

Box 2.4 Experience and experimentation in trading

The legal and regulatory context

Current efforts under the National Water initiative (NWI) to facilitate water trading build on a *history of temporary and permanent trading* dating back to 1983, when South Australia became the first State to introduce temporary water entitlements. Since then, State/Territory laws have made trading possible in all jurisdictions, but various restrictions on trading (other than those intended to protect the environment) remain mainly aimed at shielding existing uses and third-party interests.

Most trading occurs in *regulated water systems*, i.e. systems with engineered infrastructure such as dams, which allow water to be diverted and stored when stream flow is plentiful and then released later according to the needs of water users and ecological requirements. Australia has more than 500 large dams, mostly built since the 1970s, with a total storage capacity of about 85 000 GL (to be compared to a total annual water use of about 25 000 GL). In addition, there are many smaller dams (i.e. with a retaining height of less than 15 metres). Trading varies from one year to the next, depending on weather conditions.

Significant trading in the agriculture sector

Most trading has occurred *in the agriculture sector*. In the case of temporary trades (i.e. on a yearly basis), this often involves trade between farmers in the same irrigation system; in the case of permanent trades, a typical case may entail a shift from sheep and cattle farming to a dairy or horticultural venture in a different location. In the Murray basin, for example, 120 GL “moved” from pasture irrigation to horticultural uses further downstream. So far, most trading has taken place in New South Wales, Victoria, Queensland and South Australia.

Trading is a significant element of water use practice. Across Australia, a volume in the order of 1 300 GL was traded in 2004-05 (i.e. about 7% of total water consumption), of which 1 053 GL was temporary trade and the remainder permanent trade. According to one estimate concerning Victoria, about 6% of water entitlements was traded permanently to a new location during the 1990s; between 3 and 8% of annual water use was traded temporarily in the second half of the same decade. As can be expected, in any one year temporary trading typically exceeds permanent trading by a large margin. In Victoria in the 2004-05 season, total trade amounted to about 500 GL, of which 11% was permanent trade. In the 2000-01 season, the volume traded in the ten irrigation areas of New South Wales amounted to about 624 GL, of which about 7% was permanent transfers. In South Australia in the same year, permanent trade actually exceeded temporary transfers, representing 51% of a total volume of 105 GL.

Although most salinity trading has so far occurred within individual States, some *interstate trading*, often under pilot schemes ahead of formal general arrangements, has occurred in the Murray-Darling Basin since 1998 (up to a total of about 15 GL in the first three years). Most of the water traded was “sleeper water”, i.e. water not being used by the current licence holder. Pending efforts under the NWI to simplify interstate trading, trading remains quite complex owing to the different trading rules applying in each State.

The *price of water* obtained through temporary trading fluctuates from year to year, depending on weather patterns. For instance, in the Greater Goulburn Zone (Northern Victoria) average temporary trading prices ranged between AUD 40-80 per ML (thousand cubic metres) during the period 1998-2001. In South Australia, prices for permanent trade amounted to approximately AUD 1 000 per ML during the same period.

Water quality trading

Finally, some water quality trading is also occurring. One particular example of “water trading” is the Hunter River Salinity Trading Scheme in New South Wales, which is a “cap and trade” scheme to regulate *salt discharges* from 20 mines and two electricity generators along the river. “Opportunities to discharge” or credits can be traded. One credit gives the holder the ability to discharge as saline water 0.1% of the daily total allowable discharge of salt to a “block” of water in the Hunter River during days of high flow. There are 1 000 credits, and a “block” is the body of water that passes a particular point on the river (Singleton) each day. Examples of experimentation in *nutrient trading* exist in Western Australia (Busselton), New South Wales (South Creek) and Queensland.

Source: ABS, 2004b.

5. Economic and Financing

Trading water access entitlements is innovative and brings significant efficiency benefits in the agriculture sector (as it covers some 7% of total annual water use) (Box 2.4). This is higher than experienced in other parts of the world (e.g. Chile). Nevertheless, water prices and charges, as well as government interventions, remain the key instruments shaping the overall efficiency performance of water management in Australia.

5.1 Water prices

Under the NWI, Australian governments have committed themselves to implementing *nationally consistent water pricing policies* for all types of water services³² in both urban and rural areas. The intention is to achieve full-cost pricing, which is comprehensively defined as operational, maintenance and administrative costs, externalities (defined as the environmental and natural resource management costs attributable to and incurred by the water business), taxes or tax equivalents (not

including income tax), the interest on debt, dividends (if any) and provision for future asset refurbishment/replacement. If a dividend is paid, it should be set at a level that reflects commercial realities and stimulates a competitive market outcome.³³ Where service deliverers are required to provide water services to classes of customer at less than full cost, the amount should be fully disclosed and ideally paid to the service deliverer as a community service obligation.

Administrative arrangements for full cost pricing are now largely in place and jurisdictions are moving towards implementation. *Urban areas* have made the greatest progress, and all jurisdictions (except Tasmania and the Northern Territory) have introduced rising block tariffs (two or three steps) for drinking water supply. Nevertheless, in many cases the volumetric component of utility invoices received by households remains small compared to fixed charges for water connection, sewerage and solid waste services. Moreover, given the low average price of water (about AUD 1/m³, putting Australia in the lowest one-third of OECD countries), the total water supply bill represents just 0.5-0.7% of average household expenditure and about 15% of the combined water, sewerage and solid waste management bill. Overall, the new pricing structure has not had much effect on water use in urban areas.

Achieving full cost pricing of irrigation water is still some distance away and the price of irrigation water often only covers operating expenditure, with no return on capital and no provision for infrastructure renewals (Barton Group, 2005). Prices of irrigation water delivered to the farm gate may range from AUD 10 to 400 per ML,³⁴ depending on location. Irrigation water prices for traded water have risen in recent years, but do not seem to have caused a significant shift towards higher-value crops (Box 2.4). Some State/Territory governments still supplement the shortfalls of water authorities, and it is not always clear whether these payments are subsidies or a genuine community service obligation allowed under NWI principles.

5.2 Pollution charges

Among the State/Territory jurisdictions, New South Wales, Victoria and South Australia are operating some kind of pollution charging system. These systems were initially set up to recover the administrative costs of licensing, monitoring and enforcement, but in recent years *including incentives for license holders to continuously reduce their discharges to water* has become more important.

In *New South Wales*, a load-based licensing (LBL) scheme was introduced in 1999 to link licence fees to pollutant emissions to water (and air); the fees are designed to provide incentives to drive down pollution. The scheme also permits emissions trading (a 2003 voluntary “green offset” pilot scheme allowed license

holders and developers to offset nutrient loads by reducing pollution at a different location within the catchment). In *Victoria*, the fee structure for pollution licenses under the Environment Protection (Fees) Regulations 2001 is also designed to provide incentives for licence holders to reduce their discharges and emissions. In *South Australia*, a load-based fee structure is being investigated under the Environment Protection (Fees and Levy) Regulations 1994 for discharges to the marine environment. The fee system for discharges to all waters was under review as of mid-2006.

5.3 Government funding programmes

Substantial funding from Australian governments supports the implementation of the NWI. In 2004, it set up the Australian Government Water Fund with a total commitment of AUD 2 billion over 2006-10. The National Water Security Plan expects to allocate AUD 10 billion in federal funding to address overallocation and invest in water saving infrastructure works over 10 years after agreement by all States and Territories. The total of AUD 12 billion (in volume close to 2% of the GDP of a single year) would make the direct Australian Government financial contribution a new and influential factor in the implementation of the NWI. It would also bring significant financial assistance to the agriculture sector. Separately, the Australian Government allocated AUD 2 billion in 2006 for drought relief (concerning 38% of agricultural land area).

A typical contribution from the *Australian Government Water Fund* is one-third of project costs, with State/Territory and local governments and private or community beneficiaries taking responsibility for the remaining two-thirds (including in-kind contributions, such as labour). The fund contains three separate programmes: Water Smart Australia (AUD 1.6 billion, administered by NWC); the Community Water Grants Program (AUD 200 million, administered by the Departments of the Environment and Water Resources and of Agriculture, Fisheries and Forestry); the Raising National Water Standards Program (AUD 200 million, administered by NWC).

The *Water Smart Australia Program* provides support for *large-scale projects*³⁵ (minimum of AUD 1 million) aimed at any of the following: improving river flows for better environmental outcomes; returning groundwater aquifers to sustainable levels; bringing about water savings through improvements in irrigation infrastructure; encouraging or advancing efficiency improvements in on-farm water use; desalinating water for use in cities and towns; recycling and re-using storm water, “grey” water and wastewater from sewage; providing more efficient storage facilities, such as underground aquifers; providing alternatives to ocean outfalls and

better management of sewage in coastal cities; development of water-efficient housing design. The *Community Water Grants Program*, on the other hand, supports *small-scale community projects* with grants of up to AUD 50 000 to communities to promote wise use of water. In the first round of the programme, 1 750 projects³⁶ were funded with total grants amounting to AUD 61.5 million. The second round opened in July 2006. The *Raising National Water Standards Program* supports capacity building in monitoring, evaluation and reporting on water resources at the national, regional and catchment level.

The NRS programme had a budget of AUD 85 million over the first five years, but in the latter part of the review period NHT *funding for NRS land acquisition*

dwindled to AUD 2.99 million in 2003-04 and AUD 3.87 million in 2004-05. Nevertheless, a 2002 report for the Prime Minister's Science, Engineering and Innovation Council found that the NRS is one of the most cost-effective investments governments can make to secure Australia's biodiversity. The report also suggested that an investment of AUD 300-400 million would achieve the NRS objective for 2010-15, saving many native species and yielding collateral benefits of AUD 2 000 million (PMSEIC, 2002).

Local governments also have access to NRS funding (and some councils have designated protected areas), but through lack of awareness they have so far not fully taken advantage of the opportunities available under the programme. There also remains considerable potential for local governments to play a greater role in the development of protected areas on private land through grants to landholders, differentiated rates (local taxes) for covenanted land, and management agreements or covenants with landowners. The NRS programme includes funding of community awareness programmes and projects aimed at developing or acquiring private protected areas (including covenants) and protected area networks.

Box 3.2 Funding parks management

Allocations from government budgets are Australian park authorities' main *source of revenue*, but jurisdictions also derive revenue from other sources. For example, in New South Wales entrance and camping fees raised AUD 17.2 million in 2005-06, the equivalent of almost 6% of park expenditure by the NSW National Parks and Wildlife Service. Such fees come in various forms:

- entrance fees are sometimes levied only in the more frequented parks; for instance, New South Wales applies fees at 44 of its 670 parks and reserves. At remote sites in some States, there may be *self-registration systems* (e.g. “honesty boxes” or coin-operated “pay and display” machines) with fees payable upon entering the park;
- the Australian Government’s parks agency, Parks Australia, manages three parks that attract large numbers of visitors per year: Booderee (420 000), Kakadu (165 300) and Uluru-Kata-Tjuta (348 500). *Entrance fees* are charged at Booderee and Uluru-Kata-Tjuta, while those at Kakadu were abolished in 2004;
- day passes often relate to vehicles and motorbikes (around AUD 10-15), not to people. There are also annual unlimited access passes valid at all state parks and reserves (around AUD 50-80);
- visitors to the Great Barrier Reef Marine Park pay an *environmental management charge* to the commercial tourist operator (e.g. boat tour or charter), which transfers the revenue to the park authority.

On the other hand, Parks Victoria derived 43% of its total income of AUD 137 million in 2004-05 from an annual “*parks charge*” levied on residential and commercial properties throughout greater Melbourne. The parks charge funds the development and management of a network of regional parks, gardens, trails, waterways, bays and other significant recreation and conservation assets within the greater metropolitan area. The parks charge has been included on the water, sewerage and drainage bills issued to domestic and non-domestic properties since 1958. The amount charged is based on the net annual value of commercial and residential properties, with a minimum charge of just over AUD 50 for the majority of ratepayers. Queensland has a similar system.

Source: Australian government websites.

6. Economic Aspects of Biodiversity Conservation

6.1 Economic value of biodiversity

A series of studies on the economic value of Australian biodiversity (e.g. service value, tourism value) was carried out during the review period. One 1997 study

estimated the *value to Australia of terrestrial and marine ecosystem services* at USD 245 billion and USD 640 billion per year, respectively (Jones and Pittock, 1997). Australia's GDP was of the order of USD 400 billion in the same year.

Australian protected areas' natural and cultural heritage is an important asset for the *tourism industry*. In 2005, over 2.3 million international tourists visited national parks and spent AUD 6.7 billion (about one-third of total spending by foreign tourists). The 2003 Tourism White Paper makes clear that Australia's natural and cultural environment is a major tourist attraction, and that protecting these assets is a cornerstone of sustainable tourism development. In terms of governmental integration, the White Paper proposes enhanced ministerial co-ordination across a wide range of agencies, from environment to transport, small business and Indigenous affairs. Given that the Great Barrier Reef attracts an estimated AUD 4.3 billion in tourism revenue per year, and that its resilience to climate change threats may need to be enhanced through measures that go beyond nutrient/sediment control, a form of accelerated exit adjustment assistance might be considered for sugar farmers creating pressure on the reef.

The *economic value of national parks* and nature reserves is significantly greater than the size of their operational budgets. In Victoria, three national parks (Port Campbell, Grampians and Wilson's Promontory) were estimated to contribute AUD 487 million to the State's economy in 2001-02, while total expenditure by Parks Victoria on park management services in the three parks amounted to AUD 7.5 million in the same year (Parks Victoria, 2005). An earlier study involving a sample of 23 non-metropolitan parks (national parks, state parks, etc.) concluded that visitors enjoyed a net benefit of on average AUD 19 per visitor per day. The total recreational value of all 23 parks for the years 1997/98 was over AUD 173 million, again much greater than the cost of park management (Biological Diversity Advisory Committee, 2005).

Studies have also been carried out on the *economic value of threatened species*. In a 2001 study, the conservation value of Leadbeater's possum (*Gymnobelideus leadbeateri*) alone was estimated to be AUD 40-84 million per year, *or two to three times the value of the timber cut in its habitat*. The cost of conserving all 700 endangered species was estimated at between AUD 160 and 340 million per year. Government expenditure on flora and fauna conservation at the time of the study was AUD 10 million (Biological Diversity Advisory Committee, 2005).

6.2 Conservation incentives

Grant programmes

The Natural Heritage Trust (NHT) finances *three investment streams at national, regional and local levels* (AUD 3 billion for the 12 years to 2008). At the national

level, the Australia Government sets priorities for investment (without calling for funding applications from the public) that reflect national priorities and address activities with a Commonwealth-only, national or broad-scale outcome. For example, the NHT initiated the establishment of the National Land and Water Resources Audit with the aim of improving the availability of and access to nationally linked data and information for natural resource management. Projects are implemented under bilateral agreements between the Australian Government and each jurisdiction.

The bulk of NHT investment is at the regional level, further augmented by State/Territory funding. Regional NRM bodies have been made responsible for delivering both the NHT programmes and the separately funded²⁴ National Action Plan for Salinity and Water Quality (NAP) (Chapter 5).

The NHT *Envirofund* finances small projects by community groups aimed at conserving biodiversity and at sustainable resource use (ceiling of AUD 50 000 per project). In 2004-05, a total of AUD 19.8 million for *Envirofund* projects was allocated to nearly 1 300 projects. Since 2002, funding has been allocated through four strategic programmes: the Landcare Program to reverse land degradation and promote sustainable agriculture (AUD 2.1 million in 2004-05); the Bushcare Program to conserve and restore habitat for native flora and fauna that underpins the health of landscapes (AUD 8.4 million); the Rivercare Program to improve water quality and the environmental condition of river systems and wetlands outside the Murray-Darling Basin (AUD 6.2 million); and the Coastcare Program to protect coastal catchments, ecosystems and the marine environment (AUD 1.6 million).

Other biodiversity grant programmes include the Threatened Species Network Community Grants scheme, jointly run by the NHT and WWF Australia, which encourages communities to take responsibility for species and ecological communities that are threatened. By 2005, AUD 3.5 million had been allocated to almost 300 projects. A further grants scheme provides funding for environmental and heritage organisations to help them with office expenses.

Taxation measures and revolving funds

The Australian Government instituted a range of *tax measures* in 2001 in support of the conservation and protection of the natural environment. Donors of AUD 5 000 or more to an environmental or heritage organisation can deduct this amount on their tax returns over a five-year period. Eligible conservation organisations are exempt from capital gains taxes on gifts of property received through a will. Landowners (including States, Territories, some local governments and some NGOs) entering conservation covenants with eligible organisations can claim income taxation concessions. Environmental organisations have deductible gift recipient status.

Some of the above tax measures are aimed at encouraging the use of covenants to protect biodiversity on private land. Over 10 000 km² on 3 000 properties across Australia is currently covered by a conservation covenant. *Revolving funds* are a different kind of measure used to purchase land with high conservation value, and to attach a conservation covenant to the title of the land to provide for conservation management in perpetuity. These properties are resold to buyers who have indicated their interest in maintaining biodiversity values. The proceeds from the sale of properties are used to buy more properties and sell them with a conservation covenant in place. The Australian Government has provided funding under the Bush for Wildlife initiative to four not-for-profit organisations to operate revolving funds: the Trust for Nature in Victoria, the National Trust of Australia in Western Australia, the South Australian Nature Foundation and the Nature Conservation Trust of New South Wales.

Developing market-based instruments

Australian authorities are *encouraging capacity building and experimentation* with various market-based instruments (MBIs) as part of the implementation of biodiversity and NRM programmes on private land, notably at the regional level. MBI trials are conducted under a sub-programme of the NAP, the National Market-Based Instruments Pilots Program; AUD 10 million has so far been committed during the first two rounds. Trials suggest that MBIs, especially auctions, represent better value for money than traditional natural resource management instruments (National Market-based Instrument Working Group, 2005). A national Environmental Stewardship Program, announced by the Australian Government in 2006, aims to use market-based approaches to maintain and improve targeted high public value environmental assets, including purchasing relevant environmental services from private land managers under contracts for up to 15 years.

Among MBIs, *auctions of conservation contracts* are well-suited to tackling non-point source problems. For instance, under the BushBids scheme²⁵ in the Eastern Mount Lofty Ranges (a biodiversity hotspot near Adelaide) landholders set a price for the management services²⁶ they are prepared to undertake to improve native vegetation on their property. This price forms the basis of their bid, and will be compared against bids from all other participating landholders. Successful bids are those that offer the best value for money. A comparable scheme, called BushTender, has been implemented in Victoria (Box 3.4). One advantage of the auction schemes is that they turn a liability (i.e. land not available for production) into an asset by giving landholders an additional source of income from the work undertaken to improve native vegetation. Given the considerable amount of native vegetation in need of conservation on private land, however, experience with the BushTender scheme suggests that substantial ongoing government funding will be required to secure these biodiversity benefits in the long term (Box 3.4).

Box 3.4 The BushTender and BushBroker programmes in Victoria

The *conservation of native vegetation on private land* is important for salinity control, water quality, soil protection, greenhouse gas emissions reduction, landscape protection and, above all, for the conservation of native flora and fauna. In the State of Victoria:

- 12% of Victoria's 10 000 km² of native vegetation remaining on private land supports 30% of its threatened species populations; and
- 60% of the native vegetation remaining on private land is a threatened vegetation type (i.e. its conservation status is endangered, vulnerable or depleted).

An auction-based approach

BushTender is an auction-based approach for improving the management of native vegetation on private land. It is one of the approaches being implemented as part of the current experimentation with market-based instruments in Australia. Many private landholders are already engaged in the management of native vegetation through various incentive and extension schemes. *BushTender* is an additional tool intended to further extend landholder participation in active native vegetation management and target priority native vegetation. Under this system, landholders competitively tender for contracts to improve their native vegetation. Successful bids are those that offer the best value for money, with successful landholders receiving periodic payments for their management actions under agreements signed with the Victoria Department of Sustainability and Environment. These actions are based on management commitments over and above those required by current obligations and legislation.

Two *trials of the BushTender* approach have been completed. The first was undertaken in selected areas of north-eastern/north-central Victoria between late 2001 and early 2002, and the second in selected areas of Gippsland between late 2002 and early 2003. During these trials, over 4 800 ha of native vegetation was secured under management agreements with landholders. A total of AUD 1.2 million was allocated to landholder payments during the trials.

In the *Gippsland trial area*, 73 bids were received from 51 landholders (some landholders having bid separately on each of their sites), of which 33 with a total area of 1 684 ha were accepted on the basis of "best value for money". Management agreements with periods of three or six years were offered to landholders, with the further option of ten-year protection or permanent protection covenants following the management agreement period. Of the successful bids, all but one opted for at least a six-year management agreement period, with almost half of all bids committing to further protection. On approximately half of the area covered by the contracts there is vegetation of high or very high conservation significance.

A different type of market-based instrument was introduced in early 2006. Victoria aims to achieve a net gain in native vegetation across the landscape, which requires overall gains in the quality and quantity of native vegetation to be greater than overall losses. Net gain can be achieved by additions to the stock of native vegetation through the *restoration of existing areas and revegetation*. Offsetting clearing of native vegetation helps maintain the overall level of existing stocks.

Trading native vegetation credits

BushBroker is a system to register and trade native vegetation credits. A native vegetation credit is a gain in the quality and/or quantity of native vegetation that is subject to a secure and ongoing agreement. Native vegetation credits are listed on the *BushBroker* register. They can be bought by another party and subsequently used as an offset for the approved clearing of native vegetation. Permit applicants may source offsets through the *BushBroker* register.

Native vegetation credits can be established in four ways: i) landholders pay to establish the native vegetation credits and enter into an agreement with a public agency; ii) through a credit auction, similar to *BushTender*, landholders propose a price for the establishment of credits and the credits are subsequently sold to permit applicants; iii) a permit applicant locates a landholder and funds the establishment of native vegetation credits; and iv) private land is contributed to the public conservation reserve system.

Source: Victoria Department of Sustainability and Environment website.

The 2006 New South Wales Threatened Species Conservation Amendment (Biodiversity Banking) Act created an offset scheme called *BioBanking*. Individuals can set up and manage *BioBank* sites under a conservation agreement (lands secured and managed in perpetuity to protect and enhance their biodiversity values). Establishing a *BioBank* site generates “credits” that can be sold to developers, which use them to offset the impact of developments elsewhere. Funds generated by the sale would be used for future management of the *BioBank* site. The scheme will encourage landholders and developers to minimise the impact of development on biodiversity. If it is impossible to avoid detrimental effects, developers can use biodiversity offsets, i.e. appropriate actions to counterbalance the impact of development on biodiversity including at a different site. A pilot scheme was initiated in 2007.

Market-based integration: environmentally related taxes

Overall revenue from *environmentally related taxes* as a percentage of total tax revenue is decreasing and is below the mean for the OECD.⁵ A survey showed Australia with only a few taxes in place: a waste levy in New South Wales, Victoria and South Australia, an environmental contribution levy in Victoria, an oil recycling levy, an aircraft noise levy, and an ozone protection and synthetic greenhouse gas levy (OECD, 2006). However, there are also a number of incentive arrangements that use a mixture of voluntary commitments and market-based instruments to encourage environmentally desirable behaviour change, such as the load-based licence fee in New South Wales (Box 5.3).

The previous OECD Environmental Performance Review recommended that *higher energy taxation* be considered as one way of internalising environmental externalities. Australia's absolute levels of vehicle *fuel taxation* are relatively low (IEA-OECD, 2006). The correlate of low levels of fuel taxation is a growth in vehicle usage since 1998 of 40% in road freight traffic and 10% in passenger car traffic (Table 5.1). Environmental considerations played a part in recent fuel excise reforms, but the opportunity to strongly link fuel excise to carbon emissions was not taken (Kemp, 2004).

Australia's agriculture sector is among the least subsidised in the world: the level of producer support remains very low, and domestic producer and world prices are broadly aligned. While some support remains for both sugar and milk, support levels are much lower than the OECD average. However, a large share of producer support in recent years has been in the form of *diesel fuel tax credits*, which reduce the positive effect of the broader fuel taxation regime in reducing greenhouse emissions. Other support comes in

the form of research, *infrastructure* and *drought relief*. Implicit subsidisation through *undervaluation of water* (too little provision for environmental flows compared with consumptive uses) is not included in these estimates. The institutionalisation of drought relief represents a future sectoral subsidy risk.

1.4 Environmental expenditure

Estimates show that annual *pollution abatement and control (PAC) expenditure* was about AUD 8 billion (i.e. close to 0.95% of GDP) in recent years. Some 65% of this expenditure was on wastewater, waste investment and current expenditure. In some cases about 95% of local government expenditure is for the provision (directly or through specialised companies) of wastewater and waste services. Almost all of this expenditure is financed through charges paid by users. Overall, households and business finance most of Australia's PAC expenditure, roughly in line with the polluter-pays principle (OECD, 2007).

Adding expenditure for biodiversity and landscape activities and for water supply delivery to households and business,⁶ Australia's *environmental protection expenditure* reaches about 1.3% of GDP.

The Australian Government's *expenditure relating to water resources* has risen dramatically recently: AUD 2 billion through the Australian Water Fund (over five years to 2010); AUD 200 million for the Murray-Darling Basin Commission⁷ (for 2005/06); AUD 2 billion for drought relief (for 2006); and AUD 10 billion (over

ten years) under the National Plan for Water Security to improve water efficiency and address water overallocation in rural Australia. Some of the funding provides financial assistance to agriculture; some is to be matched by State funding. These programmes support the ongoing implementation of the NWI and respond to exceptional circumstances (e.g. drought relief). Together they represent some 0.4-0.5% of GDP per year, and can provisionally be seen as *transitional financial assistance*.

2.4 Economic instruments

Market-based instruments for environmental management are relatively new in Australia. In the review period, Australian governments made a significant effort to extend the use of economic instruments to achieve pollution reductions and natural resource management outcomes more cost-effectively.

Many State/Territory governments have imposed *emission or pollution charges*. Pollution charges under the load-based licensing scheme (LBL) are used in New South Wales and Victoria and are being investigated in South Australia (Box 5.3). In

response to a recommendation of the Environment Resources and Development (ERD) Committee of the South Australia Parliament, in 2003 the State Government introduced a new licensing system with a larger component of the licence fee based on the amount and type of pollutants discharged (SA EPA, 2004).

User-pays pricing and water trading rights are being introduced in all States and Territories under the Council of Australian Governments (COAG) Water Reform Framework (Chapter 2). Under the National Water Initiative, a nationally compatible system of water access entitlements, efficient water markets and water pricing have been introduced. Both ground and surface water are included in a whole system approach. Administrative arrangements for full cost pricing are now largely in place, and jurisdictions are moving towards implementation. Urban areas have made the greatest progress, and all jurisdictions except Tasmania and the Northern Territory have introduced rising block tariffs for drinking water supply. Even though irrigation water prices have risen in recent years, full cost pricing of irrigation water has not yet been achieved and the price of irrigation water often covers operating expenditure only, with no return on capital and no provision for infrastructure renewals.

Product charges are imposed on lubricating oils and used tyres to pay for product recycling. *Parking and toll charges, noise levies* (e.g. on landings at Sydney Airport) and *deposit refunds* (e.g. the South Australia beverage container deposit system) are also used.

Economic instruments have been applied in nature conservation policies, such as *auctions of conservation contracts*. Under the BushBids scheme in the Eastern Mount Lofty Ranges (a biodiversity hotspot near Adelaide), landholders set a price for the management services they are prepared to undertake to improve native vegetation on their property. This price forms the basis of their bid and is compared against bids from all other participating landholders; successful bids offer the best value for money. A comparable scheme, called BushTender, is has been implemented in Victoria (Chapter 3).¹⁶ The Australian Government's *Biodiversity Hotspots Program* also includes a trial tender scheme project. When passed, it will allow the implementation of an offset scheme called BioBanking in which individuals can set up and manage BioBank sites under a conservation agreement. The establishment of a BioBank site would generate credits that could be sold and used to offset the impact of developments elsewhere. Funds generated by the sale would be used for the future management of the BioBank site.

In 2002, the Natural Resource Management Ministerial Council agreed to launch an AUD 10 million *National Market-based Instruments (MBI) Pilots Program*. The project tests a range of economic instruments in several of the National Action Plan's 21 priority regions. In 2003, funding of AUD 5 million was provided for the first round of the National Market-based Instruments Pilots Program, with an additional AUD 5 million announced in 2005 (Table 5.5).

Greening government operations

Uptake of environmental management systems has become widespread among Australian environmental agencies. The DEH developed a *Greening of Government Program Framework Action Plan* aimed at improving the environmental performance of all government operations. By the end of 2003, more than 28 departments and agencies had an environmental management system in place, with another 19 under development (Kemp, 2004). After implementing an environmental management system, the DEH: reduced light and power consumption by 20% from 2.1 million to 1.7 million kWh; decreased CO₂ emissions associated with light and power from 2 258 to 254 tonnes; achieved a waste reduction and recycling rate of approximately 95%; and cut transport CO₂ emissions by 9%.

Agencies at the State/Territory level also implement environmental management systems in their operations. In 1998, the Victoria EPA established a cross-organisational environment committee to develop and implement actions to improve its environmental performance. Between 1998 and 2005, the committee developed and implemented a range of actions that resulted in: reduction in energy consumption of 37% by moving head offices to buildings with higher energy efficiency; purchase of 14% renewable energy; separate collection of recyclable and compostable waste in all offices; reduction in paper consumption of 24% through initiatives such as duplex and multi-page printing; purchase of office printing and copying paper made from 100% recycled material; and purchase of fuel-efficient vehicles where suitable for the task required. *Sustainable procurement* is an objective of the Queensland government.

4.1 *Estimated environmental health costs*

Recent trends show a *correlation between air pollution and morbidity/mortality* in major Australian cities. Overall, ambient levels of air pollutants (sulphur dioxide, nitrogen dioxide, carbon monoxide) are lower in Australia than in most other OECD countries (BTRE, 2005), but nitrogen oxide and particulate matter (PM₁₀, PM_{2.5}) levels remain a concern, for example in areas with high traffic congestion. Studies in Australia's major cities during the review period estimated the economic burden from the *health effects of traffic pollution* at AUD 3.3 billion per year, associating 1 200 premature deaths, 2 400 hospital cases and 21 000 days of asthma attacks with poor urban air quality (BTRE, 2005). Almost every capital city exceeds PM₁₀ standards at least once per year, often due to bushfires. In 2003, the Ambient Air Quality NEPM was adapted to include advisory reporting standards for PM_{2.5} in order to aid monitoring (DEH, 2006d).

Nation-wide, *fine particle pollution* has been linked to the deaths of 2 400 people per year, with an estimated health cost of AUD 17.2 billion (DEH, 2001b). Australians also suffer in vast numbers from *hay fever*: the presence of grass pollen in ambient air gives the country the highest global per capita rate of hay fever, although nation-wide monitoring of this factor in air quality is poor.

Pollution in *non-urban areas* (from stationary sources like mines, smelting centres and industry) continues to pose health risks to neighbouring communities. Emissions from *mining* are increasing overall, and particle levels associated with domestic burning and *bushfires* (NSW, Western Australia) as well as *industrial emissions* (NSW, Queensland, Western Australia) are high. Australia, which was behind with respect to the OECD average timeframe for eliminating use of leaded petrol, completed the phase-out by 2002. *Ongoing risks from lead exposure* near smelting centres (e.g. Port Pirie in South Australia, Broken Hill in NSW) remain a concern despite reductions over the past 20 years, and the health risks are particularly high for children. Regional air quality also suffers from agricultural activity and localised waste treatment output, but national data monitoring these trends are not available (DEH, 2006d).

Approximately 93% of the Australian population has access to mains water supplies, with 80% relying on them as a primary source of drinking water.* There are *no national data monitoring water quality* (AIHW, 2006), but regional studies indicate that drinking water quality in remote areas and Indigenous communities continues to suffer compared to that in urban areas (McKay and Moeller, 2002). A Community Housing and Needs Survey conducted during the review period indicated that 56 of the 169 Indigenous communities failed water quality tests at least once during the survey year (ABS, 2002). Measures are needed to ensure that water-trading mechanisms introduced to rationalise the allocation of water do not unduly favour urban consumption. The *2004 Australian Drinking Water Guidelines* encourage the

adoption of guidelines which many State/Territory health departments have incorporated in quasi-regulatory instruments such as operating licenses. However, these standards are not mandatory.

Health risks from recreational water activities in Australia have resulted from *chemical and microbial exposure* (e.g. blue-green algae) due to sewage discharge, agricultural runoff or stormwater. Several coastal regions have noted associations between recreational water activities and incidences of diarrhoea, vomiting, flu symptoms, skin rashes, mouth ulcers, fevers and eye, ear and respiratory conditions. Freshwater algal blooms (excluding estuaries and coastal waters) cost Australian water users an estimated AUD 180-240 million per year (ABS, 2006a).

Recent estimates from a report on *key indicators of Indigenous Disadvantage* (SCRGSP, 2005) reveal that life expectancy at birth is 59 years for Indigenous males compared with 77 years for males in the total population, and 65 years for Indigenous females compared with 82 years for females in the total population. Indigenous people are more likely than their non-Indigenous counterparts to be exposed to poor

* An additional 11% (in mostly rural locations) uses drinking water from rainwater tanks and 7.6% from bottled water.

living conditions, including improvised or *overcrowded dwellings, poor nutrition, smoking, high alcohol consumption, illicit drug use and exposure to violence*. These conditions contribute to *high rates of infectious, rheumatic heart, respiratory and genito-urinary diseases* (ASOEC, 2001).

3. International Trade and the Environment

3.1 Context

Australia's economy *benefits from overseas trade*. Recent strong economic growth has been driven by engagement with fast-growing Asian markets, for example with respect to the rapid global increase in commodities trade. Australia's major merchandise exports are coal, iron ore and non-monetary gold. Trade in goods and services with East Asian countries totalled AUD 181.6 billion in 2005, constituting 49% of Australia's total world trade. Japan is Australia's largest goods and services export market. Principal exports to ASEAN countries in 2005 were crude fossil fuels, gold, aluminium, copper and milk solids (DFAT, 2005). Under the bilateral Closer Economic Relations Trade Agreement, New Zealand remains a significant trading partner. It is the destination of 21% of Australia's exports (DAFF, 2006a).

Bilateral free trade agreements figure centrally in Australia's approach to international trade. Such agreements already exist with New Zealand, the United States, Thailand and Singapore. With exports to China and Malaysia increasing over

the review period, Australia's regional strategy has emphasised negotiating bilateral free trade agreements with these two countries. To date, the agreement with the United States is the only one that includes *environmental provisions*, Australia's general position being to deal with trade and environment agreements separately. The Department of Agriculture, Fisheries and Forestry (DAFF) and the Department of Foreign Affairs and Trade (DFAT) participate in all trade-related (FTA and WTO) negotiations, particularly regarding the development of sanitary and phytosanitary (SPS) provisions.

3.2 Endangered species

The 1999 Environment Protection and Biodiversity Conservation (EPBC) Act and its accompanying regulations control: i) the export of most indigenous species; ii) trade in species recognised internationally as endangered or threatened, or identified by other CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) member countries as posing significant ecological risk at the international level; and iii) the import of live flora and fauna that, if they became naturalised, could adversely affect Australian indigenous species or habitats (Box 8.3). A 2001 amendment to the EPBC Act fully integrated wildlife and biodiversity protection requirements. The subsequent introduction of permits that fully comply with CITES recommendations, and the establishment of a Wildlife Management Database, have strengthened monitoring of wildlife trade (CITES,

2002). Further amendments adopted in 2006 would broaden Ministerial power to seek remediation for violations, *inter alia*.

Enforcement of CITES trade provisions through inspections, seizures and arrests is carried out by agents of DEW, the Australian Customs Service and the Australian Federal Police using X-ray machines, detector dogs, risk assessment, and surveillance at international mail centres and air and seaports. Between 1999 and 2004, over 29 000 illegal wildlife goods were seized, mostly from unwitting tourists but some from smugglers. In 2005-06, 5 165 seizures were registered under the EPBC Act, but only 15 charges of wildlife smuggling were brought against 12 defendants (DEH, 2006a). The most frequently seized items are plants and animal parts used for traditional medicines² (e.g. bear bile, tiger bone, wild ginseng), followed by coral, giant clam shells, ivory and reptile skins. Occasionally, smuggled wildlife or eggs are found in plastic tubes, children's toys or sewn into suitcases or clothing (Australian Customs Service, 2001). Most of the seized items originate from other countries in the Asia-Pacific region, many of which have not ratified CITES (e.g. in 2004, 12% of the total items seized came from Vietnam).

Box 8.3 Illegal trade and biosecurity: the Australian Quarantine and Inspection Service

Australia's economic reliance on agriculture has raised concern over increased biosecurity risks from *illegal trading*. In 2002, over AUD 420 million was lost due to 30 serious animal pests and AUD 3.9 billion due to invasive plants. The Australian Quarantine and Inspection Service (AQIS), under the auspices of the Department of Agriculture, Fisheries and Forestry (DAFF), performs quarantine inspection of imports, and inspection and certification of Australian exports. Each month 33 000 items are seized at airports for quarantine; 27% of these are undeclared (ABS, 2006b).

Proximity to South-east Asia and the Pacific heightens the risk of *invasive plants and animals* in Northern Australia. Therefore, a Northern Australia Quarantine Strategy (NAQS) provides monitoring for invasive pests and plant species with sample testing of livestock and plants. The scientific budget was AUD 5.5 million in 2004, AUD 800 000 of which was allocated for scientific research, surveys and monitoring in the Torres Strait (Department of Immigration and Multicultural Affairs, 2004).

AQIS is also the lead agency responsible for the implementation of *ballast water management* in Australian ports. It combines risk assessment of arriving ships and mandatory written requests from ship owners before ballast water is discharged in Australian waters (within 12 nautical miles). The Ballast Water Management Guidelines are enforced under the Quarantine Act 1908 and involve use of a computer application called the Ballast Water Decision Support System (BWDSS), ship-submitted Quarantine Pre-Arrival Reports (QPAR) and on-board ballast water verification inspections. About 99% of the estimated 12 500 annual arrivals comply with requirements (DEH, 2006b).

Although *violation of wildlife trade and protection laws* can be penalised by up to AUD 110 000 in fines and up to ten years in prison, such penalties are seldom enforced to their full extent. Overall, fines and sentences imposed for CITES violations remain low compared to the potential gains from non-compliance. Notable arrests have resulted in comparatively light punishments. For example, a smuggler caught in 2005 with 24 rare turtles and lizards received a temporary custody sentence and was fined AUD 24 000. In 2003, another party caught with over 200 specimens of 27 indigenous species (including geckos, frogs and lizards) was released on bail and fined AUD 10 000 (BBC, 2003). Allowing and applying more severe sanctions should be considered in order to strengthen deterrence.

3.3 *Tropical timber*

Imports of tropical timber decreased from 143 000 m³ in 1998 to 95 000 m³ in 2002 (ITTIS, 2006). Australia has found it difficult to meet “Objective 2000” of the International Tropical Timber Organization (ITTO), ensuring that all traded timber comes from certified sustainably managed forests, in large part because of difficulties with putting in place an international certification system. A 2005 study estimated that about 9% of the tropical timber imported each year³ comes from illegal or suspected illegal production. Tropical wood of illegal origin is most often found in imports of wooden furniture (about 22% of annual volume, valued at AUD 241 million), doors and mouldings (about 14% of annual volume, valued at AUD 83 million) and plywood panels (some 11% by volume, valued at AUD 23 million) (Jaakko Poyry Consulting, 2005).

Australia remains committed to the ITTO objective of ensuring that all traded timber comes from certified sustainable managed forests. Combating *unsustainable forestry practices and illegal trade* has been given high priority in Australia’s international environmental diplomacy, with specific concerns about the Asia-Pacific region (Box 8.4).

3.4 Hazardous waste

As a party to the *Basel Convention* and the *Waigani Convention*, Australia has integrated provisions to limit the export of hazardous waste to developing countries into domestic waste legislation. Although Australia's data on hazardous waste generation and transport are limited, Basel Convention reports show an increase in its exports of hazardous waste since 2001, shipped mostly to Belgium, France, Italy, New Zealand and the UK (Table 8.3). Australia accepts hazardous waste for disposal from Pacific Island Countries, in keeping with the Waigani Convention. In 2003, a *bilateral arrangement* between Australia and the Democratic Republic of East Timor was established to facilitate the import and treatment of hazardous wastes from East Timor.

Australia has not ratified the "*Basel Ban*" amendment to the Basel Convention, which prohibits all exports of hazardous waste to less developed countries. In 2000-01, it issued permits for the export of 60 tonnes of hazardous waste⁴ to South Africa for experimental recycling/reclamation of metals (EA, 2000b). The export of large quantities of electronic waste for disposal in developing countries has recently elicited concern and may require international action (Box 8.5).

Enforcement against *illegal transboundary movement of hazardous waste* is jointly carried out by agents of the DEW and the Australian Customs Service. When suspect cargoes are detected, the Australian Federal Police investigate. Subsequent prosecutions may result in warnings, jail sentences of up to five years, and/or fines of up to AUD 1 million. Since 2002, seizures of three export cargoes (two of zinc ash and one of electronic scrap) resulted in prosecution and two cases resulted in police investigations.