health impacts. It would also be likely that by the end of this century the point of irreversible melting of the Greenland ice sheet would be reached and the ability of the oceans and the terrestrial biosphere to absorb carbon dioxide would be reduced.

Science suggests that an international agreement that sets the world on a path to limit the increase in global average temperatures to no more than 2 degrees Celsius will provide the best chance of avoiding catastrophic climate change.

Australia is more at risk than many other developed countries. As one of the hottest and driest continents on earth, we will be one of the hardest and fastest hit. The Great Barrier Reef and Kakadu National Park will be threatened, nearly all irrigated agriculture in the Murray-Darling Basin could cease, and the cost of urban water supply could increase dramatically.

The Garnaut Climate Change Review conservatively estimated that unmitigated climate change would leave Australian GDP in 2100 approximately 8 per cent lower than the level it would be in the absence of climate change, with even greater impacts on consumption and real wages. This is equivalent to losing around \$17,000 per person (in current prices) from the Australian economy in 2100. Moreover, unmitigated climate change involves significant risks and non-market costs not captured by such estimates.²

The Stern Review estimated that the global costs of climate change over the next two centuries would be equivalent to a reduction in global per capita consumption of between 5 and 20 per cent each year, now and forever. In contrast, the Stern Review concludes that strong, early action, which avoids the cost of more drastic action later, would have a cost of only around 1 per cent of global GDP each year by 2050.³

5.1.2 Global action

Climate change is a global phenomenon, with effects occurring independent of where the emissions occur. Coordinated global action is vital if mitigation efforts are to be effective and the adjustment costs limited.

1 Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007 — The Physical Science Basis; Contribution of Working Group I to the Fourth Assessment Report of the IPCC*, 2007. For example, see *Summary for Policymakers*.

2 R Garnaut, *The Garnaut Climate Change Review*, 2008, p 259.

3 N Stern, *The Economics of Climate Change: The Stern Review*, 2007, pp xv, p 162, 218.

The world took the first step with the Kyoto Protocol in 1997. A further step was achieved through the Copenhagen Accord of 2009. The Copenhagen Accord provides that:

- action be taken to hold the increase in global temperature to below 2 degrees Celsius;
- developed and developing countries would implement mitigation actions; and
- these actions would be subject to measurement, reporting and verification.

The foundation of this international agreement is being built upon with further negotiations and progress to reduce global emissions.

5.1.3 The benefits of prompt domestic action to address climate change

Australia is playing its part in contributing to a global solution to tackle climate change. The Government is committed to reducing national emissions to 60 per cent below 2000 levels by 2050, and to reducing national emissions:

- to 5 per cent below 2000 levels by 2020 irrespective of the actions by other nations;
- to 15 per cent below 2000 levels by 2020 if there is an agreement where major developing economies commit to substantially restrain emissions and advanced economies take on commitments comparable to Australia's; and
- to 25 per cent below 2000 levels by 2020 in the context of a comprehensive global agreement capable of stabilising atmospheric concentrations of carbon dioxide equivalent at 450 parts per million or lower.

Modelling in the Government's *Australia's Low Pollution Future: The Economics of Climate Change Mitigation* Report estimates that, where emissions pricing expands gradually across the world, economies that act early face lower long-term costs: around 15 per cent lower compared to a world of coordinated global action. This is the case as:

- economies that defer action lock-in more emissions-intensive infrastructure;
- global investment is redirected to early movers; and
- early action allows individuals and firms to plan their adjustment pathways and better manage changes in skills acquisition and capital stocks.

These modelling results support the view presented consistently by the Government, the Garnaut Review and the Report to the previous Government from the Task Group on Emissions Trading. The latter Report argued that Australia should announce a domestic post-2012 emissions constraint as soon as possible.⁴

5.1.4 The Carbon Pollution Reduction Scheme

The CPRS is an emissions trading scheme that will be the primary mechanism to reduce Australia's emissions. Thirty-two countries are currently operating emissions trading schemes and other major economies are moving towards emissions trading schemes.

The CPRS will deliver emissions reductions at a lower cost to the economy than prescriptive measures such as regulations or subsidies (Box 5.1 describes the CPRS).

Box 5.1: The Carbon Pollution Reduction Scheme

The CPRS will require businesses and households to take better account of the current and future costs of their production and consumption decisions, by capping greenhouse gas emissions covered by the scheme. The Government will issue tradeable emissions units (or permits) up to the 'cap', and businesses will be required to surrender a permit for every tonne of emissions they produce.

The 'cap' will make permits scarce so that businesses will need to undertake actions that reduce emissions. The Government will reduce the cap over time, allowing Australia to achieve deeper reductions in emissions.

Higher prices for emissions-intensive products will encourage businesses and consumers to choose cleaner, lower-emissions alternatives. Where there are low-cost abatement opportunities, businesses will shift to cleaner production processes and reduce their exposure to the carbon price.

Every cent received from the sale of pollution permits will be used to help households and businesses adjust and move Australia to the low pollution economy of the future.

Under the CPRS, businesses and the community, rather than governments, will determine where and how the required abatement will occur by taking into account current and expected future carbon prices when making production and investment decisions. By placing a cap on emissions, and through the resulting price signal, the

4 Australian Government, *Report of the Prime Minister's Task Group on Emissions Trading*, May 2007.

CPRS will motivate innovative changes in production and consumption decisions, spur investment in low-emissions technology, and provide business investment certainty.

The devolved decision-making together with the broad coverage of the CPRS will transform the entire economy, putting Australia on a sustainable growth path. Under the CPRS, every business and every job will be encouraged to become greener. The CPRS will not only reduce emissions from currently high-emitting industries like electricity generation, but will reduce the emissions intensity of every single industry in Australia (see Box 5.2).

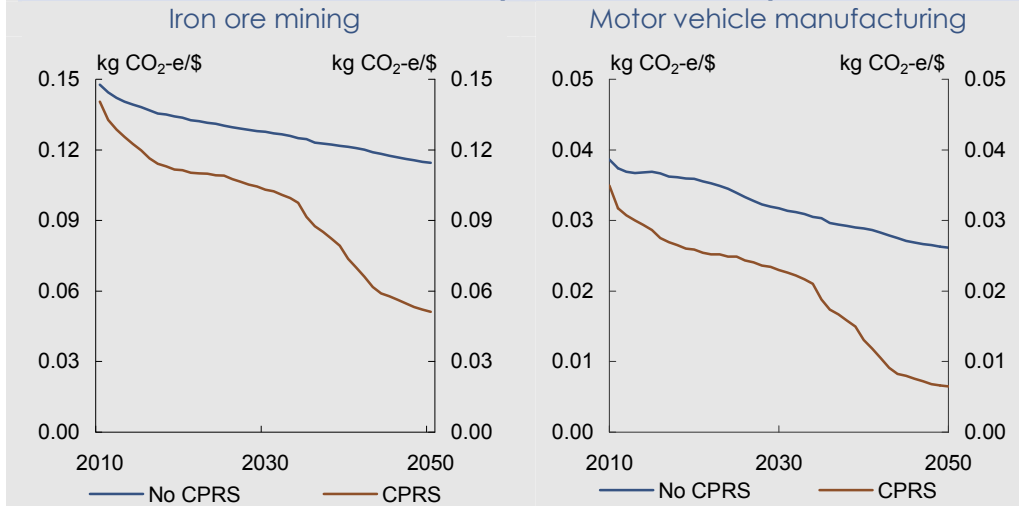
Box 5.2: Transforming the entire Australian economy

The CPRS will transform the entire economy, moving Australia onto a sustainable, low-pollution growth path. As a broad-based instrument that facilitates devolved decision-making, the CPRS is estimated to reduce the emissions intensity of each industry in Australia.

Industry emissions intensity

The CPRS is expected to deliver reductions in the emissions intensity of all industries, with many industries projected to halve their emissions intensity. Some industries could reduce their emissions intensity by three-quarters or more. Chart 5.1 illustrates two examples. By 2050 the emissions intensity of iron ore mining is projected to be reduced by around 50 per cent, and the emissions intensity of motor vehicle manufacturing is projected to be reduced by over 75 per cent.

Chart 5.1: Industry emissions intensity



Source: Treasury modelling in Monash Multi-Regional Forecasting model. CPRS -5 scenario. Measures account for the direct emissions and emissions embodied in the industry's electricity consumption, but not the emissions embodied in other inputs.

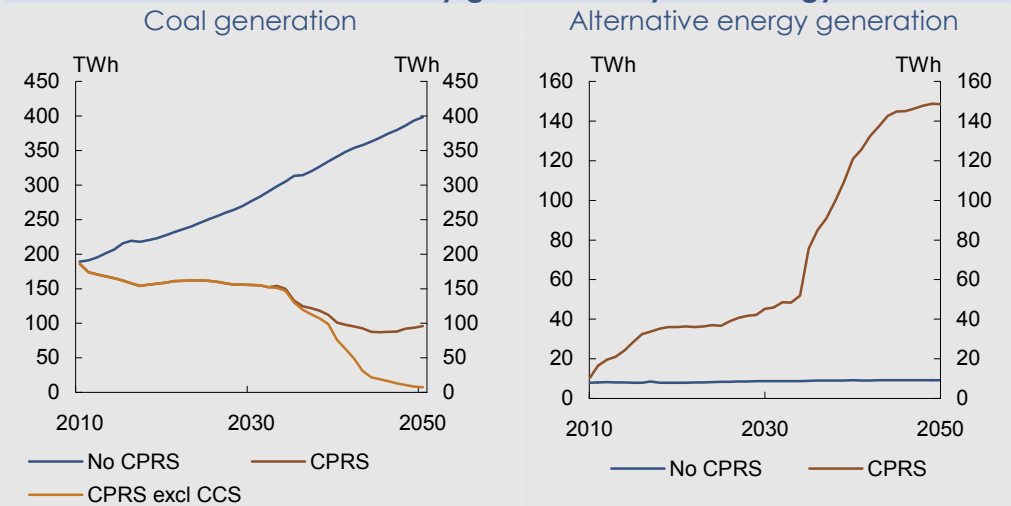
Box 5.2: Transforming the entire Australian economy (continued)

Electricity sector

The electricity generation sector is the single largest source of emissions in Australia, making up around one-third of Australia's total emissions in 2007. It also has very long-lived assets. Transformation of the sector will take time. Early action will move the electricity sector onto a low-emissions path with less dislocation.

In the absence of the CPRS, coal-fired electricity generation is projected to grow strongly to 2050 and beyond. With the CPRS it is projected that there will be significantly less coal-fired generation. By 2050 coal-fired generation is effectively eliminated except for plants using carbon capture and storage (CCS) and alternative energy generation is projected to have grown markedly (Chart 5.2).

Chart 5.2: Electricity generation by technology



Note: Alternative energy generation consists of wind, biomass, geothermal and solar photovoltaic.
Source: Treasury modelling and McLennan Magasanik Associates. CPRS -5 scenario (including RET).

5.1.5 Regulatory and subsidy arrangements

Attempting to achieve large-scale emissions reductions primarily through regulatory and subsidy arrangements would be costly for the economy, businesses and households.

An approach focussed on regulations would provide no incentive for a business to reduce emissions by more than the required amount or to develop low-emissions technologies superior to the required standard, and would not accommodate specific circumstances where meeting the requirements involves excessive costs. It would also tend to impose a significant burden on a limited number of sectors to shoulder the emissions-reduction task.

The costs of regulatory approaches can be more than double the costs of market-based approaches like the CPRS.⁵ Regulatory approaches are also less capable of achieving large-scale emissions reductions.

As an indication, the task of achieving Australia's unconditional emissions-reduction target of 5 per cent below 2000 levels by 2020 would be roughly equivalent to:

- removing emissions associated with all cars on the road, and nearly half of Australia's electricity generation, in the year 2020; or
- planting new forests equivalent to four times the area of Tasmania by 2020.

Using subsidies as a primary means to achieve significant emissions reductions would involve a significant and ongoing fiscal cost that would add to the fiscal pressures arising from an ageing population.⁶ Moreover, an approach focussed on subsidies would rely heavily on estimates of hypothetical 'business-as-usual' behaviour, in an attempt to target genuine additional emissions-reduction activity. Such estimation involves significant administrative and compliance costs, and is inherently difficult.

The CPRS, as a market-based approach, will deliver emissions reductions at least cost, with the necessary scope to provide assistance to businesses and households to help the adjustment to a low-pollution future.

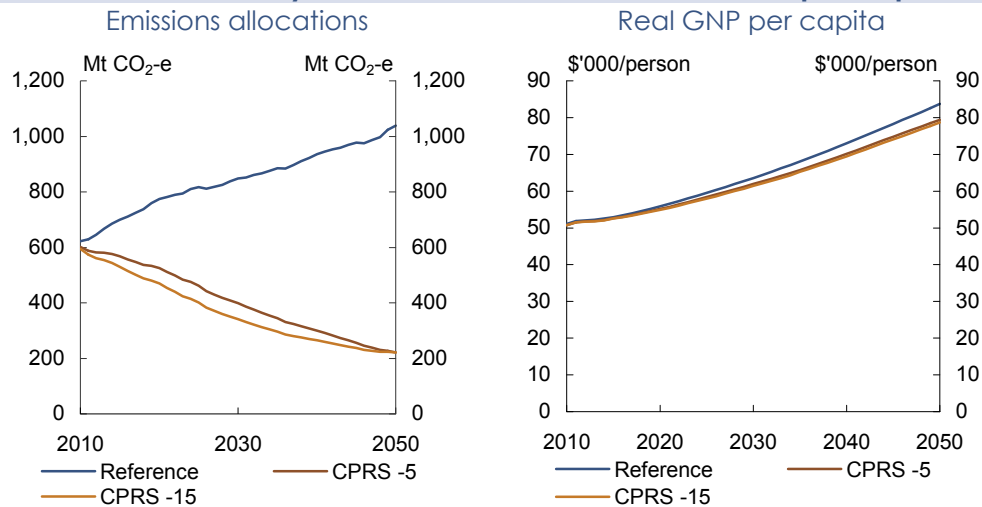
5.1.6 The CPRS and a growing economy

It is estimated that the average annual growth rate of Australia's real Gross National Product (GNP) per capita from 2010 to 2050 would be only 0.1 of a percentage point slower under emissions pricing in the context of global action compared to a scenario without climate change mitigation. That is, Australia's real GNP per capita would still be 55–57 per cent above current levels by 2050 (Chart 5.3). National employment and average real income are projected to grow strongly.

5 T Tietenberg, 'Economic Instruments for Environmental Regulation', *Oxford Review of Economic Policy*, 6(1), 1990, pp 17–34.

6 Australian Government, *Report of the Prime Minister's Task Group on Emissions Trading*, May 2007, pp 84–5; Australian Government, *Intergenerational Report 2007*, p 71.

Chart 5.3: Pathways for Australian emissions and GNP per capita



Note: Units are in Australian dollars, 2005 prices. The reference scenario shows modelled emissions in the absence of climate change mitigation. The policy scenarios show allocations to 5 and 15 per cent below 2000 levels by 2020 and to 60 per cent below 2000 levels by 2050. Actual emissions differ from allocations due to banking of permits and international permit trade.

Source: Australian Government 2008. Treasury estimates from Monash Multi Regional Forecasting model.

5.1.7 Complementary policies

The Government is committed to policies that promote the research, development and use of renewable technologies.

The expanded national Renewable Energy Target (RET) is designed to ensure that, by 2020, 20 per cent of Australia's electricity supply comes from renewable sources. By helping accelerate the deployment of renewable energy, the RET will assist the energy sector transition to the introduction of the CPRS. By 2050 output from the alternative energy sector is expected to be up to 30 times larger under a CPRS and expanded RET.

The Clean Energy Initiative, costing \$4.5 billion over nine years, complements the RET by supporting investment in low-emissions technologies, which enhances Australia's infrastructure and skills capacity.

- A \$2 billion investment is supporting commercial-scale integrated projects under the Carbon Capture and Storage Flagships Program.
- The \$1.5 billion Solar Flagships Program is assisting Australia to lead large-scale solar electricity generation.
- The establishment of the Australian Centre for Renewable Energy is promoting the development, commercialisation and deployment of new and existing renewable technologies.

Through initiatives such as the Energy Efficient Homes Package, costing \$3 billion over four years, the Government is encouraging households to improve the energy efficiency of their homes. The package provides up to \$1,200 for ceiling insulation for Australian homes and increased rebates for solar and heat pump hot water systems. In addition to supporting jobs, these initiatives are helping households take practical action to reduce their energy use and save on energy bills.

Policies to support climate change adaptation will also complement mitigation. The Government will have a role in facilitating flexible markets and providing information, so as to allow resources to shift to more productive uses as the climate changes. This is in addition to protecting public infrastructure and addressing community-wide health, safety and environment issues.

5.2 Water

Climate change mitigation will contribute to countering the risk of reduced long-term water availability, which is driven in part by poor water management as well as climate change. Improved water management will benefit urban water security, the development of rural communities and valuable ecosystems.

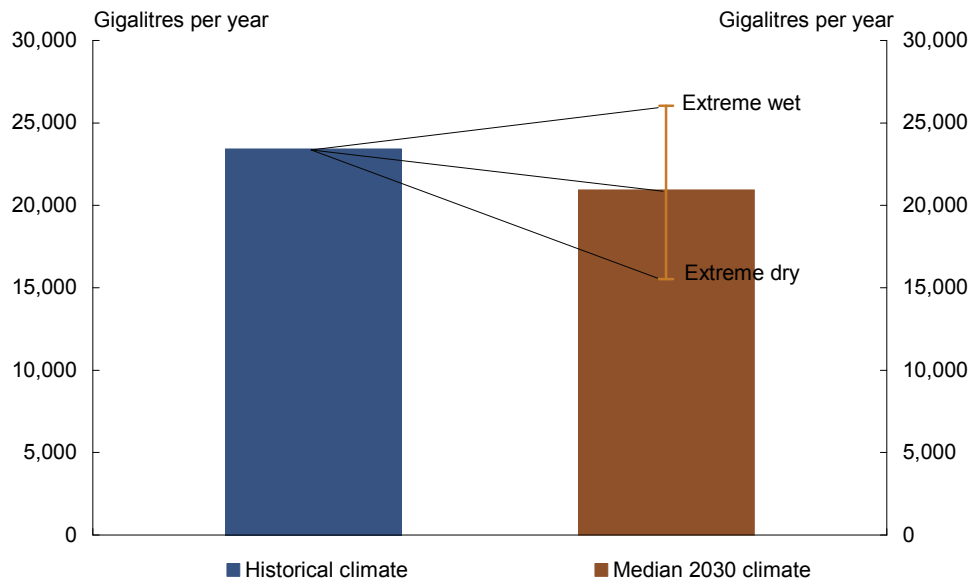
Low rainfall over long periods of time, low historical investment in water storage facilities, poor price signals to guide water allocation and increasing demand for water has created water shortages for cities, rural communities and agriculture.

Many urban water authorities have decided to impose water restrictions, rather than consider whether water charges are appropriate and properly signal investment decisions. Some are now committing to substantial investment to augment water supplies and to increases in water prices. Water pricing is needed to provide appropriate incentives for water conservation and investment in water infrastructure.

Numerous rural communities and ecosystems, particularly in the Murray-Darling Basin, are threatened by reduced water availability (Chart 5.4) and poor water management.

The Basin presently represents 40 per cent of Australia's agricultural production, and 70 per cent of irrigation water use. Various ecosystems — including a number of wetlands recognised as internationally important — rely on water flowing through the Basin's rivers and tributaries. A failure to provide sufficient environmental water flows has put many of these ecosystems under severe stress. Recovery may not be possible in some of these ecosystems.

Chart 5.4: Projected Murray-Darling Basin water availability



Source: CSIRO Sustainable Yields Project, 2008.

Water management in the Basin has been poor in three key areas. It is in these areas that improvements are most needed and where the Australian Government is investing considerable effort.

- Improved information is required on inflows, extraction levels, the water needs of environmental assets, the interaction between groundwater and surface water systems, and water losses through evapo-transpiration.
- Restoring suitable water flows to rivers, wetlands and floodplains could assist stressed ecosystems, with additional environmental water flows acquired through purchasing water entitlements from willing sellers.
- Removing restrictions on water trading would allow water to be traded to its most productive use, providing economic benefits to irrigators and the wider community (Box 5.3). Caps on the trade of permanent water entitlements remain a key barrier to trade, while inconsistent trading rules and processing timeframes are also problematic.

The history of inconsistent and complex water management in the Murray-Darling Basin arising from the involvement of multiple jurisdictions has contributed to poor water management.

New governance arrangements negotiated through the Council of Australian Governments, including the establishment of an independent Murray-Darling Basin Authority, represent a step in the right direction. Particularly important will be the

Authority's development of a comprehensive Basin plan to provide for sustainable extraction and to improve water security and quality for all users.

A particular challenge is the impact on small rural communities that primarily rely on irrigated agriculture if farmers exit the community as a result of significant trade out of water entitlements. The wellbeing of these communities will need to be taken into account. The Murray-Darling Basin Authority is required to advise on possible socio-economic impacts of water reforms.

Box 5.3: The benefits of water trading

Permanent water entitlements acquired through water trading give irrigators more certainty about pursuing long-term investments in permanent plantings such as grape vines or fruit trees. Water trading also allows irrigators to more effectively manage income streams during periods of prolonged drought.

It is estimated that the gains in output from the freeing of water trade will offset much of the losses that will result from reduced water availability — whether as a result of drought or government purchases of water.

It has also been estimated that a Government buy-back of 1,500 gigalitres in the southern Murray-Darling Basin would only result in a fall in regional output of 0.058 per cent because of the flexibility that trade allows.⁷ Similarly, a Productivity Commission paper found that trading halved the impact of 10 per cent and 30 per cent reductions in water availability on gross regional incomes.⁸

A further study found that the estimated revenue gains for the irrigation sector as a whole resulting from freeing water trade would exceed estimated revenue losses resulting from reallocating 500 gigalitres from irrigation to environmental flows.⁹

7 PB Dixon, MT Rimmer and G Wittwer, *Modelling the Australian Government's Buyback Scheme with a Dynamic Multi-Regional CGE Model*, Centre of Policy Studies, Monash University, 2009, p 19.

8 D Peterson, G Dwyer, D Appels and JM Fry, *Modelling water trade in the southern Murray-Darling Basin*, Productivity Commission staff working paper, Melbourne, 2004, p 31.

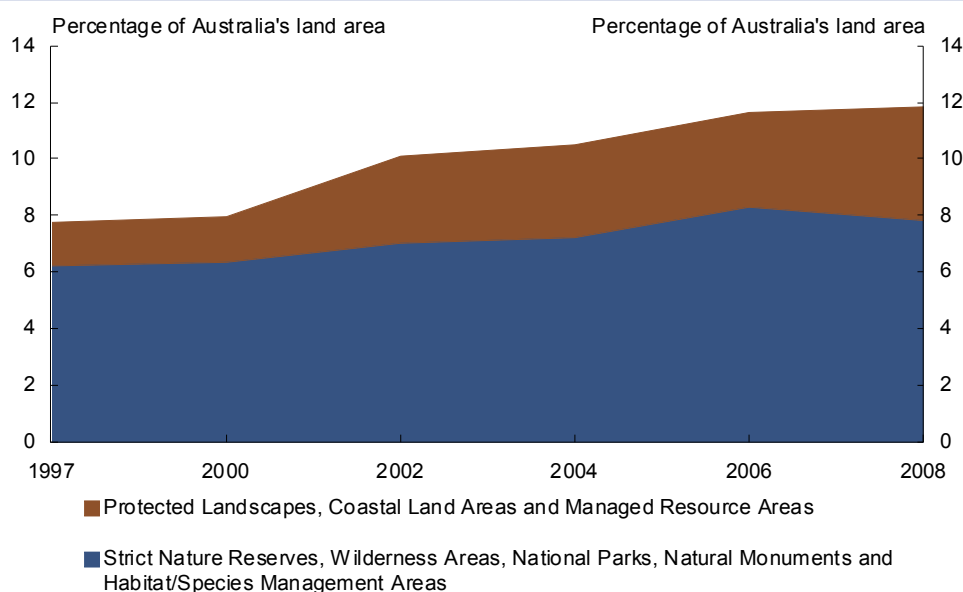
9 ME Qureshi, J Connor, M Kirby and M Mainuddin, 'Economic assessment of acquiring water for environmental flows in the Murray Basin', *The Australian Journal of Agricultural and Resource Economics* 51(3), 2007, p 297.

5.3 Land

The clearance of vegetation and degradation of natural habitats is threatening Australia's rich biodiversity.

The Australian Government and the State and local governments manage a large network of national and state parks, nature reserves and other protected areas (Chart 5.5). However, around three-quarters of Australia's land area is managed by private land occupiers. Efforts to protect biodiversity must, therefore, extend beyond the management of protected areas to conserving biodiversity on private land.

Chart 5.5: Terrestrial protected areas



Note: Australia's land area includes island external territories but excludes the Australian Antarctic Territory. Source: Department of the Environment, Water, Heritage and the Arts, 2010. Collaborative Australia Protected Area Database.

While most private land managers would value biodiversity, the competing activities that they undertake to derive benefit from their land — such as agriculture, forestry, hunting or housing development — may threaten biodiversity and native habitats. The challenge is to provide the incentives for private land managers to take into account broader environmental interests in making land use decisions.

One option is for governments to pay land managers to undertake agreed actions on their land, beyond their regulated responsibilities. The Australian Government's recently commenced Environmental Stewardship Program is consistent with this approach.

Under this program, the Government is entering into contracts for up to 15 years with landowners to manage matters of national environmental significance on their properties. The first rounds of contracts have related to the protection of box gum grassy woodlands, which provide habitat for at least 19 threatened species.