

Criterion 6

Maintenance and enhancement of long term multiple socio-economic benefits to meet the needs of societies

The 17 indicators in this criterion are designed to show the extent to which forests contribute to national and regional economies, benefit personal and community wellbeing, and support cultural values. They are considered under the subthemes of production and consumption; recreation and tourism; investment (including in research and development); culture and spiritual benefit (including Indigenous values); employment and community needs; and community resilience.

Key findings

Production and consumption

- The gross value of logs harvested from native forests and plantations in the five years to 2006–07 increased by 11% in real terms. The volume of logs harvested from native forests declined by 14%, while the volume harvested from plantations increased by 28%.
- In 2005–06, the turnover of Australia's forest product industries was more than \$19 billion, which was 5.3% of total manufacturing industry turnover and a real increase of about 10% since 2000–01. Value added in the forest products industries equalled 0.7% of Australia's gross domestic product, similar to the level in previous years.
- The total value of wood product imports increased from \$3.7 billion in 2001–02 to \$4.3 billion in 2006–07, while the total value of wood product exports increased from \$2.0 billion to \$2.4 billion. The trade deficit for the sector increased from \$1.7 billion to \$1.9 billion.
- Discarded forest products contribute approximately 6.5 million tonnes to the waste stream annually, mostly in the form of paper and timber products; the recycling rates for paper and timber products are estimated to be 53% and 30%, respectively. The volume of recovered

paper exported increased by 250% in the reporting period to nearly 1.1 million tonnes in 2006–07, due mainly to increased demand from China.

- Annual production of non-wood forest products is worth hundreds of millions of dollars to the Australian economy. Many non-wood forest products are important for many remote Indigenous communities, which often rely on them for customary uses and cash income.
- Governments are implementing legislative and institutional reforms and establishing financial incentives to encourage the supply of forest-based environmental services. Initiatives to establish a national emissions trading scheme in Australia are likely to have a significant effect on Australian forestry.

Investment

- Governments spend hundreds of millions of dollars annually on the management of nature conservation reserves and multiple-use public native forests. Limited data are available on investment in privately owned native forests.
- Investment in public and private plantation expansion over the period from 2002 to 2006 amounted to an estimated \$902 million. Investment in new or improved wood and wood product manufacturing facilities during the reporting period was worth several billion dollars.
- Reported annual expenditure on national forest-related research and development was \$198.5 million in 2004–05, a decrease of \$17.5 million from 2000–01. Of this total, annual investment in manufacturing-related research increased from \$79 million in 2000–01 to \$108 million in 2004–05. At the same time, nationally reported research on forest growing for wood production and forest-related environmental research declined.

Tourism and recreation

- Most publicly owned multiple-use and nature conservation reserve forests are available to the general public for recreation and tourism. Many facilities, such as visitor recreation centres and tree-top walks, were established or improved during the reporting period. For those forests for which data were available, the number of areas, tracks and sites available for recreation and tourism activities increased or remained the same over the period, varying with location and jurisdiction.
- Forest management agencies have strategies in place to actively manage forest areas of high recreation and tourism use.

Cultural and spiritual use

- More than 16% of Australia's land mass, or 122 million hectares, is under Indigenous ownership. Indigenous-managed land includes about 21 million hectares of forest, which is 14% of Australia's total forest area. Almost half the forest in the Northern Territory is under Indigenous management, with lower proportions in Western Australia (9%), Queensland (6%) and South Australia (3%). Very small areas of forest are under Indigenous ownership in New South Wales, Victoria and Tasmania. Legislative arrangements in all jurisdictions aim to ensure the identification and protection of Indigenous sites and places of significance.
- The number of Indigenous people employed in government agencies responsible for nature conservation and commercial timber production increased over the period. There was also a greater presence of Indigenous people in natural resource management committees and other forest stakeholder forums. Both planted and natural forests are increasingly valued by Indigenous people for their ability to contribute to economic independence.
- About 471,000 hectares of nationally listed, non-Indigenous, heritage places in forests is protected under the provisions of the national *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The states and territories are responsible for protecting thousands of additional sites in accordance with their heritage management and protection legislation.
- Many forest issues are of national importance and have played a role in recent national and state political debate, as the community seeks biodiversity conservation and the provision of environmental services from forests.
- The expansion of the plantation estate and the proposed development of new wood processing infrastructure have potentially significant employment benefits but are also accompanied by community concerns about their social and environmental impacts.

Employment and community needs

- Total direct employment in forestry and forest product manufacturing increased marginally between 2001–02 and 2006–07 from 82,800 to 83,400 full-time equivalents, although the proportion of the Australian workforce employed in the sector declined from 0.91% to 0.82%.
- Total national employment in businesses dependent on growing and using timber in 2006 was estimated to be about 120,000 people. Total annual wages and salaries in the wood and wood product industries increased from \$2 billion to \$3 billion between 2000–01 and 2004–05.
- There are limited national data on indirect employment, but it has been estimated that each direct job in the plantation forest industry in Western Australia's Great Southern region produces 0.7 indirect jobs.
- Limited data are available at the national level on the employment generated by the non-wood forest product and forest contact industries (such as tourism and park management). Nevertheless, case studies indicate that such industries generate considerable direct and indirect employment in some regional communities.
- The rate of injuries and fatalities per 1,000 employees in the wood and wood product manufacturing subsector declined from 48.9 to 37.2 between 2001–01 and 2002–03. Several organisations are working at the state level to improve occupational health and safety, with promising results.

Community resilience

- Dependence on the forestry and forest products industries as the primary means of employment has declined in some regions. Exceptions include areas of South Australia, East Gippsland in Victoria, and Tasmania. Populations in many forest-dependent regions are static or declining in line with a general trend in rural Australia, with the exceptions of Mount Gambier, Orbost, Oberon and Tumut, where populations have increased marginally. The number of working-age people is also declining in many regions. The growing investment in timber production and processing from plantations is becoming an increasingly important factor in forest-dependent communities.
- The recognition of native title through mechanisms such as Indigenous land-use agreements strengthens the potential value of forests for Indigenous people. Most state and territory land management agencies have targets for Indigenous employment, which help to build capacity in Indigenous communities and, therefore, community resilience.

Indicator 6.1a

Value and volume of wood and wood products

Rationale

This indicator measures the size of the wood products sector and its contribution to Australia's economy.¹ Analysis of trends in the value and volume of wood and wood products enables socioeconomic benefits derived from the forest industry to be assessed.

Key points

- The gross value of logs harvested from native forests and plantations in the five years to 2006–07 increased by 11% in real terms.
- The volume of logs harvested from native forests declined by 14%, while the volume harvested from plantations increased by 28%.
- In 2005–06, the turnover of Australia's forest product industries was \$19 billion, which was 5.3% of total manufacturing industry turnover and a real increase of 10% since 2000–01.
- In the same year, value added in the forest product industries equalled 0.7% of Australia's gross domestic product. This is similar to the level in previous years.
- Timber product volumes generally increased over the reporting period.

Harvested logs

After allowing for inflation, the gross value of logs harvested in Australian forests increased by about 11% to about \$1.7 billion in the five years to 2006–07 (Figure 52).² Volume increased by 11% overall but by 28% from plantations, mainly due to a greater than threefold increase from hardwood plantations. The volume harvested from native forests declined by 14% (Figure 53). Victoria, New South Wales and Tasmania were the major contributors to log production, followed by Western Australia, Queensland and South Australia (Figures 54 and 55).

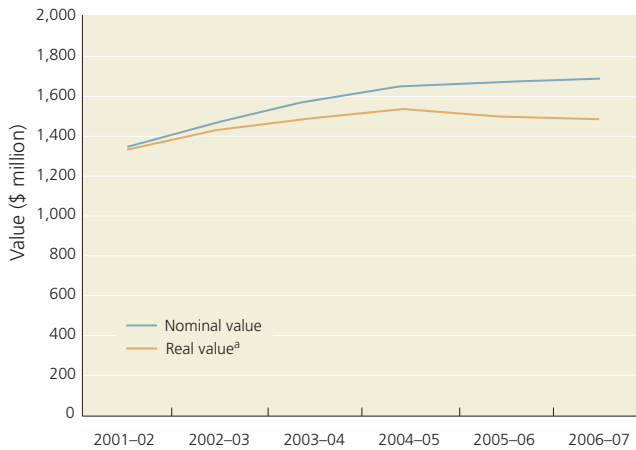


The area of native forest available for harvesting has declined and so has the volume harvested.

1 Wood products comprise logs harvested from native and plantation forests and products made from logs, including sawn timber, wood-based panels, woodchips, paper, paperboard and pulp.

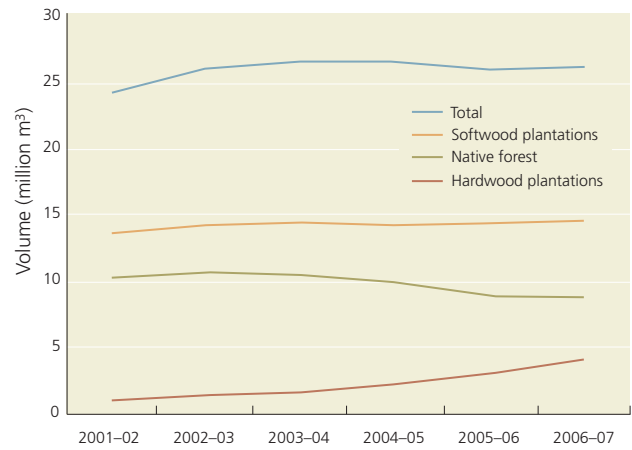
2 Value and volume figures quoted in this indicator incorporate data from all relevant tenures.

Figure 52: Value of logs harvested, 2001–02 to 2006–07



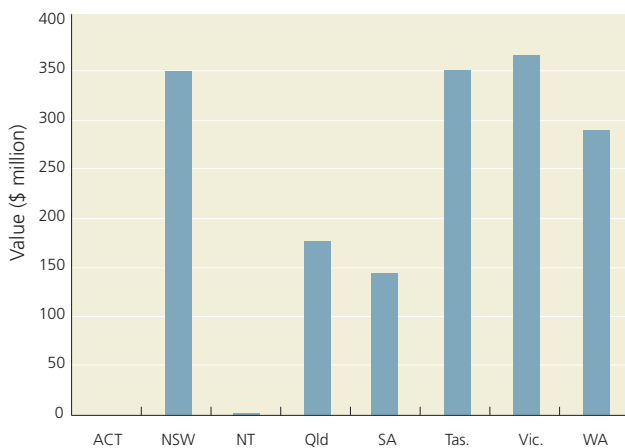
a Indexed by Consumer Price Index to 2001–02 values.
Source: ABARE (2007)

Figure 53: Volume of logs harvested, 2001–02 to 2006–07



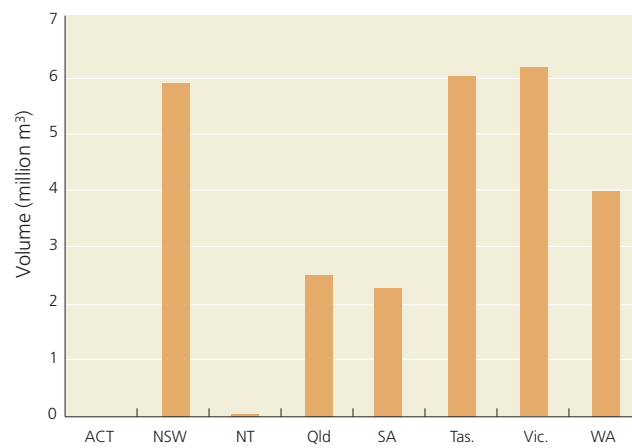
Source: ABARE (2007)

Figure 54: Value of log production, 2006–07, by jurisdiction



Source: ABARE (2007)

Figure 55: Volume of log production, 2006–07, by jurisdiction

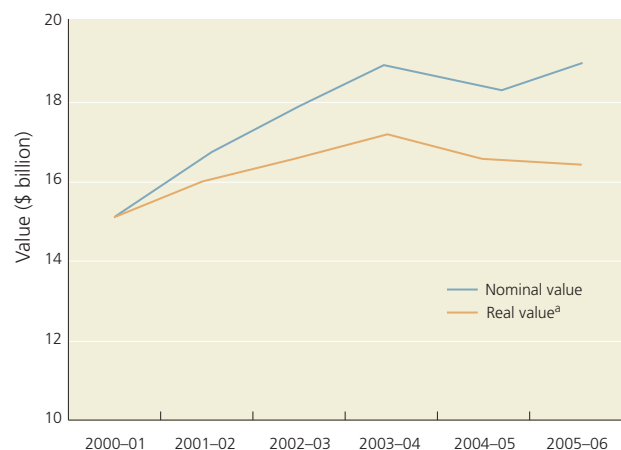


Source: ABARE (2007)

Wood products

The value of turnover in the wood and wood product industries, including paper and paper products, was \$19 billion in 2005–06 (Figure 56); wood and paper product manufacturing comprised 6% of Australia's total industry value added in that year.³ Value added in the forest product industries equalled 0.7% of Australia's gross domestic product in 2005–06. This is similar to the level in previous years. Both turnover and value added include the wholesale value of a wide range of wood and paper products (data on some of which are shown later), but not the value of finished products such as doors, windows and furniture.

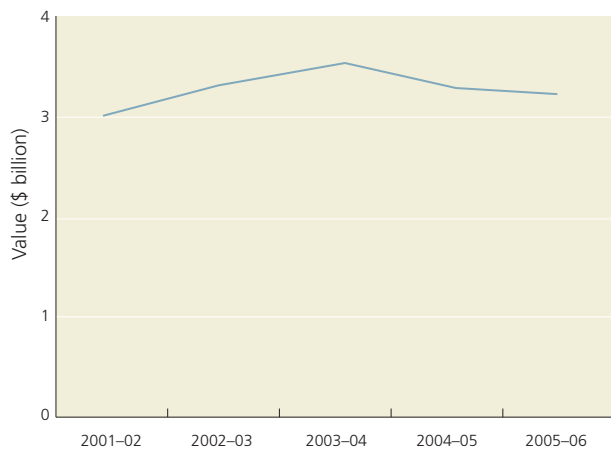
Figure 56: Value of turnover in the wood and paper product industries, 2000–01 to 2005–06



a Indexed by Consumer Price Index to 2000–01 values.
Source: ABS (2007c)

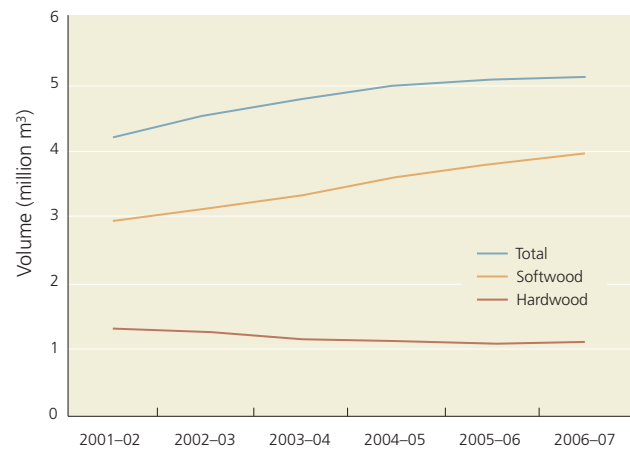
³ Industry value added is a measure of an industry's contribution to national gross domestic product.

Figure 57: Value of sawn timber production, 2001–02 to 2005–06



Source: ABS (2007c). Data for years before 2001–02 were derived by a different method and are not comparable.

Figure 58: Volume of sawn timber production, 2001–02 to 2006–07



Source: ABARE (2007)

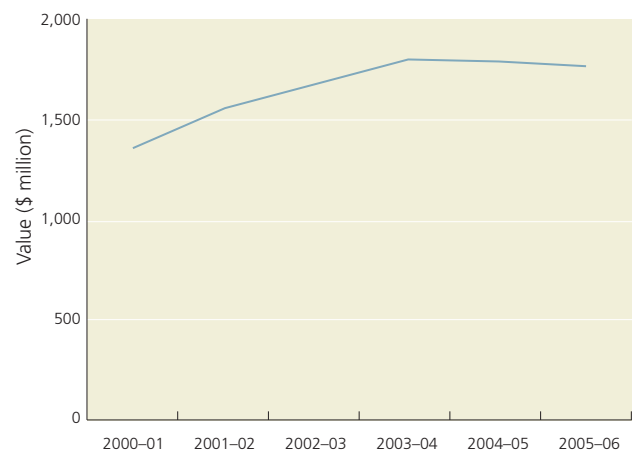
Sawn timber

The value of sawn timber production peaked at \$3.56 billion in 2003–04, 18% more than in 2001–02, and then declined in 2004–05 to 7% more than in 2001–02 (Figure 57).⁴ This pattern reproduces the level of activity in the housing and construction industry. The volume of sawn timber produced increased by 20% in the five years to 2006–07 due to increasing volumes of softwood sawn timber; the hardwood sawn timber volume produced declined by 16% (Figure 58).

Wood-based panels

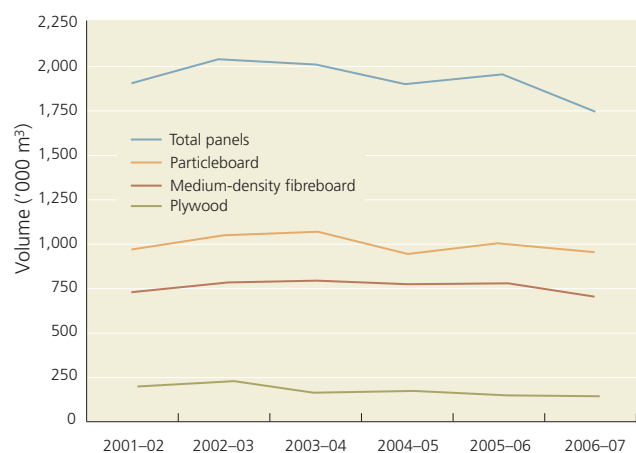
The value of wood-based panel production rose by almost 40% in the reporting period (Figure 59).⁵ The increase was due to price increases, which were more than enough to offset an 8% decline in production caused by the closure of one of the seven medium-density fibreboard mills and a lower level of housing construction towards the end of the period (Figure 60). The decrease in volume contrasts with an increase of about 60% in the decade to 2002, which was primarily due to the construction of new medium-density fibreboard manufacturing mills.

Figure 59: Value of panel production, 2000–01 to 2005–06



Source: ABARE (2007)

Figure 60: Volume of panel production, 2001–02 to 2006–07

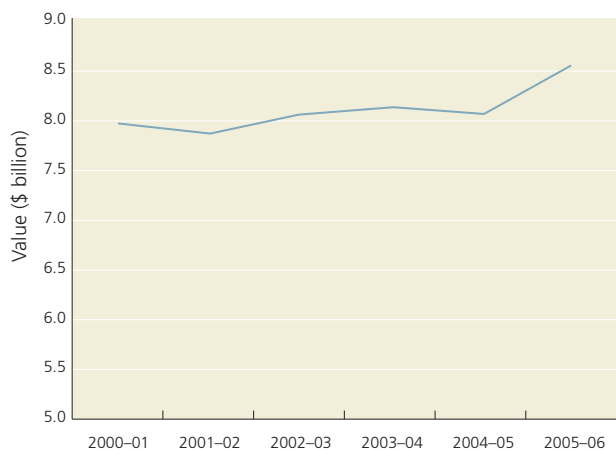


Source: ABARE (2007)

⁴ The value of sawn timber production was calculated from figures reported for the Australian and New Zealand Standard Industrial Classification classes 'log sawmilling' and 'timber re-sawing and dressing' in ABS (2007c).

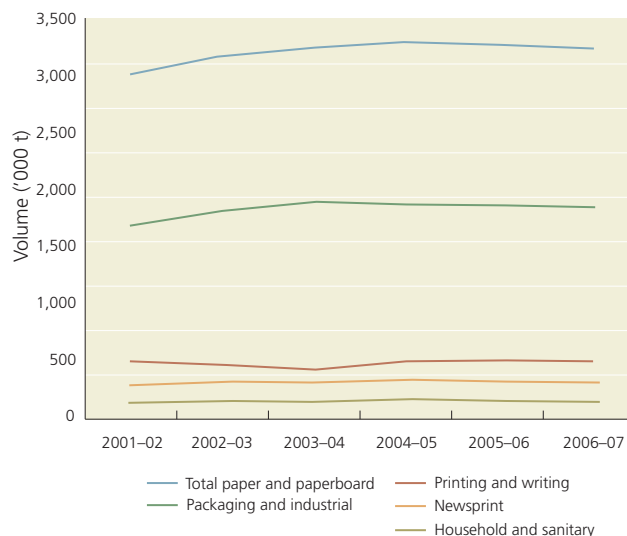
⁵ The value of wood-based panel production was calculated using data reported for the Australian and New Zealand Standard Industrial Classification classes 'plywood and veneer' and 'fabricated wood' in ABS (2007c).

Figure 61: Value of paper and paper products production, 2000–01 to 2005–06



Source: ABARE (2007)

Figure 62: Volume of paper and paper products production, 2001–02 to 2006–07



Source: ABARE (2007)

Paper and paper products

The annual value of paper and paper production fluctuated between \$7.8 billion and \$8.5 billion during the period (Figure 61). The volume produced increased by 10% (Figure 62).

Pulpwood for pulp and paper manufacture

The volume of pulpwood harvested from Australian native forests and plantations for pulp and paper manufacture increased by about 2.4 million cubic metres or 24% over the reporting period to 12.6 million cubic metres. This includes pulpwood used for pulp and paper manufacture in Australia and pulpwood exported as woodchips for manufacture in other countries. Pulpwood is also harvested and used with sawmilling residues to manufacture particleboard and medium-density fibreboard.

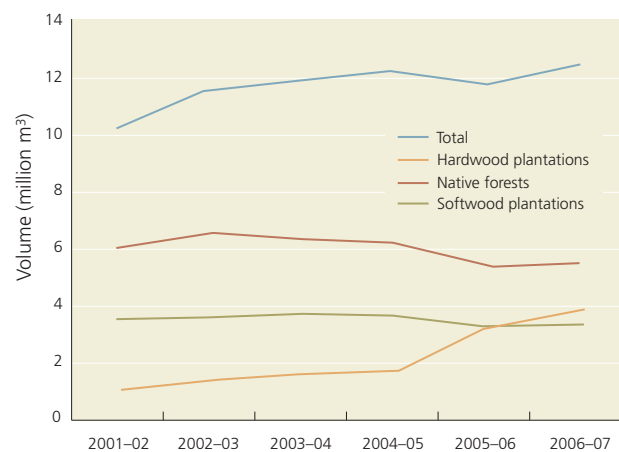
An 11% decrease in the volume of pulpwood harvested in native forests for pulp and paper manufacture was offset by a nearly fourfold increase in the volume harvested from hardwood plantations (Figure 63).

Data were not available for the total value of pulpwood harvested from Australian forests for pulp and paper manufacture. The real value of woodchip exports (Figure 64) increased by 17% in the reporting period.

References and further reading

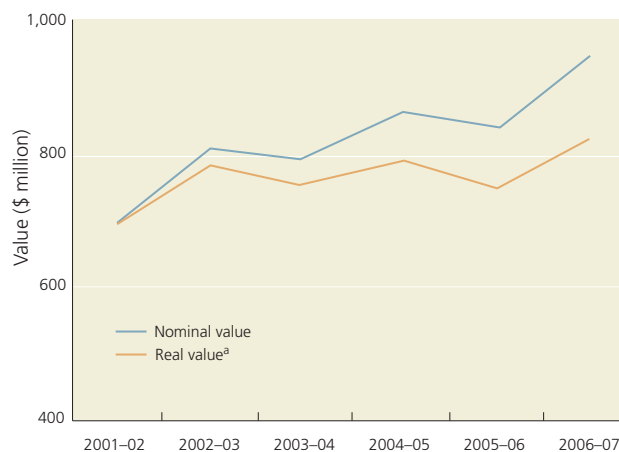
ABS (2006b, 2007c), ABARE (2006, 2007) (list at the back of the report).

Figure 63: Pulpwood for pulp and paper manufacture, 2001–02 to 2006–07



Source: ABARE (2007)

Figure 64: Value of woodchip exports, 2001–02 to 2006–07



^a Indexed by Consumer Price Index to 2001–02 values.

Source: ABARE (2007)

Indicator 6.1b

Values, quantities and use of non-wood forest products

Rationale

This indicator measures the quantities, values and usage of non-wood products. It enables socioeconomic benefits to be monitored by ascertaining trends in quantities, values and usage of those products.

Key points

- Non-wood forest product industries offer supplemental income and seasonal employment to rural communities.
- Case studies provide an insight into the nature, scale and socioeconomic value of the non-wood forest product sector. Annual production is worth hundreds of millions of dollars to the Australian economy.
- Non-wood forest products are a significant asset base for many remote Indigenous communities, which often rely on them for customary uses and cash income.

Limited data are available for many non-wood forest product industries. Table 83 provides estimates of the annual value of some industries and lists the states and territories where they are of significant size. Some of the estimates include products derived from landscapes other than forests.

In the absence of comprehensive national data, case studies provide an insight into the nature, scale and socioeconomic value of the sector. In the Northern Territory, a number of non-wood forest products are harvested in large quantities and often have a high value, relative to the total incomes of harvesters and primary users. Two industries stand out: arts and crafts (Case study 33) and crocodile-egg collecting (Case study 34). Beekeeping, another valuable Australian industry, is the subject of Case study 35.

References and further reading

ABS (2001), Altman (2003), Altman and Taylor (1989), ANZECC (2001), Beal (1998), DIR (2005), Driscoll et al (2000), Gibbs and Muirhead (1998), Griffiths et al (2003), Koenig (2007), Koenig et al (2005, 2006), Miers (2004), PWSNT (2005), RIRDC (2007), Webb et al (1984), Webb et al (1994), Wood et al (1994), Wright and Morphy (1999) (list at the back of the report).



Bee hives in a private native forest.

Table 83: Value of some of Australia's non-wood forest products

State	Kangaroo	Eucalyptus oil	Honey, beeswax, other apilary products	Hunting	Sandalwood oil	Whole plant harvests	Cut flowers (wild harvest)	Bark and wood for Indigenous art products	Grazing (including live export of cattle)	Crocodile eggs	Bushfood (e.g. <i>Acacia</i> seed, <i>Solanum centrale</i>)	Seed collection
ACT	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓
NSW	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓
NT	✗	✗	✗	✓	✗	✓	✗	✓	✓	✓	✗	✓
Qld	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓
SA	✓	✓	✓	✓	✗	✓	✗	✓	✓	✗	✗	✓
Tas.	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
Vic.	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓
WA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total value of industry (\$ million)	240 ^a	<1.5 ^b	49 ^{ac}	36 ^a	27 ^d	12	7 ^{ae}	~4 ^{af}	446.9 ^{ag}	1 ^{ah}	0.33 ⁱ (only for wild harvest of three bush products)	0.6 ^a
Notes	Total value of industry	Decline in recent years due to exports from China. Estimate based on farm gate value in 1991; retail value was estimated to be \$5 million.		Duck and quail shooting industry in Victoria; estimated value to the state economy	Predicted turnover of Mt Romance, 2005-06	Tree ferns exported from Tasmania to other states and overseas	15% of WA export production, which was ~55% of Australian exports (value \$85 million)	NT arts and crafts industry valued at ~\$5-6 million	Value estimate derived from value of live export of cattle, mainly from northern Australia	Derived from permit returns of eggs collected with a retail price of \$50 per hatchling		Cape York Peninsula 1992-97

a May include revenue derived from non-forested areas.

b Wood et al (1994).

c ABS (2001).

d DIR (2005).

e Beal (1998).

f Griffiths et al (2003).

g Sourced from www.livecorp.com.au.

h PWSNT (2005).

i Miers (2004) for *Acacia* and *Solanum*.

Case study 33: Arts and crafts in the Northern Territory

The Northern Territory Indigenous arts and crafts industry has grown substantially over the past few decades and now constitutes an important cultural and economic enterprise. Its overall value is not known; according to a 2002 estimate, however, community arts centres in the Northern Territory turn over \$5–6 million annually. The industry is thought to employ 4,500 Indigenous artists in 39 remote communities. In a recent survey of 39 remote Indigenous communities in northern and central Australia, 18 communities listed wood sculpture as a market commodity.

Arts and crafts are often the only commercial commodities produced by remote Indigenous communities, and income from the industry can amount to more than 40% of a community's cash income. The majority of the arts and crafts produced in remote communities use local woody plant material, including from forests. Those plant resources are therefore a significant asset to the communities and sustainability is an important issue.

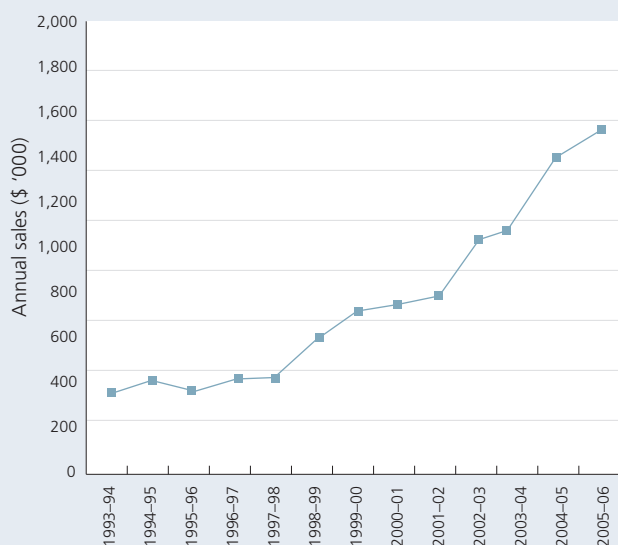
The growth in the arts and crafts industry is reflected in trends in the value of art production at Maningrida Arts and Culture (MAC) in central Arnhem Land (Figure 65). The Maningrida region covers about 10,000 square kilometres; the township has a population of 1,350 residents, and another 500 people live on surrounding outstations. The products sold through MAC include carvings, bark paintings, fibre craft weavings, ochres and dyes. The number of wood carvings

that pass through MAC has increased considerably since 1994 (Figure 66), as has the number of bark paintings. The number of artists producing sculptures increased steadily between 1985 and 2003; a total of 259 sculpture artists produced carvings for MAC during the period. Average returns to wood carvers for their work remained fairly constant between 1993 and 2003 at around \$100–200 per item, generating an estimated \$12–14 per hour. The two main types of carving wood used by Maningrida carvers are northern kurrajong (*Brachychiton diversifolius*) and cotton tree (*Bombax ceiba*). Separate studies have found that the use of these woods for carving production is sustainable, even at sites that have had a long history of use.

The production of arts and crafts is an important economic activity for Australia's Indigenous people and is perhaps the only forest-dependent industry in which they play a decisive role. In addition to commercial arts-based products, a huge variety of non-wood items are used for customary ceremonial purposes. International and national sales through centres such as MAC contribute to the total national production of Indigenous visual art, which is estimated to be worth \$100–300 million per year. While modest at the national level, this activity is critical in economically depressed remote regions of the Northern Territory.

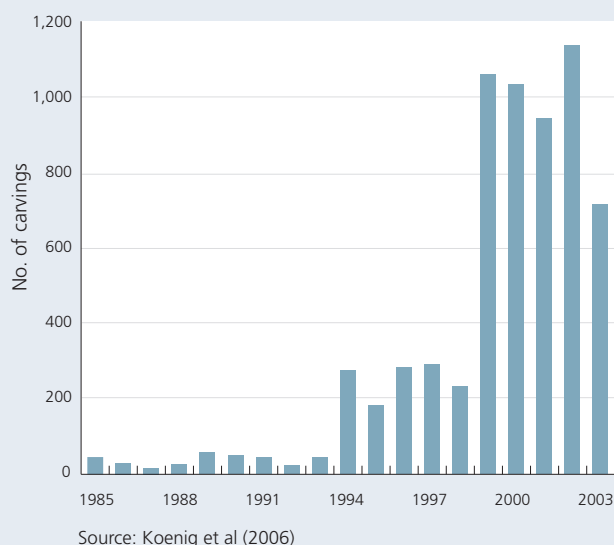
Sources: Altman and Taylor (1989), Griffiths et al (2003), Koenig et al (2005, 2006), Wright and Morphy (1999)

Figure 65: Annual sales of art based on the use of woody plants in the Maningrida region, 1993–94 to 2005–06



Source: Maningrida Arts and Culture

Figure 66: Wood carvings purchased by Maningrida Arts and Culture per year, 1985 to 2003



Source: Koenig et al (2006)

Case study 34: The crocodile egg industry

Saltwater crocodile (*Crocodylus porosus*) eggs can be considered non-wood forest products because they are often taken from forested (melaleuca) wetlands. The harvesting of saltwater crocodile eggs in the wild, largely by Indigenous Land and Sea Ranger groups on Indigenous land, has been taking place in the Northern Territory since 1984. The harvested eggs are hatched in farms; the crocodiles are grown to the desired market size and then used for skin and meat production.

The commercial hunting of saltwater crocodiles started in the Northern Territory in 1945 and continued until 1971 when, in the face of a marked population decline, the species was protected. By that time, there were only an estimated 3,000 crocodile non-hatchlings (individuals >0.6 metres long) in the wild. On 1 July 1975, the species was listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which meant that no international trade of the species was permitted. In 1984, the number of non-hatchling crocodiles in the wild was estimated to be 30,000–40,000 and the species was deemed to have recovered sufficiently to be moved to Appendix II of CITES, thus allowing the controlled international trade of the species and of products derived from it.

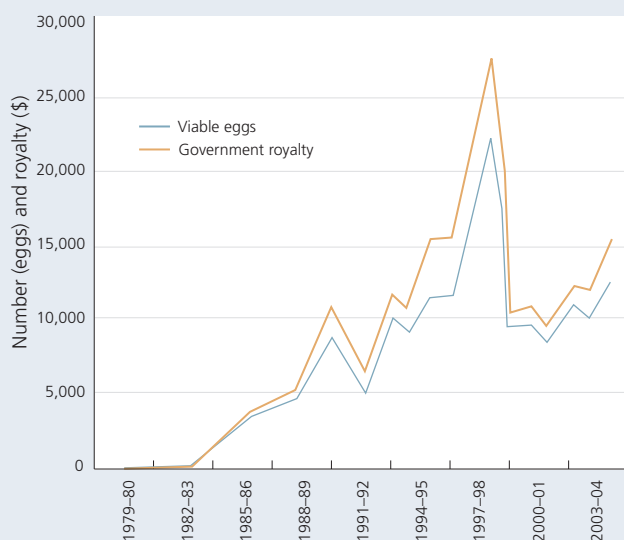
The industry has worked to ensure that the offtake is sustainable and, since 1996, there has been only limited harvesting of adults and hatchlings. Under the Parks

and Wildlife Service of the Northern Territory crocodile management plan, 25,000 eggs may be harvested from the wild each year, although collections have always been well below that number (Figure 67). The sustainability of the crocodile industry is evident from the continued increase in the population of non-hatchlings in the wild, which by 1994 had grown to 70,000–75,000 individuals despite more than a decade of egg harvesting.

The total number of viable eggs collected in the Northern Territory varied considerably between 1984 and 2004 and peaked at 21,872 in 1995–06 (Figure 67). Take permits must be submitted to the Parks and Wildlife Service regardless of the tenure of the land on which the eggs are collected. On all but Indigenous freehold land, a royalty payment of \$1.25 per crocodile egg must be paid to the agency; this is used for administration costs or, in the case of jointly managed areas, goes back to the traditional owners. On Indigenous freehold land, traditional owners may collect eggs commercially without paying the royalty and can make independent royalty agreements with third parties wanting to collect from their land. Crocodile farms pay about \$20 per egg and \$50 per hatchling; this part of the crocodile industry is therefore worth hundreds of thousands of dollars to the Northern Territory economy annually (Figure 68).

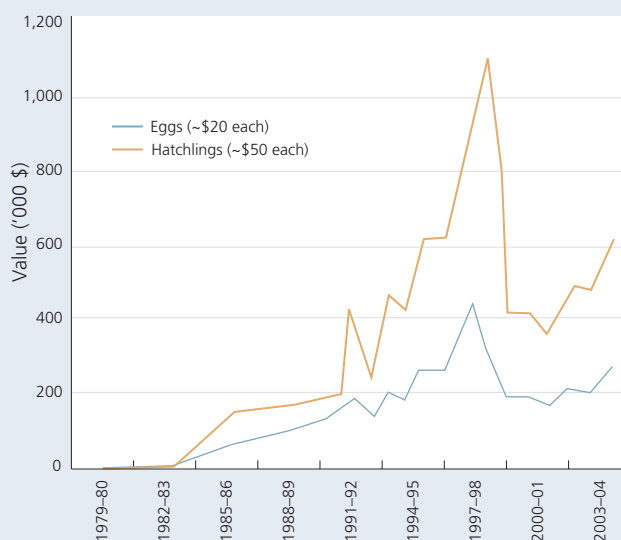
Sources: PWSNT (2005), Webb et al (1994)

Figure 67: Viable saltwater crocodile eggs harvested in the Northern Territory and estimated government royalty paid for their collection, 1979–80 to 2003–04



Source: PWSNT (2005)

Figure 68: Estimated value to Northern Territory crocodile farms of wild harvested eggs or hatchlings



Note: Based on what crocodile farmers would pay to buy the eggs. Since many farmers collect their own eggs (under agreement with landowners), these are probably overestimates.

Source: Estimated from PWSNT (2005)

Case study 34: The crocodile egg industry *continued*



Melaleuca forested wetlands, Northern Territory.



Saltwater crocodile (*Crocodylus porosus*).

Case study 35: Beekeeping

The European honey bee (*Apis mellifera*) was introduced to Australia in 1822 and quickly became widespread. Many of the continent's dominant native trees, including the eucalypts, produce large quantities of nectar that attract insects, birds, possums and fruit bats. This nectar is a major source of food for the introduced honey bees.

The apiary industry is well established in Australia, with a gross value of production of all products estimated at \$60–65 million per year, of which \$49 million is from honey production. Australia has just over 10,000 registered beekeepers, who manage 600,000 hives producing around 30,000 tonnes of honey every year; 24–30% of this annual production is exported. New South Wales, Queensland and Victoria dominate the industry, with 82% of the beekeepers and 80% of the hives, although South Australia, Western Australia and, to a lesser extent, Tasmania are also significant honey producers. In addition to honey, there are markets for beeswax, live bees (queens and packaged bees), pollination services in forest tree seed orchards and horticultural crops (such services may be provided free or in return for a fee to pay for transport and the setting up of hives), pollen, royal jelly and medicinal applications.

The apiary industry is economically and socially important in Australia, generating considerable income and employment. Because of its strong reliance on



Honeybees (*Apis mellifera*).

forests and the need to move hives around the landscape according to the seasonal availability of pollen and nectar, a number of forest-related issues have the potential to seriously affect the industry, including forest clearing, dieback among eucalypts, salinity and weed control. The industry depends largely on public lands (including conservation areas and national parks), so continued access to those areas is an important concern.

Sources: Gibbs and Muirhead (1998), RIRDC (2007)

Indicator 6.1c

Value of forest-based services

Rationale

This indicator measures forest-based services, such as ecosystem services, carbon credits, salinity mitigation and ecotourism. Forest-based services provide economic values and contribute to the sustainability of forests by providing significant social and environmental benefits.

Key points

- Australia's forests are a major supplier of forest-based services to the community. Such services have traditionally been treated as public goods with little or no explicit financial value and, in the main, this is still the case.
- However, governments are implementing legislative and institutional reforms and establishing financial incentives to encourage the supply of forest-based services.
- Initiatives to establish a carbon trading regime in Australia are likely to have a significant effect on Australian forestry. In 2005, one state agency, Forests NSW, began trading carbon credits arising from its plantations in a registered greenhouse gas abatement scheme.

Forests produce a wide range of environmental services (also called 'ecological' or 'ecosystem' services). For example, forests help to regulate water flow and maintain water quality (Case studies 37 and 38) and play an important role in the long-term survival of species. Such services have traditionally been treated as public goods with little or no explicit financial value, but this is changing. Payments for forest-based services, such as carbon sequestration, salinity abatement and opportunities for ecotourism, wildlife photography and environmental education, can provide significant environmental, economic and social benefits and contribute to the financing of sustainable forest management. While markets for such services remain a small component of the national economy compared to markets for wood products, they are expected to grow.

Increasingly, forests are being established to deliver environmental benefits that have been lost due to the historical removal of native vegetation. This includes planting for salinity abatement, along riparian corridors to filter runoff, reduce erosion and enhance biodiversity, and to sequester carbon. Diverse market-based schemes are in place or being developed to promote such planting, including tradeable resource access rights, permit trading, environmental accreditation, eco-labelling and performance bonds. The continued development of such markets is critical for the conservation of private forests and the amelioration of land degradation because they provide landholders with additional incentives for forest restoration, regeneration and replanting.

Carbon markets

Carbon is set to become a significant tradeable commodity in Australia. The Greenhouse Gas Reduction Scheme, which commenced in New South Wales in 2003, is one of the world's first mandatory greenhouse gas emissions trading schemes. It establishes annual statewide greenhouse gas reduction targets and then requires individual electricity retailers and certain other parties who buy or sell electricity in New South Wales to meet mandatory greenhouse gas reduction benchmarks based on the size of their share of the electricity market; they are able to trade carbon to offset their emissions (Case study 36 describes the involvement of Forests NSW in the scheme). All states are investigating the establishment of frameworks to create carbon offset credits from forest projects based on an extension of the carbon sequestration framework now operating under the Greenhouse Gas Reduction Scheme. In the Northern Territory, a partnership between local Indigenous communities, government and a gas refinery is encouraging the re-introduction of traditional burning practices, partly for the carbon offsets this provides.



Re-introduction of early season traditional burning practices in northern Australia is being encouraged for the carbon offsets this provides.

The states are active in creating rights to the sale of carbon from forestry investments. Victoria, New South Wales, Queensland, South Australia and Western Australia have all enacted legislation establishing new property rights over carbon sequestered in forest plantations, allowing forest owners to enter into agreements to transfer the rights to carbon sequestered in their forests separately from the land and timber. Tasmania has not created new legislation for this purpose, but carbon rights can be defined and are recognised under the state's *Forestry Rights Registration Act 1990*.

Other market-based instruments

Nationally, programs such as the Natural Heritage Trust have invested in research on market-based incentives, focusing primarily on the feasibility of alternative market instruments. There is agreement across jurisdictions to pursue an expansion of market-based instruments, stewardship arrangements and environmental management systems as part of national natural resource management programs.

The states and territories are also investing in other mechanisms that promote markets for forest-based services. For example, under its 2006 *Environmental Sustainability Action Statement*, the Victorian Government is investing \$14 million over four years to design and develop efficient markets for ecosystem services on private land, using innovative economic approaches such as competitive tenders, tradeable permits and offset markets for improved environmental outcomes. This includes projects such as BushTender, CarbonTender and EcoTender, which typically involve incentives for improved native vegetation management and the revegetation of degraded areas. BushBroker is a native vegetation credit registration and trading system under which landholders can obtain a native vegetation credit for permanent gains in the quality or extent of native vegetation (including forests) on their properties.

Forests NSW provides plantation forest management services for timber and carbon to third-party private investors. Major investments have been made by TEPCO, ST Microelectronics (one of the world's largest semiconductor companies), and NM Rothschild & Sons (a leading independent investment bank). Since 2000, Forests NSW has established around 11,000 hectares of plantation under contracts that so far have delivered over \$40 million in capital investment and provided jobs in regional New South Wales for Forests NSW staff and private contractors, and income for private landowners.

Ecotourism

The aesthetic quality of forests can also be viewed as a service that benefits the ecotourism sector, which in turn provides considerable benefits to the community (Indicator 6.3b). Some jurisdictions earn significant revenues from forest visitors, concessions operating in national parks, and fees and charges levied on certain activities. Commercial tourism operators generate revenue from forest environmental services if forests comprise part or all of their tours. Other local businesses benefit too, because forests attract visitors who, in turn, buy local goods and services. Some businesses provide park management services, such as supplying picnic tables and constructing and maintaining camping grounds and walking tracks.

Further reading

Australian Government (2007a), IPART (2007), Van Bueren et al (2002) (list at the back of the report).

Web resources

Case study 38: Water for Sydney



One-year-old sugar gum (*Eucalyptus cladocalyx*) planted in saline-affected soils, Katanning, Western Australia. Markets for salinity abatement are expected to grow.

Case study 36: A world first in carbon trading

In early 2005, the NSW Greenhouse Gas Reduction Scheme accredited Forests NSW to become the first body in the world to trade carbon credits arising from forests in a registered greenhouse gas abatement scheme. Forests NSW registered 166,005 certificates, each equivalent to one tonne of carbon dioxide, representing the carbon sequestered during 2004 by 10,000 hectares of planted hardwood forests. The first batch of Forests NSW carbon certificates, worth more than \$1 million, was purchased by EnergyAustralia to help offset the greenhouse gases released into the atmosphere as a result of electricity use in New South Wales. Forests NSW has since registered over a million more certificates.

The initial success of the scheme confirms that there is a market for tradeable carbon certificates. The ability to trade carbon credits in New South Wales provides an incentive to companies and other landowners to establish new plantations and to manage them over longer rotations, either for high-quality sawlogs or purely for environmental reasons, with income from credits offsetting establishment and management costs.

In addition to developing a carbon accounting system that is robust enough to gain accreditation under the NSW Greenhouse Reduction Scheme, Forests NSW has been heavily involved in developing state, national and international standards and guidelines to enable carbon accounting and trading.

Source: Forests NSW

Case study 37: Water for Melbourne

Melbourne Water is responsible for the harvesting, distribution and supply of safe, high-quality drinking water that consistently meets stringent requirements. Not only is Melbourne's water safe, but it was judged Australia's best-tasting drinking water at the National Water Olympics in 2003. Approximately 90% of Melbourne's water supply comes from closed catchments, making it one of only about five cities in the world that draw water from protected forest catchments.

Melbourne now has more than 157,000 hectares of native forest in the Yarra Ranges and Kinglake area reserved for the purpose of harvesting water. A significant area of these forests has been closed to the public for more than 100 years. This means that the water requires minimal treatment to assure its quality. High-quality water is harvested from the catchments and stored in 10 major water-storage reservoirs, often for years at a time, to help purification.

If Melbourne did not have the closed forested catchments, it is estimated that it would have to build an additional water treatment plant at a cost of up to \$1 billion and spend hundreds of millions of dollars a year in operating costs. In 2005–06, \$3 million was spent to protect catchments from bushfire due to the prolonged fire season.

Source: Melbourne Water

Indicator 6.1d

Production and consumption and import/export of wood, wood products and non-wood products

Rationale

This indicator measures the consumption of forest-based products in Australia. Consumption trends over time provide a measure of the ability of Australian forest and timber industries, through domestic production and importation, to meet Australian society's demand for forest products, and of the industry's contribution to the economy.

Key points

- The total value of timber product imports increased from \$3.7 billion in 2001–02 to \$4.3 billion in 2006–07, while the total value of product exports increased from \$2.0 billion to \$2.4 billion. The trade deficit in those products therefore increased from \$1.7 billion to \$1.9 billion.
- The larger categories of wood product exports are packaging and industrial papers, woodchips, medium-density fibreboard and softwood sawn timber. The larger categories of wood product imports are printing and writing papers, newsprint and softwood sawn timber.
- Many native plants and animals are highly sought after by national and international markets. Controls have been put in place with the aim of ensuring that the production, consumption and export of native plants and animals do not put species at risk of extinction.
- The harvesting of non-native plants and animals can provide a source of income and livelihood opportunities.

This indicator reports on the production, consumption and trade of wood, wood products and non-wood products by product category. Wood and wood product categories include sawn timber, wood-based panels, paper and paperboard. Categories of non-wood products typically include native flora and fauna, honey, water, mined commodities, grazing products, and Indigenous people's products. Domestic (or 'apparent') consumption is assessed and reported by assuming that it equals domestic production plus imports minus exports.

Wood and wood products

Production and consumption

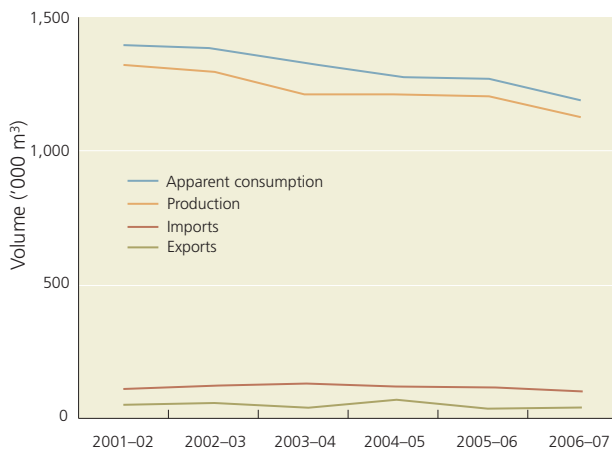
Australia's production and consumption of wood products increased by about 10% between 2001–02 and 2006–07. The production of sawn timber and wood-based panels increased from 6.4 million to 6.8 million cubic metres, and the production of paper and paperboard increased from 2.9 million to 3.2 million tonnes. The volumes of logs used to make those products are reported in Indicator 6.1a.

Australia produces substantial volumes of all major categories of wood products. Information on some of the major categories is provided below. Information on woodchip exports is reported in Indicator 6.1a.

Trade performance

Domestic production of most products is less than consumption, so substantial volumes are imported to meet demand. The total value of wood product imports increased by 14% in the five years to 2006–07, from \$3.7 billion to \$4.3 billion, while the total value of exports increased by 17%, from \$2.0 billion to \$2.4 billion. The trade deficit in the sector therefore increased from \$1.7 billion to \$1.9 billion.

Figure 69: Hardwood sawn timber production, 2001–02 to 2006–07



Source: ABARE (2006, 2007)

The overall growth in exports was due to substantial growth in specific sectors of the wood product industry, particularly sawn timber (where the value of exports has more than doubled since 2001–02) and wastepaper (in which exports have increased by 250% since 2001–02). Exports of woodchips, paper and paperboard, and paper manufactures also increased, while the value of wood-based panel exports declined by 27%. The main export destinations include Japan (38% of total value of exports), New Zealand (17%) and China (16%).

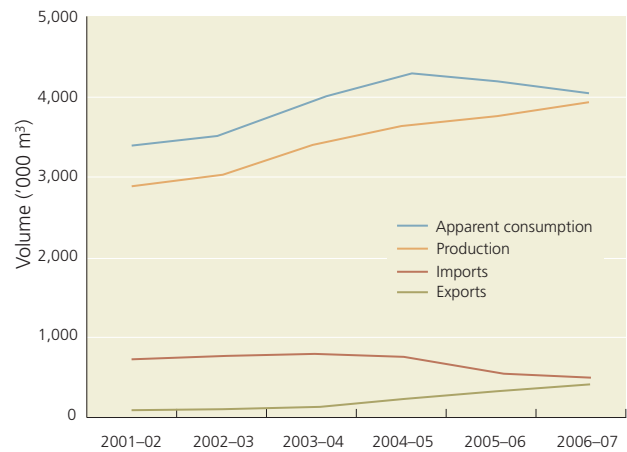
Some sectors experienced significant import growth. For example, the value of wood-based panel imports increased by 64% and paper and paperboard by 35% over the period. The main sources of imports include New Zealand (19% of total value of imports), China (10%) and Indonesia (8%).

Sawn timber

Most hardwood sawn timber is used in flooring, decking, joinery, furniture and similar applications where particular appearances or colours are required, or for engineering and architectural applications that demand particular strength, hardness, durability or other technical characteristics. The production and consumption of hardwood sawn timber declined by about 15% in the reporting period (Figure 69), reflecting lower sawlog supply from native forests (Indicators 2.1a and 2.1c). Imports increased by 23% but are still a small proportion of consumption (7% of consumption in 2001–02 and 11% of consumption in 2006–07).

Softwood sawn timber is used mainly as a structural component of house walls and roofs. Softwood sawn timber production increased by 24% in the reporting period (Figure 70) due to increasing sawlog supply from pine plantations established in the 1960s and 1970s by state governments, supported by loans from the Australian Government. Consumption also rose, but to a lesser extent because the level of house construction waned during the reporting period (Figure 71). The volume of imports

Figure 70: Softwood sawn timber production, 2001–02 to 2006–07

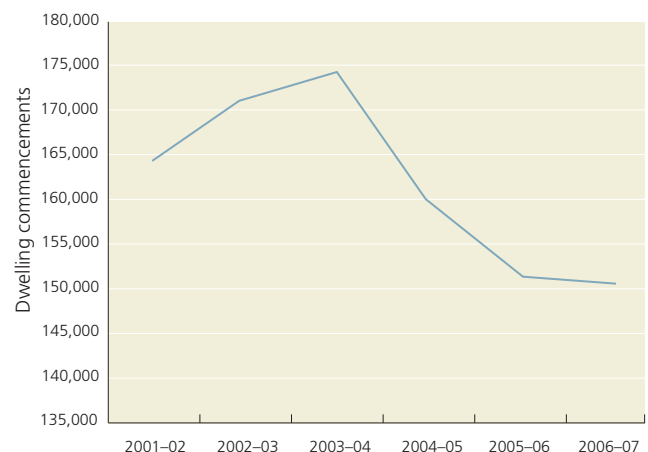


Source: ABARE (2006, 2007)

declined from 18% to 12% of consumption, probably because domestic production became more plentiful and competitive. Exports increased from about 43,000 cubic metres in 2001–02 to 367,000 cubic metres in 2006–07.

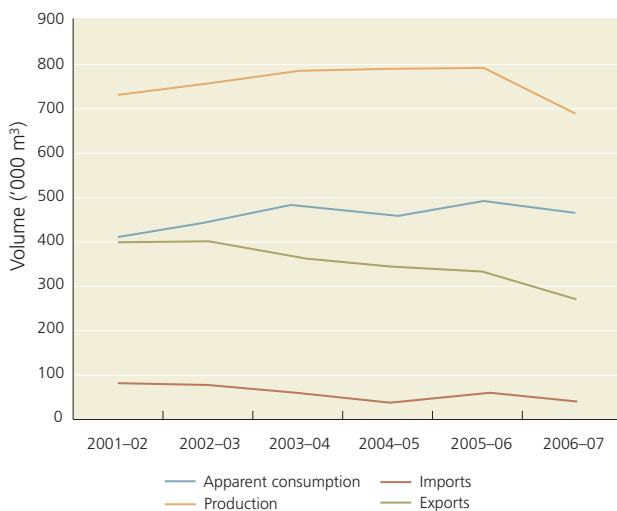
The value of exports of sawn timber from Australia in 2006–07 was \$145 million, twice the level at the start of the reporting period. At the same time, the value of sawn timber imports declined by about 5% to \$418 million.

Figure 71: Dwelling commencements, 2001–02 to 2006–07



Source: ABARE (2007)

Figure 72: Medium-density fibreboard production, 2001–02 to 2006–07



Source: ABARE (2006, 2007)

Panel products

Medium-density fibreboard and particleboard are used mainly for flooring and joinery (e.g. kitchen benches and cupboards) and together comprise about 90% of all timber-based panels. Therefore, as for sawn timber, trends in the consumption of these products follow trends in the building industry, in particular the rate of house construction.

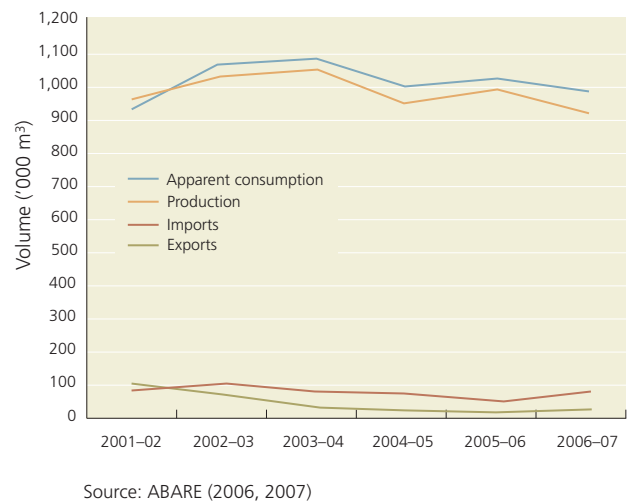
Australia's medium-density fibreboard production stabilised during the reporting period (Figure 72) after increasing substantially in the previous few years due to the development of new mills. About half of the medium-density fibreboard produced in Australia is exported. That proportion waned during the reporting period.

Particleboard is a relatively heavy and low-value product, and little of it is exported or imported. Domestic production, which nearly equals consumption, fluctuated with the level of building activity in the reporting period (Figure 73).

Paper and paperboard

The major categories of paper and paperboard are newsprint, printing and writing papers, household and sanitary papers, and packaging and industrial papers and paperboard. Packaging and industrial papers and paperboard is by far the largest category, representing about 60% of domestic production of paper and paper products, followed by printing and writing papers (21%), newsprint (13%) and household and sanitary papers (6%).

Figure 73: Particleboard production, 2001–02 to 2006–07

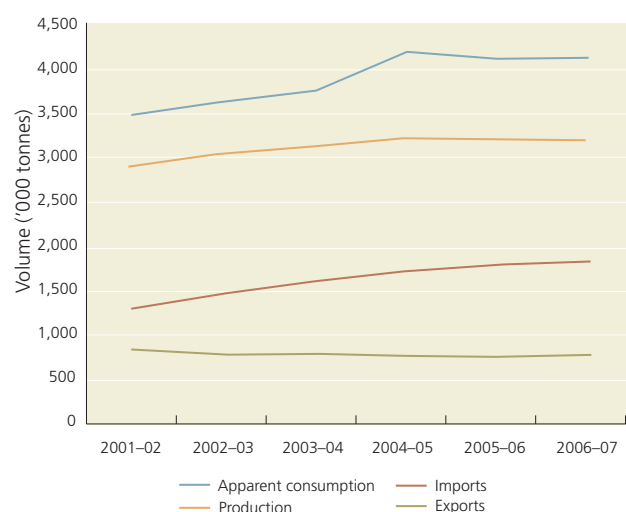


Source: ABARE (2006, 2007)

Australia's consumption of paper and paperboard increased by about 20% in the reporting period (Figure 74), to nearly 4.2 million tonnes per year. Consumption far exceeds domestic production. The shortfall is made up by imports of about 1.8 million tonnes per year, 65% of which is printing and writing papers and 15% is newsprint. Those imports are partly offset by exports of 0.8 million tonnes, about 80% of which comprises packaging and industrial papers.

The value of exports of paper and paperboard increased from \$613 million to \$650 million over the reporting period, while the value of imports increased from \$2 billion to nearly \$2.3 billion.

Figure 74: Paper and paper product production, trade and consumption, 2001–02 to 2006–07



Source: ABARE (2006, 2007)

Non-wood products

Many products other than wood are harvested from Australia's forests and plantations. They include water, minerals, tree bark, honey, plant oils, flowers, foliage, seeds, animal meat and skins, and 'bush foods'. Some of these products (such as minerals), occur in but are not produced by the forest. Forests are also used for grazing and recreation.

Several native plant species are used to create non-wood forest products that are in demand internationally. Sandalwood (various *Santalum* species), a tree native to Australia, is considered a non-wood forest product because it is not used in the conventional timber sector; its uses and markets are canvassed in Case study 39. The market for billy-goat plum, a fruit harvested from the tree species *Terminalia ferdinandiana*, is also growing (Case study 40).

The live export of native vertebrates other than fish is prohibited under the EPBC Act, but non-native species can be harvested and exported. Case study 41 describes the live export trade of Asian water buffalo in the Northern Territory.

References and further reading

ABARE (2006, 2007), ABS (2006c, 2007c), Altman (1987), Brand et al (1982), CALM (2001), DPIFM 2007, Henschke (2000), Johnson (2000), PWSNT (2007), Ridpath and Waithman (1988), Stratham (1987), Tonts and Selwood (2002) (list at the back of the report).

Web resources

Case study 40: Billy-goat plum (including Figure 75)

Case study 41: Asian water buffalo (including Figure 76)



Planted young sandalwood (*Santalum spicatum*), beneath its host plant jam wattle (*Acacia acuminata*), Katanning, Western Australia.

Case study 39: Sandalwood

Sandalwood usually occurs as a slow-growing tree that requires a host plant for survival. Of the 16 species in the *Santalum* genus, only two – *S. album* and *S. spicatum* – are commercially important. The wood from those species is highly valued in Southeast Asia and is used as incense in Buddhist and Hindu religious ceremonies, as well as for carving; Indigenous Australians in northern Australia also value the wood for its aroma. Santalol oil, which is distilled from the heartwood of the tree and used as a fixative in soaps and perfumes, is particularly valuable. Despite being widely distributed across Southeast Asia, *S. album* is so threatened that both India and Indonesia have placed a moratorium on its export.

S. spicatum is slower growing, less fragrant and has a lower oil content than *S. album*. Australia has the world's largest reserve of *S. spicatum*; the species is distributed over an area of about 42 million hectares and has an estimated total standing wood volume of 200,000 tonnes. Under the *Sandalwood Control Act 1929* (WA), the Governor of Western Australia may limit and restrict the amount of sandalwood that can be harvested from natural stands in that state.

Exports of sandalwood have been restricted to about 2,000 tonnes per year for the past two decades, while world demand for the product is increasing at around 5% per year. The best quality unprocessed sandalwood harvested in Western Australia now fetches \$10,000 per tonne. In 1995, a newly formed company, Westcorp Sandalwood Inc, won a tender from the Western Australian Government for the sandalwood harvest. In addition to exporting raw logs, the company set up a sister company, New Mountain Company, which started value-adding by producing joss sticks; revenue from this value-added product increased by 400% between 2001 and 2002.

A sandalwood oil distillation company, Mt Romance Australia Pty Ltd, was set up in Albany, Western Australia, in 1999. The company has a 10-year agreement with the Forest Products Commission to process up to 1,000 tonnes of sandalwood per year – a contract estimated to be worth \$40 million. One tonne of sandalwood produces about 50 litres of sandalwood oil, which is worth about \$500 per litre. Mt Romance is looking to add further value by capitalising on sandalwood-based products in the cosmetics industry.

Sources: CALM (2001), Henschke (2000), Stratham (1987), Tonts and Selwood (2003)

Indicator 6.1e

Degree of recycling of forest products

Rationale

This indicator measures the extent to which recycling or reuse of forest products occurs. As global demand for forest products increases, there is a growing need to meet societal demands for the recycling of forest products.

Key points

- Discarded forest products contribute approximately 6.5 million tonnes to the waste stream annually, usually in the form of paper and timber products.
- The recycling rates for paper and timber products are estimated to be 53% and 30%, respectively.
- The volume of recovered paper exported increased by 250% in the reporting period, to nearly 1.1 million tonnes in 2006–07, due mainly to increased demand from China.

As global demand for forest products increases, there is a growing awareness of the opportunity and need to extend the life of forest products and improve the efficiency of their use. This indicator identifies the extent to which the recycling and reuse of forest (wood) products occur and can be linked to the conservation of forest resources and reductions in solid waste.

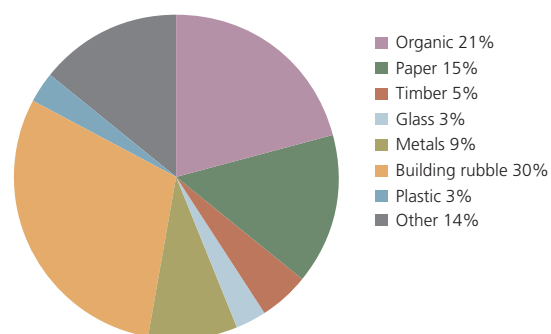
In general, forest products are highly recyclable. Recycling – the collection, separation and processing of materials for manufacture into raw materials or new products – reduces both the need to harvest the forest resource and the volume of solid waste going to landfill. High rates of recycling can also help reduce pressure on forest resources and the country's reliance on forest product imports. Waste wood products can also be used in the generation of heat and electricity for domestic and industrial use.

The processing of wood wastes is regulated by the states and territories. Some jurisdictions have initiated schemes that encourage producers to reduce and recycle wood wastes.

In 2002–03 (the most recent period for which data were available), Australians generated approximately 32.4 million tonnes of solid waste, of which an estimated 6.5 million tonnes (20%) was discarded forest products, mostly paper and timber (Figure 77).

An estimated 46% of all waste in Australia is recycled. Paper (53%) has one of the highest product recycling rates, while the estimated rate for timber (30%) is also substantial.⁶ These are at the high end of rates achieved internationally, although direct comparison with other countries is difficult because some countries report the amount of material collected for recycling and others report the amount that is actually reprocessed. The rate of recycling is influenced by many factors, some of which are discussed below.

Figure 77: Composition of solid waste, Australia, 2002–03



Source: Productivity Commission (2006)

⁶ Australian Plantation Products and Paper Industry Council data, 2004–05, www.a3p.asn.au (accessed September 2007).



Printing paper containing 10% recycled fibre.

Paper products

Australians consumed over 4 million tonnes of paper products in 2006–07. The municipal, commercial and industrial sectors were the largest contributors to this total, with paper comprising 22–23% of waste in these streams. The vast majority of paper and cardboard produced is recyclable; however, because the fibres in paper products become shorter and weaker the more they are processed, most can only be recycled from four to six times. Virgin fibre is usually added to provide strength, the amount depending on the type of paper product being produced; for example, high-quality writing paper requires more virgin fibre than does tissue. Most paper recovered from waste is reprocessed in Australia, but significant volumes of recovered paper are also exported. The volume of recovered paper exported increased by 250% in the reporting period, from 0.3 million tonnes in 2001–02 to nearly 1.1 million tonnes in 2006–07. The increase is mainly due to increased demand from China.

Timber products

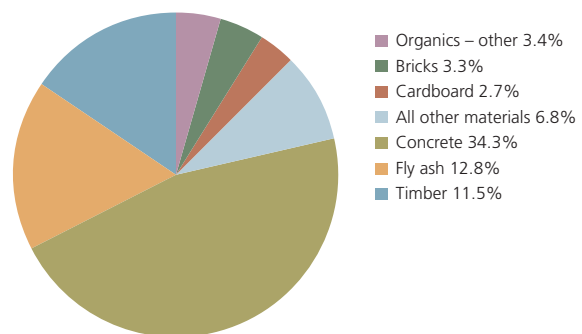
An estimated 1.7 million tonnes of wood products contributes to the Australian waste stream each year, mainly from the commercial and industrial sectors.⁷ Waste timber products are made up of untreated timber; composite wood products, such as particleboard, plywood and laminated veneer; and treated timber products. Untreated, uncontaminated timber is the most valuable of these and the easiest to recycle, while treated timber products are difficult to recycle. Limited data suggest that around 30% of waste timber products is recycled to make mulch and compost, biofuel and particleboard. There is also a small industry for the recovery of high-quality timbers from demolition sites.

According to a recent study conducted as part of a joint project by the Timber Development Association and the Australian Plantation Products and Paper Industry Council, an estimated 1.4 million cubic metres of treated timber is consumed in Australia each year. The biggest markets are for

agricultural uses; urban fencing and landscaping; outdoor building and construction applications (decks, pergolas, etc); and termite-resistant house framing. Another study conducted under the same project, on demolition timber, found a high degree of reuse of good-quality hardwoods and Douglas fir recovered from demolitions. According to the study, key impediments to increased recycling of demolition timber are a lack of end products and markets for low-value timbers. A third study, on packaging timber, found that 636,000 cubic metres of timber was used to make timber packaging in Australia in 2005–06. In addition, 120,000 tonnes of timber pallets was used to import goods into Australia. While a high proportion of that packaging comprises reusable pallets, 290,000 tonnes of timber packaging are disposed of in landfills in Australia each year. All three studies are being considered as part of the development of a national strategy for waste timber by the National Timber Stewardship Group.

An estimated 500,000 tonnes of timber is added to landfill in Victoria each year. In an effort to reduce this, the Victorian Government's EcoRecycle program is supporting timber recycling businesses that recycle timber into high-value, high-quality particleboard and convert clean and untreated timber into a range of garden mulches and fuel bricks. The South Australian Government is also working to reduce waste (Case study 42), including waste timber. In 2004–05, timber was the major organic material recovered (Figure 78), with 300,980 tonnes recycled, of which 62% was bark from the forestry industry.

Figure 78: Composition of recovered materials in South Australia, by weight, 2004–05



Source: O'Farrell (2006)

References and further reading

ABS (2006c), A3P (2004–05), O'Farrell (2006), Productivity Commission (2006), Taylor et al (2005), Zero Waste SA (2005) (list at the back of the report).

⁷ Taylor et al (2005).

Case study 42: South Australia's Waste Strategy, 2005–10

State and local government agencies, the waste management industry, business and the community have been involved in helping Zero Waste SA to develop a waste strategy that will guide the way waste is managed in South Australia. The five-year strategy establishes waste reduction goals and targets for the state and sets out a range of strategies and steps to achieve them. It is focused on five key objectives:

- **Foster sustainable behaviour.** Simply providing information will not influence people to recycle or reuse material or resources in a sustainable way.
- **Less waste.** Substantially reducing the waste going to landfill in South Australia means that materials must be redirected towards more beneficial uses.

- **Effective systems.** South Australia needs to establish, maintain and increase the capacity of recycling systems and reprocessing infrastructure in metropolitan and regional areas.
- **Effective policy instruments.** Economic, regulatory and other policy measures must be introduced to give the necessary traction in the marketplace to encourage the avoidance, reduction, reuse and recycling of waste.
- **Successful cooperation.** Targets of this and future strategies will only be reached with the successful cooperation of a range of stakeholders.

The strategy sets key material and recycling targets for each waste stream as follows:

Waste stream	By 2006	By 2008	By 2010	By 2014
Municipal solid waste	At least 25% of all material presented at the kerbside is recycled	50% of all material presented at the kerbside is recycled	75% of all material presented at the kerbside is recycled (if food waste is included)	Reduce waste to landfill by 25% (as required by South Australia's Strategic Plan)
Commercial and industry	5% increase in recovery and use of materials	15% increase in recovery and use of materials	30% increase in recovery and use of materials	–
Construction and demolition	20% increase in recovery and use of materials	35% increase in recovery and use of materials	50% increase in recovery and use of materials	–

Source: Zero Waste SA (2005)

Indicator 6.2a

Investment and expenditure in forest management

Rationale

This indicator quantifies investment and expenditure in developing, maintaining and obtaining goods and services from forests. This indicates the long-term and short-term commitment to forest management, further processing and other forest uses.

Key points

- Governments spend hundreds of millions of dollars annually on the management of nature conservation reserves and multiple-use public native forests. Few data are available on investment in privately owned native forests.
- Investment in public and private plantation expansion increased over the period from 2002 to 2006, totalling an estimated \$902 million.
- Investment in new or improved manufacturing facilities during the reporting period was several billion dollars.

The purpose of this indicator is to assess the level of forest-related investments aimed not only at providing commercial products but also environmental services such as catchment protection and nature conservation. Forests managed for all purposes on all land tenures would ideally be included in such an assessment, but that has not been possible for this report. Information is available on investments in the management of public nature conservation reserves and multiple-use public forests in some states, in plantation development and, to some extent, in timber processing. However, few data are available on investment in privately owned native forests.

Nature conservation reserves may be managed by the Australian Government or by state or territory governments, and some private land is also managed for nature conservation. Nature conservation reserves often contain other ecosystems besides forests, and it is difficult to identify the portion of expenditure dedicated to forest ecosystems within the reserve system. Therefore, the estimates of public expenditure given in Tables 84 and 85 apply to all land in nature conservation reserves, not just forests.

The New South Wales Department of Environment and Climate Change manages more than 750 individual reserves, including 174 national parks, covering 8% of the state's land area. Table 85 shows total expenditure on protection and conservation, visitor facilities, fire protection and other activities.

Tasmania's Parks and Wildlife Service manages 1.11 million hectares of forests in national parks and other reserves; its annual operating budget in 2005–06 was about \$20 million. The total investment in infrastructure to facilitate recreation and tourism, including roads, bridges, walking tracks, camping areas, viewing platforms and other facilities is conservatively estimated to be \$230 million. There is also considerable private investment in servicing tourism in forested reserves.

The southwest forests of Western Australia are managed according to a management plan developed by the Conservation Commission of Western Australia.

Table 84: Expenditure on the seven Australian Government-managed nature conservation reserves (forest and non-forest), 2002 to 2006 (\$ million)

	2002	2003	2004	2005	2006
Expenditure	52.8	54.6	57.5	58.7	57.0

Note: The reserves are the Kakadu, Uluru–Kata Tjuta, Booderee, Pulu Keeling, Christmas Island and Norfolk Island national parks and the Australian National Botanic Gardens. They cover a total of 2.13 million hectares.

Source: Standing Committee on Environment, Communications, Information Technology and the Arts (2007)

Table 85: Expenditure on New South Wales public nature conservation reserves (forest and non-forest), 2002 to 2006

	2002	2003	2004	2005	2006
Number of reserves	–	–	660	671	753
Area managed (million hectares)	–	–	5.95	6.07	6.49
Expenditure (\$ million)	284	338 ^a	247	305	326

a Includes costs associated with organisational restructuring.

Note: Total operational expenditure on protection and conservation, visitor facilities, fire protection and other activities.

Source: Department of Environment and Climate Change (NSW) annual reports

The plan applies to about 2.5 million hectares of forest, 52% of which is in national parks and other nature conservation reserves and 48% of which is designated as multiple-use public forest (which includes commercial timber plantations). Western Australia's Department of Environment and Conservation is the land manager and the Forest Products Commission manages timber production. Expenditure by those agencies is shown in Tables 86 and 87. Because the commission sells forest products, the revenue earned and the value of the assets held are also shown for that agency.

Table 86: Expenditure by Western Australian Department of Environment and Conservation on management of native forests in multiple-use public forests, southwest Western Australia, 2004 to 2006

	2004	2005	2006
Area managed (million hectares)	1.25	1.30	1.30
Expenditure (\$ million)	\$34.4	\$40.9	\$38.4

Source: Department of Environment and Conservation (WA) annual reports

Table 87: Expenditure, revenue and assets of Forest Products Commission, multiple-use public forests, southwest Western Australia, 2002 to 2006 (\$ million)

	2002	2003	2004	2005	2006
Gross revenue	114	66	67	67	71
Natural resource asset	190	185	194	233	240
Expenditure	100	56	60	65	49

Note: Comprises multiple-use public (state) forest, including commercial timber plantations.

Source: S Eccleston, Forest Products Commission, pers comm, February 2008

Plantation development

The total annual investment in plantations in Australia is not known, but the area of new plantation establishment provides a guide as to whether investment is increasing or declining. Table 88 reports the area of new plantations established annually in Australia from 2002 to 2006; it shows that the rate of establishment increased significantly in 2005 and 2006.

The expenditure required to develop a plantation varies widely depending on planning and land costs, the need to develop roads and other infrastructure, the tree species

planted, the site preparation techniques used, the scale and management structure of the project and other factors. Assuming that the average cost of planning, preparation and establishment is \$3,000 per hectare, expenditure on plantation expansion in Australia from 2002 to 2006 was approximately \$902 million.

Table 88: New plantation establishment in Australia, 2002 to 2006 ('000 hectares)

	2002	2003	2004	2005	2006
Area of new plantations	54.4	42.3	53.6	72.0	78.3

Source: Parsons et al (2007a)

Timber processing

A massive investment was required to develop the infrastructure and manufacturing facilities that processed the 27 million cubic metres of logs harvested from Australia's native forests and plantations in 2005–06. Several billion dollars was invested in new or improved manufacturing facilities during the reporting period. As well as servicing the capital cost of that investment, Australia's forest product industries continue to invest in new or improved manufacturing facilities, including at least \$700 million in developing and adopting new processing techniques in the Tasmanian forest sector over the past decade, and the Forest Industries Structural Adjustment Program funded by the Australian and state governments. The Australian and Tasmanian governments also committed \$250 million under the 2005 Tasmanian Community Forest Agreement to support programs that 'enhance forest conservation and the development of forest industries'. Those programs aim to help re-equip mills so they can adapt to changing markets and wood supply. Indicator 7.1c provides more information.

References and further reading

Parsons et al (2006, 2007a); Standing Committee on Environment, Communications, Information Technology and the Arts (2007) (list at the back of the report).

Indicator 6.2b

Investment in research, development, extension and use of new and improved technologies

Rationale

This indicator monitors the investment in, and adoption of, new or improved technologies in forest management and forest-based industries. It also quantifies the level of research and development. Significant investment in research, development and new technologies results in continual improvements to forest management practices.

Key points

- Reported expenditure on national forest-related research and development was \$198.9 million in 2004–05, a decrease of \$17.2 million from 2000–01.
- Of that total, investment in manufacturing-related research was reported to have increased from \$79 million in 2000–01 to \$108 million in 2004–05.
- At the same time, nationally reported research in forest growing for wood production declined.
- Forest-related environmental research declined from \$56 million in 2000–01 to \$47 million in 2004–05.
- The benefits of research are maximised via ongoing partnerships with the private sector and new delivery arrangements through collaborative research programs, such as cooperative research centres.

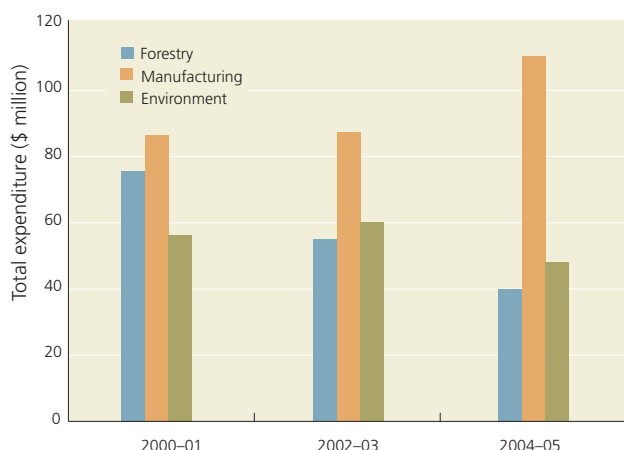
This indicator provides a national view of investment in research and development in forestry, wood and paper product manufacturing and environmental management in forests using information collected nationally by the Australian Bureau of Statistics (ABS). It is valuable in establishing broad trends, although limitations exist in the capture of investment in activities dispersed across and within jurisdictions, particularly environment-related research, which is broad-based and not easily partitioned into forest and non-forest research.

Over the period from 2000–01 to 2004–05, the proportion of funds allocated to forest sector research declined for forestry (i.e. primary wood production) and environment, and increased for manufacturing (Figure 79). Total reported annual forest-related research expenditure declined by 8%, from \$216 million in 2000–01 to \$199 million in 2004–05 (Table 89). This decline, which follows a sustained period of growth in expenditure in the previous decade, coincides with reduced native forest production and maturity in plantation (particularly softwood) research. The most significant contributor to expenditure was private sector research in wood, wood product and paper manufacturing, which totalled \$112 million in 2004–05, while forestry research amounted to \$40 million (Table 90). These data may not fully reflect the true situation because they do not include new research conducted by organisations other than traditional forest research providers.



Aerial application of fertiliser to a blue gum plantation.

Figure 79: Government and private research and development expenditure in the forest sector, 2000–01 to 2004–05



Forestry = primary wood production; Manufacturing = manufacturing in the wood, wood products and paper sectors; Environment includes research and development related to 'forests and wooded lands', an ABS category similar in scope to the definition of forests used in this report.
Source: Derived from ABS data

Table 89: Government and private research and development expenditure in forest sector, by objective, 2001–02 to 2004–05 (\$ million)

Socioeconomic objective	2000–01	2002–03	2004–05
Forestry (primary wood production)	74.9	54.4	40.2
Manufacturing (wood, wood product and paper)	85.0	85.9	111.9
Environmental management (forest and wooded lands ^a)	56.2	60.5	46.8
Total	216.1	200.8	198.9

a 'Forest and wooded lands' is an ABS category similar in scope to the definition of forests used in this report.

Source: Derived from ABS data

Table 90: Research and development expenditure, by objective, 2004–05 (\$ million)

Socioeconomic objective	Sector		Total
	Public	Private	
Forestry (primary production)	38.5	1.7	40.2
Manufacturing (wood, wood product and paper)	3.9	108.0	111.9
Environmental management (forest and wooded lands ^a)	44.1	2.7	46.8
Total^b	86.5	112.4	198.9

a 'Forest and wooded lands' is an ABS category similar in scope to the definition of forests used in this report.

Source: Derived from ABS data (expenditure by higher education institutions not included)

Table 91: National, state and territory government research and development in forest-related areas, 2002–03 and 2004–05

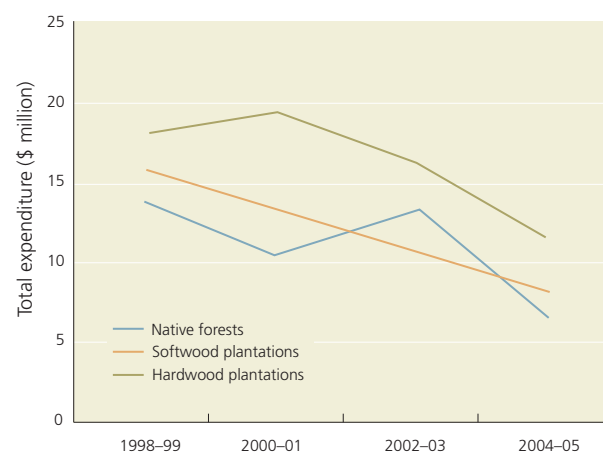
Socioeconomic objective	2002–03 (\$ million)	2004–05 (\$ million)
Forestry (primary wood production)	33.2	38.5
Manufacturing (wood, wood product and paper)	4.1	3.8
Environmental management (forest and wooded lands)	59.6	44.1
Total	96.9	86.4

Source: Derived from ABS data

The major focus of public sector forest-related research and development expenditure is on forestry (also referred to as 'primary wood production') and environmental management. Total annual government expenditure in those two areas in 2004–05 was \$86 million, down from \$97 million in 2002–03 (Table 91). The investment by state and territory governments was around the same as that reported for the Australian Government. The other major public investment occurred in higher education institutions, which reported expenditure of \$12.6 million in 2004–05, a similar amount to that reported in 2002–03.

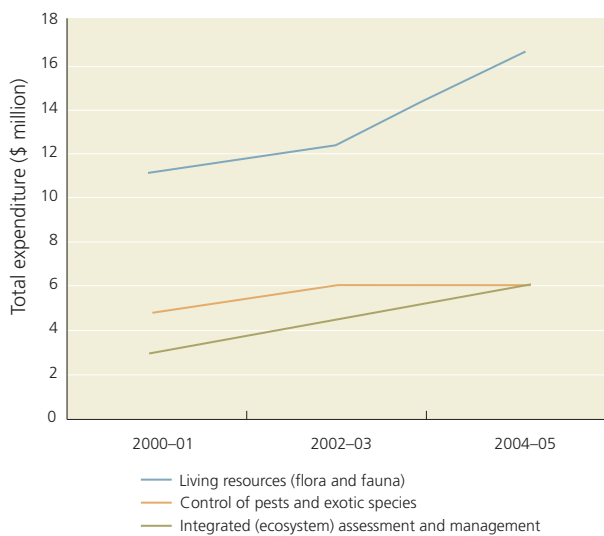
The decline in government research in forestry production illustrated in Figure 80 coincides with declining native forest production and the maturation of plantation (particularly softwood) research. On the other hand, government funds available for research into fauna and flora increased significantly between 2000–01 and 2004–05, while investment in research into forest-related pests and invasive species and integrated ecosystem assessment and management both grew marginally (Figure 81). Although investments in research and development relating to land and water management apparently declined between 2001–02 and 2004–05, that is likely to be a growth area in the future. Increasing attention is likely to be paid to water quality and quantity and the impact of

Figure 80: Government research and development expenditure on forest-related primary wood production, 1998–99 to 2004–05



Source: Derived from ABS data

Figure 81: Government research and development expenditure on forests, 2000–01 to 2004–05



Note: Respondents to the ABS survey self-report using the given categories but adopt their own definitions.

Source: Derived from ABS data

climate change, along with the role of trees and forests in delivering environmental outcomes such as reduced salinity in agricultural landscapes. For example, a 12-year, \$20 million trial on the role of forests and vegetation in delivering better water quantity and quality outcomes is now under way in the Wungong catchment near Perth. There is increasing interest and activity in long-term research sites (Case study 43).

Substantial new programs are under development to intensify research and development into efficient, cost-effective industry practices and improved environmental outcomes. For example, governments, industry and educational institutions have established an active partnership under the umbrella of the Cooperative Research Centre (CRC) for Forestry, an Australia-wide research venture designed to operate between July 2005 and June 2012. The CRC, which is headquartered in Hobart, focuses on new technologies, innovation, value-adding, efficiency and competitive advantage as well as landscape issues and community engagement. Over its seven years of operation, it will receive \$26.6 million from the Australian Government and \$57 million in cash and in-kind contributions from partners.

Forest and Wood Products Australia brings together key industry stakeholders to provide a competitive program of research and development to address national priorities. It supports a range of activities that reflect national research priorities, including the development of:

- sustainable forest management assessment systems, certification and chain-of-custody arrangements for plantations and multiple-use forests
- control or management strategies for biotic and abiotic risk factors (pests, fire, drought)

- economically efficient and low environmental impact harvesting and transport operations
- precision forestry systems/technologies for more profitable plantation forest management
- new forests for commercial products and environmental services in lower rainfall environments (through the Joint Venture Agroforestry Program).

Case study 43: The Warra Long-term Ecological Research Site

Forestry Tasmania's Division of Forest Research and Development and the state's Parks and Wildlife Service manage the Warra Long-term Ecological Research Site in southern Tasmania. The site provides a focal area for collaborative research in wet eucalypt forests by nine site partner agencies. Over 100 research projects have been conducted at Warra, many of them ongoing; they are progressively documenting the climate, geomorphology, hydrology and aquatic and terrestrial biodiversity of the site, as well as testing the development of sustainable forest management indicators.

The long-term flagship projects at Warra are a silvicultural systems trial, a log decay study, baseline altitudinal monitoring plots, a hydrological program and a set of wildfire time-sequence plots. The findings of these and other, shorter term, projects are directed into forest management. For example, the silvicultural systems trial provided data on variable-retention silviculture that enabled the Tasmanian Government to commit to phasing out clearfelling in old-growth forests (Case study 67). Projects on coarse woody debris and its associated biodiversity, along with the wildfire time-sequence plots, inform the management of key structural attributes in production forests at a range of spatial and temporal scales.



The hydrological program at Warra has included measures of the quantity and quality of run-off.

Source: J Davidson, BRS, pers comm, 2007

Indicator 6.3a

Area of forest available for public recreation/tourism

Rationale

This indicator measures the area of forest available for use by the community for recreation and tourism. This provides an indication of the emphasis placed by society on the management of forest for those purposes.

Key points

- Most publicly owned multiple-use and nature conservation forests are available to the general public for recreation and tourism.
- Some forests that are generally available for public recreation and tourism may be closed temporarily, mainly for safety reasons related to harvesting operations and fire and to minimise the spread of disease. Public access to private land for recreation and tourism is generally limited.
- Access to forests for some recreation and tourism activities may be restricted where such activities are likely to compromise the primary objective of management, such as the protection of sensitive environmental and cultural values.



Facilities like this skywalk are available in many forest areas to assist ecotourism, recreation and nature education.

Most publicly owned forested lands designated for multiple uses or nature conservation are available for general recreation and tourism; Table 92 illustrates this for New South Wales, Queensland, South Australia, Victoria and Western Australia. For specific forests, forest management plans may specify the types of visitor activities that are permissible and the conditions of use. In forests not subject to management plans, the broad policies of the responsible agency usually indicate the types of recreation and tourism permitted. Public access to private land for recreation and tourism is generally limited, although few data are available on this.

Some publicly owned forest areas may be closed to the public, including designated scientific reference and conservation areas, some water catchment areas, significant Indigenous cultural sites, and defence training areas. In Western Australia, some forest areas under the threat of spread of the fungal pathogen *Phytophthora cinnamomi*, known as 'disease risk areas', are closed to the public. Such areas account for a significant part of the 40% of multiple-use forests not open to recreation and tourism in Western Australia. In Queensland, recreation and tourism are permanently excluded from designated scientific areas making up less than 1% of multiple-use forests. In New South Wales, South Australia, Victoria and Western Australia, nearly all multiple-use forests and nature conservation reserves are available for recreation and tourism (Table 92). In Tasmania, 2.32 million hectares of forest, or 70% of the total forest area in that state, is available for general recreation.

Table 92: Area of forest available for general recreation and tourism in New South Wales, Queensland, South Australia, Victoria and Western Australia, by tenure and percentage

	Multiple-use public forests		Public nature conservation reserves	
	Area ('000 ha)	%	Area ('000 ha)	%
NSW	2,400 ^a	99 ^a	5,750 ^b	88 ^b
Qld	2,500	99	–	–
SA ^c	106	100	22.8	100
Vic. ^d	3,080	99	3,330	97
WA ^e	1,070	60	847	89

- a Forests NSW.
- b Parks and Wildlife Group of the Department of Environment and Climate Change (NSW); based on the whole-of-parks system and not specific to forests.
- c Primary Industries and Resources SA Forestry; based on all ForestrySA-managed forest reserves.
- d Department of Sustainability and Environment (Vic.).
- e Department of Environment and Conservation (WA); for the southwest forest area only; does not take into account restrictions on access to reservoir protection zones; data for other areas not included.

In some cases, forests that are generally available for public recreation and tourism may be closed temporarily due to harvesting, extreme fire danger, fuel reduction burning, the control of feral animals or weeds, special events or bad weather. Road access, a lack of facilities or other practical considerations may also restrict or prevent public use of multiple-use and nature conservation forests.



Swimming.



Orienteering.

Indicator 6.3b

Range and use of recreation/tourism activities available

Rationale

This indicator assesses the range and number of recreation and tourism facilities provided in forests, their level of use and their contribution to the broader tourism sector. Appropriate and well managed recreation and tourism facilities help to optimise visitor satisfaction and minimise environmental impacts.

Key points

- A wide range of forest-based recreation and tourism services are available to meet demand by the general public.
- For those forests for which data were available, the number of areas, tracks and sites available for recreation and tourism activities increased or remained the same over the reporting period.
- Forest management agencies have strategies in place to actively manage forest areas of high recreation and tourism use within their jurisdictions.

In all jurisdictions, forest management aims to provide a balanced range of opportunities for recreational pursuits such as walking, running, cycling, climbing, fishing, camping, horse riding, snow activities and water sport, and facilities that are appropriate for each forest setting and consistent with demand and resources (Case study 44). Two measures are used in this indicator: the numbers of areas, tracks and sites, used to measure the range and number of recreation and tourism facilities provided by forest managers; and the numbers of people, vehicles and licences, which indicate the level of use of those facilities.

Some jurisdictions conduct comprehensive visitor surveys and have a good understanding of visitor needs and expectations (Case study 45); others provide sites and facilities in response to local demand and patterns of current use. Table 93 indicates the numbers of areas, tracks and sites available for forest-based tourism and recreation activities in multiple-use public forests in New South Wales, South Australia and Victoria, the three states for which data were available. These figures do not include sites and facilities managed by local governments or the commercial and private sectors. The figures show that the number of facilities available to visitors generally increased in South Australia and Victoria from 2001–02 to 2005–06 but, in some instances, decreased in New South Wales due to the transfer of significant additional areas of multiple-use public native forest to national parks as a result of the Brigalow Belt Bioregion and Western regional assessments.



Visitor accommodation in a rainforest, southeast Queensland.

Table 93: Numbers of areas, tracks and sites provided for recreation and tourism in multiple-use public forests in New South Wales, Victoria and ForestrySA-managed forests in South Australia, 2001–02 and 2005–06

Activity	Unit	NSW ^a		Vic. ^b		SA ^c	
		2001–02	2005–06	2001–02	2005–06	2001–02	2005–06
Riding or walking animals	km of tracks	n.d.	n.d.	160	170	65	84
Cycling	no. of permits (NSW) km of tracks (SA, Vic.)	n.d.	107	11	170	200	232
Driving	no. of permits (NSW) km of roads (SA, Vic.)	19	24	248	733	140	130
Walking or running	no. of permits (NSW) km of tracks (SA, Vic.)	48	37	550	715	190	304
Climbing	no. of documented sites	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Cultural (non-Indigenous) heritage appreciation	no. of managed sites	n.d.	n.d.	25	34	1	1
Events or festivals	no. of events	230	193	344	142	2	2
Fishing	no. of managed sites	n.d.	n.d.	20	25	1	1
Nature study	no. of sites	n.d.	n.d.	5	7	11	11
Camping	no. of sites	177	94	200	227	21	21
Picnicking and playing	no. of sites	94	77	200	226	25	27
Snow activities	no. of managed sites	4 ^d	4 ^d	10	10	n.d.	n.d.
Swimming and diving	no. of managed sites	n.d.	n.d.	5	5	n.d.	n.d.
Watercraft (motorised)	no. of sites	n.d.	n.d.	2	2	n.d.	n.d.
Watercraft (non-motorised)	no. of sites	n.d.	n.d.	5	5	1	1
Total length of roads and trails	km of roads	33,751	32,846	n.d.	n.d.	n.d.	n.d.

n.d. = no data available

a Forests NSW; comprises multiple-use public forests.

b Department of Sustainability and Environment (Vic.).

c Primary Industries and Resources SA Forestry; based on all ForestrySA-managed forest reserves, comprising public multiple-use and nature conservation reserve forests.

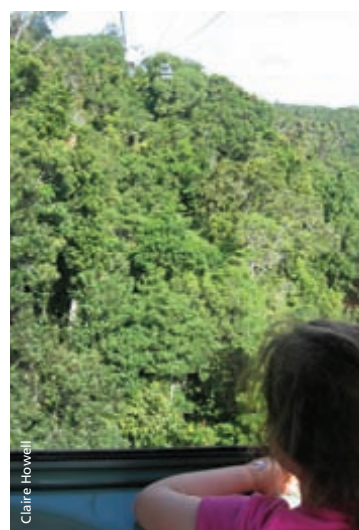
d These four ski resort centres (Perisher, Charlotte Pass, Selwyn and Thredbo) – are in the New South Wales national park system.

Visitor numbers in forests are monitored by a mixture of counts and estimates by agency staff. Counted data are based on entry fees, traffic counters, camping permits and surveys and are relatively accurate, while estimates are likely to be less accurate. Visitor numbers are difficult to estimate because most forests have many entry points and visitor use is dispersed. In addition, usage can vary dramatically according to the day of the week and the season, and greatly increases during holiday periods. Sites that are well signposted and promoted in various media receive many more visits than lesser known sites, where usage depends more on word of mouth.

In Tasmania, while data are not available for all sites used for recreation, more than 1.1 million person-visits to forests were recorded during 2005–06. Sites recording more than 100,000 person-visits were Freycinet National Park, Cradle Mountain – Lake St Clair National Park, Mount Field National Park and the Tahune airwalk in state forest. In September 2004, Forestry Tasmania opened a new ecotourism development at Dismal Swamp near Smithton in northwest Tasmania; the agency is now further developing environmentally sensitive tourism infrastructure.

Tables 94 and 95 show data on forest-related tourism and recreation use in South Australia, Victoria and Western Australia. Forests NSW does not measure the number of

visitors using forests but notes an increase in the number of permits issued to stakeholders for access to multiple-use public forests for recreation; it is redeveloping its information database to improve its future capacity to report on built facilities and activities within its forest areas. This will build on a 2005 estimate of 22 million visits annually to New South Wales national parks, including forested landscapes.



A cable skyway facility is a major tourist attraction in northern Queensland.

Table 94: Forest recreation and tourism in South Australia, Victoria and Western Australia, 2001–02 and 2005–06

Activity	Unit	SA ^a		Vic. ^b		WA ^c
		2001–02	2005–06	2001–02	2005–06	2005–06
Riding or walking animals	People/year	960	1,100	266,000	266,000	
Cycling	People/year	2,900	5,000	304,000	304,000	36
Driving	Vehicles/year	51,000	42,000	304,000	304,000	
Walking or running	People/year	10,100	9,800	510,000	510,000	435
Climbing	People/year	–	–	–	–	16
Cultural heritage appreciation	People/year			160,000	160,000	364
Events or festivals	People/year	13,900	26,700	27,520	11,360	
Fishing	Licences/year	–	–			80
Hunting	Licences/year	–	–	29,823 ^d	32,832 ^d	
	No. of deer-hunting days			120,511 ^d	123,908 ^d	
Nature study	People/year			304,000	304,000	205
Camping	Overnight visitors/year	9,100	12,800	400,000	400,000	245
Picnicking and playing	People/year	7,900	8,900	490,000	490,000	236
Snow activities	People/year	–	–	100,000	100,000	
Swimming and diving	People/year	–	–	152,000	152,000	169
Watercraft (motorised)	People/year	–	–	114,000	114,000	
Watercraft (non-motorised)	People/year	50	50	152,000	152,000	46
Caving	People/year	2,150	2,400			
Fossicking	People/year	570	410			
Trail-bike and 4-wheel-drive activities	People/year			432,000	432,000	

a Data from the Department of Primary Industries and Resources SA; based on all ForestrySA-managed forest reserves, comprising multiple-use public and nature conservation reserve forests.

b All Victorian multiple-use forests (Parks Victoria facilities are shown in Table 95). Activities such as camping and horse riding are permitted in most multiple-use public forests (in line with codes of forest practice). For example, the public can camp almost anywhere if adhering to certain rules. The figures supplied are for sites and tracks that are actively promoted and maintained for specific activities.

c Data from visitor feedback survey in forest areas on lands managed by the Department of Environment and Conservation (WA). Data based on the responses of 649 people at 20 survey sites, including national parks and state forests; therefore, these data are not estimates of absolute usage, but a sample.

d Game licences in Victoria are not tenure specific. Estimates derived from the Department of Sustainability and Environment (Vic.) Hunter Mail Survey 2000–06.

Table 95: Facilities available for recreation and tourism activities in nature conservation reserves managed by Parks Victoria

	Protected areas	Other Crown land
Driving (km of roads)	13,300	2,633
Walking or running (km of tracks)	See note a	See note a
Climbing (no. of documented sites)	52	–
Cultural heritage appreciation (no. of managed sites)	193	36
Fishing (no. of managed sites)	633	6
Hunting (no. of managed sites)	20	1
Camping (no. of sites)	668	10
Picnicking and playing (no. of sites)	599	214
Snow activities (no. of managed sites)	62	–
Swimming and diving (no. of managed sites)	630	5
Watercraft – motorised (no. of sites)	30	–
Watercraft – non-motorised (no. of sites)	348	3

a There are 3,700 kilometres of walking tracks in areas managed by Parks Victoria, the majority in forest, including some on other Crown land.

Note: The total number of visitor assets is 12,500. About 80% of the following assets managed by Parks Victoria occur on forested land: 54 visitor centres, nearly 1,000 toilet blocks, over 400 lookouts, 900 vehicle bridges and 1,200 car parks.

Source: Parks Victoria

Case study 44: Visitors to South Australian forest reserves

South Australia's forest reserves are a significant open space and tourism resource that contain an interesting diversity of landscape types, including native forest, plantations, open spaces and heritage areas. Survey data indicate that more than 200,000 day visits are made each year to the Mount Lofty Ranges forest reserves near the Adelaide metropolitan area. A wide range of recreational activities are undertaken, including walking, nature study, picnicking, camping, cycling, horse riding, fossicking and motor sports. The plantation areas provide locations for many of the more active pursuits that may be unavailable in other public open spaces, such as conservation and national parks.

ForestrySA manages facilities to support these activities, including 30 picnic and camping areas that provide shelters and hut accommodation. More than 300 kilometres of multiple-use trails are maintained, including the long-distance Heysen, Mawson and Kidman trails. Each year, more than 50,000 visitors enjoy a range of community events, including the Bundaleer Weekend Arts Festival and the Rally of SA – a round of the Australian Rally Championship.

Source: ForestrySA



Picnic shelters at Bundaleer Forest Reserve, South Australia.

Case study 45: Visitor Satisfaction Index in Western Australia

The Western Australian Department of Environment and Conservation has developed a Visitor Satisfaction Index as a key performance indicator for the Parks and Visitor Services Division. The index was developed from an annual visitor feedback survey using satisfaction ratings given by respondents visiting parks and other areas managed by the department. Two questions relate to satisfaction: 'How did you feel about your visit today?' and 'How would you rate your visit overall?' Respondents are asked to rate their responses on a scale of 1 to 7, where 1 is the lowest and 7 the highest level of satisfaction.

The overall mean (average of the means of these two questions) constitutes the Visitor Satisfaction Index for all parks, which was calculated to be 6.22 in 2005–06 based on a sample of 2,580 respondents. This is above the state benchmark rating of 6.1, which was derived from a consultant's study on the parameters that contribute to visitor satisfaction in natural areas in Western Australia.

Source: DEC, WA

Indicator 6.4a

Area of forest to which Indigenous people have use and rights that protect their special values and are recognised through formal and informal management regimes

Rationale

This indicator monitors the degree to which land is placed under appropriate tenure classifications or management regimes to protect Indigenous people's values in forests. An acceptable level of accountability for the protection of Indigenous people's cultural, religious, social and spiritual values is an essential part of forest management.

Key points

- Indigenous-owned land includes around 21 million hectares of forest, which is 14% of Australia's total forest area. Most of it is eucalypt woodland or open forest in the tropical northern areas.
- Almost half the forest in the Northern Territory has Indigenous ownership, but the proportion is lower in Western Australia (9%), Queensland (6%) and South Australia (3%). Only very small proportions of the forest estate are under Indigenous ownership in New South Wales, Victoria and Tasmania.
- Legislative arrangements in all jurisdictions aim to ensure the identification and protection of Indigenous sites and places of significance.



Interpretation board describing aboriginal use of Australia's tropical rainforests.

This indicator uses information from the Indigenous Land Corporation (ILC) to report the area of land on which Indigenous people have use and rights that protect their special values and which are recognised through formal and informal management regimes. It also reports on the number of Indigenous heritage places recognised and protected under legislation. Indicator 6.4c reports on the range of measures that promote Indigenous engagement and involvement in forest management.

There are no lands in Australia on which Indigenous people fully determine land management objectives and practice, because all lands are subject to environmental or resource allocation laws made by the national and state and territory governments. Nonetheless, Indigenous people have obtained full legal title to various areas of land and re-established large measures of customary control. The extent to which Indigenous people have gained ownership or other rights to land varies by geographical location and formal land valuation. In general, Indigenous ownership and other rights apply to fewer areas in longer settled landscapes in southern Australia and the more fertile mesic (often forested) lands of the eastern coast, where land has been alienated from Indigenous control.

Aboriginal and Torres Strait Islander peoples represent 2% of Australia's population of 21 million. The ILC reports that more than 16% of Australia's land mass, or 122 million hectares, is under Indigenous ownership (44.8% in the Northern Territory, 15% in Western Australia). Much of that land is in Australia's arid zones, where there are few forests. Based on ILC information and National Forest Inventory mapping, 14% of the country's forests, or more than 20.8 million hectares, is estimated to be under Indigenous ownership. That area has not changed significantly from that reported in SOFR 2003, and any slight changes are more likely due to forest mapping than tenure changes. The vast majority (98%) of these forests are in the Northern Territory, Queensland and Western Australia, where 38% of the Indigenous population resides (Figure 82, Table 96).

Figure 82: Forests on Indigenous Land Corporation registered lands, 2006

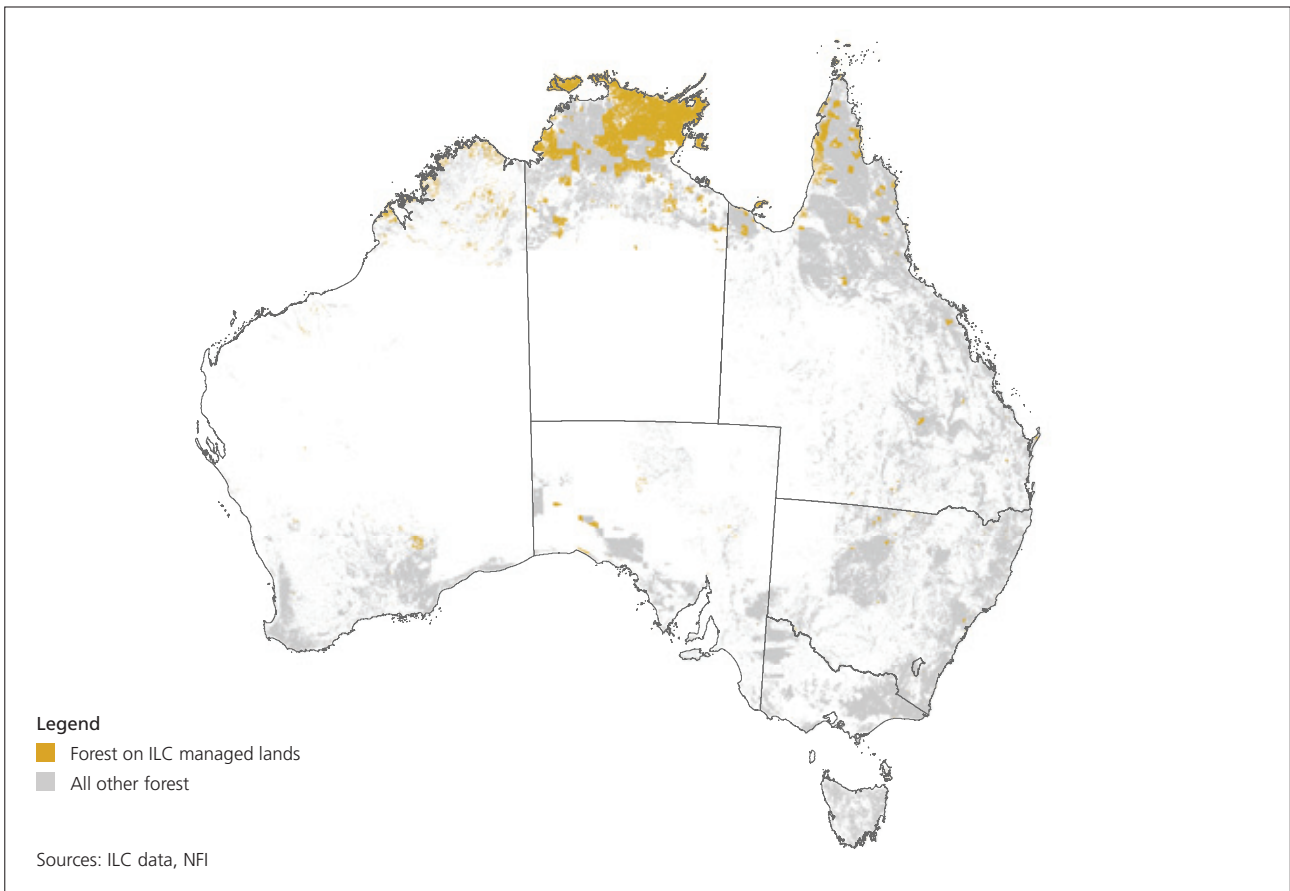


Figure 83: Register of the National Estate: forests on Indigenous sites

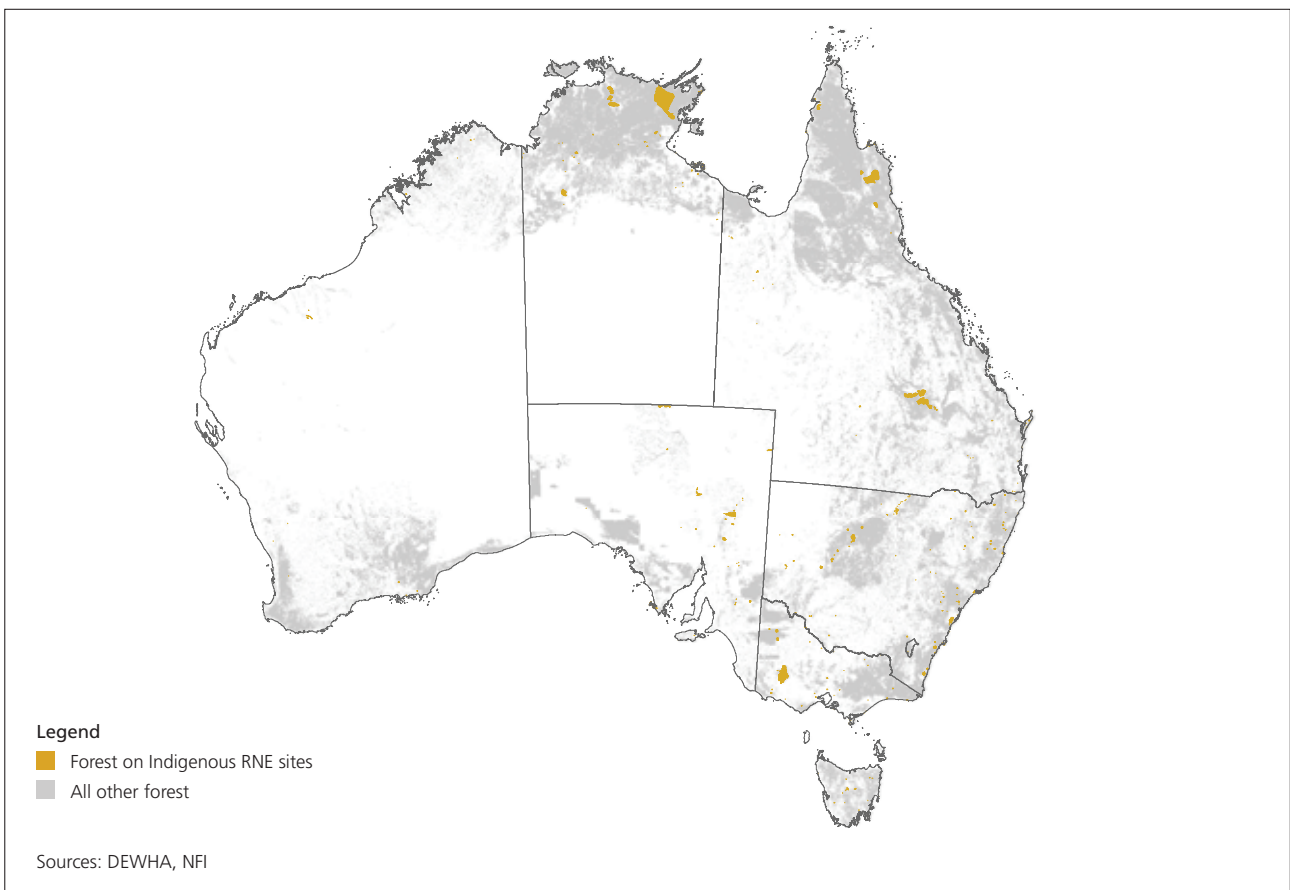


Table 96: Area of forest and non-forest land under Indigenous ownership ('000 hectares)

Forest type	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Total
Acacia	–	30	195	211	–	–	–	227	663
Callitris	–	2	315	3	3	–	–	–	323
Casuarina	–	1	73	1	–	–	–	2	77
Eucalypt	–	159	13,492	2,638	279	4	4	1,331	17,908
Eucalypt low closed	–	–	9	–	–	–	–	3	11
Eucalypt low open	–	–	462	80	–	–	–	6	548
Eucalypt low woodland	–	–	2,362	86	43	–	–	505	2,996
Eucalypt mallee open	–	–	–	–	31	–	–	–	31
Eucalypt mallee woodland	–	–	–	–	192	–	–	6	199
Eucalypt medium closed	–	–	55	1	–	–	–	11	67
Eucalypt medium open	–	132	4,395	137	–	–	3	90	4,757
Eucalypt medium woodland	–	13	6,209	2,335	12	4	1	711	9,287
Eucalypt tall closed	–	–	–	–	–	–	–	–	–
Eucalypt tall open	–	12	–	–	–	–	–	–	12
Eucalypt tall woodland	–	–	–	–	–	–	–	–	–
Mangrove	–	–	237	82	–	–	–	22	342
Melaleuca	–	1	724	257	–	–	–	–	982
Rainforest	–	1	254	132	–	–	–	2	389
Other	–	4	51	49	1	–	–	60	165
<i>Subtotal native forest</i>	–	197	15,342	3,374	283	4	4	1,645	20,848
Plantation hardwood	–	–	14	2	–	–	–	–	17
Plantation softwood	–	–	1	–	–	–	–	1	2
Plantation mixed or unknown species	–	–	–	–	–	–	–	–	–
No data	–	3	31,573	5	10	–	–	56	31,647
Non-forest land	–	243	13,598	1,470	20,044	58	6	34,591	70,010
Total Indigenous land	–	443	60,528	4,851	20,337	63	11	36,292	122,524

Note: Totals may not tally due to rounding.

Source: NFI

The ILC and the Indigenous Land Fund were established in recognition of the likelihood that many Indigenous people will not be able to prove native title to land under the *Native Title Act 1993* (Cwlth). The ILC came into existence on 1 June 1995 with the commencement of the *Land Fund and Indigenous Land Corporation (ATSIC Amendment) Act 1995* (Cwlth). The aim of the corporation's land acquisition and land management program is to deliver environmental, cultural, economic and social benefits to Indigenous people.

All jurisdictions have in place legislative protection for significant Indigenous heritage and additional protection under codes of practice and other procedures that support the discovery and management of Indigenous heritage sites in forests. Where land acquisition and management are not possible, other legislative and administrative arrangements must provide the means for Indigenous interests to identify the attributes they wish to protect and to strongly influence land use and management practice. Among the most significant of those arrangements are the various heritage protection mechanisms employed by governments.

Indigenous places on the Australian Government's Register of the National Estate, the National Heritage List and the Commonwealth Heritage List are subject to the

provisions of the Environment Protection and Biodiversity Conservation Act (although the status of the Register of the National Estate is changing – Indicator 1.1c). The Minister for the Environment, Heritage and the Arts is required to consider these lists when making certain decisions under the Act. Proposals for actions that could affect such values are assessed by relevant government agencies.

Australia-wide, 2.6 million hectares of land is listed on the Register of the National Estate for its Indigenous values; of that area, 1.6 million hectares is forested (Table 97). Such areas are mostly outside the major timber production forests (Figure 83).

State and territory legislation, codes of practice and management prescriptions govern the management of Indigenous places in forests, and cover many places not included on the Register of the National Estate. Case studies 46 and 47 (also Case study 48 on the SOFR website) illustrate the commitment of state governments to the protection of Indigenous cultural values and the involvement of Indigenous people in forest management.

Web resources

Case study 48: Tasmania

Table 97: Area of land and forest on the Register of the National Estate for Indigenous values ('000 hectares)

Forest type	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Total
Acacia	–	8	–	25	–	–	1	–	34
Callitris	–	2	73	5	3	–	20	–	101
Casuarina	–	6	8	–	2	–	1	–	18
Eucalypt	–	74	557	383	47	2	133	4	1,199
Eucalypt low closed	–	–	1	–	–	–	–	–	1
Eucalypt low open	–	–	19	43	–	–	–	–	62
Eucalypt low woodland	–	1	16	12	24	–	–	3	56
Eucalypt mallee open	–	–	–	–	1	–	–	–	1
Eucalypt mallee woodland	–	–	–	–	14	–	1	1	16
Eucalypt medium closed	–	–	1	–	–	–	–	–	1
Eucalypt medium open	–	43	261	34	–	–	50	–	389
Eucalypt medium woodland	–	25	259	286	7	1	80	–	658
Eucalypt tall closed	–	–	–	–	–	–	–	–	–
Eucalypt tall open	–	4	–	9	–	–	–	–	14
Eucalypt tall woodland	–	–	–	–	–	–	–	–	–
Mangrove	–	–	2	5	–	–	–	–	8
Melaleuca	–	–	123	15	–	–	3	–	142
Rainforest	–	1	27	10	–	–	–	–	38
Other	–	5	–	14	–	–	15	–	35
<i>Subtotal native forest</i>	–	96	790	458	51	2	173	4	1,574
Plantation hardwood	–	–	–	–	–	–	–	–	–
Plantation softwood	–	–	–	–	–	–	–	–	–
Plantation mixed or unknown species	–	–	–	–	–	–	–	–	–
No data	–	3	179	–	9	–	–	–	191
Non-forest	–	74	80	173	293	14	28	171	834
Total	–	173	1,048	631	353	16	202	175	2,599

Note: Totals may not tally due to rounding.

Source: NFI

Case study 46: New South Wales

In New South Wales, about 400,000 hectares of land managed by the Department of Environment and Climate Change is set aside as Indigenous-owned reserves or places managed under memorandums of understanding or other forms of agreement between government and Indigenous community groups, including co-management or other arrangements to maintain or enhance Indigenous cultural connection to land, objects and places (Table 98).

In multiple-use public forests, the Anaiwan Traditional Owner Group (New England area), the Bahtoo Aboriginal Corporation (Taree area), the Eden Local Aboriginal Land Council (south coast) and the Darkinjung Local Aboriginal Land Council (central coast) all have formal arrangements with Forests NSW.

Entry into such agreements is usually initiated by an Indigenous community with the aim of increasing the involvement of the community in cultural management or to engage in cultural practice, thereby fulfilling

cultural obligations and needs. Forests NSW also works with Indigenous groups to develop memorandums of understanding, under which approaches to further joint interests are identified and undertaken.

To protect Indigenous places in multiple-use public forests, Forests NSW consults Indigenous representatives at both the regional level and operational levels. Pre-operational field inspection identifies sites and places of importance or interest to Indigenous people, who assist in the identification of prescriptions that are appropriate for protecting those values. The operational *Guidelines for Aboriginal Cultural Heritage Management* identify processes for consultation and the management of Indigenous cultural heritage. An Indigenous cultural awareness program has given Forests NSW staff increased awareness and appreciation of Indigenous values and helped to improve communication between the agency and local Indigenous communities.

Source: Forests NSW

Table 98: Area of DECC-managed lands formally managed to protect Indigenous values

Tenure category	Hectares	Proportion of DECC-managed lands (%)
Sites gazetted for their Indigenous values	563	0.1
Indigenous-owned reserves	96,626	21.0
Indigenous areas	12,349	2.7
Indigenous land-use agreements	186	0.0
Memorandums of understanding	286,405	62.0
Declared Aboriginal Places (based on total gazetted area) ^a	5,306	1.2
Total	401,435	87.0

DECC = Department of Environment and Climate Change (NSW)

a Some of these areas may overlap with non-parks and Wildlife Division-managed lands.

Note: Totals may not tally due to rounding.

Source: DECC

Case study 47: Western Australia

The *Aboriginal Heritage Act 1972* (WA) provides protection for Indigenous objects and places of significance across all land tenures in the state. The Act provides for the protection of Aboriginal cultural material from damage resulting from forest management activities.

The Department of Environment and Conservation (DEC) recognises the importance of Indigenous participation in nature conservation and land management. It continues to develop an approach to achieve an adequate recognition of the importance of land to Indigenous cultural heritage and to consider matters of cultural importance in land and wildlife management. DEC also works towards joint management arrangements between Indigenous and non-Indigenous Australians to achieve sustainable conservation outcomes throughout Western Australia, both on and off the DEC-managed estate. DEC consults with Indigenous stakeholder groups for various levels of land management planning, including high-level area management planning (such as for conservation reserves) and local management planning (such as special proposals for disturbance activities).

Consultation with key Indigenous stakeholders is undertaken for all area management plans, including forest management plans. The Forest Management Plan 2004–13, which covers all the main timber production

areas in the state's southwest, commits the department to a number of actions to involve Indigenous people in the identification, interpretation, protection and management of significant cultural heritage sites within the forest management plan area. These actions include the establishment of a formal Nyoongar consultative working group to advise on issues relating to Indigenous heritage, identifying Nyoongar women and men with authority and knowledge relating to Indigenous cultural heritage in the area and providing for their involvement in the management of the forest, and facilitating cross-cultural awareness and interpretive activities to inform and educate the wider community about Indigenous culture.

At the local scale, DEC engages local Indigenous representatives when forest management activities occurring on land managed by the department are likely to cause significant disturbance to Indigenous cultural heritage. In circumstances that necessitate the disturbance of a registered Indigenous site, appropriate ministerial consent is required; the proponent must apply to the state Aboriginal Cultural Heritage Materials Committee for approval to undertake the activity in the vicinity of the registered site.

Source: DEC (WA)

Indicator 6.4b

Registered places of non-Indigenous cultural value in forests that are formally managed to protect those values

Rationale

This indicator measures and monitors management regimes for non-Indigenous cultural values, such as historical, research, education, aesthetic and social heritage values. Maintaining these values is integral to the protection of non-Indigenous people's values associated with forests.

Key points

- About 485,000 hectares of nationally listed, non-Indigenous historic or cultural heritage places in forests are protected under the provisions of the Environment Protection and Biodiversity Conservation (EPBC) Act.
- The states and territories are responsible for protecting thousands of additional sites within their jurisdictions in accordance with their respective heritage management and protection legislation.
- State and territory governments maintain legislative provisions that provide for the notification of new sites on public land.

Australia's forests include many sites that provide evidence of the complex interactions between people and forest landscapes and the activities that have taken place on the continent since European settlement. A wide variety of sites, features, structures and landscapes may have cultural value at a local, regional, state or national level, including places associated with people and settlers; pastoral–agricultural settlement; exploration and survey; telecommunications; forestry and timber production; mining; and social activities. Significant features can also include graves and cemeteries; railways and tramways; travel routes; recreation sites; and natural places of aesthetic value.

Places of outstanding national heritage significance, including historic places, on the Australian Government's Register of the National Estate, National Heritage List and Commonwealth Heritage List are subject to the provisions of the EPBC Act (although the status of the Register of the National Estate is changing – Indicator 1.1c). The Minister for the Environment, Heritage and the Arts is required to consider these lists when making certain decisions under the

Act. Proposals for actions that could affect such values are assessed by relevant government agencies.

National Estate places listed for their historic values cover more than 862,000 hectares, of which 485,000 hectares is forest land; most is in the drier woodlands and open forests (Table 99). Figure 17 in Indicator 1.1c shows forest areas listed on the Register of the National Estate.

States and territories have legislation and operational procedures (including codes of practice) for the protection of non-Indigenous heritage places; they usually require the notification of newly discovered sites in multiple-use and conservation forests and maintain site registers. A large number of sites are protected on public land. Examples include the following:

- Around 4,000 listings of places are managed formally for non-Indigenous cultural heritage in Victoria's public forests (Case study 49).
- 3,804 places of non-Indigenous cultural heritage in nature conservation reserves are formally managed to protect cultural values in New South Wales.⁸ There are an additional 689 sites in multiple-use public forest.
- Around 883 places of non-Indigenous cultural heritage have been identified in Western Australia's southwest forest region.
- 1,400 sites in multiple-use forests are specifically managed to protect non-Indigenous cultural heritage in Tasmania in 'special management zones'. The area of special management zones and areas of Indigenous cultural heritage, combined, exceeds 49,000 hectares (Case study 50 on the SOFR website).

⁸ This figure is derived from a count of sites that have been assigned one or more specific non-Indigenous cultural heritage themes. Many recognised sites have not been assigned themes and are therefore not included.

Table 99: Register of National Estate non-Indigenous places in forests

Forest type	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Total
Acacia	–	–	–	–	–	–	–	–	1
Callitris	–	–	–	–	–	–	–	–	–
Casuarina	–	–	–	–	–	–	–	–	–
Eucalypt	2	360	57	2	5	34	19	1	480
Eucalypt low closed	–	–	–	–	–	–	–	–	–
Eucalypt low open	–	1	–	1	–	–	–	–	2
Eucalypt low woodland	–	95	41	–	–	–	–	–	136
Eucalypt mallee open	–	–	–	–	–	–	–	–	–
Eucalypt mallee woodland	–	–	–	–	4	–	–	–	4
Eucalypt medium closed	–	–	–	–	–	–	–	–	–
Eucalypt medium open	–	191	–	–	–	–	14	–	206
Eucalypt medium woodland	1	8	16	1	–	19	3	1	49
Eucalypt tall closed	–	–	–	–	–	–	–	–	–
Eucalypt tall open	–	66	–	–	–	15	2	–	82
Eucalypt tall woodland	–	–	–	–	–	–	–	–	1
Mangrove	–	–	–	–	–	–	–	–	–
Melaleuca	–	–	2	–	–	–	–	–	3
Rainforest	–	–	–	–	–	–	–	–	1
Other	–	–	–	–	–	–	–	–	–
<i>Subtotal native forest</i>	2	361	59	3	5	35	20	1	485
Plantation hardwood	–	–	–	–	–	1	–	–	1
Plantation softwood	–	–	–	–	–	1	–	–	1
Plantation mixed or unknown species	–	–	–	–	–	–	–	–	–
No data	5	7	6	–	7	1	1	–	27
Non-forest	–	123	31	4	84	90	9	8	349
Total	7	491	96	7	96	127	30	9	862

Note: Totals may not tally due to rounding.

Sources: Australian Government Department of the Environment, Water, Heritage and the Arts; NFI for forest areas

Sites on leasehold and other state lands, and on freehold tenure, might not be formally protected unless listed on the relevant state/territory heritage register.

Legislative protections are particularly important in those states with significant harvesting for wood production in public forests. Victoria, New South Wales, Queensland, Tasmania and Western Australia all conduct inspections or surveys of heritage places in multiple-use public forest before allowing timber harvesting operations to proceed, and carry out targeted and/or comprehensive cultural heritage place surveys and heritage studies. The purpose, definitions, criteria and methods used to identify and record heritage places vary by jurisdiction according to statutory responsibilities and management practices. All jurisdictions endeavour to manage the effects of threatening processes such as fire, development, timber harvesting and road building in heritage places. However, as shown by the 2003 wildfires, which destroyed several historic huts in the Australian Alps, there are limits to the protection that can be provided against fire under extreme conditions.

Web resources

Case study 50: Tasmania's approach to cultural heritage in forests



Early 20th century timber cutters' hut near Launceston, Tasmania.

Case study 49: Victoria's approach to cultural heritage in forests

Under the Victorian *Heritage Act 1995*, it is an offence to damage or disturb archaeological sites or relics unless consent has been obtained from Heritage Victoria. All known archaeological sites are listed on the Victorian Heritage Inventory, and places deemed to be of statewide significance are listed on the Victorian Heritage Register.

Places listed on the Victorian Heritage Inventory cannot be removed, demolished, despoiled, developed, altered or excavated without a permit from the Victorian Heritage Council, while Victorian Heritage Register listing provides the highest level of protection. There are almost 200 reserves in Victoria for which the primary land use is the protection of historic and cultural features.

Historic places, including those in forests, are managed in accordance with the principles of the Burra Charter. The charter is used by Australia ICOMOS (International Council on Monuments and Sites) to set a standard

of practice for those who provide advice on, make decisions about, or undertake works in places of cultural significance, including owners, managers and custodians. In multiple-use public (state) forest, known historic places are listed in forest management plans or regional inventories. In many forest management areas, specific management actions are prescribed for each site to protect it from potentially damaging forest operations. Significant sites are protected by forest management prescriptions or heritage management plans.

As a consequence of survey programs, the state's historic places database has over 8,000 records, covering all Victorian public land under the control of the Department of Sustainability and Environment; almost half the records relate to historic places in forests (Table 100). New sites are added to the database mainly as a result of opportunistic field surveys.

Table 100: Places of non-Indigenous cultural heritage in forests formally managed to protect cultural values, Victoria

Culturally significant themes	Number of places recognised at state level	Number of places recognised at local level	Number of places to be assessed or not significant
Developing local, regional and national economies ^a	139	877	538
Settlements, towns and cities ^a	7	84	63
Educating ^a	1	10	7
Governing ^a	1	6	1
Australia's cultural life ^a	3	16	21
Marking the phases of life ^a	3	46	9
Historic places ^b	236	2,400	

a Applies to all public forested land except that managed by Parks Victoria.

b Clumped for all public land and assets managed by Parks Victoria. Asset types known not to occur on forested land (e.g. piers, shipwrecks) are excluded.

Source: Department of Sustainability and Environment (Vic.)



Historic place, the first Conservator's hut, Bundaleer, South Australia.



Remains of tram tracks used for transporting logs in the early 20th century, Tasmania.

Indicator 6.4c

The extent to which Indigenous values are protected, maintained and enhanced through Indigenous participation in forest management

Rationale

This indicator focuses on the extent to which Indigenous people participate in forest management. Active participation in management reflects the relationship between people and the land, and the integration of Indigenous people's values with forest management practice, policy and decision making.

Key points

- Mechanisms now exist to facilitate Indigenous participation in the forest sector and to provide economic benefit to Indigenous communities.
- Greater numbers of Indigenous people are now employed in the government agencies responsible for nature conservation and commercial timber production, and there is also a greater presence of Indigenous people in natural resource management committees and other forest stakeholder forums.
- Both planted and natural forests are increasingly valued by Indigenous people for their ability to contribute to economic independence.

Indigenous people value forests for a range of cultural, social and economic reasons. This indicator discusses the relationship between the participation of Indigenous people in forest management and the protection, maintenance and enhancement of the values associated with the forests.

In the past, the forest sector has tended to deal with Indigenous issues mostly in terms of archaeological sites, placing less emphasis on the values associated with a spiritual attachment to the land. However, the forest sector's understanding of Indigenous forest values has changed significantly in recent years. In part, this is due to movements for social justice and land rights. Moreover, greater numbers of Indigenous people are now employed in the government agencies responsible for nature conservation and commercial timber production, and there is also a greater presence of Indigenous people in natural resource management committees and other forest-stakeholder forums.

Indigenous values

Indigenous values can be divided into three broad but not mutually exclusive categories: heritage, contemporary and aspirational.

Heritage values are associated with Indigenous history and are important for connecting people with the landscape and the past. Examples of features with heritage value include the following:

- **Archaeological sites.** These provide tangible evidence of prior Indigenous presence. Most states protect archaeological sites by statute and maintain databases on them.
- **Natural landscape features associated with dreaming/creation stories.** Information on these is held by individuals and passed on orally, and may also be contained in historical records.



Indigenous consultation in forest management, Northern Territory.

- **Places associated with Indigenous history and culture.** These places might not contain physical evidence of such associations. They can include places of teaching, resource collection and work. Most of this information is only available orally.
- **Secret and sacred places.** Information on these places is held by particular knowledge-holders and is released on a discretionary basis according to customary laws.

Indigenous people also value forests for contemporary reasons, including the following:

- **A landscape of reconciliation and empowerment.** For example, logging on the sacred mountains of Mumbulla and Gulaga on the south coast of New South Wales was halted as a result of Indigenous protests in 1979 and 1990.
- **Places where Indigenous beliefs and customs can be integrated with modern living.** For example, customary knowledge can be applied in economic development to produce wood products for the arts and crafts industry.
- **Natural areas where Indigenous cultural values can be protected.**

Both planted and natural forests are also increasingly valued by Indigenous people for their ability to contribute to economic independence.

Forests may also have aspirational value for Indigenous people. Most native forests are in public ownership, under which native title rights and interests may prevail; they can therefore potentially contribute to inter-generational equity. Forests are valued as areas in which Indigenous people can gain greater autonomy and economic returns through a range of mechanisms, including ownership.

Indigenous participation

Accurate data on Indigenous involvement in forest management are not readily available at a national level. However, a review of annual reports, equal employment opportunity data, forest codes of practice and forest management agency corporate plans in New South Wales, Queensland, Victoria and Western Australia suggests that Indigenous people participate more in native forest management, forest conservation and the use of non-wood forest products than in direct employment in industrial wood production and processing.

Effective consultation and participation are essential for the protection, maintenance and enhancement of Indigenous forest values. Various studies in the past 20 years have shown that Indigenous people want to participate more in the forest sector for two main reasons: to ensure that Indigenous values are protected, and for economic benefit.⁹ Participation can occur through a variety of mechanisms, including:

- direct employment in the forest sector
- community employment schemes, such as Community Development Employment Projects program and projects funded by the Natural Heritage Trust

- forest management agencies' consultative processes, which can be ongoing or one-off and can vary in their effectiveness (e.g. face-to-face meetings in culturally appropriate places with adequate time for inter-community consultation are likely to be more effective than letters requesting responses with short turnaround times)
- cooperative research programs, such as forest surveys for endangered species (these are usually short term but can help build the land management capacity of Indigenous people and maintain good relationships between land management agencies and Indigenous organisations)
- partnerships, formal examples of which include the joint management of national parks; Indigenous land-use agreements (ILUAs), such as the Githabul ILUA; Indigenous protected areas; the 'Caring for Country' programs in the Northern Territory; Land and Sea Councils; local memorandums of understanding for hunting-and-gathering access, such as that between the Eden Local Aboriginal Land Council and Forests NSW, and cultural camps.

Indigenous people are also increasingly participating in forest management as:

- forest owners, such as the Arnhem Land and Tiwi Island communities
- owners of land on which plantations can be established (these are increasing in number)
- business operators, including for ecotourism, firewood collection, bush food and arts and crafts manufacture
- forest stewards (managing land on behalf of the Australian population).

Different kinds of participation have differing effects on the maintenance, protection and enhancement of Indigenous forest values. A process of consultation with elders about a forest management plan will provide information on those spiritual and cultural values about which the elders are able to speak publicly. On the other hand, Indigenous participation through direct employment in a sawmill or commercial plantation is less likely to be relevant to the protection of Indigenous forest values, especially if the employee is not from the local area. However, income generated from this type of participation may still contribute to protecting Indigenous forest values by increasing the ability of a family or community to engage in such protection.

Examples of participation that helps protect cultural values and allows for economic development include plantation-related work near Esperance and heritage surveys in multiple-use forests in New South Wales (Case study 51).

⁹ For example, BDO Consulting (SA) Pty Ltd (2004), Black et al (2003), Brooks et al (2001), Buchy and Hoverman (1999), Cane (1990).

References and further reading

BDO Consulting (SA) Pty Ltd (2004), Black et al (2003), Brooks et al (2001), Buchy and Hoverman (1999), Cane (1990), English (2004), Feary (1988) (list at the back of the report).

Case study 51: Indigenous employment and business

A plantation company in Western Australia contracts the Esperance Aboriginal Corporation to perform land management tasks, such as weeding, fencing and erecting signs, in research plots of planted blue gums. The corporation has limited machinery and equipment and so cannot carry out some of the more mechanised or technical components of plantation management. This is an example of participation for economic purposes, but it also has indirect non-economic benefits because it builds the capacity of the Indigenous people involved and the status of the Indigenous community as a whole in the regional economy. The Esperance Aboriginal Corporation administers the contract, and the wages contribute to the social and economic wellbeing of workers and their extended families.

The Eden Local Aboriginal Land Council in southern New South Wales runs a business that conducts heritage surveys of crown timber production forests before logging. Forests NSW uses this service on a fairly regular basis, and other government agencies and some private companies also require similar forest-based surveys from time to time. The business builds on good local relations between Forests NSW and the land council. Its ongoing viability depends on a number of factors, including the long-term future of timber harvesting in the region.

Source: S Feary, PhD candidate, Australian National University, pers comm, May 2007

Indicator 6.4d

The importance of forests to people

Rationale

This indicator measures the range of attitudinal values that communities and individuals place on their forests. The importance of forests to society is exemplified through the value that people place on biodiversity, clean air and water, social equity, or simply the knowledge that Australia's forests exist.

Key points

- Many forest issues are of national importance and have played a role in recent national and state political debate, as the community seeks biodiversity conservation and the provision of environmental services from forests.
- Regional forest agreements are an attempt to find the balance between social, economic and environmental forest values in some forests.
- The expansion of the plantation estate and the proposed development of new wood processing infrastructure have potentially significant employment benefits but are also accompanied by community concerns about their social and environmental impacts.

Surveys have been used to identify community attitudes to timber-harvesting methods and non-industrial forest uses, such as tourism and conservation.¹⁰ However, there is a general lack of data about such attitudes, and the research methods used have not been uniform. Many forest issues are of national importance and have played a role in recent political debate.

The regional forest agreements (RFAs) struck in the period from 1997 to 2001 between the Australian Government and several state governments were an attempt to find a balance between social, economic and environmental forest values. Since then, most jurisdictions have continued to assess the role of multiple-use public forests and forests in nature conservation reserves; overall, the area of forest within the latter has increased at the expense of the former (changes in forest tenure are discussed in Indicator 1.1a).

A recently completed study sought to identify attitudes to forest management practices, such as clearfelling in Tasmania's eucalypt forests.¹¹ Researchers used visual aids and psychological theory to link the values held by respondents with their knowledge of the kinds of management practices used in harvesting. The study found that the public acceptability of forest harvesting tended to increase as the proportion of forest excluded from harvesting increased.

Many forest issues are of national importance and have played a role in recent national and state political debate, as the community seeks biodiversity conservation and the provision of environmental services from forests.

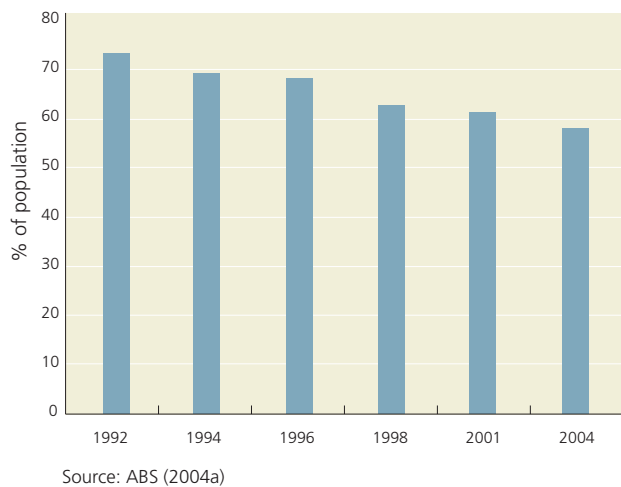
Since the 1990s, there has been a rapid increase in the commercial timber plantation estate, with a subsequent change in the aesthetic values of the landscape, the incidence of heavy traffic on rural roads, and the delivery of economic and environmental benefits. Moreover, water use by plantations and wood processing facilities has become the focus of attention in some communities.

¹⁰ The importance of forests to people can be measured in a number of ways, including with visual prompts to observe public reaction to a range of forest management practices. Another method uses survey techniques to identify the importance that people place on forest use, which might be:

- **non-consumptive:** the value of forest areas gained from their existence (e.g. viewing nature films or enjoyment of the recreational and aesthetic value of an area and contact with nature)
- **consumptive:** the value of forest areas gained from the use of the resource for human benefit (e.g. timber harvesting).

¹¹ Ford et al (2004).

Figure 84: Level of public concern about environmental issues, 1992 to 2004



Substantial research was undertaken during the reporting period into the socioeconomic impacts of forest plantations in rural Australia.¹² It identified three overlapping phases of plantation development:

- In the *establishment* phase, when new plantations are being planned and established, some previous landowners may leave the region, and jobs are created in nursery, planting and field management enterprises. Beneficiaries during this phase include machinery suppliers and contractors, suppliers of materials such as chemicals and fertilisers, and providers of services that apply these inputs in the field.
- In the *transition* phase, further employment opportunities are generated by the commencement of harvesting and processing and, often, the continued expansion of the plantation estate and the development of processing facilities. Total employment per unit area of plantation usually increases rapidly.
- During the *mature* phase, the processing of plantation wood provides most of the employment generated by the sector. The extent of local and regional employment therefore depends on the location of the processing facilities, although there is also ongoing employment in plantation management, harvesting and haulage and in the re-establishment of trees on harvested areas. Periodic upgrading and expansion of facilities provide additional jobs. Once the plantation estate reaches the mature phase, the employment it generates per unit area is higher than for cropping, sheep or beef-cattle enterprises.

Despite the significant employment benefits provided by forest industries, communities may be divided over social issues and environmental effects associated with the establishment of large processing infrastructure, such as pulp mills. In recent years, particular concern has been expressed over possible air and water pollution produced by pulp mills proposed in northern Tasmania and southeastern South Australia, as well as over impacts on local transport, tourism and water consumption.

People's general concern for the environment might be another way of gauging the importance of forests to them. According to the ABS, there was a gradual decline in public concern about environmental issues in all jurisdictions between 1992 and 2004 (Figure 84). However, the decline may have reversed recently because of concerns about water supply, drought, climate change and wildfire. For example, results from a recent survey of community attitudes in New South Wales suggest that such issues are significant in that state.¹³

References and further reading

ABS (2004a), DEC NSW (2007), Ford et al (2004), Schirmer et al (2005ab), Williams (2002), Williams et al (2001b), Williams et al (2005), Winter (2005) (list at the back of the report).



Public field day, discussion of the management of Leadbeater's possum.

¹² Schirmer et al (2005ab).

¹³ DEC NSW (2007).

Indicator 6.5a

Direct and indirect employment in the forest sector

Rationale

This indicator measures the level of direct and indirect employment in the forest sector. Employment is an important measure of the contribution of forests to viable communities and the national economy.

Key points

- The forest-growing and wood product sectors employ many people in regional areas.
- Total national employment in businesses dependent on growing and using timber in 2006 was estimated to be about 120,000 people.
- Total direct employment in forest sector employment increased marginally between 2001–02 and 2006–07, from 82,800 to 83,400 full-time equivalents, although the proportion of the Australian workforce employed in the sector declined from 0.91% to 0.82%.
- While there are limited national data on indirect employment, it has been estimated that each direct job in the plantation forest industry in Western Australia's Great Southern region produces 0.7 indirect jobs.
- The non-wood forest product and forest contact industries generate considerable direct and indirect employment in some regional communities.

The 'forest sector' category encompasses several subsectors reliant on forests – primarily forest growing and wood product industries, non-wood forest product industries (e.g. beekeeping, grazing) and forest contact industries (e.g. tourism, park management). Direct employment data for the forest growing and wood product industries are collected as part of the national statistical collection system. National data are less readily available for employment directly attributed to the non-wood forest product or forest contact industries; instead, state and territory data are used here to analyse trends. The national-level data discussed in this indicator differ from those used in Indicators 6.5c and 6.5d, which are collated at a regional scale.

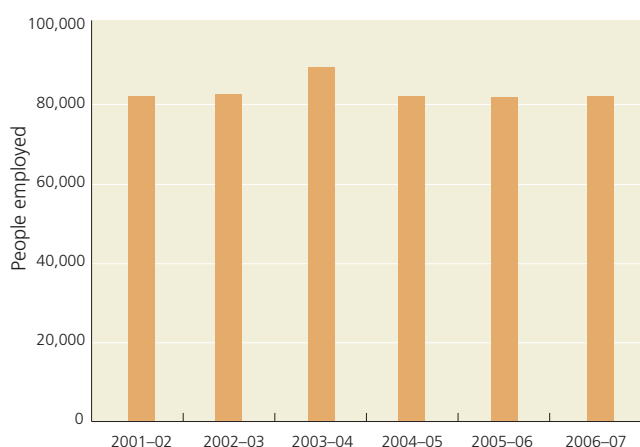
Employment in the forest growing and wood product industries

Data on employment in the forest growing and wood product industries are available from the ABS and the National Skills Company for the Forestry and Forest Products, Furnishing and Pulp & Paper Industries Ltd (ForestWorks). The Australian Bureau of Statistics' (ABS) labour force survey data include several categories within the forest-growing and wood product industries. The labour force survey is updated annually and a long-term trend is available. Forestworks initiated a survey for the Forest and Wood Products Research and Development Corporation in 2003. That survey covers a wider range of businesses dependent on growing and using timber than does the ABS data and is updated periodically.

The ABS labour force categories relevant to the forest-growing and wood product industries are 'forestry and logging' and 'wood manufacturing', the latter including the three subsectors of 'log sawmilling and timber dressing', 'paper and paper products', and 'other wood products'. Total direct employment in the four groupings combined increased marginally from 2001–02 to 2006–07, from 82,800 to 83,400 full-time equivalents (Figure 85). Total Australian employment increased by 11% in the period, so the proportion employed in the four groupings declined from 0.91% to 0.82%.

Table 101 shows estimates of the numbers of people employed in each major industry sector derived from the ForestWorks survey. The numbers employed in each state and territory are shown in Table 102.

Figure 85: Direct employment in ABS forest-growing and wood product industry sectors, 2001–02 to 2006–07



Note: Annual employment data is the average of monthly survey data.
Source: ABARE (2007)

Non-wood forest product and forest contact industries

Direct employment in the non-wood forest product and forest contact industries comprises jobs in beekeeping, grazing, forest reserve management, ecotourism, fishing and hunting, recreation, extractives (e.g. gravel and stone), mineral exploration, mining and water production. Several of these, such as forest-based tourism and recreation, are known to provide significant levels of employment in some regions, but few data are available at the national level. Table 103 shows direct employment related to the non-wood forest product and forest contact industries in Forests NSW and the South Australian Department for Environment and Heritage and ForestrySA for 2001–02 and 2005–06.

Indirect employment

Indirect employment is employment in other sectors that is generated from direct employment in the sectors of interest. Indirect employment might be in wholesale and retail trade; legal, accounting, marketing and business services; motor vehicles, rail, pipeline and other transport services (parts, equipment, maintenance and repairs); electricity, gas and water supply; education, scientific research, and technical and computer support; government administration; and media services. SOFR 2003 provided indications of the multiplier effects of forest production; no additional information was available for this report, beyond some regional reviews (e.g. Case study 52).

Since indirect employment covers such a broad range of occupations, data are not collected routinely on a national basis and vary with industry development drivers; for example, the impacts of indirect employment in plantations are likely to be more pronounced at the maturation and harvesting stage. Case studies 52 and 53 illustrate the regional impact of indirect forest employment.

Table 101: Estimated employment in forest-growing and wood product industry sector, 2006

Sector	No. of employees
Forest growing and management	7,348
Timber harvesting and haulage	8,973
Sawmilling and timber processing	19,081
Timber product manufacturing	37,800
Wood panel and board production	5,635
Pulp and paper manufacturing	11,024
Timber merchandising	22,134
Support service internal to industry	5,445
Support service external to industry	2,745
Total	120,184

Source: ForestWorks (2006)

Table 102: Estimated numbers of enterprises and employees in forest-growing and wood product industry sectors, 2006, by jurisdiction

	No. of businesses	No. of employees
ACT	105	1,563
NSW	2,511	38,328
NT	42	339
Qld	1,250	19,732
SA	634	12,999
Tas.	522	7,930
Vic.	1,875	32,154
WA	501	7,139
Total	7,440	120,184

Source: ForestWorks (2006)

Table 103: Direct employment related to the non-wood forest product and forest contact industries in some government agencies in New South Wales and South Australia, 2001–02 and 2005–06

	NSW		SA ^a	
	2001–02	2005–06	2001–02	2005–06
Forest management	1,146 ^b	1,109 ^b	302 ^c	729
Recreation/tourism	36	36		
Apiary	397	294		
Firewood/fencing	169	110		
Grazing	119	420		
Miscellaneous plant products	15	12		
Volunteers (unpaid)			4,356	5,850
Various employment schemes	1	105		

- a Department for Environment and Heritage (SA) and ForestrySA employees only, for employment related to the management of state-owned land covered by the *National Parks and Wildlife Act* and ForestrySA land.
b Forests NSW employees in publicly owned multiple-use forests only.
c Department for Environment and Heritage (SA) Conservation Management staff carry out land management activities such as firefighting, policy, regulatory, education, ancillary. Total includes forest policy, forest management/growing, regulatory, conservation research, conservation management, others (ForestrySA Corporate Services and Support).

Sources: State agencies

References and further reading

ABARE (2007), ABS (2006ab, 2007ab), ANZSIC (2006), FWPRDC (2003), Forestworks (2006), GTRPC (2006), Schirmer et al (2005ab) (list at the back of the report).

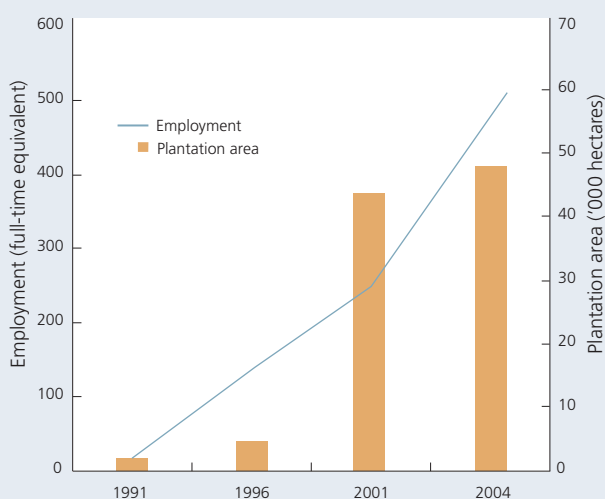
Case study 52: Employment in Western Australia's Great Southern region

The Great Southern region stretches from east of Bremer Bay on the south coast of Western Australia, north past Nyabing and Katanning, west beyond Kojonup and south to Denmark. The region's forest plantations increased from 6,150 hectares in 1991 to 127,500 hectares in 2001. Employment in the sector has grown rapidly since harvesting began in 2001, almost doubling from 263 employees in 2001 to 500 in 2004. Plantation harvesting and processing have also supported the expansion of local contracting businesses in the region.

Based on recent studies, it is estimated that 17 jobs are created for every \$1 million spent in the forest industry. In addition, each direct job produces 0.7 indirect jobs in the region, as well as employment outside the region when goods and services are imported from elsewhere. The region generally experienced either rural population growth or reduced rates of rural population decline between 1991 and 2004 due to the expansion of the plantation estate (Figure 86). The supply of local independent employment in the forest sector and the integration of plantations with multiple forms of land use have contributed to a diverse economic base that has helped stabilise the population and improved prospects for long-term economic growth in the region.

Source: Schirmer et al (2005b)

Figure 86: Forest-sector employment and plantation area in the Great Southern region, 1991 to 2004



Source: PWSNT (2005)

Case study 53: Employment in the Green Triangle

The Green Triangle straddles the border between southeastern South Australia and southwestern Victoria (Figure 87). It is a major plantation region, containing around 20% of the nation's plantation estate – almost 300,000 hectares of radiata pine (*Pinus radiata*) and 150,000 hectares of blue gum (*Eucalyptus globulus*). The forestry and wood processing sector directly and indirectly employs around 8,760 people, about 12% of total employment in the region. In 2003–04, the forestry and wood processing industries contributed more than \$778 million to the region.

The forestry sector actively promotes opportunities for skills and training development through a vocational education and training program for secondary school students and a four-year forestry degree at the Mount Gambier campus of Southern Cross University. Employment generated by the forest sector in the Green Triangle has increased the skills base of regional forest-dependent communities, which will help to sustain the forestry sector in the longer term.

Source: GTRPC (2006)

Figure 87: The Green Triangle in southeastern South Australia and southwestern Victoria



Indicator 6.5b

Wage rates and injury rates within the forest sector

Rationale

This indicator measures wage and injury rates in the forest sector. A sustainable industry will ensure high levels of workforce health and welfare and wage rates comparable with national averages for other occupations.

Key points

- Total wages and salaries in the wood and wood product industries increased from \$2 billion to \$3 billion between 2000–01 and 2004–05.
- The rate of injuries and fatalities per 1,000 employees in the wood and wood product manufacturing subsector declined from 48.9 to 37.2 between 2001–01 and 2002–03. No trend in this measure was evident in the forestry and logging subsector, although the number of compensated fatalities within this subsector dropped from seven in 2000–01 to two in 2002–03.
- Several organisations are working at state level to improve occupational health and safety standards in the wood and wood product sector, with promising results.



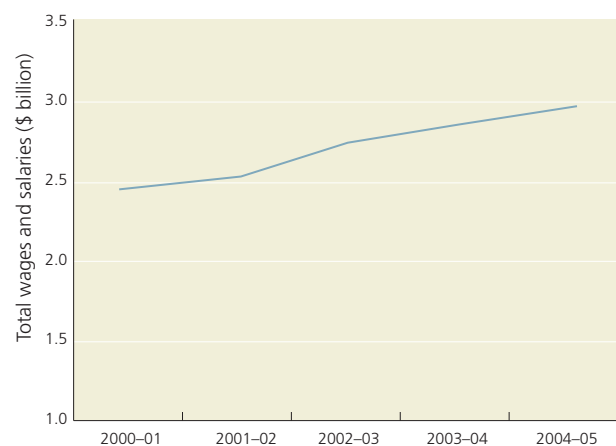
Loading pine logs.

This indicator focuses primarily on the wood and wood product sector, for which data are collected both nationally and by states.

Wage rates

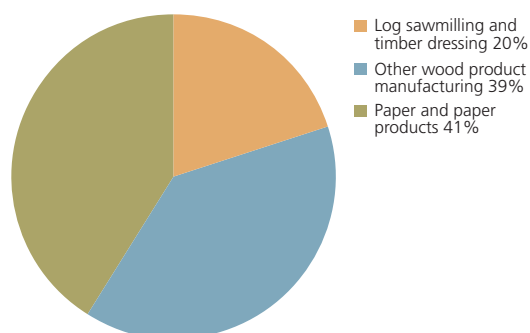
Total wages and salaries in the sector increased from about \$2.5 billion to \$3 billion over the period (Figure 88) due to general wage inflation, an increased emphasis within the sector on positions requiring greater levels of skill (and therefore attracting high wages), and a possible reduction of less skilled positions. Figure 89 shows that the 'paper and paper products' and 'other wood products' subsectors provided the bulk of total wages and salaries in 2004–05.

Figure 88: Wages and salaries in wood and wood product industries, 2000–01 to 2004–05



Sources: ABARE (2006), ABS (2006b)

Figure 89: Wages and salaries in different classes of wood and wood product industries, 2004–05



Sources: ABARE (2006), ABS (2006b)

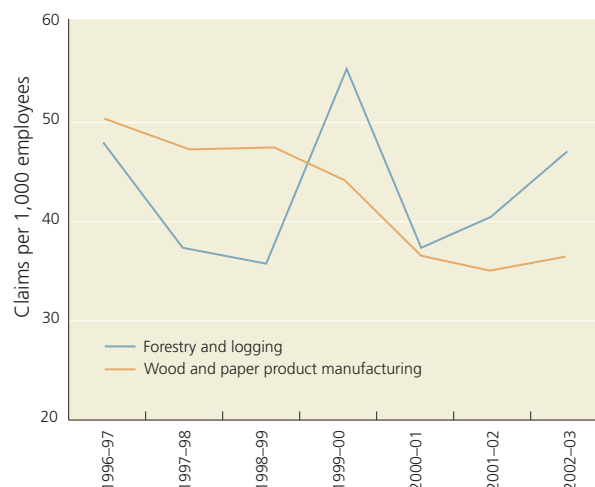
Injury rates

Injury and fatality rates reflect occupational health and safety standards as well as the level of danger inherent in the industry. The number of compensated fatalities in the forestry and logging subsector fell from seven in 2000–01 to two in 2002–03 (Table 104); there were five fatalities in the forestry and logging sector and the wood manufacturing sector combined in 2002–03, compared to eight in 2000–01 and twelve in 1996–97. However, given the overall very low numbers of compensated fatalities in the sector it is difficult to discern a trend.

The number of notified fatal and nonfatal compensated claims can be expressed as a rate per 1,000 workers in a given employment class (incidence rate, Table 104), thereby allowing comparisons between datasets. The incidence rate in the wood manufacturing sector declined from 48.9 to 37.2 claims per 1,000 employees between 1996–97 and 2002–03. Figure 90, which was derived from data in Table 104, shows that no clear trend was apparent in the forestry and logging sector over the same period.

Workforce health and welfare have significant secondary effects on expenditure in the forest sector. Employee health can affect individual income and can also affect national

Figure 90: Notified fatal and non-fatal compensated claims per 1,000 workers, 1996–97 to 2002–03



Source: Australian Safety and Compensation Council (2006)

income through loss of workdays and the costs of insurance and staff replacements. The human and social assets held by the industry can be reduced by the loss of trained workers through workplace injuries or fatalities.

In 2002–03, the incidence rate for forestry and logging (47.4 claims per 1,000 employees) was higher than that for the combined grouping of agriculture, fishing and forestry (30.3 claims). The incidence rate for wood and paper product manufacturing (37.2 claims) was higher than that for all manufacturing industries (29.3 claims) in the same period.

Several groups are working within the wood and wood product sector to improve and update workplace safety measures. Education and training are primary mechanisms (Case studies 54 and 55). For example, attitudinal changes can be initiated by identifying barriers to the adoption of safety measures and proposing new methods to change the underlying attitudes of forest-industry participants.

Figure 91 shows that the injury frequency rate in Tasmania for the 'log sawmilling and timber dressing' and 'other wood product manufacturing' subsectors declined significantly

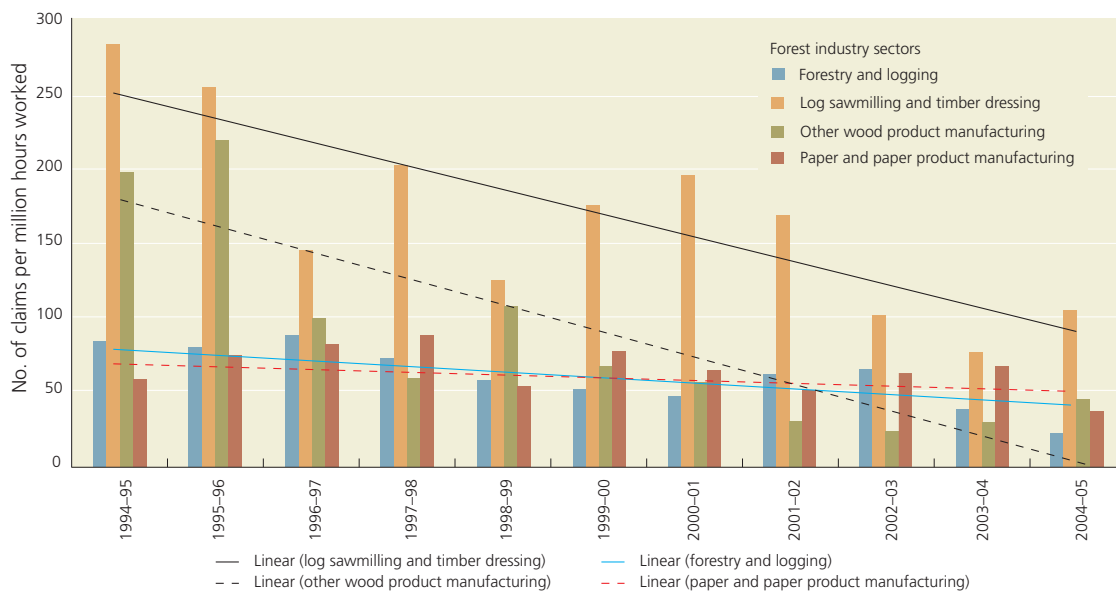
Table 104: Number of fatalities and number of notified fatal and non-fatal compensated claims per 1,000 workers (incidence rate), 1996–97 to 2002–03

Financial year	1996–97 ^a	1997–98 ^a	1998–99 ^a	1999–2000	2000–01	2001–02	2002–03
Number of fatalities							
Forestry and logging	6	6	6	7	7	4	2
Wood manufacturing	6	5	3	5	1	6	3
Incidence rates for all fatal and non-fatal compensated claims (claims per 1,000 employees)							
Forestry and logging	46.9	34.7	33.4	56.2	37.3	40.2	47.4
Wood manufacturing	48.9	44.6	44.9	42.6	36.5	35.6	37.2

a Excludes ACT private sector.

Source: Australian Safety and Compensation Council (2006)

Figure 91: Injury frequency rates in Tasmania, 1994–95 to 2004–05



Source: WorkCover Tasmania

over the 11 years from 1994–95 to 2004–05; smaller declines also occurred in the ‘forestry and logging’ and ‘paper and paper product manufacturing’ subsectors.

The improvements in injury frequency rates in Tasmania may be due to a number of factors, including the emphasis placed on safety management by forestry companies; post-accident investigations leading to improved practices; awareness, promotional and enforcement activities relating to safety management by Workplace Standards Tasmania; and the increasing mechanisation of forest operations.

References and further reading

ABARE (2006), ABS (2006b), Australian Safety and Compensation Council (2005, 2006), Forests NSW (2006), GPF (2005), NLWRA and BRS (2005), Spencer (2005), WorkSafe Victoria (2007) (list at the back of the report).

Web resources

Case study 55: The ‘Think safe, act safe, stay safe’ campaign in New South Wales (including Figure 93)



Firefighting carries a higher degree of risk than most other forestry activities.



Safety helmets and high visibility vests are specified for all in-forest activities, including tree-marking.

Case study 54: Forest Industry Occupational Health and Safety Stakeholder Forum – WorkSafe Victoria

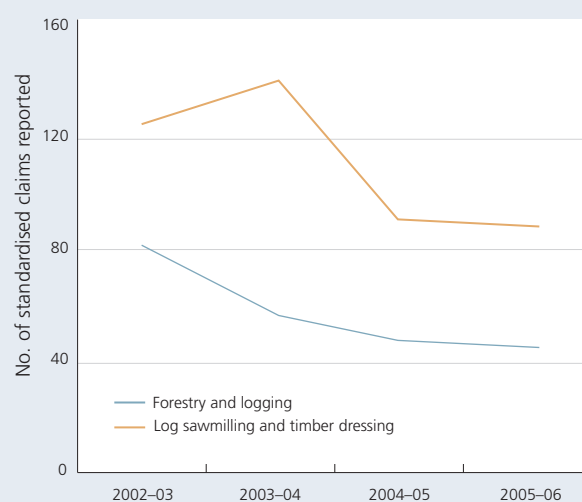
WorkSafe Victoria established the Forest Industry Occupational Health and Safety Stakeholder Forum in October 2002 with the aim of identifying and prioritising occupational health and safety issues to achieve practical outcomes for Victoria's forest industry workers. Among other things, the forum produces guidelines to help improve occupational health and safety. These include *Fatigue Management in the Forest Industry*, *Manual Handling Solutions for the Sawmill Industry* and the *Safety in Forestry Operations (Harvesting and Haulage) Industry Standard*. The last of these, which was released in July 2007, uses a combination of illustrations, images and a traffic-light model to establish a benchmark and raise occupational health and safety standards for high-risk forestry operations.

Two new short courses specific to the Victorian forest industry have been developed in response to a review of the national training competency package. This initiative delivers presentations to the National Forest Industry Trainers Association and international forest industry conferences and also conducts compliance inspectorate visits to promote the uptake of occupational health and safety risk-control systems.

The forum is co-funded and co-owned by the industry. Together with the support of industry land managers, principal contractors and government agencies, it can effectively develop risk-control tools and increase the

adoption of a systematic approach to occupational health and safety in the Victorian forest industry. The downward trend in injury rates in forestry and logging and log sawmilling and timber dressing in Victoria since the forum's inception (Figure 92) is therefore expected to continue.

Figure 92: Standardised claims reported, Victoria, 2002–03 to 2005–06, by industry sector



Source: WorkSafe Victoria (2007)

Indicator 6.5c

Resilience of forest dependent communities to changing social and economic conditions

Rationale

This indicator provides a measure of the extent to which forest-dependent communities are able to successfully respond and adapt to change. Resilient forest-dependent communities will adapt to changing social and economic conditions, ensuring that they remain viable into the future.

Key points

- Dependence on the forestry industry as the primary source of employment has declined in some regions. Exceptions include areas of South Australia, East Gippsland in Victoria, and Tasmania.
- Populations in many forest-dependent regions are static or declining in line with a general trend in rural Australia, with the exceptions of Mount Gambier, Orbost, Oberon and Tumut, where populations have increased marginally. The number of working-age people is also declining in many regions.
- Areas near larger population centres, such as Mount Gambier, appear to have greater resilience than others because of their larger economic base, greater economic diversity and alternative employment opportunities.
- The growing investment in timber production and processing from plantations is becoming an increasingly important factor in forest-dependent communities.

Assessing the extent to which communities with high economic and social dependence on forests and forest-related industries can adapt to and manage change is a way of gauging forest management sustainability.

The focus of this indicator is on native and plantation wood production forests, which cover approximately 20% of Australia's total forest area. Data are sourced from the ABS censuses of population and housing for 1996 and 2001.¹⁴ Because it uses relatively old census data, the analysis presented here does not capture significant recent changes that are known to have occurred in some regions, such as Tumut (New South Wales) and the Huon Valley and Smithton (Tasmania).

Regions with significant dependence on the Australian wood production and processing sector have been identified by statistical local area (SLA – a unit of aggregation used by the ABS; see Figure 94).¹⁵ Table 105 presents data useful in assessing the dependence, vulnerability and resilience of those regions and the change in those factors between 1996 and 2001. The dependence of forest users outside the wood sector, such as harvesters of non-wood forest products, graziers, apiarists and tourism operators, and the indirect or flow-on employment generated by the demand for goods and services from the plantation industry, are less easily quantified and are not assessed here.

¹⁴ The results of the 2006 census were not available at the time of report preparation. Updated assessments of the social and economic conditions of forest-dependent communities based on the 2006 census are currently being prepared by BRS.

¹⁵ Using the ABS categories 'forestry and logging', 'forestry support services', and 'wood and paper product manufacturing'.

Australian forest industry communities

The sustainability of forest industry communities is a function of their dependence on the industry, their vulnerability and their resilience.

Dependence

Direct employment in the wood production and processing sector gives a good indication of a community's economic dependence on the forest industry. ABS data suggest the following:

- Dependence on the forestry industry as the primary means of employment has declined in some regions. Exceptions include areas of South Australia, East Gippsland in Victoria, and Tasmania.
- Declining employment can be attributed to broader rural population decline as well as to changes in the forestry sector, which include reduced native forest harvesting and labour requirements and the increased efficiency of plantation processing.

Vulnerability

The vulnerability of forest-dependent communities to change (e.g. in forest allocation and use) can be indicated by population size, age distribution and mobility:

- **Static or declining population.** This has occurred in most highly dependent SLAs, with the exception of Mount Gambier, Orbost, Oberon and Tumut, where populations increased marginally.
- **Declining working-age (15–64 years) population.** This has also occurred in most highly dependent SLAs, although some, such as Oberon (+4.1%), saw an increase.
- **High population mobility.** This can affect the fabric of communities positively (an area may be attracting new people to live and work) and negatively (people may be leaving the area in search of education or employment opportunities). Mobility can be measured by the number of respondents with a different address in consecutive censuses. Oberon, Wattle Range East and Grant showed particularly high mobility between the 1996 and 2001 censuses.

Resilience

The resilience of forest-dependent communities – their ability to absorb and bounce back from the effects of change – may be shaped by a number of factors, including the following:

- **Population change.** Forest-dependent areas follow the general trend in rural Australia of declining populations. Areas with larger population centres, such as Mount Gambier, appear to have greater resilience than others because of their larger economic base, greater economic diversity and alternative employment opportunities.
- **Population mobility.** Higher mobility could mean a greater ability to adapt or, alternatively, a general lack

of commitment to an area. For example, relatively high mobility in Gympie and Copmanhurst is possibly more a reflection of the increasing attraction of coastal living, particularly along the more densely populated east coast of Australia.

- **Post-school qualifications.** A higher proportion of people with post-school qualifications indicates a greater capacity for learning and therefore an increased ability to adapt to new situations and changing employment opportunities. The number of higher qualifications is particularly high in areas closer to universities (such as La Trobe University in central Victoria).
- **Dependent population.** The working-age population in areas with relatively low numbers of dependents (children and the elderly) has a lower economic burden to bear.
- **Unemployment.** This is strongly influenced by other economic processes. Higher unemployment generally means lower resilience to further shocks, such as decreasing employment in the forest sector.
- **Historical response to change.** Communities with a proven ability to deal with the effects of change have greater self-belief and, therefore, a stronger capacity to adapt to further change.

Social resilience can also be affected by other, less readily measured factors, such as relationships within a community and the attitudes and values that shape how changes are perceived. Typically, such information must be collected through surveys, focus groups and other methods on a case-study basis.

Figure 94: Employment dependence in the wood and wood processing sectors in selected statistical local areas, 2001

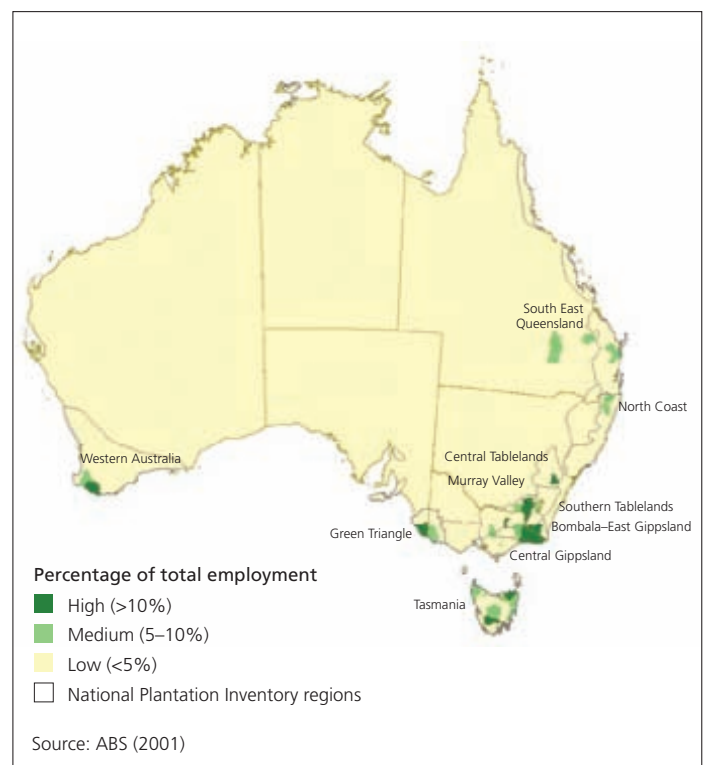


Table 105: ABS 2001 census data for statistical local areas with high (>5%) regional employment dependence on the forestry industry

SIA	% Forest industry employment, 2001 ^a	% Change forestry industry employment 1996–2001	% Population change, 1996–2001 ^b	% Age dependency, 2001 ^c	% Change in working age, 1996–2001 ^d	% Different address, 1996–2001 ^e	% Higher qualification, 2001 ^f	% Unemployment, 2001 ^g
Australian Capital Territory								
Gungahlin–Hall	8.6	–	3.7	24.4	31.3	–	–	–
Remainder of ACT	5.6	–41.7	1.9	62.8	6.6	38.8	31.9	2.7
New South Wales								
Oberon	18.7	–34.4	1.0	53.3	4.1	21.4	5.8	7.0
Turnut	15.7	–28.7	0.4	59.0	2.5	15.5	6.6	6.8
Bombala	15.7	–43.8	–3.4	58.6	–17.1	13.8	6.3	6.3
Tumbarumba	13.4	–45.1	–0.3	56.4	–1.4	15.3	6.6	5.2
Copmanhurst	8.1	14.7	0.8	56.3	4.6	28.3	6.5	13.2
Kyogle	7.2	–22.0	–1.1	65.0	–4.8	17.7	6.7	13.4
Holbrook	7.2	62.2	–1.6	66.0	–5.1	16.7	7.1	3.8
Queensland								
Eidsvold	9.6	16.3	–0.9	51.9	0.5	26.1	5.3	5.3
Cooloola (excluding Gympie)	6.8	–20.7	1.5	55.4	8.4	29.4	5.6	11.6
Cooloola – Gympie only	6.6	–4.2	–0.1	63.2	0.9	26.7	6.3	10.4
Bungil	5.7	–3.0	0.1	54.3	1.8	27.9	6.1	1.5
Tiaro	5.5	–9.9	1.0	50.9	5.2	33.1	4.0	20.1
Woocoo	5.3	15.6	0.6	52.1	3.1	27.9	5.8	8.8
South Australia								
Wattle Range–West	19.4	–15.4	–0.8	56.3	–2.7	12.1	4.3	6.8
Mount Gambier	15.4	6.7	0.6	54.5	2.7	18.8	6.4	6.9
Wattle Range–East	13.2	–20.9	–0.7	51.5	–0.3	18.2	7.5	3.3
Grant	13.1	10.1	–0.1	46.1	1.4	23.3	5.6	5.4
Tasmania								
Dorset	17.0	–9.6	–0.3	61.7	–0.5	13.3	5.7	7.0
Derwent Valley – Pt B	13.5	–1.4	–1.5	42.7	–3.5	25.2	5.5	13.8
Derwent Valley – Pt A	11.9	–38.6	–1.0	58.3	–6.4	17.6	3.3	14.0
Burnie – Pt B	9.8	–43.9	–1.1	47.2	–3.0	21.9	5.4	10.4
Launceston – Pt C	8.7	–2.0	–0.7	46.7	–2.0	19.3	7.8	9.9
Glamorgan/Spring Bay	8.5	–31.5	0.1	58.1	–1.7	21.5	6.7	10.9
Circular Head	7.9	0.4	–1.0	54.3	–4.4	9.9	4.1	7.9

Table 105: ABS 2001 census data for statistical local areas with high (>5%) regional employment dependence on the forestry industry *continued*

SLA	% Forest industry employment, 2001 ^a	% Change forestry industry employment 1996–2001	% Population change, 1996–2001 ^b	% Age dependency, 2001 ^c	% Change in working age, 1996–2001 ^d	% Different address, 1996–2001 ^e	% Higher qualification, 2001 ^f	% Unemployment, 2001 ^g
Break O'Day	7.3	-26.7	-0.3	58.5	-0.5	22.6	6.0	16.3
Waratah/Wynyard – Pt A	5.7	-13.3	-0.4	61.5	-2.1	18.6	6.0	12.1
West Tamar – Pt B	5.4	39.0	-0.4	44.5	0.9	23.4	8.3	8.8
Central Highlands	5.4	-66.7	-1.5	50.4	-7.4	20.7	5.9	11.8
Victoria								
Alpine–West	15.6	-13.3	-1.0	60.9	-5.7	15.4	6.9	6.7
East Gippsland–Orbost	11.6	7.5	0.2	60.4	1.3	19.9	7.5	8.6
Latrobe–Traralgon	7.6	1.6	0.7	52.5	4.5	17.6	9.5	9.1
Glenelg–North	6.6	-5.4	-1.7	71.9	-9.0	14.6	5.2	4.7
Yarra Ranges – Pt B	5.9	45.5	-6.8	60.1	-23.7	31.8	8.0	7.8
East Gippsland Bal	5.6	10.2	-2.5	55.7	-10.3	22.1	8.3	7.4
Delatite–Benalla	5.5	22.1	0.1	69.7	1.1	21.4	6.7	8.8
Colac–Otway–Colac	5.4	-11.9	0.2	69.4	1.0	18.2	5.3	6.3
Murrindindi–East	5.2	12.7	0.5	59.8	4.7	23.7	10.6	6.2
Western Australia								
Manjimup	14.3	-13.0	-0.3	58.0	-2.2	18.1	7.8	4.5
Bridgetown–Greenbushes	8.8	-42.5	0.1	53.4	2.8	26.9	9.3	6.8
Nannup	7.1	-62.2	0.9	44.8	10.8	28.2	8.8	7.9
Donnybrook–Balingup	5.4	-21.9	1.4	52.3	9.8	27.1	8.2	5.4

a Proportion of total people employed in the forestry industry (forestry and logging, forestry support services, wood and paper product manufacturing), 2001.

b Average annual population change, 1996 to 2001.

c Total dependency ratio, 2001 (ratio of children aged 0–14 years and elderly aged 65+ years to the working-age population aged 15–64 years).

d Change in the proportion of working-age (15–64 years) people, 2001.

e Proportion of the population who live in an SLA different from the one they lived in five years previously.

f Proportion of the population with a bachelor degree or higher qualification, 2001.

g Proportion of the labour force not employed, actively looking for work, 2001.

Note: Results of the 2006 census were not available at the time of report preparation.

Source: ABS (2001)

The changing nature of the Australian forest industry

The Australian forest industry has changed significantly in recent years. For example, there has been a shift in timber production from native forests to production from plantations, which affects both the character and location of the wood processing sector; usually it means that wood production is more intensive and products are more uniform. In addition, some public plantation forests have been privatised, and there has been greater international investment in plantation forests and processing.

These changes have affected communities in different ways. On the southwest slopes of New South Wales, for example, the populations of towns with large-scale plantation-processing facilities have tended to grow or remain stable, while those without such facilities have often diminished. Other towns that once relied on timber production from native forests have needed to adapt to a reduction in the scale of harvesting.

Increasingly, employees in the forest sector are able to travel long distances to their places of work. In effect, this means that even if a forest industry is based in a small town its employees might live elsewhere, perhaps in a larger regional centre. Alternatively, processing facilities may be located some distance from the resource, nearer to regional centres that provide pools of human resources as well as markets for products.

References

ABS (2001), Davidson et al (2008) (list at the back of the report).

Case study 56: High forestry industry dependence in South Australia's part of the Green Triangle

Comprising the large regional centre of Mount Gambier and many smaller localities, South Australia's part of the Green Triangle is one of the most forest-dependent regions in Australia, with the forest industry providing 13% or more of total direct employment.

Between 1996 and 2001, forest industry employment grew by more than 10% in Mount Gambier and the neighbouring municipality of Grant; population mobility and the number of working-age people also increased. In contrast, forest industry employment declined by more than 15% in the Wattle Range East and Wattle Range West SLAs, where the proportion of non-working-age people increased and population mobility decreased. Considering the predominance of low-income households (18%), a relatively high unemployment rate (7%), smaller population base, dependence on the working-age population (56.3%) and fewer employment opportunities outside the sector, Wattle Range may be less resilient than Mount Gambier and Grant to continued change in the industry.

Source: Bureau of Rural Sciences



Harvesting pines in the Green Triangle, South Australia.

Indicator 6.5d

Resilience of forest dependent Indigenous communities to changing social and economic conditions

Rationale

This indicator provides a measure of the extent to which forest-dependent Indigenous communities are able to respond and adapt to change successfully. Resilient forest-dependent Indigenous communities will adapt to changing social and economic conditions, ensuring their sustainability into the future.

Key points

- The recognition of native title through mechanisms such as Indigenous land-use agreements strengthens the potential value of forests for Indigenous people.
- Most state and territory land management agencies have targets for Indigenous employment, helping to build capacity in Indigenous communities and therefore resilience.

Current employment levels and extensive oral history research indicate that fewer Indigenous people are employed today in forestry or forest-based industries in southeastern Australia than were employed in the mid-20th century. This is due to a combination of factors, including improved technology and increased mechanisation (which mean less employment per unit of production across the sector), stricter requirements for skills and education, and the availability of alternative sources of income, including welfare.

Conversely, there has been a significant increase in the number of Indigenous people employed in forest-related conservation and natural resource management. Most state and territory land management agencies have targets for Indigenous employment; for example, about 15% of staff in the New South Wales Department of Environment and Climate Change are Indigenous. Special mentoring and training programs assist in reaching these targets. The majority of natural resource management committees have Indigenous representatives; participation in the committees and employment in land management agencies build capacity and therefore resilience.

Forest dependence

Measuring forest dependency in relation to Indigenous people is difficult because of the influence of welfare payments and Community Development Employment Program (CDEP) income.¹⁶ Forest dependence has differing levels of intensity and economic, social and cultural dimensions.

Table 106 summarises data compiled from the 1996 census as part of the social assessment phase of two regional forest agreement processes in New South Wales, for the Lower North East and Upper North East regions. Industry employee profiles suggest that Indigenous employment in hardwood processing in the two regions was above what would be expected, given the proportion of Indigenous people in the wider community. This may reflect the presence of a local CDEP project targeting forest employment and is not necessarily representative of other forest regions. Nevertheless, it shows that the timber industry is a substantial employer of Indigenous people.

Conventional descriptions of the dependence of Indigenous people on forests have often focused on cottage industries, such as arts and crafts. In practice, however, Indigenous involvement is much broader, including timber processing (Case study 57), plantation management, agroforestry, heritage surveys of crown timber production forests, and ecotourism (Case study 58). Other economic enterprises include the collection and sale of fuelwood, contract road building, the manufacture of fine furniture, charcoal-burning and nursery management.

¹⁶ The CDEP program makes up part of the Australian Government's 'work for the dole' program, which, according to one survey (Morphy and Sanders 2001), accounts for 38% of income in Indigenous communities.

Table 106: Indigenous employment in the timber industry in Upper and Lower North East RFA areas, New South Wales (%)

Regional forest agreement catchment	Indigenous people in total population	Indigenous people in hardwood mills	Indigenous people in hardwood processing	Indigenous people as contract employees (bush crew)
Lower North East	1.9	4.5 (Survey sample 1)	2.4	–
		12 (Survey sample 2)		
Upper North East	2.8	3.5	–	3

Source: Brooks et al (2001)

Most Indigenous people, even those living significant distances away, are likely to have some cultural dependence on forests, particularly where the forest is part of the traditional country for which a particular group has customary responsibility. Native forests are places where new generations of Indigenous people can learn about cultural practices and laws. Access to the forests is critical for the continuation and maintenance of cultural values; conversely, loss of access to or use of forests and their products may lead to a diminution of culture and therefore of resilience.

Native title rights and interests over Crown native forests are increasingly being recognised. Such recognition is difficult to quantify but generally occurs through partnerships and negotiated outcomes for the ongoing use of the land, often through Indigenous land-use agreements (ILUAs) negotiated under the national *Native Title Act 1993*. For example, the Githabul ILUA is an agreement between native-title holders and the New South Wales Government for access to and use of multiple-use public forests and national parks in the northern part of the state. It includes access to over 112,000 hectares in 10 national parks and 13 state forests, the freehold transfer of 102 hectares of public land, and job creation within the Department of Environment and Climate Change. The recognition of native title through mechanisms such as ILUAs strengthens the role of forests in assisting Indigenous people to pursue forest-based economic independence.

Resilience

Indigenous systems of kinship confer resilience at individual, family and community levels. Resilience is not related just to economic status; it is influenced by personal, family and community health and wellbeing and the ability of a community to access its country and to engage in and teach cultural practices. Poor health reduces resilience, as do low levels of education, training and job readiness. Addressing health and education and maintaining and increasing access to traditional lands are therefore fundamental to the future prosperity of Indigenous communities.

Generally, the most resilient Indigenous communities are those in which economic development occurs in the context of customary values and laws. However, applying those values and laws can be difficult in the face of pressures to meet demand and apply modern technology. Adaptability requires the proper use of customary knowledge in the modern economy. Sometimes, greater resilience may be achieved by separating the economic business from social activities.

References

Annandale and Taylor (2007), Brooks et al (2001), Egloff et al (2005), Koenig et al (2005), Morphy and Sanders (2001) (list at the back of the report).

Case study 57: Nanum Tawap sawmill, Weipa, Cape York Peninsula

Nanum Tawap, a company operating a sawmill near Weipa on the Cape York Peninsula, is owned and managed by the five major Indigenous clan groups of the wider Napranum–Weipa area. The venture, which has been made possible by collaboration between mining company Comalco, the Queensland Government and Nanum Tawap, uses timber salvaged from Comalco’s bauxite mining lease and employs about five local Indigenous men.¹⁷

Comalco has been extracting bauxite on Cape York Peninsula since 1955. Before the establishment of Nanum Tawap, the forests on the mining lease were cleared and burned.

With potential domestic and overseas markets, Nanum Tawap has access to enough timber to keep the sawmill operating for the foreseeable future. There are also proposals to expand the existing mill and to establish sawmills in nearby communities, as well as to construct a plant for further processing at a nearby regional centre.

¹⁷ Annandale and Taylor (2007).

Case study 58: Forest-based ecotourism

Umburra Cultural Tours, based on the south coast of New South Wales, is run by the Yuin people of Wallaga Lake. The operation offers a range of cultural activities, including guided tours of two culturally significant mountains, known as Biamanga and Gulaga.

The Biamanga and Gulaga national parks were proclaimed in 1994 and 2001, respectively, after Indigenous people fought to halt logging in the area, believing that it was destroying the cultural values of the mountains. In 2006, the ownership of the area was returned to the Yuin people, who lease the national parks back to the National Parks and Wildlife Service and jointly manage them through two boards of management.

The ecotourism experience provided by Umburra Cultural Tours is centred on the forest-covered mountains and involves guided tours by Indigenous owners. The cultural significance of the landscape is revealed using traditional storylines and customary knowledge. Forests also provide the physical setting for the Umburra Cultural Centre, where a wide range of customary activities are demonstrated for tourists.

Sources: Egloff et al (2005), www.umburra.com.au/culture.htm