

# 6.1

PRODUCTION  
AND CONSUMPTION

## INTRODUCTION

These six indicators are concerned with the supply, consumption, recycling and value-adding of wood and other forest products. The indicators consider the volume of these products and their value to the economy.

The total value of primary forest production has increased in the last five years, and stood at nearly \$1.3 billion in 2001. The estimated value of the country's standing timber is about \$10.6 billion. In addition, forests provide other vital benefits that are less easily measured. For example, many of metropolitan Australia's water supply catchment areas are in forests. For example, forests in water supply catchment areas are integral to maintaining water quality. Indigenous people maintaining customary lifestyles gain a large proportion of their non-cash income from forests. The production and consumption of forest-related products play an important part in the country's economy and in meeting the socio-economic needs of society.



Stacking jarrah boards for export, Greenbushes, south west Western Australia

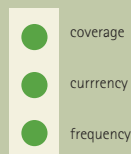
## Wood product values and volume

### Indicator 6.1a

Value and volume of wood and wood products production, including value added through downstream processing

#### Rationale

Enables socio-economic benefits to be monitored by ascertaining trends in value and volume of wood production against management objectives.



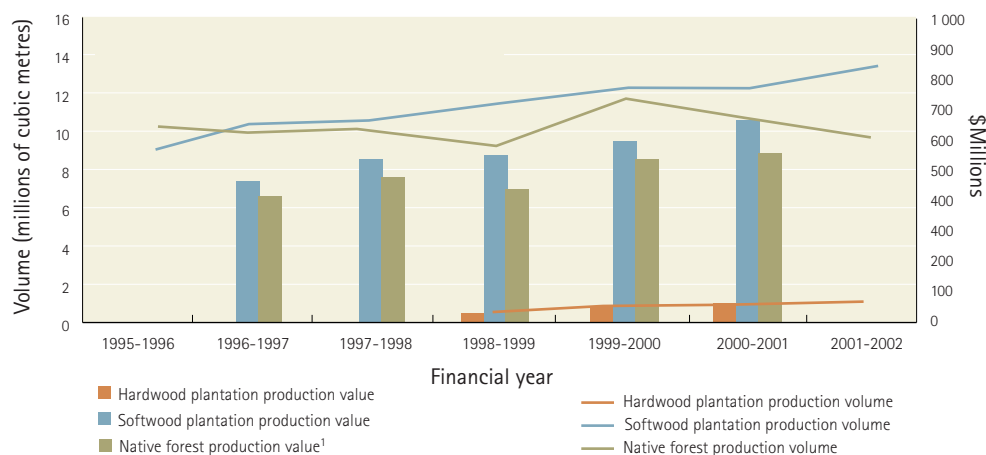
*The value of logs harvested from Australia's native forests and plantations has increased significantly. Australia is a net importer by value of wood and wood products and, since 1995–1996, a net producer and exporter by volume. The volume of sawnwood produced has increased significantly due to production from softwood plantations. Production and exports of wood based panels and woodchips has increased significantly. Australia remains a net importer of pulp and paper products.*

The *value* of timber in plantations and native forests is reported in the National Accounts. The volume of production of wood and wood products and the value of products imported and exported are available. However, data on the *value* and *value-added* of domestic production are not publicly available.

In 2000–2001, the National Accounts reported the estimated value of timber in plantations and native forests at \$10.6 billion (ABS 2001). In real terms, the value of timber in plantations increased from 70 per cent of the total value in 1991–1992 to more than 77 per cent in 2000–2001. This is due to the increasing area and maturity of plantations.

In the five years from 1996 to 2001 the estimated combined value of native and plantation logs harvested rose in real terms from \$894.2 million to \$1.3 billion (Figure 50). During this time, the volume from plantations increased, while the production from native forests declined slightly. This trend will become more evident in the future as plantations mature and native forests contribute less to production. The volume of softwood plantation timber harvested increased from 9 million cubic metres in 1995–1996 to 13.5 million cubic metres in 2001–2002. The volume of hardwood plantation harvested increased from 580 000 cubic metres in 1998–1999 to 1.11 million cubic metres in 2001–2002, representing an increased harvest of over 90 per cent.

Figure 50: Estimated real value and volume of logs harvested from native and plantation forests



Source: ABARE (2002a), ABARE (2003)

Notes: Real value is calculated using the Wood and Wood Product Price Index; the base year for this index is the 2001-2002 financial year

<sup>1</sup> Native forest production value figures for 1996-1997 and 1997-1998 include small amounts of hardwood plantation production value

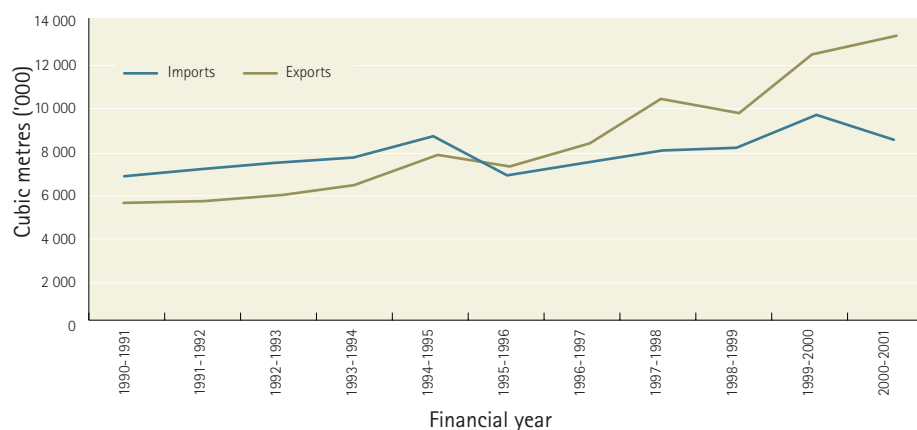
In volume terms, Australia has become both a net producer and a net exporter of timber since 1995-1996 (see indicator 6.1c and Figure 51 below). However, in value terms, Australia imports more wood and wood products than it exports—by about \$1.7 billion per year. This imbalance is because exports are primarily low value raw materials, in particular woodchips, but imports are primarily high value wood manufactures, such as paper products. This pattern continues that reported in the 1998 State of the Forests Report.

The production of major wood and wood products over the past decade is summarised in Table 72. This shows an increased processing capacity in the industry, which suggests a considerable increase in Australian competitiveness in the production of sawnwood and woodbased panels. Further evidence is provided by the decreasing contribution of woodchip exports to the total value of exports, from 57 per cent in 1991-1992, to 38 per cent in 2001-2002. Furthermore, in the last decade there has been an expansion in Australia's exports of wood products, in particular woodbased panels, and a growth in the proportion of paper and paperboard exports (from 10 per cent in 1990-1991 to 19 per cent in 2000-2001).



Skateboards built from Australian timbers at East Gippsland Forestech, Victoria

Figure 51: Volume of wood traded in gross roundwood equivalents



Source: ABARE (2002a)

Note: Gross roundwood is the volume of logs actually removed from the forest. 'Equivalent' refers to the estimated volume that is required to make a specific forest product

## Sawnwood

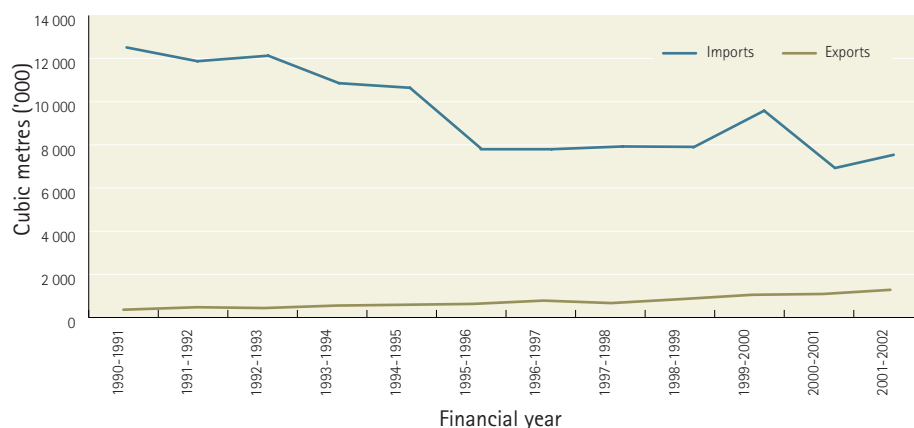
The volume of sawnwood produced has increased by over 30 per cent in the ten years to 2002. Softwood sawnwood production increased by 80 per cent in that period while hardwood production declined by 30 per cent (Table 72). Increased sawnwood production has displaced imports, which decreased by 40 per cent in ten years. Exports of sawnwood increased five-fold, although the volumes are relatively small (Figure 52).

Table 72: Production of wood and selected wood products

Commodity	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sawnwood ('000 m³)										
Softwood	1 660	1 898	2 118	2 054	2 1120	2 338	2 338	2 637	2 351	3 011
Hardwood	1 440	1 533	1 555	1 406	1 424	1 328	1 268	1 346	1 174	1 108
Wood based panels ('000 m³)										
Plywood	122	138	145	131	151	170	169	192	157	201
Particleboard	726	828	864	826	790	882	902	978	904	965
Medium density fibreboard	318	421	436	377	434	501	495	621	712	732
Paper and paperboard ('000 tonnes)										
Newsprint	434	426	444	445	421	444	405	464	465	395
Printing and writing	396	386	365	351	364	424	497	535	554	624
Household and sanitary	165	170	173	180	181	191	187	232	204	198
Packaging and industrial	1 164	1 255	1 312	1344	1 452	1 483	1 475	1 605	1 449	1 679

Source: ABARE (2002b)

Figure 52: Trade in sawn timber

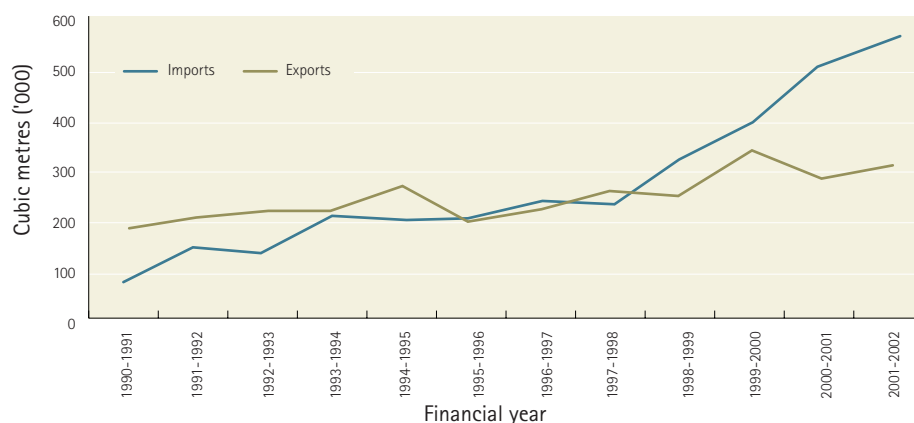


Source: ABARE (2002a)

## Wood based panels

Production of wood based panels increased by over 70 per cent in the ten years to 2002 (Table 72). The volume of wood based panels exported has exceeded imports since 1997–1998 (Figure 53). This is mainly due to exports of medium density fibreboard, which have increased four-fold and now exceed domestic consumption. The value of wood based panel exports has therefore increased from 6 per cent to 11 per cent of the total earnings from wood and wood products and totalled \$216 million in 2001–2002.

Figure 53: Trade in woodbased panels

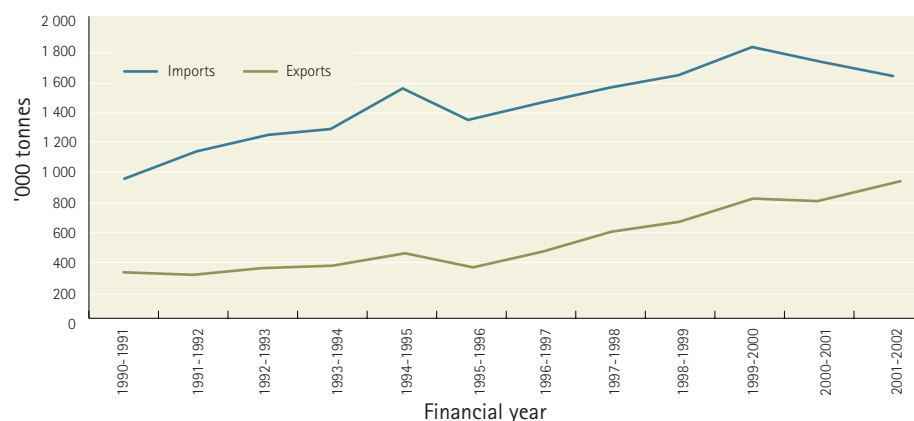


Source: ABARE (2002a)

## Paper, paperboard, wastepaper and pulp

Production of paper and paper products has increased by over 30 per cent in the past ten years. Despite this increase, pulp and paper products continue to be a major contributor to Australia's trade deficit in wood and wood products. Over the past decade, imports of paper and pulp products have accounted for an average of 69 per cent of the total value of imports of wood and wood products. The value of paper and pulp product imports increased by 54 per cent (from \$1.6 billion to \$2.4 billion) in the ten years to 2001–2002. On the other hand, the value of exports increased by 166 per cent (from \$276 million to \$735 million) over the same period (Figure 54 and Table 72).

Figure 54: Trade in paper, paperboard waste paper and pulp

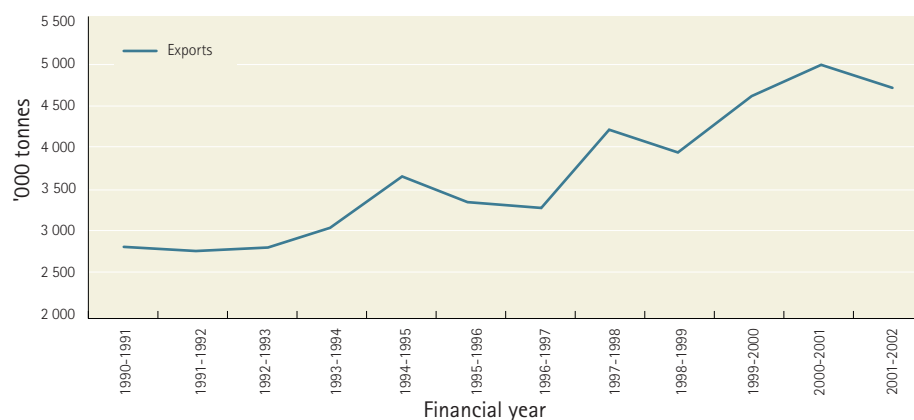


Source: ABARE (2002a)

## Woodchips

Woodchip exports are a major component of Australia's trade in wood and wood products, and have expanded in volume over the last decade. In 2001–2002 the volume of woodchips exported was 4 722 000 tonnes, valued at \$712 million (Figure 55). Over the same period, the contribution of woodchip exports to the total value of wood and wood product exports decreased from 52 per cent to 38 per cent.

Figure 55: Trade in woodchips



Source: ABARE (2002a)

Note: Imports of woodchips have ranged from 0.05 Kt in 1990–1991 to 3.1 Kt in 2000–2001. These figures are too small to be depicted at the scale above.

## Further reading

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coverage



currency



frequency



## Non-wood product value and quantities

### Indicator 6.1b

#### Value and quantities of production of non-wood forest products

##### Rationale

Enables socio-economic benefits to be monitored by ascertaining trends in value and quantities of non-wood production against management objectives.

*There are several products, apart from wood, that come from Australian forests. These include minerals, water, honey, various animal products (meats and skins), plant oils, grazing opportunities, native wildflowers and some bush foods.*

Forests and trees provide a broader range of products and services than simply wood and wood-products. This indicator deals specifically with these non-wood forest products. The annual removal of non-timber forest products is more fully described in indicator 2.1e. Supply and consumption of non-wood products are captured in indicator 6.1f.

### Minerals

Data about mining in forests are hard to separate out, as most figures apply to mining on forested and non-forested land together. Mineral extraction in general is a major economic enterprise in Australia, and accounts for a significant portion of the country's export earnings.

### Water

A large portion of the water consumed in the highly populated regions of Australia originates in forested catchments. As well as its use for domestic consumption, water from forested catchment areas is essential for many industries and agriculture.

Several forest ecosystems in Australia—for example, river red gums (*Eucalyptus camaldulensis*) and mangroves—are dependent upon water availability for regeneration and health. The impact of agricultural activities, land clearing and forest management on water quality and quantity is an increasingly important issue for Australia.

### Bee-keeping and honey

The apiary industry in Australia is significant in servicing domestic and overseas markets. Products supplied by the industry include honey, beeswax, queen bees (for new colonies), royal jelly and pollen.

The apiary industry is highly dependent on native forests. Victorian data, for example, suggest that 75 per cent of that State's apiary industry uses forest areas for production. Across Australia in 2000–2001, almost a quarter of the honey produced came from public forests. In addition, these areas provide a safe feeding area for rebuilding the strength and health of hives. States and Territories have different restrictions on the production of apiary products in multiple-use forests and nature conservation reserves.



Changes in land tenure such as transfer from multiple-use forests to nature conservation reserves, which can become protected and unavailable for commercial bee keeping, or changes in forest species composition have the potential to impact on honey production.

Tables 73 and 74 summarise the production of the apiary industry in Australia. New South Wales produces substantially more bee-related products than other States or Territories.

Table 73: Beekeeping (year ended June 2001)

Beekeeping	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Beekeepers (no.)	n.p.	407	n.p.	200	100	28	174	59	971
Productive ('000)(a)	n.p.	127	n.p.	39	36	12	57	17	289
Unproductive ('000)	n.p.	30	n.p.	20	3	2	6	5	68
Total ('000)	n.p.	157	n.p.	59	40	14	63	23	357
Beeswax (t)	n.p.	209	n.p.	47	53	12	76	33	430

Source: Australian Bureau of Statistics (2002)

Note: Australian Bureau of Statistics' data for Victoria refer only to full-time beekeepers, although part-time beekeepers contribute to a large percentage of the industry.

n.p.: no producers

This trend is also evident in Table 74, which shows honey production by State and Territory. In addition, the sale of bees and beeswax are each worth \$3–4 million nationally.

Table 74: Honey production by State and Territory

Honey produced	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
2000								
Quantity produced (t)	n.p.	8 775	n.p.	2 069	3 008	944	4 971	1 596
Gross value (\$m)	n.p.	14.5	n.p.	3.4	5.1	2.0	8.3	2.7
Gross unit value (\$/kg)	n.p.	1.7	n.p.	1.6	1.7	2.1	1.7	1.7
1999								
Quantity produced (t)	n.p.	8 921	n.p.	3 287	1 959	686	2 477	1 508
Gross value (\$m)	–	15.1	–	5.5	3.3	1.4	4.2	2.5
Gross unit value (\$/kg)	1.5	1.7	1.5	1.7	1.7	2.0	1.7	1.7
1998								
Quantity produced (t)	n.p.	8 232	n.p.	3 721	3 274	741	4 266	1 781
Gross value (\$m)	–	13.7	–	6	5.7	1.4	7.3	2.7
Gross unit value (\$/kg)	–	1.7	–	1.6	1.7	2	1.7	1.5

Source: Australian Bureau of Statistics (2002)

n.p.: no producers

## Animal products

Animal products from forests include game meat from wallabies, kangaroos, wild boar (*Sus scrofa*) and deer; skins from brush tailed possums (*Trichosurus vulpecular*) and kangaroos (*Macropus* spp.); and carcasses from brush tailed possums. However, not all States and Territories permit commercial harvesting of native animals. Analysis suggests that commercial use of kangaroo, on both forested and cleared land, is the largest native animal industry in Australia.

The Indigenous customary economy, particularly in remote northern Australia, depends substantially on animals taken from forests. Recent research indicates that, in some locations, more than half of total protein intake continues to come from wild animals. Further detail about Indigenous use of animal and other products is provided below.

## Grazing

Grazing on public land is conducted under permits provided by district authorities. The process allows agisting of animals on a short-term basis with fees being paid per head. Excessive grazing can have negative impacts on forests. Policies for grazing differ between States and Territories.

## Vegetative bush foods

Examples of forest bush foods include quandongs (*Elaeocarpus grandis*), wattle seeds (*Acacia* spp.) and native herbs. A major factor in the success of marketing bush foods is their acceptance by the wider community. Recently, some bush foods have become available in supermarkets, but most bush foods are expensive for the consumer when compared with other similar products. Table 75 summarises some of the bush foods and products available in the Australian market.

Table 75: Native foods production

Species	Type	Total product used by processors, 1995–1996 (tonnes)
Bush tomatoes	Whole, dried	5.0
Illawarra plum	Fresh, frozen	2.5
Kakadu plum	Fresh, frozen	2.5
Lemon aspen	Fresh, frozen	3.6
Lemon myrtle	Dried, ground	2.5
Lemon myrtle	Whole leaf, dried	2.5
Muntries/munthari	Fresh, frozen	5
Native herbs	Dried Aniseed, Mint or Thyme	0.04
Native mountain pepper	Dried leaf and berry	2.5
Quandong	2nd grade dried halved	5.0
Riberry	Fresh, frozen	2.5
Warrigal greens	Fresh	0.22
Wattle seed	Clean, roasted	6.0
Wattle seed	Clean, roasted, ground	
Wild lime	Fresh, frozen	0.71

Source: Graham and Hart (1997)

## Eucalyptus and tea tree oil

Eucalyptus oil comes from a number of eucalypt species including the blue mallee (*Eucalyptus gamophylla*) and is used for a variety of purposes. These include medicinal, industrial (oils, solvents), as a perfume and for flavouring. Australia produces approximately 120 tonnes of eucalyptus oil per year (5–10 per cent of the world's supply), of which 60–70 per cent is exported.

Tea tree (*Melaleuca* spp.) oil is a commercial forest product, addressed in the following case study.

### Case study – Tea tree oil

Tea tree oil and its products are used for a variety of medicinal purposes and products including lip balm, soaps, shampoo, deodorant and toothpaste. Recently there has been extensive research into the properties of natural medicine and demand has risen.

Thursday Plantations, in northern New South Wales, is an Australian company trading tea tree oil products. The company currently has a projected turnover of \$22 million and expects to reach \$40 million by 2005. Such is the demand for tea tree oil products that Thursday Plantations has expanded internationally.

## Wildflowers

Wildflowers may be grown in controlled environments or picked from native woodlands. Each State and Territory implements its own policy for native flower picking. In Western Australia, for example, picking wildflowers is prohibited without a license.

Exporters are required to obtain authority from the Australian Government before entering the Australian native wildflower export market. In 1995, Australia produced between \$5 and \$6 million worth of wild flower and stem products of which \$1–2 million was consumed domestically leaving a large proportion for export. Western Australia exports the largest percentage of wild flower and stem products in Australia, contributing almost 60 per cent of the value of Australian exports annually (Table 76).

Table 76: Wildflower and stem products from Western Australia

	Wild: Crown Land	Wild: private land	Unknown source	Total bush harvest	Estimated value (\$)
Number of stems	13 608 000	7 881 000	1 574 000	23 063 000	3 053 000

Source: Karingal Consultants (1997)

## Seed

Tree seed plays a large role in planting forests for the future, and Australian tree seeds are also exported. Considerable expense may be incurred in financing the collection, storage, testing and despatch of seed. Collection is also a seasonal and extremely variable exercise. Many types of seed are also consumed as food.



Alpine ash (*Eucalyptus delegatensis*) seed, Orbost seed store, Victoria

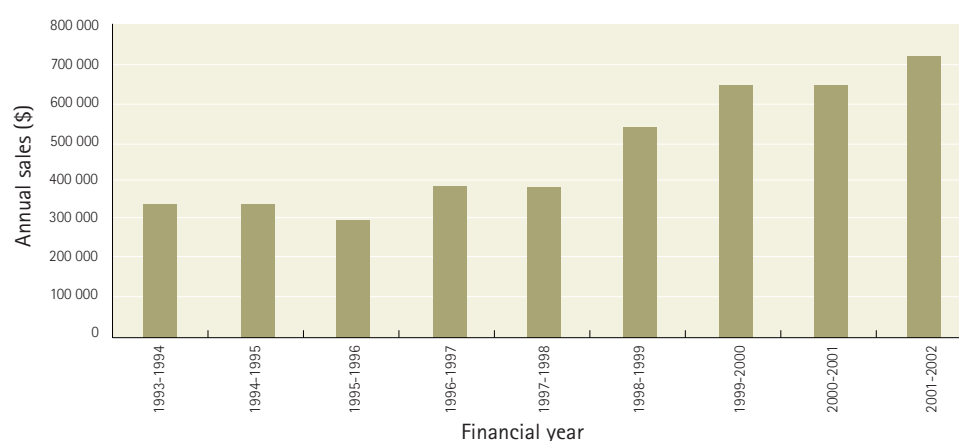
## Indigenous use

Indigenous people in many parts of the nation require access to wild plants and animals from native forests to maintain customary economic practices (see also indicator 6.1.f). However, in common with other segments of Australian society, they differ in their views of acceptable levels and modes of exploitation that have the potential to cause substantial change in forested landscapes. Some entirely reject enterprises that would cause significant change in biophysical structure or function, or that would conflict with customary obligations for management of land. Nonetheless, there is increasing and widely shared interest in exploring local enterprise based on commercial use of native plants and animals.

At present, production of Arts and Crafts is arguably the only forest-dependent industry in which Australia's Indigenous people play a decisive role. Most arts-based products, whether for customary or commercial use, include non-wood items (dyes, ochres, pigments, fibres) taken from forest or woodland sites. The industry and its spin-off social benefits (see indicator 6.1f) are fundamentally dependent on Indigenous access to healthy, floristically diverse forests. Many products also use woody (but non-timber) material, including bark for paintings, hollow limbs or stems for didgeridoo, and poles for carvings. Total national production of Indigenous visual art is estimated to be worth \$100–300 million per year, and is increasing. Whilst modest at the national level, this activity is critical in economically depressed, remote regions. Research on tourism in the Northern Territory indicates that 58 per cent of international visitors purchase Aboriginal arts and crafts (estimated at \$38 million in 2001–2002) or seek related cultural experiences. Most of this work is produced on land owned by Aboriginal people.

Recent trends in the value of arts production at one site in Central Arnhem Land are illustrated in Figure 56. Most of the materials used in the production of these artworks and crafts originate in forests. The income from these sales represents a large proportion of the cash income earned by 300–400 artists from a total adult population of less than 1 200.

Figure 56: Income from arts based on plant products, Maningrida region



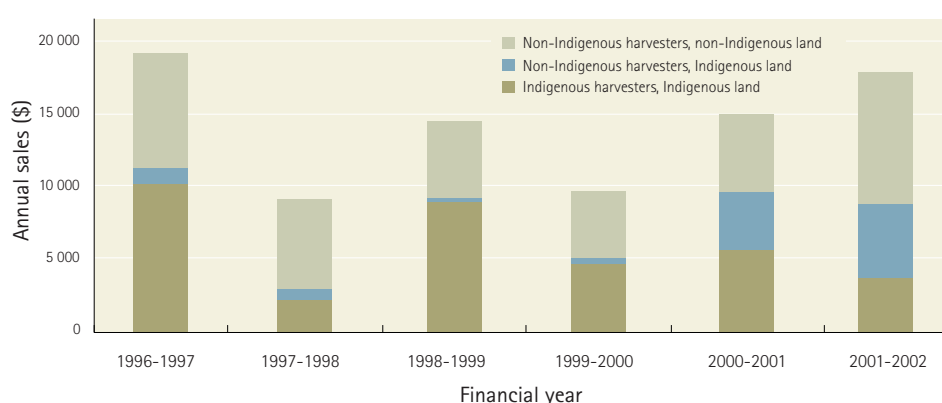
Source: Maningrida Arts and Culture

Other plant-based production includes harvest of whole plants (e.g. cycads and grass trees) and seeds for the nursery and landscaping trades. Most of these industries are presently small. Some native fruits (e.g. Kakadu plum *Terminalia ferdinandiana*) are harvested from the wild by both Indigenous and non-Indigenous people and there is scope for this use to expand. However, information on trends is difficult to obtain in this area and such imperfect data as are available rarely separate Indigenous from non-Indigenous use. Many Indigenous communities are actively exploring additional options, including supply of additional fruits and nuts to expanding native food markets and supply of botanical medicines. Economic

utilisation of such forest-based enterprise is likely to increase in the future as remote communities seek to develop sustainable economic bases.

Commercial harvests of animals by Indigenous people are also relatively small at present, but there is increasing interest in exploring a wide range of options. Examples include farming of crocodiles and freshwater turtles. Eggs are often taken from forested (*Melaleuca*) wetlands, where nests tend to be more successful because they are less likely to overheat than in open habitats. Lizards and snakes may be taken for the pet trade. These options are being most actively pursued in the Northern Territory under the Government's 'Strategy for Conservation through Sustainable Use of Wildlife'. Comprehensive information is difficult to obtain, except where use is authorised under formal species management plans, which usually require authorities to make data on use publicly available. Figure 57 shows figures on use of crocodiles in the Northern Territory. Approximately 60 per cent comes from Indigenous lands and an unmeasured, but substantial, proportion from swamp forests.

Figure 57: Crocodile eggs harvested in the Northern Territory



Source: Parks and Wildlife Service, Northern Territory

In addition to these direct harvests of non-wood products, Indigenous landowners and residents receive incomes from resource rentals paid in a variety of ways when non-renewable resources are extracted from their land. From 1997 to 2001 amounts paid to the Aboriginal Benefits Account established under the *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA) ranged from \$33.8 to \$38.0 million per year. In other States that lack the formal frameworks provided by the ALRA, arrangements are more *ad hoc* and often confidential. It is likely that resource rentals in Queensland and Western Australia also total several millions per year.

### Case study – Use of forests for Indigenous artwork

Aboriginal people in central Arnhem Land have over the last few decades expanded manufacture for commercial sale of a range of carvings based on distinct regional subject matters and styles. Larger carvings are created from stems of the tree *Bombax ceiba*, which occurs in relatively high densities in mostly small patches of rainforest or monsoon vine thicket scattered through the region's savanna landscapes. The species was mainly used in the past for dugout canoe manufacture and some other material culture. The carvings have proved to be commercially popular and artistically important, so that harvest for sale has risen to several hundred stems annually.

Studies completed to date suggest that risk of over-harvest at a regional scale is small, although there is some threat of local shortages, especially at more accessible sites close to the region's major township of Maningrida. Studies are continuing to develop a detailed population model for the species and to specify harvest limits.

## Further reading

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Warm temperate rainforest, New South Wales

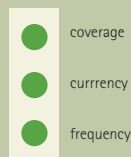
## Wood supply and consumption

### Indicator 6.1c

Supply and consumption of wood and wood products, including consumption *per capita*

#### Rationale

This indicator measures the trends in the consumption of wood and wood products in Australia, and the sources of supply. It also illustrates the ability of Australia's forests and timber industries to meet society's demand for wood products, and the demand pressures faced by Australia's forest resources.

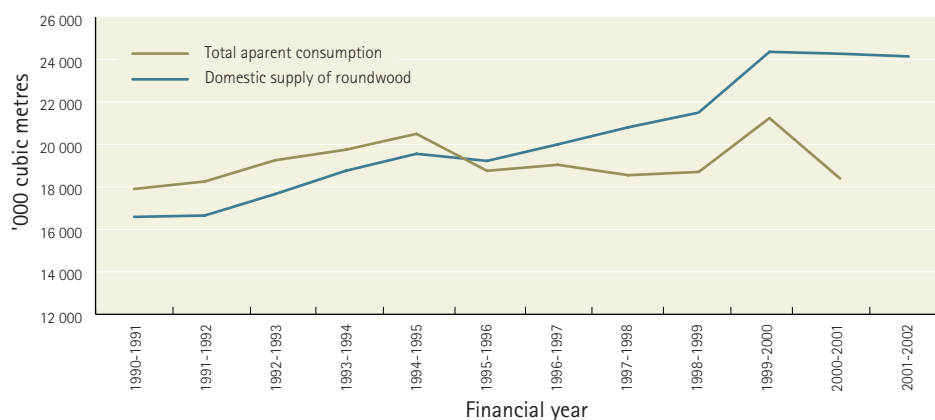


*Domestic supply of wood and wood products in Australia has increased over the past decade, largely due to the maturing softwood plantation estate. While the total consumption has fluctuated, it has increased slightly over the past decade. Consumption per capita, however, has fallen due to population growth and some substitution away from timber products in the housing sector.*

Domestic supply of wood and wood products has increased over the last decade (Figure 58). This has been due largely to the maturing softwood plantation resource, which provides an additional source of wood to native forests. Substitution of wood from native forests by plantation wood is a feature of the domestic market and is likely to continue into the future as Australia's plantation resource continues to develop.

Despite cyclical fluctuations, the total consumption of wood and wood products in Australia has increased slightly over the past decade (Figure 58). *Per capita* consumption, on the other hand, has declined over the past 20 years (Figure 59). This is largely attributed to population growth and some substitution of wood products in the construction industry with non-timber products that offer a range of advantages other than price.

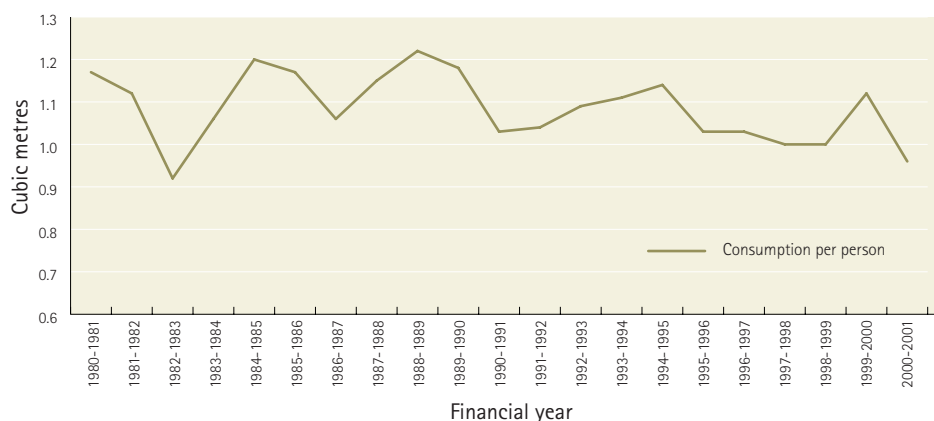
Figure 58: Apparent consumption of wood and wood products; domestic supply of roundwood



Source: ABARE (2001c)

Notes: 'Apparent consumption' is an estimate of national level of consumption; it is the sum of total production plus imports minus exports. 'Production' does not include firewood



Figure 59: *Per capita* consumption of wood products

Source: ABARE (2001c)

There is a clear trend towards import replacement in the consumption of sawn timber and woodbased panels, but imported high value paper and paper products continue to provide a significant share of domestic consumption. In 2001–2002, the total value of imports was \$3578.4 million with 68 per cent attributed to paper, paperboard, paper manufactures, wastepaper and pulp imports.

In 2000–2001, Australia's apparent consumption of paper and paperboard was 3.7 million tonnes, equivalent to 192 kilograms per person. Imports of paper and paper products in 2000–2001 were more than double those in 1990–1991, and it is expected that consumption will increase in the near future, in line with rising incomes.



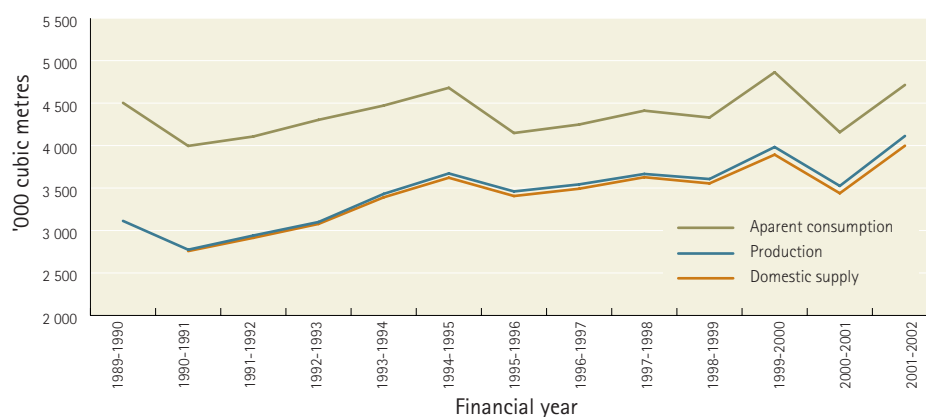
Radially sawn timber weatherboard house



## Sawnwood

Domestic supplies of sawnwood have been increasing over the last 10 years (Figure 60), with a trend towards import replacement. The proportion of demand met by domestic supply rose from 56 per cent in 1990–1991 to 79 per cent in 2000–2001.

Figure 60: Apparent consumption and production of sawnwood



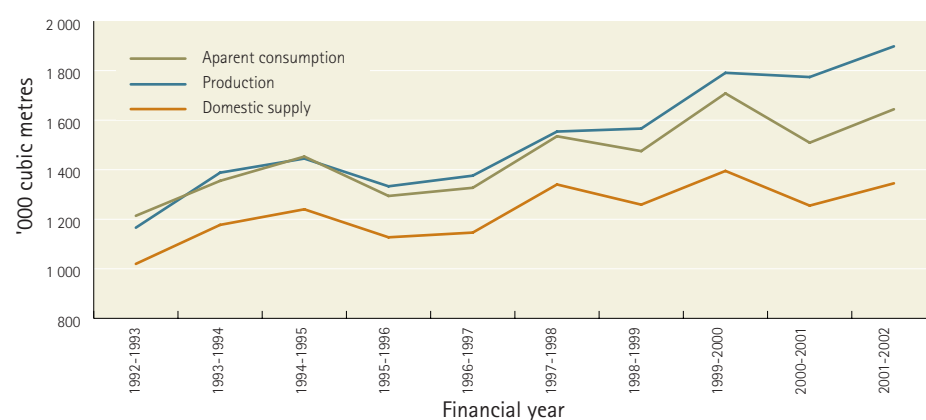
Source: ABARE

## Wood and woodbased panels

The production of wood and woodbased panels has expanded over the last decade, (Figure 61), driven primarily by an expansion in exports, particularly of particleboard and medium density fibreboard. In 2000–2001, domestic supply of wood and woodbased panels accounted for 83 per cent of domestic consumption, after a peak of 87 per cent in 1997–1998. Over the last two years, exports of woodbased panels have increased by 100 per cent.

Further increases in the domestic demand for woodbased panels will probably be met by imports, as the size of mills required for economic production may exceed the likely requirements of Australia's small market.

Figure 61: Apparent consumption and production of wood and woodbased panels

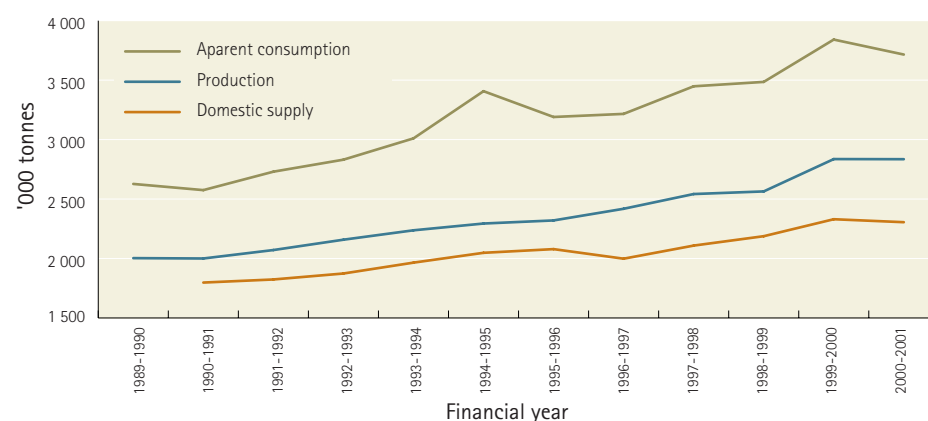


Source: ABARE

## Paper and paperboard

Paper and paperboard production rose steadily over the last decade, but was outgrown by consumption (Figure 62). The proportion of domestic supplies consumed locally decreased from 70 per cent in 1990–1991 to 62 per cent in 2000–2001. In 2000–2001, printing and writing paper accounted for about half the total volume of paper and paperboard imports, with 760 000 kt imported at a value of \$1.18 billion. The proportion of printing and writing paper imported as a share of total paper and paperboard imports increased from 58 per cent in 1991–1992 to 61 per cent in 2000–2001.

Figure 62: Apparent consumption and production of paper and paperboard



Source: ABARE

## Further reading

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# Value of forest products

●	coverage
●	currency
●	frequency

## Indicator 6.1d

Value of wood and non-wood products production as percentage of regional value of production

### Rationale

This indicator would be a useful measure of the contribution of the forest industries to regional economies.

*Over the nine years to 2001–2002, the value of wood products to the Australian economy increased from \$5.9 billion to \$6.6 billion. Although the value increased, the contribution to gross domestic product during this period remained relatively stable, between 1 and 1.3 per cent.*

While the value of timber is clearly defined and well known, the economic role of non-wood products is more difficult to ascertain. Data collection for these products is *ad hoc* and not always coordinated. It is difficult to separate out certain products and services that may be produced in both forest and non-forest areas. In addition, various environmental services (such as water catchment) and human and aesthetic values (such as recreation) are hard to quantify.

The size of the forest sector's contribution to Australia's economy can be estimated by the value of the sector's inputs to other areas. For example, in 1995–1996 the forest sector contributed 2.9 per cent of all inputs to other industries. The largest user was the construction industry, with forest inputs to the value of \$2.8 billion (which represents 8 per cent of the total value of inputs for this industry). Next was the printing and publishing industry, with forest product inputs to the value of \$2 billion (17 per cent of the total value of inputs in this industry).

Wood production in the forest sector includes primary production (timber harvesting) and downstream processing. In 1993–1994 the sector contributed an estimated \$5.9 billion (1.3 per cent) to Gross Domestic Product (GDP); by 2001–2002, this contribution was \$6.6 billion, which represented only 1 per cent of GDP. In this same year, the timber harvesting component of the forest sector contributed an estimated \$562.7 million to industry gross value added (IGVA), or 0.1 per cent to GDP (Table 77). IGVA is a measure of output derived from items based on a national accounting concept. Adjustments are made to exclude changes that result from processes not associated with the production of goods and services, for example, changes in the value of inventories due to price fluctuations. Additional value accrues to a commodity after production, harvesting and processing.

The wood and paper-manufacturing component of the forest sector makes the most significant contribution to economic growth, with a contribution of about \$6 billion to IGVA or 0.9 per cent to GDP. The Australian Bureau of Statistics defines the manufacturing component of the forest sector to include sawmilling, other wood product manufacturing and paper and paper product manufacturing. These industries account for all primary and secondary processing of wood and wood products.

The timber harvesting component of the forest sector's declining contribution to GDP is consistent with other primary industries for which economic growth may be restricted by physical and climatic constraints as well as biological growth rates.

Table 77: Industry gross value added and contribution of the forest sector to gross domestic product (GDP)

Year	Forestry and fishing (\$m)	Timber harvesting <sup>1</sup> (\$m)	Wood and paper manufacturing (\$m)	Gross value added at basic prices (\$m)	Forest sector contribution to GDP (%)
1993–1994	1 294	427	5 460	467 897	1.3
1994–1995	1 387	458	5 622	487 467	1.2
1995–1996	1 372	453	5 743	508 581	1.2
1996–1997	1 520	502	5 541	527 848	1.1
1997–1998	1 579	521	5 602	549 884	1.1
1998–1999	1 612	532	5 552	578 866	1.1
1999–2000	1 640	541	6 303	602 021	1.1
2000–2001	1 681	555	5 688	614 061	1.0
2001–2002	1 705	563	6 041	638 256	1.0

Source: ABS (2002a)

<sup>1</sup> Assumes output to value-added ratio applies to forestry and fishing, and takes a value of 33 per cent for forestry production (timber harvesting component)

The increase in the absolute value of primary production relative to manufacturing in the forest sector, however, suggests a greater rate of expansion in the timber-harvesting component of the sector relative to manufacturing. This is likely to be due to government-funded plantation establishment.

During the six years to 2000–2001, wood and paper product manufacturing made the most significant contribution to the value adding process of the timber industry. It contributed between 67 per cent and 75 per cent to industry value added (IVA)—the value added to commodities as they undergo processing—within the forest sector (see Table 78). In 1999–2000 more than half of all value adding in wood and paper product manufacturing was recorded in New South Wales and Victoria.

Wood production was of greatest significance in Tasmania, where wood and paper product manufacturing contributed 6.6 per cent of Australia's total IVA in wood and paper product manufacturing, compared to the 2.4 per cent contribution this State makes to Australia's total IVA in the manufacturing sector. However, in Tasmania IVA in wood and paper product manufacturing has been decreasing in relative and absolute terms over the last four years to 2000–2001. This trend has been paralleled by an expansion in the resource establishment and increases in Tasmania's woodchip exports.

Table 78: Value added to wood and paper products (\$ million)

Year	Forestry and logging	Wood and paper product manufacturing	Sawmilling and timber dressing	Other wood product manufacturing	Paper and paper product manufacturing	Total
1995–1996	355	3 987	1 154	832	2 000	8 328
1996–1997	521	4 240	898	1 372	1 970	9 001
1997–1998	589	4 657	1 141	1 548	1 967	9 902
1998–1999	658	4 971	988	1 650	2 333	10 600
1999–2000	681	5 203	1 142	1 817	2 244	11 087
2000–2001	n/a	4 929	961	1 504	2 465	9 859

Source: ABS (2002c)

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Michael F. Ryan

Export woodchip mill, Burnie, north east Tasmania

coverage



currency



frequency



# Recycling

## Indicator 6.1e

### Degree of recycling of forest products

#### Rationale

This indicator identifies the extent to which recycling or reuse of forest products occurs.

*Paper is the main recycled forest product, and the rate of paper recycling has been steadily increasing, although it appears to be levelling off.*

*Timber waste is recycled to a much lesser extent.*

As the domestic and worldwide demand for forest products increases, so too does the opportunity and need for recycling. The timber industry produces highly recyclable products, such as paper and wood. Recycling forest products conserves the forest resource base, reduces the volume of solid waste going to landfill, and has implications for the atmospheric carbon balance.

### Paper products

Data suggests that waste paper recovery rates have almost doubled in the past 15 years, rising from 23.4 per cent (557 000 tonnes) recovered in 1985 to 44.2 per cent (1.6 million tonnes) in 2000. This can be attributed to improved environmental awareness and access to recycling facilities.

Most of the waste paper collected each year is used in the re-production of paper. National Association of Forest Industries (NAFI) figures published in 2001 claimed that 57 per cent of raw materials used in the pulp and paper industry were recycled. As Table 79 shows, these figures are high compared to international standards.

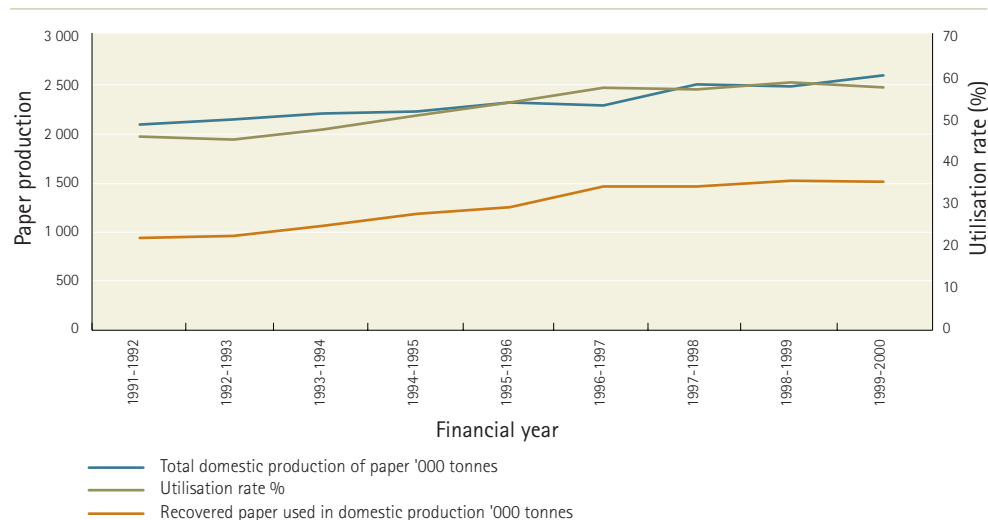
Table 79: Wastepaper component in paper production

Country/Region	Wastepaper component (%)
Australia	62
Western Europe	50
United States of America	45

Source: Recycling, APIC (2002)

Figure 63 shows the amount of recovered paper used in paper production as compared with the total paper production over a number of years. It also illustrates the utilisation rate of recovered paper. It indicates an overall increase in the recovered paper use since 1991–1992 although there appears to be a plateau in recent years. As paper production has recently experienced a slight increase without an increase in recovered paper usage, the utilisation rate has experienced a slight decline following a peak in 1997.

Figure 63: Utilisation of recovered paper in domestic paper production



Source: Australian Bureau of Statistics

Different varieties of paper are recycled and reused to different extents (see Table 80). According to NAFI, of the raw materials used, packaging and industrial papers utilise 100 per cent recycled fibre, newsprint utilises 24 per cent, tissue paper uses 12 per cent, and printing and writing papers use 6 per cent.

Table 80: Recovered paper use ('000 tonnes)

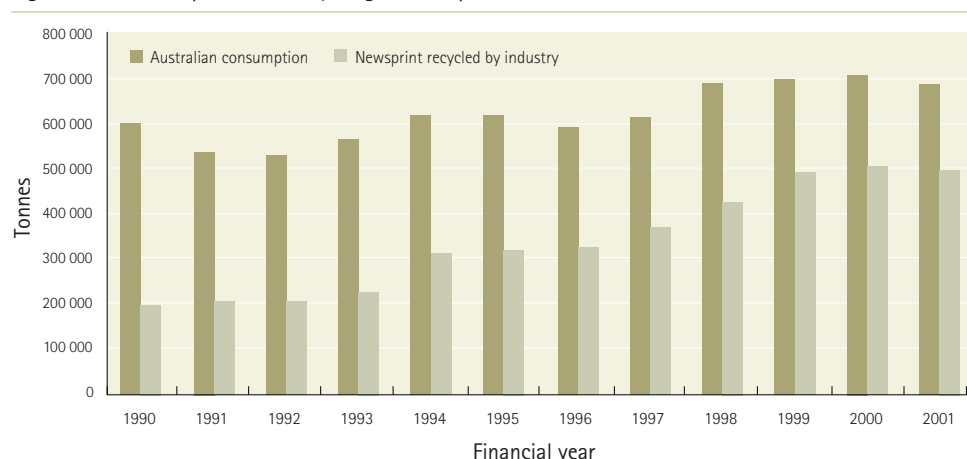
Recovered paper type used	Packaging and industrial	Newsprint	Printing and writing	Tissues	Total
Packaging papers	1 120	0	0	0	1 120
Printing/writing woodfree	63	0	36	20	120
Printing/writing other	14	0	0	5	19
Newsprint	280	96	0	0	380
Total recovered paper used	1 480	96	36	25	1 600
Yield <sup>1</sup> (per cent)	90	85	70	70	88
Recycled fibre content	1 330	82	18	18	1 440
Virgin fibre and additives	150	290	350	190	1 100
Paper production	1 470	370	370	210	2 540
Utilisation rate <sup>2</sup> (per cent)	100.0	24.2	6.1	12.4	61.5

Source: Australian Paper Industry Council (2001)

<sup>1</sup> 'Yield' is the percentage of fibres used from recovered paper once ink and other waste products have been extracted.<sup>2</sup> 'Utilisation rate' is total recovered paper used as a percentage of total domestic paper production.

Newspaper recycling in Australia has increased greatly in recent years. Of 725 974 tonnes consumed in 2000 about 70 per cent was recycled. In 1990, just 30 per cent of newspaper consumed was recycled. Figure 64 demonstrates this trend.

Figure 64: Consumption and recycling of newsprint, 1990–2001



Source: Publishers National Environment Bureau (2002)

Recycling of Australian printing and writing paper is at a lower level than that of newsprint. According to the Pulp and Paper Manufacturer's Federation of Australia (PPMFA) 16 per cent of printing and writing paper was recycled in 2000. However, nearly 85 per cent of Australian households recycled paper in 2000, an increase from 55 per cent in 1992.

Waste paper is an exportable product. Table 81 shows the income from wastepaper exports as compared with that of other paper products. This table shows a significant increase in wastepaper exports in the last year. Waste paper is the only paper product with a trade surplus (Table 82).

Table 81: Waste paper and associated exports (\$million)

Product	1993–1994	1994–1995	1995–1996	1996–1997	1997–1998	1998–1999	1999–2000	2000–2001	2001–2002
Wastepaper	14.9	43.7	26.2	10.8	17.88	25.1	39.9	39.7	55.5
Newsprint	1.8	0.8	1.3	0.1	7.45	6.9	1.6	2.6	1.3
Printing and writing	62.1	43.6	49.4	55.1	65.99	81.5	121.1	145.6	197.9
Household and sanitary	29.0	7.9	47.9	58.8	63.93	59.7	80.1	80.4	94.8
Packaging and industrial	122.5	141.0	146.9	235.6	236.99	207.2	287.9	300.1	297.6
Paper manufactures <sup>1</sup>	6.0	6.4	6.0	8.3	66.51	61.7	65.9	83.8	83.5
Pulp	–	0.2	0.7	1.7	0.6	0.9	1.6	4.6	2.9

Source: ABARE (1996, 1997, 2001, 2002); Australian Bureau of Statistics (2002)

<sup>1</sup> includes boxes, bags, letter trays, paper bags, notebooks, letter pads and other paper articles that have had some further processing

Table 82: Balance of paper trade (\$million, 2001–2002)

Product	Exports	Imports	Trade balance
Paper and paperboard	593	1 841	– 1 248
Waste paper	56	5	+ 51
Pulp	3	221	– 218
Paper manufactures	84	374	– 290
Total	735	2 441	– 1 706

Source: ABARE (2002a)



## Timber products

Timber recycling is less common than paper recycling in Australia, but data about the re-use of timber waste are available. The demand for recycled hardwood is predicted to exceed the supply within the next ten years.

In 2001, approximately 23 per cent of timber waste generated by Melbourne industries was recycled/reused and about 16 per cent of timber waste was recycled in Sydney. Recycled timber is used by a number of specialist furniture companies. While information on the market is limited, these companies appear to have identified a niche market, using recycled inputs as a major selling point. Woodcarving and other wood related art is very popular amongst artisans. This creates an excellent opportunity for the use of recycled timber products.



More than 70 per cent of Australia's newsprint is recycled

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coverage



currency



frequency



## Non-wood supply and consumption

### Indicator 6.1f

#### Supply and consumption/use of non-wood products

##### Rationale

Communities within a region can derive socio-economic benefits from non-wood products.

*Major non-wood products from forests in Australia are honey and other apiary products, for which international demand is increasing; tree seeds, which continue to be in demand domestically and internationally; and grazing rights. Bush foods, animal skins and plant oils are relatively small scale and low-demand activities. Indigenous people in many parts of Australia make significant use of non-wood products from forested landscapes.*



Michael E. Ryan

Bees on honeycomb

Data on the supply and demand of non-wood products are sparse. Many of these products are also produced in environments outside forests, so the figures are aggregated. This makes it difficult to separate the forest specific information. The annual removal of non-timber forest products is more fully described in indicator 2.1e. Value and quantities of production of non-wood products are captured in indicator 6.1b.

### Apiary

International demand for honey has been increasing. While it is difficult to ascertain the actual value of supply and demand for forest-produced honey, Table 83 shows the distribution of honey production nationally and the proportion of honey produced on public land, including production in multiple-use forests.

### Bush foods

Australian bush foods are produced primarily in farms or other controlled environments with only a small proportion being produced in native forests.

There is a lack of current information regarding demand for the product and there is potential for oversupply. This limits the entry of potential new suppliers into the market. The following table demonstrates the capacity to supply and recent demand for native foods.

It has been argued that the last five years has seen an increase in supply that has not been matched by demand. The high price of bush foods may be constraining demand. Public awareness and acceptance, as well as ready availability of the foodstuffs, might also be contributing factors.

Table 83: Distribution of honey production in Australia, 2000–2001

Honey production	NSW	Qld	SA	Tas	Vic	WA	Australia
Percentage of honey in 2000–2001 from <sup>1</sup> :							
Northern New South Wales	70	6	0	0	0	0	23
Southern New South Wales	27	0	0	0	15	0	12
Victoria	1	1	1	0	85	0	19
Queensland	2	93	0	0	0	0	22
South Australia	0	0	99	0	0	0	13
Western Australia	0	0	0	0	0	100	8
Tasmania	0	0	0	100	0	0	3
Producers use of public land							
Used public land in last five years (per cent)	67	71	33	100	48	89	62
Percentage of honey in 2000–2001 from:							
Multiple-use forests	20	26	1	58	26	40	23
Nature conservation reserves	4	2	1	13	5	4	3
Other crown land	5	4	0	3	2	8	4
Privately managed land	71	68	98	26	67	48	70

Source: ABARE (2003)

<sup>1</sup> For producers who operate in more than one State, the table shows the proportions of production from the region in which they are based and adjoining regions where they also operate.

Table 84: Capacity to supply current native food processors through commercial cultivation

Species	Plant density per hectare	Yield per plant (kg)	Yield/hectare (tonnes)	Known plantings (plants)	Potential yield (tonnes)	Demand 1995–1996 (tonnes)
Bush tomatoes	8 000	0.5	4.0	12 000	6.0	5.0
Muntries/Munthari	2 000	1.5	3.0	5 000	7.5	5.0
Warrigal	3 000	2	6.0	5 000	10.0	0.22
Native herbs (pot culture)	8 000	0.2	1.6	–	–	0.04
Native mountain pepper	1 200	–	–	5 000	–	2.5
Lemon myrtle	625	2	1.250	5 000	10.0	5.0
Quandong	850	1	0.85	40–50 000	40.0	5.0
Illawarra plum	275	6	1.65	500	3.0	2.5
Kakadu plum	275	10	2.75	–	–	2.5
Lemon aspen	275	10	2.75	5 000	50.0	3.6
Riberry	275	15	4.125	5 000	75.0	2.5
Wattle seed	625	1.5	0.93	–	–	6.0
Wild lime	625	2	1.25	500	1.0	0.71

Source: Graham and Hart (1997)

## Tree seed

Tree seeds are used primarily in the establishment and expansion of plantations. Supply of quality seeds from native forests is seasonal and variable. Seeds and genetic material of native trees are also important export products.

## Eucalyptus oil

Eucalyptus oil is supplied to consumers as pure oil or as a component of other products—for example, medicinal preparations. Global demand for oil is currently static, with countries such as China producing enough to meet demand. Current demand is approximately 2500–3000 tonnes per year, but world supply exceeds this. Australia produces approximately 120 tonnes per year. A difference in character of the oil, resulting from different variations in eucalypt forests, allows Australia to maintain a market share despite a relatively high price. Tea tree oil is described in indicator 6.1b.

## Animal products

Supply of native animal products from forests is limited by legislation. While there is a larger market for captive-bred animal products, there is a commercial market for wild animal products. Products come from a range of species including kangaroo (*Macropus* spp.), brush-tailed possum (*Trichosurus vulpecula*) and mutton birds (*Puffinus* spp.), along with deer, and feral pigs and goats.

## Grazing

The supply of grazing on public forests varies considerably between States and Territories. Grazing sites in New South Wales and Victoria are identified in the following table.

Table 85: Grazing area (hectares) on public land in New South Wales and Victoria

State	1997–1998	1998–1999	1999–2000	2000–2001	2001–2002
New South Wales	768 950	727 210	764 380	711 540	644 970
Victoria	–	–	–	810 670	810 670

Source: National Forest Inventory (2003)



Bee hives in private native forest

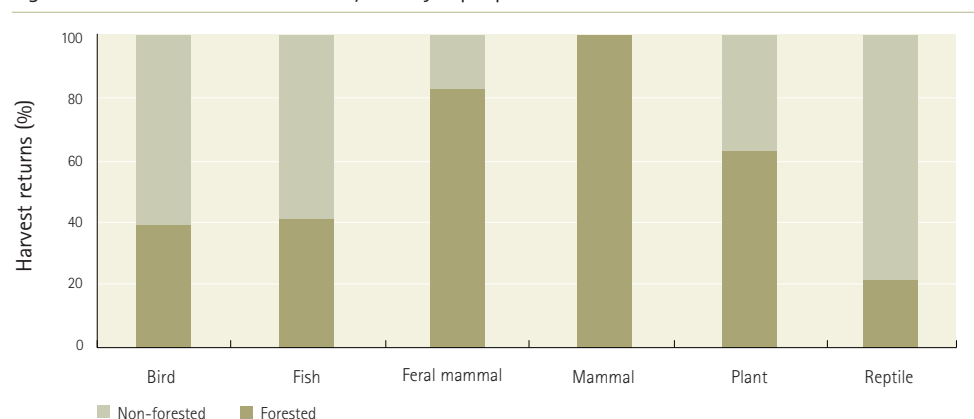
## Indigenous use

Indigenous people in many parts of Australia make significant use of non-wood products derived from forested landscapes. For example, the Kuninjku people of central Arnhem Land were found in a year-long study 1979–1980 to derive over 60 per cent of their total (cash and imputed) income from use of wild plants and animals. More recent research in 2002 and 2003 indicates that the customary economy has remained both robust and sustainable over the last 2 decades. Many items are obtained direct from forested landscapes, but even when harvested elsewhere, important animal products often depend for part of their life cycle on forests (Figure 65). This utilisation is maintained at various levels across much of northern Australia, including the Top End of the Northern Territory, Cape York in north Queensland and the Kimberley in Western Australia. Direct reliance on forests is lower in many other parts of the nation, especially where people have been unable to maintain access to their lands and resources and where landscapes have been more modified for other purposes.

In addition to direct economic value, access to these products contributes strongly to the sustainability of Indigenous cultures and identities, which in turn are critically important for the sound management of north Australian forests and much other economic activity. People engaged in customary activities on country maintain favourable fire regimes, reduce feral animals and weed infestations, and can provide early warning of entry of exotic plants, animals or diseases. High standards of catchment management maintain water quality in freshwater or estuarine spawning and nursery grounds (see indicator 7.1.e) and so help sustain productive fisheries, such as the inland and near shore barramundi and prawn fisheries of northern Australia. These and other usually un-remunerated ecosystem services deriving from well-managed forests are critical to the maintenance of both Indigenous and regional economies and social systems, which are underpinned by use of renewable resources.

Artworks, handicrafts, and implements are often constructed from forest products, including non-wood items such as dyes, ochres, pigments and fibres. In addition to their commercial value (see indicator 6.1.b) such items play roles in transmission of knowledge and perspectives both within and outside Indigenous societies, are used in ceremony, or have more utilitarian value in harvesting or preparing food. Temporary and permanent dwellings

Figure 65: Sources of foods taken by Kuninjku people, central Arnhem Land



Source: A.J. Griffiths and J. Altman, unpublished data

Notes: From a sample of 585 animals harvested over a 5 week period in 2002 and 2003 in wet and dry seasons. Many animals use forest and open habitats and are harvested from different habitats in different parts of the seasonal cycle. The separation is therefore somewhat arbitrary, but does indicate a genuine dependence of harvest returns on healthy forest. Indigenous management is in part aimed at maintenance of a habitat mosaic that favours both the animals and harvesting processes.



are constructed from forest products. For instance, the locally-manufactured mud bricks used in many permanent dwellings in the Maningrida region are made from soils found in forest sites, and superstructure includes poles from the same forests. Removal of bark for painting and, within walking distance of outstations, fuel for cooking, has limited impact on exploited species in landscapes which have not been disturbed, for example, by agriculture.

Diverse, healthy forests remain critically important to those Indigenous people who retain access to them, and especially in northern Australia make an irreplaceable contribution to a vibrant and regionally significant 'hybrid' economy. Some senior artists use the income from commercial art sales to underwrite continued presence on their country, carrying out the land and natural resource management work that sustains the forests (see indicator 7.1.e).

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Michael F. Ryan

Karri tree (*Eucalyptus diversicolor*) south west Western Australia

# 6.2

RECREATION  
AND TOURISM

## INTRODUCTION

Australian forests provide a diversity of settings for visitors seeking outdoor recreation and tourism. The vast majority of publicly owned forests are accessible to visitors, subject mainly to safety and operational considerations. While available data are far from comprehensive, they suggest that visitor numbers are increasing in most jurisdictions. Forest management agencies cater for different types of visitor activities by varying the mode of access—foot, bicycle, boat, horse or vehicle—and the location and design of facilities, and by regulating the type and duration of use. However, excessive visitor use or inappropriate behaviour may result in detrimental site impacts that can only be contained by proactive or remedial measures.



The Tree Top Walk in tingle forest, near Denmark, Western Australia



## Forests for recreation and tourism

### Indicator 6.2a

Area and per cent of forest land available for general recreation and tourism

#### Rationale

The indicator provides information on access for recreational and tourism uses of forests. It also provides a fairly coarse measure of the extent to which forest management is providing for the recreational needs of the community.



*Most publicly owned forested lands, irrespective of tenure, are available for recreation or tourism. There are some temporary closure—mainly for safety reasons—and some permanent exclusions for scientific reasons.*

Forested areas are used extensively for outdoor recreation and tourism-related activities in Australia. As such they are of tremendous economic value to the nation and greatly enhance the quality of life of all visitors and adjacent urban communities. They provide opportunities for a wide range of recreation and tourism experiences and will continue to do so, provided they are managed to sustain the increasing pressures that growing urban population centres can exert.

Most publicly owned forested lands, irrespective of tenure, are available for general recreation and tourism activity (see Tables 86 and 87). Policy decisions taken by the land manager—be it Australian, State or Local Government, commercial or private—determine the area available and types of recreation and tourism permitted. Where management plans are in place, detailed guidelines are usually specified regarding the types of visitor opportunities that will be provided, the recreation and tourism activities that will be permitted (or prohibited) and the conditions of use.

Typical forest areas permanently closed to the public include designated scientific reference and conservation areas, some water catchment areas, highly significant Indigenous cultural sites, defence training areas, and areas of forest subject to particular threats, for example the fungus *Phytophthora cinnamomi*. However, recreation and tourism exclusions only cover a small proportion of the total area of multiple-use forests. For example, in Queensland recreation and tourism are permanently excluded from designated Scientific Areas (20 245 hectares) within multiple-use forests (2.5 million hectares).

Forest areas can be temporarily closed if they are subject to harvesting, extreme fire danger, fuel reduction burning, control of feral animals or weed eradication, special events or bad weather. Thus the area of forest from which recreation and tourism are excluded varies depending on the forest operations underway at any given time.



Michael F. Ryan

Bird watching

Table 86: Forest area managed for recreation and tourism within each State/Territory (hectares)

State/Territory	Year	Multiple -use forests	Nature conservation reserves	Other crown land	Private land	Total
Australian Capital Territory	2000	–	–	–	–	–
New South Wales	2001	1 706	3 625 <sup>1</sup>	–	0	5 331
	2000	877	3 800 <sup>1</sup>	–	0	4 677
Northern Territory	2002	n/a	3 462	–	0	3 462
	2000	n/a	2 450 <sup>2</sup>	–	0	2 450
Queensland	2000	2 447	4 350	– <sup>3</sup>	0 <sup>4</sup>	7 797
South Australia	2001–2002	n/a	3 943	–	0	3 966
Tasmania	2000	1 105 <sup>5, 7</sup>	960 <sup>6, 7</sup>	–	0	2 065
Victoria	2000	663	2 957	103	13	3 737
Western Australia	2000	–	–	–	–	–

Source: National Forest Inventory 2003

<sup>1</sup> The area within nature conservation reserves for New South Wales for 2001 includes formally dedicated reserves that are managed by State Forests and excludes wilderness and nature conservation reserves that are managed by National Parks and Wildlife Service but are not actively managed for recreation and tourism. The area for nature conservation reserves for New South Wales for 2000 includes all land managed by National Parks and Wildlife Service.

<sup>2</sup> This is the total amount of IUCN Category 2 land in Northern Territory, that is, nature conservation reserve or equivalent. Most of this is freehold or crown land tenure, therefore management intent is complex and recreation/tourism may only comprise a component of the total estate listed.

<sup>3</sup> In Queensland, other crown land contains reserves for community purposes (including camping reserves, recreation reserves, reserves for travelling stock, etc., as declared under the *Land Act 1994* but no data are easily accessible on the area of these reserves located in forests.

<sup>4</sup> Some local governments and State agencies in Queensland are buying increasing amounts of private freehold land, which is not identified as public land on the Queensland Government Land Register.

<sup>5</sup> This includes all multiple-use forest other than coupes currently being harvested and *Phytophthora cinnamomi* management areas.

<sup>6</sup> Assumed to include Forest reserves, Wellington Park and all reserve types under the Tasmanian *National Parks and Wildlife Act 1970* except nature conservation reserves that are not managed for tourism and recreation.

<sup>7</sup> Includes all land available for recreation and tourism.

### Case study – Inter-agency cooperation for forest tourism in Tasmania

Forested lands span many tenures and administrations, and so Tasmanian agencies have established an Interagency Committee for Recreation and Tourism to coordinate projects, share information and develop joint brochures and activities. Agencies involved are Tourism Tasmania, Forestry Tasmania, Parks and Wildlife, Hydro Tasmania, Sports and Recreation, Transport Tasmania and the Tasmanian Outdoor Recreation Council.

The Interagency Committee has several sub-groups including a Visitor Research Working Group, a Recreational Vehicle Working Group, a Tasmanian Walking Track Strategy Working Group, a Tasmanian Trail Committee and an occasional group to coordinate interagency brochures. There is also a joint Commercial Visitor Services Licence system, which administers all commercial tourist operators carrying out tours and similar activities on State-owned land.

Table 87: The percentage of the total forested area managed for recreation and tourism within each State/Territory compared against the 1998 State of the Forests Report

State/Territory	Year	Multiple -use forests	Nature conservation reserves	Other crown land	Private land
Australian Capital Territory	1998	100	100	–	0
New South Wales	2001	67	85 <sup>1</sup>	–	0
	1998	100	100	–	0
Northern Territory	2002	–	–	–	–
	2000	–	–	–	0
Queensland	2000	85	–	–	0
	1998	99	87	–	0
South Australia	2001–2002	n/a	100	–	0
Tasmania	2000	97 <sup>2</sup>	87 <sup>2</sup>	–	0
	1998	99	–	–	0
Victoria	2000	20	97	50	1
	1998	20	30	49	1
Western Australia	1998	99	100	90	0

Source: National Forest Inventory 2003

<sup>1</sup> For nature conservation reserves for New South Wales National Parks and Wildlife Service 1997 it was 100 per cent because the whole estate was included.

Since 1997, some States and Territories have changed the way in which information is reported. This has created gaps in the data that make it difficult to analyse emerging trends in the availability of forest land for recreation and tourism. The following issues have the potential to significantly alter the amount of forest land apparently available for recreational and tourism use within each region:

- *Area of forests* – most State or Territory land management agencies record recreation and tourism use by tenure or park type, but not by forest cover. Therefore, extracting statistics relating only to forested land is problematic.
- *Corporatisation of multiple-use forest and water management organisations* – some corporations do not accept an obligation to continue to provide for recreation and tourism activities as these are no longer considered part of their core business.
- *Land tenure changes as a result of Regional Forest Agreements* – former forest-lands containing significant conservation values are being afforded a higher level of protection against high impact activities by having their tenure changed to nature conservation reserves and/or wilderness areas. High impact activities include those requiring vehicles, mountain bikes or horses.
- *Public risk and liability* – increasing recognition of the responsibilities associated with the duty of care of land managers is forcing many agencies to rethink how, when and where they cater for recreation and tourism activities. In many cases users themselves are required to have appropriate insurance cover before activities will be permitted. Where the cost of insurance is prohibitive, groups are cancelling activities. This situation is currently subject to government review in most regions.

coverage



currency



frequency



## Visitor activities

### Indicator 6.2b

Number, range and use of recreation/tourism activities available in a given region

#### Rationale

This indicator is useful because it provides information on the diversity of recreation opportunities.

*Data are available on a range of recreational uses across the country. However, the lack of reliable time series, or of evaluations of the usage rates or public perceptions of the facilities, prevents further national level comment on the indicator.*

Forests provide a wide range of settings within which a variety of recreational and tourist activities will occur. Forest management in Australia aims to provide a balanced range of recreational opportunities and facilities, appropriate for each forest setting and consistent with demand and resources. Two measures are used in this indicator, namely, the number of areas, tracks and sites, and the total number of recreation/tourism related facilities located in all sites.

Some agencies undertake comprehensive visitor surveys and have a good understanding of visitor needs and expectations. Others tend to provide sites and facilities in response to local demand and patterns of existing use. Table 88 indicates the number of sites available for forest-based tourism and recreation activities. Table 89 indicates the types and number of facilities available in each State or Territory. These figures are very conservative, as they do not include sites and facilities managed by local governments, or by the commercial and private sectors.



Michael F. Ryan

Mountain bike racing, ACT Forests, ACT

Table 88: Recreation and tourism sites by activity

Activity group		ACT 2001	NSW <sup>1</sup> 2001	NT <sup>2</sup> 2002	SA <sup>3</sup> 2002	TAS 2000	Vic 2000
Riding and walking animals	Areas/Tracks	–	17	5	15	11	5
Cycling	Tracks	–	25	3	19	–	3
Motor vehicle use	Tracks	–	13	14	–	50	13
Walking and running	Tracks	–	267	60	17	1 441	1 058
Aerial activities: motorised	Sites	–	–	1	–	–	–
Aerial activities: non-motorised	Sites	–	–	–	–	–	5
Caving	Sites	–	–	1	–	4	–
Climbing	Sites	–	24	1	–	–	–
Cultural heritage appreciation	Sites	–	37	12	2	–	15
Events and festivals	Sites	–	0	3	2	–	–
Fishing	Sites	–	105	17	1	11	–
Nature study	Sites	–	225	38	10	97	52
Over-night stays	Sites	7	379	35	15	145	286
Picnicking and playing	Sites	–	213	37	17	1354	390
Snow activities	Sites	–	12	–	–	2	10
Swimming and diving	Sites	–	107	21	6	–	–
Watercraft: motorised	Sites	–	26	12	1	5	26
Watercraft: non-motorised	Sites	–	26	6	1	4	20
Weapons use	Sites	–	3	–	2	–	–

Source: National Forest Inventory 2003

<sup>1</sup> Multiple-use forests and nature conservation reserve estate

<sup>2</sup> Protected areas managed by Parks and Wildlife Commission Northern Territory (2.5% of Northern Territory lands)

<sup>3</sup> For the area managed by Forestry South Australia

<sup>4</sup> Department of Primary Industries, Water and the Environment category 'day use areas', which may include other facilities such as boat ramps.

Note: No information available for Queensland and Western Australia.

### Case study – Recreation and Tourism Information System in Western Australia

The Western Australian Department of Conservation and Land Management (CALM) has developed a sophisticated Recreation and Tourism Information System (RATIS) to provide decision-makers, planners and managers with ready access to all relevant information at the State, region, district or site level. The system comprises of 50 separate databases, that can be easily accessed by staff anywhere in the State using the internet.

For example, one of the databases provides detailed information on CALM's 1230 nature-based recreation sites, detailing 660 walking tracks, 260 camping areas, 11 800 furniture assets (such as rubbish bins, picnic tables, signs, seats), 1160 buildings (such as visitor centres, shade shelters, information shelters, toilets) and 1300 structures (including boardwalks, steps, bridges, lookout platforms) across the State. Another provides data relating to the number of visits to Parks/Reserves managed by the Department at a State, region, district and park/reserve level.

RATIS is supported and maintained by CALM's Recreation and Information Management Unit that also produces comprehensive user manuals and regular training programs. Information regarding the system can be obtained from CALM.

The following issues may affect the number and range of recreation and tourism activities available in given regions, and the ability to report these trends:

- *Consistent data* – the information supplied needs to be standardised across all agencies so that there is a consistent method of reporting.
- *Changing patterns in recreational and tourist use* – there appears to be little information regarding the likely changes in recreational and tourist use resulting from such factors as population ageing, changing ethnic composition and increasing ownership of motorised vehicles including 4WDs and trail bikes.
- *Loss of access* – many traditional recreational and tourist uses are being displaced because of tenure changes, particularly where Regional Forest Agreements result in tenure changes from multiple-use forest to nature conservation reserve.
- *Lack of funding and resources* – many forest management agencies lack the resources (staff, funding and equipment) to manage and maintain all existing facilities in a reasonable condition, or to develop the new areas and facilities required for additional visitors or changing visitor priorities.



Michael F. Ryan

Dhanyah Forest Visitor Centre, Barmah Forest, Victoria



Table 89: Number of recreation and tourism related facilities by State/Territory compared with those reported in 1998

Tenure/Facility	ACT		NSW		NT		Qld		SA		Tas		Vic		WA	
	1998	1998	2001 <sup>1</sup>	2002 <sup>2</sup>	1998	2000	1998	2002 <sup>4</sup>	1998	1998	2000	1998	1998	2000	1998	1998
Multiple-use forest																
Picnic sites with little development	139	239	87	n/a	65	62	n/a	n/a	94	450	200	212				
Developed campsites with toilets	5	112	23	n/a	31	32	n/a	n/a	32	78	60	49				
Visitor centres	0	35	3	n/a	0	0	n/a	n/a	0	1	1	2				
'Grandstand' developments > \$1m	0	1	0	n/a	0	1	n/a	n/a	0	1	1	2				
Number of tracks	–	–	70	n/a	–	70	n/a	n/a	–	–	–	–				
Length of tracks (km)	32	114	–	n/a	620	–	n/a	n/a	700	250	250	1 711				
Nature conservation reserve																
Picnic sites with little development	6	281	214	17	144	–	7	17	11	900	499	–				
Developed campsites with toilets	3	128	69	17	81	–	10	11	53	350	209	–				
Visitor centres	1	14	5	4	19	–	2	2	4	10	10	–				
'Grandstand' developments > \$1m	0	6	–	1	9	–	0	0	6	2	10	–				
Length of tracks (km)	184	1 296	–	256 <sup>3</sup>	986	–	15	270	2 849	2 400	3 723	–				
Other																
Picnic sites with little development	–	–	–	–	–	–	–	–	26	1 800	1 800	–				
Developed campsites with toilets	–	–	–	–	–	–	–	–	37	600	600	–				
Visitor centres	–	–	–	–	–	–	–	–	1	50	50	–				
'Grandstand' developments > \$1m	–	–	–	–	–	–	–	–	1	5	5	–				
Length of tracks (km)	–	–	–	–	–	–	–	–	–	1 000	1 000	–				
Private land																
Developed campsites with toilets	–	–	–	–	–	–	–	–	–	200	200	–				
Visitor centres	–	–	–	–	–	–	–	–	–	2	2	–				

Source: National Forest Inventory 2003

<sup>1</sup> New South Wales' data only covers tenures managed by State Forests and the National Parks and Wildlife Service (NPWS).

For 2001 the nature conservation reserve data only includes the area in the Southern Directorate of the NPWS tenure.

<sup>2</sup> Only covers protected areas managed by Parks and Wildlife Commission Northern Territory (2.5% of Northern Territory).<sup>3</sup> Walking tracks only.<sup>4</sup> Only includes land managed by ForestrySA.

Note: No data are available on recreation and tourism facilities on leasehold land.

coverage



currency



frequency



## Visitor numbers

### Indicator 6.2c

Number of visits per annum

#### Rationale

The indicator is useful because it provides an indication of the level of overall recreation use and the demand. It is a key variable in determining the sustainability of recreation and tourism.

*Available data are far from comprehensive but suggest that visitor numbers are increasing in most jurisdictions.*

The number of visitors to the forest is difficult and costly to measure because most forested areas possess many entry points, and visitor use is dispersed throughout the forest. In addition, the pattern of visitor usage varies tremendously between weekday, weekend, vacation periods and seasons. Where a visit includes an overnight stay, the type of support facilities and the nature of the visitor-related impacts increase significantly. Sites that are well signposted and promoted in various media receive greatly increased visitation over less known sites where usage is dependent on word of mouth.

Methods currently used for monitoring visitor numbers in forests are a mixture of actual counts and estimates. The counted data are based on entry fees, traffic counters, camping permits and surveys and are relatively accurate. The remaining information, based on staff estimates, is less accurate and may be an underestimate.

Table 90 shows the number of recorded visitors from 1995–1996 to 2000–2001 for each reserve type. The vast majority of forest visits occur in nature conservation reserves. There appear to be significant differences in some States and Territories between the 1995–1996 data and that from later years, but this is a reflection of changed methods of reporting and improved accuracy of measurement. No consistent changes are evident although the number of visitors to accessible, attractive forest sites appears to be increasing rapidly—at least in Victoria.

The following issues will have a significant affect on the number of recorded visitors to forest area over the coming years:

- *Adoption of a more useful unit of measurement* – the ‘number of visits’ is a very coarse measure of visitor use, as it does not relate in any way to the length of stay.
- *The lack of reliable visitor figures* – prevents agencies from quantifying the extent of demand as well as the benefits that accrue to an area as a result of recreation and tourism use, thus limiting the ability of the agency to attract increased funding and resources.
- *Greater emphasis on active living* – the Australian population is becoming more obese and unhealthy because of changing lifestyles. There is a concerted effort underway by many health agencies to reverse this trend by emphasising the need for increased physical activity. Forests close to cities can expect to cater for a significant proportion of the increased demand, where people choose to exercise in a natural setting.
- *Increasing demand for recreational walking and cycling trails* – many Australian towns and cities are considering connecting urban pedestrian and cycle trail networks with surrounding forested areas so as to reduce reliance on motorised vehicles for people wanting to recreate in non-urban settings.



- *Marketing and promotion of forest attractions* – uncontrolled marketing and promotion can raise the level of visitation to attractive forest sites beyond the ability of an agency to sustain the level of use with existing funds and resources.
- *Group size* – there appears to be an increasing tendency for large groups to congregate at some venues for cultural and family-related activities, particularly near cities.
- *Events* – forests are increasingly used for a wide range of events that attract a large number of participants and/or spectators crowds, such as orienteering, fun runs, rally car driving and rock concerts.

Table 90: Number of visitors to forested areas each year ('000)

State/Territory and reserve type	1995–1996	Year 1999–2000	2000–2001
Multiple-use forests ('000)			
Australian Capital Territory	735 <sup>1</sup>	1 050 <sup>2</sup>	–
New South Wales	4 000	–	–
Northern Territory	n/a	n/a	n/a
Queensland	2 000	–	–
South Australia	206	230	188
Tasmania	129	–	171
Victoria	3 500	3 600	–
Western Australia <sup>3</sup>	7 215	–	–
Nature conservation reserves ('000)			
Australian Capital Territory	140	–	–
New South Wales	20 148	21 000	7 116 <sup>4</sup>
Northern Territory <sup>5</sup>	1.7	2.3	2.2
Queensland <sup>6</sup>	701	14 700	–
South Australia	–	2 895	–
Tasmania	980	–	1 343
Victoria	12 960	12 195	–
Western Australia <sup>3</sup>	960	–	–

Source: National Forest Inventory 2003

<sup>1</sup> Derived from the Commonwealth Data Request and are from the years 1995 or 2000.

<sup>2</sup> Montreal Process Category A reporting for the year 2000 – Australian Capital Territory.

<sup>3</sup> Includes only the area managed by the Department of Conservation and Land Management and within the Regional Forest Agreement region.

<sup>4</sup> Includes only Regional Forest Agreement areas.

<sup>5</sup> Only covers land managed by the Parks and Wildlife Commission, which does not include major nature conservation reserves such as Kakadu National Park.

<sup>6</sup> Includes only the land under Queensland nature conservation reserve tenure.

coverage



currency



frequency



## Unacceptable visitor impacts

### Indicator 6.2d

Proportion of forest sites available for recreation and tourism which are impacted unacceptably by visitors

#### Rationale

This indicator provides a broad measure of forest sites being used for recreation that are experiencing extreme visitor impact.

*Little information is available on the unacceptable impact of visitors. It was reported that visitors are impacting unacceptably on 10 per cent of the multiple-use forest managed for recreation and tourism in Victoria and 3 per cent of the area managed by Forestry South Australia.*

Australia's forest management agencies have the role of developing strategies to ensure sustainable levels of visitor uses. Many of these organisations define unacceptable impacts as the outcomes of visitor activities that increase the cultural, social, environmental and economic impacts that lead directly to site deterioration. The same level of visitor use will affect different forest values in different ways. Some aspects of a forest are more sensitive than others. In addition, the level of visitor impact will vary depending on such things as visitor behaviour, provision of facilities including interpretation and education, on-site supervision, degree of vehicle control, time of year and weather conditions. It should be noted that acceptable levels of impact vary with the objectives of particular management units—for example, wilderness areas have much lower tolerance levels than high use visitor areas.

Examples of unacceptable impacts include:

- damage to or removal of vegetation cover;
- erosion and/or siltation;
- destruction of animal habitat;
- reduction in water quality;
- conflicts between different user groups;
- overcrowding;
- litter and rubbish;
- vandalism;
- trespass onto a designated sacred site; and
- excessive costs to clean up after an event.

Many forest recreation and tourist activities tend to be concentrated around prime attractions that are designed and managed to withstand anticipated levels of visitor use and behaviour. Forest management agencies employ a range of direct and indirect strategies to actively manage these areas. Direct strategies include zoning, rationing use intensity, restricting activities and enforcement. Indirect strategies include facility and infrastructure design (walkways, restrooms, outdoor cooking facilities, etc.), information dissemination

### Case study – Survey and assessment in Queensland

The Queensland Parks and Wildlife Service, Queensland Environmental Protection Agency, undertook an assessment of visitor impacts on 100 frequently used routes and sites throughout the Great Sandy Region World Heritage Area in 1997 and followed this with a site capacity study in 2002. Readily assessable visitor-related impacts such as site erosion, site compaction, modification of waterways and water systems, vehicle damage (track rutting and braiding), weed invasion, vegetation disturbance or removal, litter, vandalism, crowding, noise and inappropriate mix of visitors were recorded for each site or route and categorised as high, moderate or low. The level of acceptable impact varied, depending on the management objectives for the zone within which each route or site was located, that is, the levels of acceptability were more stringent in natural (minimal use) areas than they were in developed (high use) areas.

The study found that approximately half of all sites and routes were showing evidence of physical impacts beyond acceptable limits, while about 30 per cent were being managed in a fashion consistent with management objectives contained in the management plan. However, the majority of sites and routes were experiencing a level of visitor use that could not be sustained at the 1997 levels of management and infrastructure provision.

(provision of maps and brochures) and cost recovery mechanisms. Recreation surveys are now being used to target areas under active management in order to refine active management strategies.

The case study suggests that visitor-related impacts are common and likely to be greatest where there is inadequate site management, particularly where vehicle movement is uncontrolled. This situation will worsen over time unless appropriate visitor infrastructure and site management mechanisms are put in place.

The following issues are likely to have an effect on the areas of forest where tourism and recreation activities have been identified as having an unacceptable impact:

- *Processes for determining unacceptable impacts* – there is lack of agreement between agencies regarding realistic ways to determine how unacceptable impacts should be defined and measured for various forest settings and management regimes.
- *Inappropriate behaviour* – a greater understanding of the causes of vandalism and unacceptable visitor behaviour are required so that proactive measures can be put in place to deter offenders.
- *Lack of adequate resources* – many land management agencies lack sufficient resources (funding, staff and equipment) to ensure that appropriate levels of visitor infrastructure and control are in place to manage sites before problems develop.



Impacts from vehicles on a forest floor in a campground

- *High impact sports* – the recent upsurge in the popularity of extreme sports has dramatically increased the numbers of people participating in activities such as mountain-biking, motorcross, car rallying and horse riding. All land management agencies are experiencing difficulties finding additional areas to cater for the demand within reasonable distance of population centres. Consequently much informal use occurs in inappropriate areas, resulting in severe impacts.
- *Codes of behaviour* – encouraging codes of ethics such as ‘Tread lightly’ and ‘Leave no trace’, which foster personal responsibility for behaviour when recreating outdoors.



Michael F. Ryan

Blackbutt (*Eucalyptus pilularis*) regrowth



# 6.3

INVESTMENT IN  
THE FOREST SECTOR

## INTRODUCTION

The four indicators in this section examine the economics of investing in the forest sector, as well as the importance of research and development, new technologies and education. In the decade since the early 1990s the forest sector, in particular the plantation sector, has attracted new domestic and foreign investment. Forest-related research and development expenditure in Australia has been steadily increasing over the last decade, and in 2000–2001 totalled \$216 million. At the same time, new and improved technologies have allowed forestry operations to become more efficient and sustainable.

Indigenous people in remote Australia invest considerable effort in applying customary management to maintain forest values. Some of this activity, especially in regard to fire management, is supported by Australian and State Government research and development and other grants. Economic returns are not easily quantified, but important contributions to conservation of biodiversity and ecosystem services are increasingly recognised.



New Visy pulp mill, Tumut, New South Wales

# Value of investment



## Indicator 6.3a

Value of investment, including investment in forest growing, forest health and management, planted forests, wood processing, recreation and tourism

### Rationale

Provides an indication of the long-term and short-term commitment to forest management, further processing and other forest uses.

*Since the early 1990s the forest sector, and in particular the plantation sector, has attracted new domestic and foreign investment to the value of more than \$6.5 billion. New forest and wood-processing investments have occurred in each State and Territory.*

The value of investment in wood processing, plantation establishment, and native forest management, health, recreation and tourism indicates investors' commitment to Australian forest-based industries. Australia's ability to meet its own wood and non-wood product needs into the future depends on the sustainable use of its forests and continued investment in forest industries.

Since the early 1990s the forest sector, and in particular the plantation sector, has attracted new domestic and foreign investment to the value of more than \$6.5 billion. This investment consists of take-overs and acquisitions of existing processors, new processing equipment, rebuilding existing production lines, and investment in plantations. Leading international forest product companies have featured highly in all three major areas of investment in the forest sector.

During the last decade:

- Takeovers and buyouts of existing processing facilities totalled 19, and reached a value between \$3.5 and \$4 billion.
- There were 25 new forest and wood processing investments in Australia valued at \$1.7 billion (Table 91).
- Major forest resource investments totalling \$1.6 billion included acquisitions of public plantations in Victoria and Tasmania, and expansion of the national hardwood plantation estate.

There are two main drivers for investment. First, Australia's strong domestic market, in particular for structural wood products, has provided opportunities for efficiency gains. This has attracted investment from multinational companies seeking to capture market share and profits through global knowledge and economies of scale. Second, Australia's proximity to Asia provides opportunities for producers to enter new and emerging markets in the region, as well as the Japanese pulp and paper industry.



Table 91: New forest and wood-processing investments in Australia since early 1990s

State	Number of projects	Value (\$million)
New South Wales	5	660
Queensland	4	155
South Australia	2	70
Tasmania	3	175
Victoria	10	680
Western Australia	1	10
Total	25	1 750

Source: URS Forestry/Ausnewz 2002

Indigenous forest managers make an important contribution to forest health, especially in northern Australia. For example, The Bawinanga Aboriginal Corporation in Central Arnhem Land, Northern Territory, estimates that it spends about \$160 per square kilometre per year in land management work that contributes to maintenance of forest values.

### Further reading

ABARE (2000). Sustainability Indicator 6.3a – Survey of the value of investment in forest industries in Tasmania. December 2000. Australian Bureau of Agricultural and Resource Economics, Canberra.

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URS Forestry/Ausnewz (2002). The Australian Forest and Wood Products Review 2002. URS Australia Pty Ltd, Hobart.

### Case study – Tasmania

The forest sector is a dominant element of the State's economy. In 2000, the Australian Bureau of Agricultural and Resource Economics surveyed investment in forest-based activities in the four years following the signing of the Tasmanian Regional Forest Agreement. The forest-based activities included: forest-growing, forest harvesting, sawmilling, panel products, pulp and paper manufacture, timber manufacturing, tourism and recreation, and other forest contact industries.

The survey was designed to measure the long and short-term commitment to the forest industry through investment. It found that total investment averaged around \$195 million per year between 1996 and 2000 (see Table 92).

Other key findings were:

- Market value of forest sector companies more than doubled from \$360 million in 1996–1997 to \$731 million in 1999–2000.
- The greatest increases were observed in: sawmills; pulp and paper manufacturing; panel manufacturing; harvesting and plantation establishment contracting; and forest growing, which was not included but available data indicate significant increase.

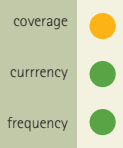
Since the 2001 survey was completed, Gunns Limited has become the dominant company in the Tasmanian forest sector and has a market value now approaching \$1 billion.

Table 92: Market capitalisation of Tasmanian forest sector by business category, 1996 and 2000 (\$million)

Total	30 June 1996		30 June 2000	
	Total	Average per business	Total	Average per business
Forest management	9.8	0.5	12.8	0.7
Harvesting and plantation establishment contractors	126.4	0.7	281.2	1.5
Pulp, paper and panel manufacturers	25.3	6.3	182.7	45.7
Sawmills	171.6	1.8	209.1	2.2
Craftwood industries	3.2	0.6	6.7	1.3
Secondary processors	7	1.1	12	1.9
Tourism and recreation operators	12.8	0.3	19.2	0.4
Other forest contact industries	5.8	0.3	7.8	0.4
<b>All business categories</b>	<b>362.0</b>		<b>731.3</b>	

Source: ABARE (2001)

Note: Data on forest growers are not available.



## Research and development expenditure

### Indicator 6.3b

Level of expenditure on research and development, and education

#### Rationale

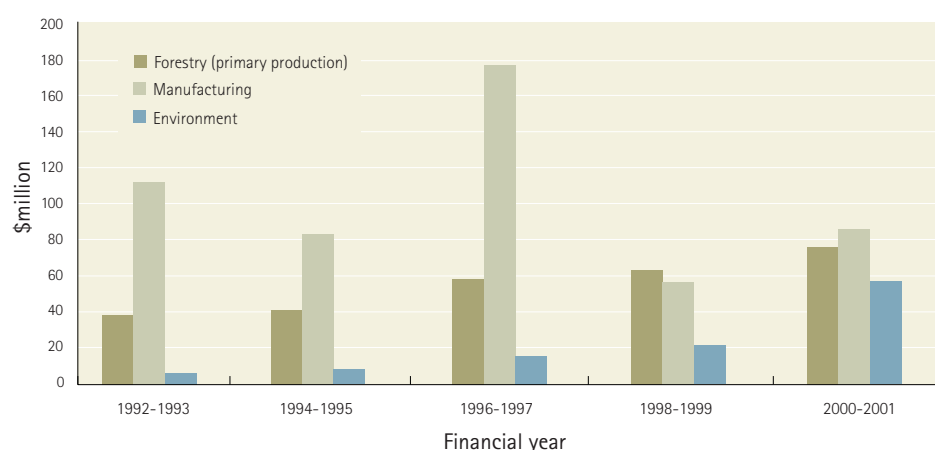
This indicator provides a measure of the level of expenditure on forest-related research and development.

*Forest-related research and development expenditure in Australia has been steadily increasing over the last decade and in 2000–2001 totalled \$216 million.*

In general, expenditure on forest-related research and development is steadily increasing in real terms. Figure 66 summarises total levels of research and development expenditure since 1992–1993.

In 2000–2001, forest-related research and development expenditure in Australia totalled \$216 million. The largest amount was spent on manufacturing, followed by primary production and environment (see Table 93).

Figure 66: Total public and private research and development expenditure in the forest sector



Source: Australian Bureau of Statistics

Table 93: Research and development expenditure by objective, 2000–2001 (\$'000)

Socio-economic objective	Public sector	Private sector	Total
Forestry (primary production)	71 188	3 786	74 974
Manufacturing (wood, wood product and paper)	6 333	78 620	84 953
Environmental management (forest and wooded lands)	55 709	480	56 189
<b>Total</b>	<b>133 230</b>	<b>82 886</b>	<b>216 116</b>

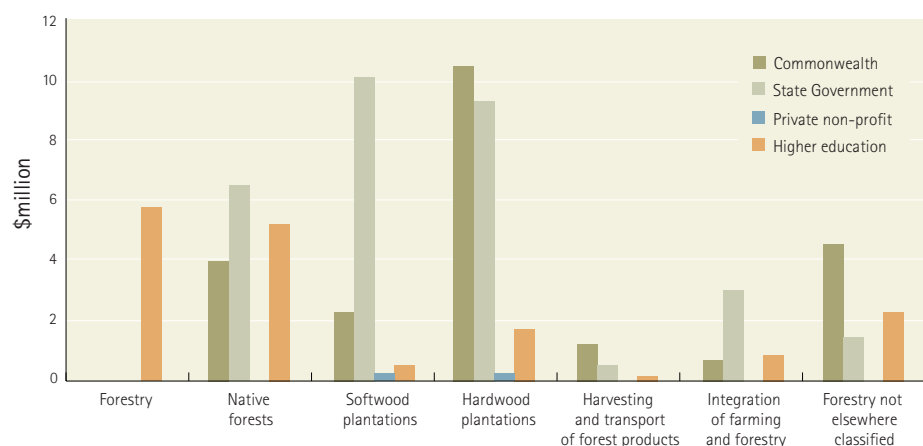
Source: Australian Bureau of Statistics

Note: Figures for 2000–2001 are reported for a new classification; whereas primary production and manufacturing remain unchanged. The new classification ('environmental management, forest and wooded lands') is broader.

## Public sector

The public sector includes Governments, private non-profit organisations, and higher education institutions. The major focus of the public sector expenditure on research and development is primary production and environmental management (Figure 67). The public sector provided 94 per cent of all expenditure on primary production research. Australian and State governments reported the highest research and development expenditure for primary production-oriented forestry, of \$23.7 million (33 per cent) and \$30.7 million (43 per cent), respectively. Higher education institutions followed with a reported \$16.2 million (23 per cent).

Figure 67: Public sector research and development expenditure on primary production 2000–2001



Source: Australian Bureau of Statistics

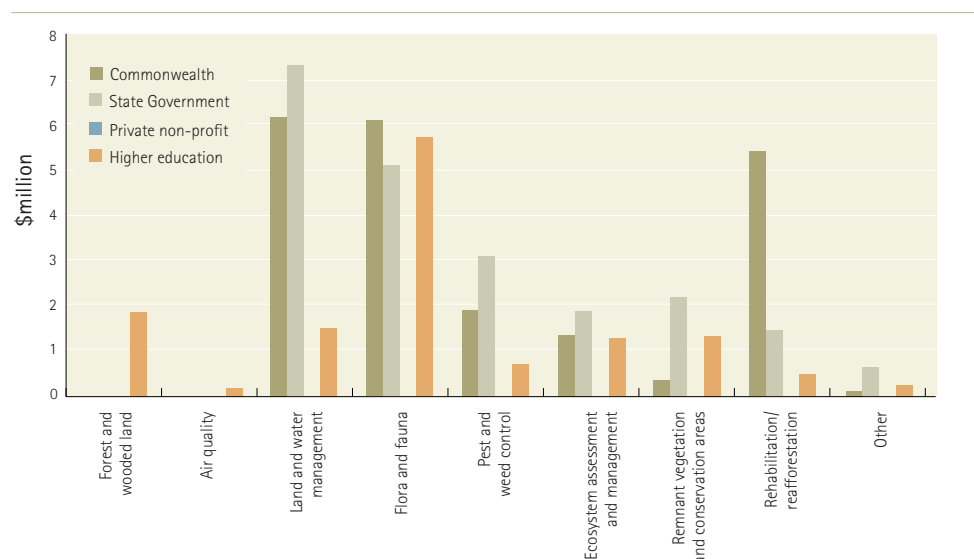
The public sector also reported that 99 per cent of all research and development expenditure was for environmental management of forest and wooded lands (Figure 68). Of this funding, Commonwealth and State governments reported the highest research and development expenditure for environmental management of forest and wooded lands, with \$21.2 million (38 per cent) and \$21.6 million (39 per cent) respectively. The third largest level of public sector expenditure in environmental management was reported by the higher education sector with \$12.8 million (23 per cent) spent.

These figures do not include substantial additional expenditure that contributes indirectly to maintenance of forest values, such as improved fire management, and support for Indigenous land managers to develop infrastructure and training to protect forest values.



Identification of timber and timber properties, CSIRO Forestry and Forest Products, Clayton, Victoria

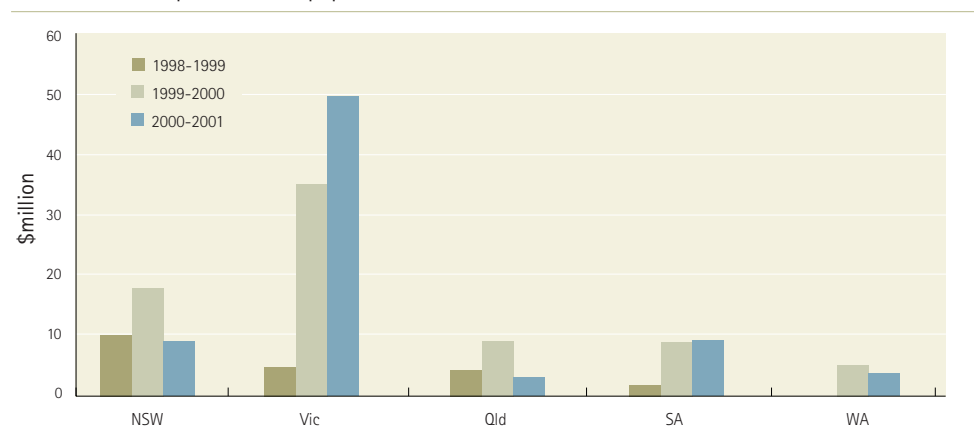
Figure 68: Public sector research and development expenditure in environmental management, 2000–2001



Source: Australian Bureau of Statistics

Note: Amounts reported under the general heading 'Forest and wooded lands' are those reported by survey respondents who were unable to breakdown expenditure into the lower classification levels

Figure 69: Private sector research and development expenditure in manufacturing of wood, wood products and paper



Source: Australian Bureau of Statistics

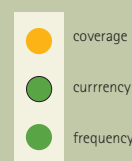
## Private sector

The major focus of the private sector's research and development expenditure was in manufacturing of wood, wood products and paper. Data for this sector are available at the national level, and for primary production and environmental management are confidential in some States. The private sector was responsible for 92 per cent of all expenditure in the manufacturing of wood, wood products and paper. Most of this expenditure took place in Victoria (Figure 69).

## Further reading

ABS (2002). Research and Experimental Development. Catalogue Nos. 8104.0, 8109.0, 8111.0 and 8112.0. Australian Bureau of Statistics, Canberra.

# New technologies



## Indicator 6.3c

### Extension and use of new and improved technologies

#### Rationale

This is an indicator of continuous improvement in forest management and in forest-based industries relevant to the sustainability of forest use.

*The indicator lists the main technologies that have improved forestry and forest-based industries. There are no quantitative data.*

The goal of managing forests sustainably for production purposes relies on continuous improvement in management skills and in the development and adoption of new technologies to allow for more efficient resource use. Identifying the growth and use of technologies is a useful indicator of progress in forest management. New technologies involved in conservation forest management or recreation are not considered in this indicator.

Improvements in forest management have arisen through improved knowledge in several areas. The major areas of improvement are:

- the roles of components of forest ecosystems;
- forest regeneration processes;
- tree-breeding enhancements;
- improved assessment techniques leading to superior seed collections; and
- knowledge of the fire ecology of forest vegetation.

Improved tree-breeding has led to lower planting densities, which match more closely the final stocking rates at time of harvest and thereby reduce impacts on soil and water quality during the growing period. Similarly, improved planting machinery, herbicides and pesticides have led to reduced site preparation and therefore reduced site impact in plantation establishment. Tree breeding for improved growth rates, tree form and salinity tolerance have made possible greater plantation establishment by farmers, resulting in broader soil and water protection.

The development and use of remote sensing and computing technologies has led to improved knowledge about forest extent, type, health and ecosystems, including more cost-effective approaches to mapping, field surveys, and forest modelling—especially in remote parts of Australia. These advances—along with improved communication networks and advances in protective clothing, personal safety systems on fire tankers, fire support aircraft and fire suppressants—have also led to more effective, responsive and safer bushfire management. Advances in the role of biological controls, such as blackberry rust, pest controls and disease management have led to an improvement in forest health.

New forest harvesting technologies have been adopted to address the changing types of forest being harvested; there are now more even-age native regrowth forests and plantations. The new technologies also conform with more stringent occupational health and safety standards, economic pressures, and more rigorous codes of forest practice, especially for soil and water



Monitoring of forests is enhanced by using Global Positioning System technology to define ground plot location

protection. Cording and matting are used on tracks within coupes to reduce soil disturbance, minimise sediment runoff into streams and enable harvesting to continue during wet weather. Similarly, improvements in harvesting equipment and techniques reduce soil compaction and water degradation. Enclosed climate-controlled cabins, responsive driving mechanisms, and safety protection such as rollover bars, improve the health and safety of harvesting operators.

Changing consumer preferences, a change in the resources such as plantation grown and regrowth timber, and new products, have seen considerable advances in timber-processing over the past ten years in Australia. New sawing methods, including a change from back-sawing to quarter-sawing to process small diameter logs, radial sawing, and new drying techniques to process regrowth native forests, are being tested to enable existing mills to adjust to the changing resources, especially to provide high quality timber for the wood furniture industry. Computing technology such as infrared scanning is now used in mills to maximise the timber cut from an unprocessed log.



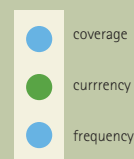
# Return on investment

## Indicator 6.3d

### Rates of return on investment

#### Rationale

An acceptable internal rate of return on investment in forests and forest-based industries indicates that society values its forests enough to invest in them.



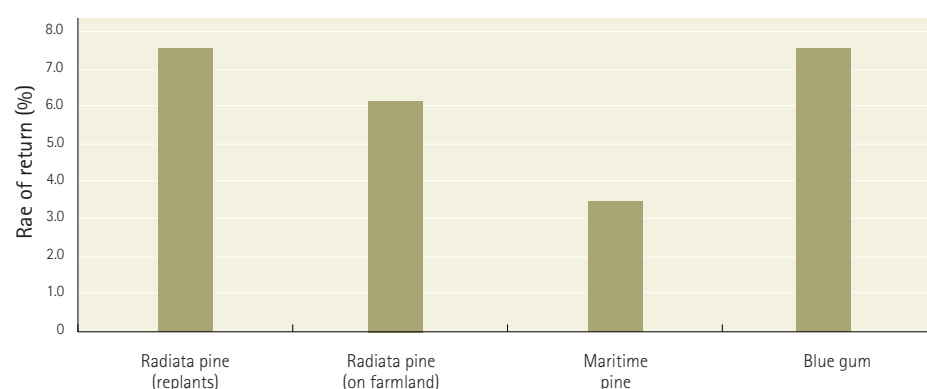
*Rates of return vary with a range of factors but are generally higher with good site quality and product options, as well as desirable plantation species.*

An increasing demand for wood and wood products, and Australia's proximity to the emerging markets of Asia, have driven the recent growth in the forest sector over the past decade. Australia's forests present investors with viable investment opportunities and attractive rates of return.

A key measure of the rates from investment is the internal rate of return (IRR). IRR is the rate at which capital invested grows over the life of the investment, and it allows comparisons between investment opportunities. In Australia, 7 per cent is the target for public sector forest enterprises. In the private sector, the IRR is considered commercial-in-confidence and is not readily disclosed.

Return on investment in the forest industry depends on several factors including site cost, productivity, management and its costs, and the market price of the final products. The species used in a plantation can also affect growth rates and market prices. Figure 70 displays the variance in the IRR among a number of different species.

Figure 70: Internal rate of return with different plantation species



Source: Forestry Pacific Pty Ltd (2000)

Site quality, distance to the mill, and product options all have a substantial effect on the IRR (Table 94). A good quality site will increase the IRR. Proximity to the mill will also increase the IRR, as it will decrease transport and associated costs. The study also found that wood for paper or pulp markets produced the highest potential returns to growers.

Table 94: Effect of site quality and distance to mill on Internal Rate of Return (percentage)

Distance from mill (km)	50	50	50	200	200	200
Site quality	Poor	Average	Good	Poor	Average	Good
Domestic market						
Printing and writing paper	3.0	8.6	12.2	1.1	5.6	8.5
Export market						
Hardwood bleached kraft pulp	2.6	8.0	11.5	0.5	4.7	7.3
Printing and writing paper	2.2	7.4	10.8	–	3.7	6.0
Hardwood pulp logs	0.7	3.8	9.1	–	–	–
Hardwood woodchips	–	3.4	5.7	–	–	–

Source: ABARE (1994)

## Further reading

ABARE (1994). Economic Assessment of Private Forests in Northern Tasmania. Pp. 15–18 in *Faces of Farm Forestry – the Biennial Conference of the Australian Forest Growers*, May 2–5 1994. Australian Bureau of Agricultural and Resource Economics, Canberra.

Department of Primary Industries, Queensland (2000). *Investing in Queensland's Private Plantations*. Department of Primary Industries, Brisbane.

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Mills, W.L. Jnr. (1988). Forestland: investment attributes and diversification potential. *Journal of Forestry* 1988, pp: 19–24



Prospectuses for forestry industry investment

# 6.4

CULTURAL, SOCIAL AND  
SPIRITUAL NEEDS AND VALUES

## INTRODUCTION

This section focuses on how forests provide for uses that do not involve consuming a tangible product. These uses include a range of values that people place on forests.

Indigenous people have close ties to their land and forests are an integral part of expressing their cultural, social, religious and spiritual values. For non-Indigenous Australians there are also many places of cultural value located in forested areas. Forests need to be managed to take these into account.

Non-consumptive uses include visiting forests for recreation and pleasure. These intangible uses are hard to measure—as are the benefits received—but they are no less real than timber or clean water.



Pukumani poles surround a ceremonial site on Bathurst Island, Northern Territory. The burial poles are uniquely Tiwi and highly regarded as art and tourist attractions

## Areas formally managed to protect indigenous values

### Indicator 6.4a(i)

Area and per cent of forest land in defined tenures, management regimes and zonings which are formally managed in a manner which protect Indigenous peoples' cultural, social, religious and spiritual values, including non-consumptive appreciation of country

#### Rationale

To ensure that adequate land is placed appropriately under the range of tenure classifications and/or dedicated management regimes to protect Indigenous peoples' values associated with forests. These values include access and custodial rights, cultural maintenance and ceremony and education.



*There is no comprehensive national database of Indigenous land holdings. More than 18 per cent of Australia's total land and about 13 per cent of forested land is under Indigenous ownership, mostly in the Northern Territory, South Australia and Western Australia.*

Australia is committed to legal and management arrangements designed to protect Indigenous peoples' values associated with forests. To achieve this, there needs to be access and recognition of custodial rights, and maintenance of the essential features of Indigenous cultures through ceremony and education. Australia acknowledges the cultural, spiritual, and religious connection between Indigenous communities and forests.

The area of land that is brought under Indigenous tenure is one component of this indicator. The intent of the indicator is to monitor and report levels of Indigenous ownership of forested land and so be accountable for the protection of Indigenous peoples' cultural, religious, social and spiritual needs and values.

This indicator provides details of the area of lands where the full range of values important to Indigenous people are most strongly protected by formal Indigenous ownership under land title law. Native Title issues, where Indigenous interests do not hold formal title in land, are reported under Indicators 6.5d and 7.1a.

Despite unique forms of legal ownership, Indigenous people's land management objectives and practices remain subject to environmental or resource allocation laws made by States or Territories and the Australian Government. Environmental or resource allocation laws made by States or Territories and the Australian Government have effect across all tenures. Nonetheless, full legal title in land has permitted re-establishment of large measures of customary control and so allowed obligations to the land to be met to varying extents in all jurisdictions. However, the Indigenous title varies markedly by jurisdiction, and with geographical location and formal land valuations.

About 18 per cent of Australia's total land or more than 1.3 million square kilometres, and 13 per cent of its forested land, was under Indigenous ownership of some sort in 2000 (Figure 71 and Table 95). The vast majority of Indigenous land is in the Northern Territory, South Australia and Western Australia, where 32 per cent of the Indigenous population resides. By contrast, the States of Victoria, Tasmania and New South Wales, with a somewhat larger proportion of the Indigenous population (39 per cent), have only about 1 per cent of their land area under Indigenous ownership.

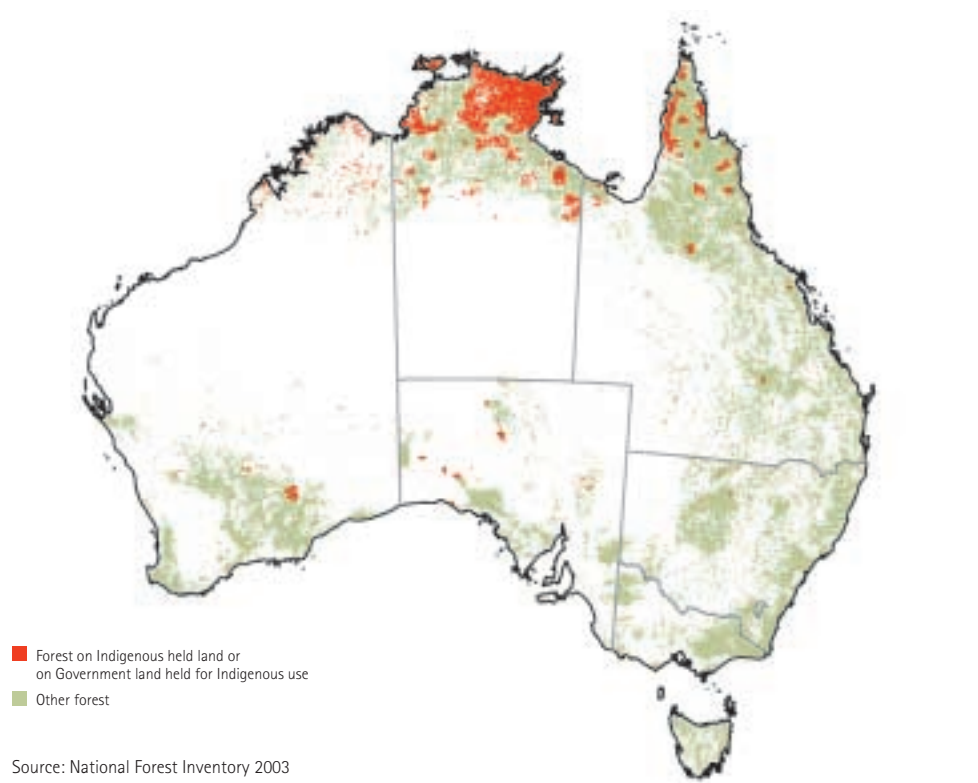
Table 95: Estimates of the proportion of Australia under Indigenous ownership

Year	Proportion (per cent)	Comments	Source
1993	14.3	Excluded some smaller landholdings	Australian Land Information Group
1996	15.1	Did not include all recent purchases	Indigenous Land Corporation (Regional Indigenous Land Strategies)
1997	15.2	Some anomalies in New South Wales and Victoria	Department of Prime Minister and Cabinet
2000	16–18	Most recent published comprehensive assessment	Pollack (2001)

Source: Pollack (2001)

Note: These figures do not include Native Title determinations or Indigenous Land Use Agreements except where formal title has been granted.

Figure 71: Indigenous forest land in Australia, 2002



Tables 96 and 97 show the extent of Indigenous land ownership arising from land purchases and claim processes over the last few decades. There remains some ambiguity about the classes of title or ownership. Thus, the values in Table 96 are best regarded as a starting point for future reporting of trends, rather than as a definitive statement of the precise area of Indigenous lands.

These data and the associated map illustrate strong bias towards central and northern Australia, and the relatively weak representation of forested sites in areas where commercial

forestry is most concentrated. The Indigenous Land Corporation (ILC), purchases land on behalf of Indigenous people (Table 97). For example, a property capable of commercial timber production has been purchased in Western Australia and two purchases planned in Central Queensland include farm forestry in business plans.

Indigenous title over large areas in arid parts of the country differs markedly from Indigenous title to land in forested lands alienated following European settlement. Significantly there are various heritage protection mechanisms employed by Governments. The use of these provisions to protect Indigenous values is dealt with under indicator 6.6a.

Table 96: Land and forest area under Indigenous tenure

Jurisdiction	Area (hectares)	Indigenous tenure across all lands (per cent)	Indigenous tenure in forested lands (per cent)
Australia	768 500	21	13
New South Wales <sup>1</sup>	80 400	–	1
Northern Territory	134 800	45	47
Queensland	172 700	3	7
South Australia	98 400	21	5
Tasmania	6 800	0.3	–
Victoria	22 800	0	0
Western Australia	252 600	14	7

Source: National Forest Inventory 2003

<sup>1</sup> Includes the Australian Capital Territory

Table 97: Land acquired for divestment to Indigenous people, 1997–2002

Jurisdiction	No. properties	Total area ('000 hectares)
New South Wales	40	183
Northern Territory	10	572
Queensland	30	1 230
South Australia	25	835
Tasmania	4	20
Victoria	24	4
Western Australia	27	2 278
Total	160	5 121

Source: National Forest Inventory 2003

Note: While the area acquired represents only 0.7% of Australian land, purchasing is able to focus on sites where claims of continuing connection may be strong but which are unavailable for claim under land rights legislation.

## Further reading

Pollack, D. (2001). Indigenous land in Australia: a quantitative assessment of Indigenous landholdings in 2000. Discussion Paper 221/2001. Centre for Aboriginal Economic Policy Research, Australian National University, Canberra.



coverage



currency



frequency



## Areas formally managed to protect places of non-indigenous value

### Indicator 6.4a(ii)

Proportion of places of non-Indigenous cultural value in forests 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.

*Wherever known non-Indigenous heritage places are located in multiple use forests or nature conservation reserves, formal mechanisms are in place to manage them. However, the extent of surveys and heritage significance assessments varies widely between jurisdictions.*

Australia's forests are significant repositories of heritage places associated with the diversity of human activity since the earliest days of non-Indigenous occupation of the country. Places of non-Indigenous cultural value include sites, features, structures and landscapes assessed as having some cultural significance at local, regional or state level in each State or Territory.

Heritage places found in Australia's forests are evidence of the complex interaction between people and forest landscapes and reflect the many changes in life and work experienced over the last two centuries. Forest heritage includes places associated with Indigenous contact and conflict, pastoral and agricultural settlement, exploration and survey, forestry and timber production, mining, graves and cemeteries, railways and tramways, travel routes, transport and telecommunications, recreation, social life and natural places of aesthetic value.

At present nationally consistent protocols for identifying and measuring non-Indigenous cultural heritage values in forest areas have not been developed. All States and Territories have carried out some inventory surveys of heritage places. However, the purpose, definitions, criteria and methods used to identify and record them vary according to each jurisdiction's statutory responsibilities and management practices.

Most jurisdictions have adopted a risk management approach based upon the effective management of threatening processes such as fire, development, timber harvesting and road-building. For example, Victoria, New South Wales, Tasmania and Queensland all conduct inspections or surveys before timber-harvesting operations may proceed, and have conducted targeted and comprehensive cultural heritage place surveys and heritage studies.

In all States and Territories, where known non-Indigenous heritage places are located in multiple-use forests or nature conservation reserves, formal mechanisms are in place to manage the places for protection. Sites on leasehold, other public lands, or on freehold tenure, might not be formally protected unless listed on the relevant State/Territory or Commonwealth Heritage Register (Table 98).

The degree to which surveys and heritage significance assessments have been conducted varies widely between the States and Territories. All jurisdictions have focused their inventory survey efforts on multiple-use forests and nature conservation reserves. Victoria has surveyed 5.9 million hectares, 90 per cent of its total public native forest estate. Queensland has

surveyed 4.45 million hectares (10 per cent). Taken alone, these figures are somewhat deceptive. While Victoria's public native forests comprise over 83 per cent of its total forest estate, Queensland's native forests (55.7 million hectares) include leasehold and private land tenures accounting for 45.7 million hectares (or 82 per cent) of its total forest area. More than 56 per cent of Queensland's 7.9 million hectares of protected area forest estate has been subject to some form of heritage inventory survey and assessment.



Damco's slab hut c. 1900, Barakula State Forest, Queensland

Table 98: Number of places of non-Indigenous cultural value in forests formally managed to protect their values

Number of:	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Commonwealth
Places formally managed through legislation or codes of practice	–	2 123	–	1 852	–	140	2 800	–	3 (2 Qld; 1 Jarvis Bay Territory)
Places in production forests on public land	–	–	–	1 068 <sup>1</sup>	–	112 <sup>1</sup>	1 428 <sup>1</sup>	–	0
Places in conservation forests on public land, including nature conservation reserves	–	–	–	784 <sup>2</sup>	–	28 <sup>2</sup>	1 372 <sup>2</sup>	–	–
Places in forests on other public land, including leasehold	–	–	–	249 <sup>3,4</sup>	–	2 378	–	–	–
Places in forests on freehold and other private land	–	–	–	147 <sup>5</sup>	–	–	–	–	–
Cultural heritage surveys undertaken in context of timber harvesting plans	–	Surveys for all timber harvesting operations	–	Pre-harvest inspections	–	–	–	–	–
Percentage of forests of all tenures surveyed	–	–	–	8	–	–	90 <sup>6</sup>	–	–
Total area of forest ('000 ha)	118	26 658	32 837	55 734	10 866	3 169	5 953	25 365	–

Source: National Forest Inventory 2003

<sup>1</sup> Multiple-use forest

<sup>2</sup> Nature conservation reserve

<sup>3</sup> Leasehold land

<sup>4</sup> Other State lands

<sup>5</sup> Freehold land

<sup>6</sup> Public native forest only

Case study – Clermont Area State Forests, Central Queensland

Sixty thousand hectares of predominantly narrow leaf ironbark (*Eucalyptus crebra*) forest near Clermont in Central Queensland were surveyed for a Queensland Parks and Wildlife Service cultural heritage inventory project in 2001.

Explorer Ludwig Leichhardt traversed the Clermont district during his 1844–1845 expedition to Port Essington, and shortly thereafter the first pastoralists settled in the district. Conflict between the Indigenous peoples and the pastoralists ensued as they battled for control of the natural resources of the area. Gold and copper were discovered in the Clermont area in 1861 and it became Queensland’s first viable goldfield. Timber-cutting developed to service the pastoral and mining industries and to supply railway sleepers for new lines in central and north Queensland. The government established a sleeper mill in the State forest at Birimgan in 1912.

A total of 110 places (Table 99) with cultural heritage value were identified as a result of the inventory project. Places recorded include numerous gold mine workings, timber getter’s camps and huts, a section of the inland telegraph line, the Birimgan sleeper mill, township and tramway sites and pastoral homesteads, stockyards and camps.

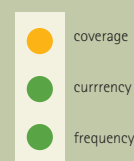


Sleeper cutters and families at the 20 mile camp, Blair Athol, Queensland 1924. These cutters supplied ironbark slabs for the government sleeper mill at Birimgan (Photo courtesy of Keith James, Belyando Shire Council, Clermont)

Table 99: Cultural heritage sites identified

Place category (type)	Number
Forestry	7
Mining	24
Pastoral	17
Rail and tramways	32
Timber industry	14
Settlement	4
Other	12

# Non-consumptive use forest values



## Indicator 6.4b

### Non-consumptive use forest values

#### Rationale

This indicator recognises the breadth of values that communities place upon forests and is designed to measure the accessibility and availability of forest areas for non-consumptive uses such as recreation and aesthetic appreciation.

*There are little data on the value of non-consumptive uses as many of these are intangible and hard to measure.*

This indicator recognises the breadth of values that communities place upon forests, and measures the accessibility and availability of forest areas for non-consumptive uses. These uses include conservation, recreation and education. The indicator also includes community satisfaction with existing use and opportunities for expression of non-consumptive and non-use forest values including cultural and spiritual values.

There is no national measure of community satisfaction. There are, however, some limited data available that can give a basic indication about the non-consumptive uses of forests.

Table 100 shows some of these activities in the multiple-use forests of New South Wales. The financial value of these activities cannot be quantified but the educational and recreational value to participants is significant. The list is not comprehensive and other forest uses include fishing, bird watching and nature studies.

Table 100: Non-consumptive activities in multiple-use forests, New South Wales

Activity	1997–1998	1998–1999	1999–2000	2000–2001	2001–2002
Eco-tourism/4x4 Tours	54	42	87	50	41
Horse, trail, endurance rides	32	32	32	45	32
Car rallies/go carts	38	36	36	34	30
Motor bike rallies	6	8	6	5	6
Mountain bike rallies	30	6	5	20	17
Orienteering/mountain runs/ triathlon	37	37	34	21	16
Education	27	45	272	575	20
Training/exercises	152	77	84	79	68
Marked drives	30	34	31	24	19
Camping sites	308	225	266	115	160
Marked forest walks	90	61	61	46	48
Filming and documentary permits	3	5	6	3	3

Source: State Forests of New South Wales (2002)

## Conservation

The main purpose of conservation is to ensure that ecosystems are maintained. Conservation values are frequently acknowledged by communities as a major reason for wanting to preserve forested landscapes. Many people are content in the knowledge that a forest exists with conservation and other values intact, even without visiting the area personally. Non-commercial photographing and filming is often encouraged as it is seen to increase community awareness and an appreciation of forest conservation.

In 2003 approximately 13 per cent (21.4 million hectares) of Australian native forests were in nature conservation reserves. This figure may be understated as reserves may also be within leasehold land, multiple-use forests or private land, via covenants. There are little available data on the amount of money spent on conservation. Funding comes from primarily government bodies, but there are also community contributions in the form of donations, bequests and membership fees.

The Department of Conservation and Land Management, Western Australia, provided some conservation expenses in its 2001–2002 Annual Report (see Table 101). These figures may be understated because funding contributing to conservation may be grouped under other outputs.

Table 101: Conservation expenditure by output (\$'000)

Output	2000–2001	2001–2002
Nature conservation	47 991	55 061
Sustainable forest management	89 103	33 333
Resources and services provided to the Conservation Commission of Western Australia	287	684
Parks and visitor Services	38 745	50 297
Astronomical services	1 010	1 187
Total cost of outputs	177 136	140 562

Source: CALM (2002)

## Hiking and bushwalking

Bushwalking is a popular form of recreation. Nature conservation reserves and multiple-use forests contain developed walking trails. Bushwalks increase community awareness, education and interest in conservation. Marked bushwalks often contain information on the local forest species. There are many hiking clubs throughout the country that use forests regularly.

## Education

Community education is a major beneficiary of non-consumptive uses in forests. For example, some forest managers run education and awareness programs throughout the year, especially during school holiday periods. In addition a number of organisations work with members of the public to conduct research and monitoring of flora and fauna in forests.

## Further reading

State Forests of New South Wales (2002). *Seeing: Social, Environmental and Economic Report 2001/02*. State Forests of New South Wales, Pennant Hills.

CALM (2002). *Annual Report, 2001–02*. Department of Conservation and Land Management, Perth.

# 6.5

EMPLOYMENT AND  
COMMUNITY NEEDS

## INTRODUCTION

The five indicators in this sub-criterion measure a range of factors connected with employment in the forest industry and related sectors. The indicators also assess the viability of communities dependent on forests. From 1993 to 2001, direct employment in the forest sector increased in total number but declined from 0.98 per cent of the national workforce to 0.86 per cent. However, the forest sector also generates considerable employment in other related industries.

In addition, this section considers how Indigenous people are able to exercise their rights to meet their needs from forested land to which they may hold no formal title.

The third theme to this section concerns workers within the forestry industry, and measures wage and injury rates. The average injury rate for the forest, wood-milling and manufacturing sectors is 39 per 1000 employees per year, compared with 24 for all Australian industry. Many injuries are connected with activities involved in harvesting. The number of employees involved in the sector is declining, but in the three years to 2001 the spending on wages increased.



Logging crew in alpine ash (*Eucalyptus delegatensis*) forest

Michael F. Ryan



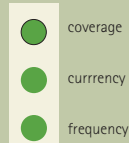
# Employment

## Indicator 6.5a

Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment

### Rationale

Employment is an important measure of the contribution of forests in meeting community needs.



*From 1993 to 2000, direct employment in the forest sector declined from 0.98 per cent to 0.81 per cent of the Australian workforce, rising to 0.86 per cent in 2000–2001. However, the forest sector generates considerable employment elsewhere, with the multiplier effect ranging from 1.57 in South Australia to 2.35 in Victoria.*

Employment is one measure of the contribution of forests to meeting community needs. Employment in the forestry sector can be direct or indirect. Direct employment refers to employment in the wood and wood product industries and to those commercial activities in direct contact with forests—for example, beekeeping, grazing, eco-tourism or forest reserve rangers. Indirect employment is employment in other sectors generated by direct forest employment. It indicates the potential multiplier effect of direct forest employment.

## Direct employment

Currently the data collected by statistical agencies have a number of limitations. The main limitation is that forest management staff working in production or conservation are not included; neither are recreation staff or log truck drivers. Therefore, while the reported figures for this indicator under-estimate the total numbers employed by the Australian forestry sectors, the changes in relation to total employment in Australia are relative to what would be expected for all participants in forests and forestry.

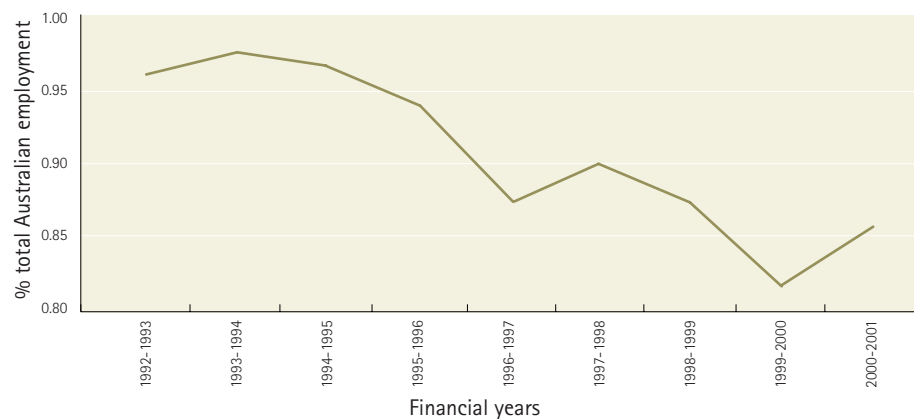
From 1993 to 2000, direct employment reported in forest sector industries as a proportion of total Australian employment declined from 0.98 per cent to 0.81 per cent. However, latest figures show a rise to 0.86 per cent for the year ended June 2001 (Figure 72; Table 102).



Michael F. Ryan

Log truck refuelling, Numeralla, Victoria

Figure 72: Forest industry employment as a percentage of total employment in Australia



Source: ABS (2002a,b); ABARE (2002a)

Note: derived from data in Table 103.

Table 102: Direct employment in the forest sector ('000 employees)

Year	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001
Forestry and harvesting <sup>1</sup>	11.3	12.4	11.4	10.9	14.0	14.1	8.8	13.4
Wood and wood products								
Log sawmilling	8.3	9.0	8.1	7.1	7.0	5.6	6.5	5.3
Resawn and dressed timber	6.7	7.1	6.4	6.9	7.4	6.2	6.2	7.9
Veneers, plywood and fabricated wood manufacturing	5.6	6.2	5.9	5.6	4.9	5.0	4.9	5.5
Wooden structural fittings and other joinery	18.0	17.2	17.1	16.4	18.7	20.1	22.2	20.2
Hardwood woodchips	0.7	0.8	0.9	0.9	0.9	0.7	0.8	0.6
Other wood products	7.6	7.8	7.4	6.7	6.5	5.7	6.2	5.7
Total	46.9	48.1	45.8	43.8	45.4	43.4	46.8	45.3
Paper and paper products								
Pulp, paper and paperboard	5.8	5.6	5.8	5.2	4.8	4.4	4.3	5.1
Paper bags (including sack)	1.0	0.9	1.0	1.2	1.2	1.3	1.4	1.2
Solid fibreboard containers	2.4	2.3	4.1	2.4	2.4	2.5	2.6	2.9
Corrugated fibreboard containers	4.8	5.3	5.7	5.6	5.4	5.5	4.9	5.9
Other paper products	3.8	3.6	3.5	3.4	3.5	3.7	3.6	4.6
Total	17.9	17.8	20.0	17.9	17.2	17.3	16.9	19.7
Total forestry and wood products sectors	76.1	78.3	77.2	72.6	76.6	74.8	72.4	78.4
Total manufacturing industries	1 092.3	1 115.3	1 111.5	1 129.3	1 121.2	1 083.5	1 114.9	1 131.0
Total employees	7 755.2	8 056.6	8 289.2	8 354.8	8 461.3	8 647.4	8 906.6	9 090.0
Forest and wood products as a proportion of total employees (per cent)	0.98	0.97	0.93	0.87	0.91	0.86	0.81	0.86

Source: ABS (2002); ABARE (2002a,b, 2003)

<sup>1</sup> Does not include truck drivers, managers or conservation staff.

Table 103 shows employment of foresters and park rangers in Australia from 1996–2001. It can be assumed that these employees were not accounted for in Table 102.

Improved estimates of direct employment in non-wood forest industries have been obtained as part of the economic and social assessments for Regional Forest Agreement areas. Data were collected for the beekeeping, tourism and grazing industries.

Table 103: Park ranger and forester employment (total numbers)

1996	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Other	Total
Forester	62	483	9	309	74	227	386	217	0	1 767
Park ranger	38	333	168	435	106	84	351	169	6	1 690
2001										
Forester	59	427	10	309	98	342	418	272	0	1 935
Park ranger	21	382	145	399	92	53	421	78	8	1 599

Source: Space Time Research (1996, 2000)

Note: The terms forester and park ranger were defined by the individuals completing the census.

## Indirect employment

Indirect employment is usually measured at a national or State/Territory level using macro-economic models since they capture the broad structure and linkages between the different sectors of the economy.

State/Territory and national employment multipliers have been generated (Table 104). The State multipliers represent the overall State employment that is generated by an increase in employment in that State's forestry, logging, wood and paper industries.

For example, in Western Australia the State employment multiplier in the forestry and logging sector of 1.97 indicates that 100 people employed in that State's forestry and logging sector would generate additional employment of 97 people in the rest of the State's economy. Similarly, the national employment multiplier of 3.61 for the same sector implies that an increase of employment of 100 people in that industry in Western Australia provides additional employment of 261 people in the national economy. As direct employment is understated, it is likely that indirect employment is also understated.

Table 104: Employment multiplier effects of forest-related industries

	Forestry and logging		Wood and paper manufacturing		Total forest-based industries	
	State	National	State	National	State	National
New South Wales	2.25	4.20	1.66	1.24	1.88	2.72
Queensland	2.25	4.20	1.49	1.19	1.64	2.31
South Australia	1.57	3.70	1.43	1.02	1.65	2.86
Tasmania	2.26	3.77	1.29	0.61	1.44	2.24
Victoria	2.35	3.85	1.61	1.25	1.80	2.79
Western Australia	1.97	3.61	1.44	1.15	1.67	2.38

Source: ABARE (2002b)

### Case study – Small communities

Forest sector employment is especially significant in a number of small rural Australian communities. Livelihood in these communities can often rely on the employment provided by the forest sector. The Queensland Department of Primary Industries has researched the impact of forest industry employment on a small town. The town, Injune, is in Southern inland Queensland and has a population of roughly 400. Statistics suggest that approximately half of the population 'directly relies on the forest industry for all or part of their livelihood'. Approximately 70 families in Injune derive at least one income from direct employment in the forestry sector. Furthermore, around three-quarters of these families are single income families, therefore relying wholly on the forestry sector for income. Further information on forest industry-dependent communities is in indicator 6.5c.

### Further reading

ABARE (2002a). Australian Forest and Wood Product Statistics March/June 2002 Quarters. Australian Bureau of Agricultural and Resource Economics, Canberra.

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## Wage and injury rates

### Indicator 6.5b

Average wage rates and injury rates in major employment categories within the forest sector

#### Rationale

A sustainable industry will ensure high levels of workforce health and welfare and wage rates comparable with other rural industries.



*Employment and spending on wages in the forestry sector increased in the three years to 2001. The average injury rate for the forest, wood-milling and manufacturing sectors is higher than the national average. The fatality rate for the forest sector is considerably higher than the national average.*

A sustainable industry will strive to safeguard the health of its workforce and maintain wage rates comparable with similar industries. Changing injury or wage rates reflect on employment quality and desirability, and so affect the future of forest management as well as the larger community.

Table 105 provides employment data for the forestry sector. It is not practical to ascertain average wages from these data, as it does not allow for part-time workers, contractors and seasonal variation. Overall the forestry sector has seen a greater increase in spending on wages than in employment. This may be attributed to an increased emphasis on positions of a higher skill level, resulting in higher associated wages and a possible reduction of lower skilled positions. General wage increases would also have contributed to this trend.



Required safety equipment for harvesting operations

Michael E. Ryan

Table 105: Wages in the forest products sector (\$million)

Sector	1998–1999	1999–2000	2000–2001
Log sawmilling and timber dressing			
Log sawmilling	156	170	134
Wood chipping	37	39	19
Timber re-sawing or dressing	222	211	298
Sub-total	416	420	451
Other wood product manufacturing			
Plywood and veneer	53	53	34
Fabricated wood	143	138	191
Wooden structural component	533	654	562
Other wood products	137	145	148
Sub-total	866	990	935
Paper and paper products			
Pulp, paper and paperboard	265	270	296
Solid paperboard containers	107	120	140
Corrugated paperboard containers	–	273	353
Paper bag and sack	–	60	43
Other paper products	142	142	238
Sub-total	864	865	1 070
Total forest products sector wages	2 146	2 274	2 456
Total manufacturing industry wages	–	39 900	38 746
Proportion in forest products sector (per cent)	–	5.7	6.3

Source: ABARE (2002); ABS (2001)

## Injury rates

Some 2.36 per cent of fatal injuries and 0.27 per cent of non-fatal injuries in the Australian workplace are directly attributable to the forestry sector. While the rate of fatal injuries in the forestry sector is high and has remained fairly steady in recent times, there has been a significant drop in non-fatal injuries.

The average injury rate for the forest and wood-milling and manufacturing sectors is 39 per 1000 employees per year compared with 24 for all Australian industry (Table 106). The pulp and paper industries perform better than the average for Australian industry, again reflecting the more capital-intensive and controlled manufacturing environment for that sector. Logging and paper bag and sack industries have a very high rate of injury.

Table 107 refers to the average fatality rates in the sector. The data show a high level of fatality, particularly when compared with the figure for the Australian workforce in general, of 8.1 fatalities per 100 000 workers. It identifies logging as one of the most dangerous industries within Australia. Explanations for the high fatality rate include isolation, poor work practice, errors of judgement and equipment problems.

Table 106: Annual injury rates in the forestry sector

Sector	Injuries per 1000 employees
Forest sector (1991–1992)	
Logging	68.1
Forestry	21.2
Log sawmilling and timber dressing	
Log sawmilling	52.4
Timber re-sawing and dressing	28.3
Wood chipping	6.2
Other wood product manufacturing	
Wooden doors	56.2
Plywood and veneer	51.8
Other	51.7
Wooden containers	44.8
Wooden structural components	28.2
Average of above industries	39.3
Paper and paper-product manufacturing	
Paper bag and sack <sup>1</sup>	135.7
Other	35.9
Corrugated paperboard container	35.6
Pulp, paper and paperboard	17.6
Comparative industries (1992–1993)	
Services to agriculture	75.2
All agriculture	49.1
Agriculture	47.1
All Australian industry (1991–1992)	23.7
All Australian industry (1992–1993)	25.5

Sources: NOHSC (2000); Driscoll *et al.* (1995)

<sup>1</sup> This is a small industry and the data are based on a small sample size (19.5 per cent of the industry).

Table 107: Annual fatality rates

Position/Job Title	Deaths per 100 000 employees
Loggers	396
Forest service workers	52
Sawmill workers	30
Mining and quarrying	70
Agriculture	19
Commercial fishing	143
National average	8.1

Source: Driscoll *et al.* (1995)



The National Occupational Health and Safety Commission completed a study on activities undertaken and the mechanisms causing fatal injuries in the forestry sector. Tables 108 and 109 clearly show that felling or clearing is the most dangerous activity.

Table 108: Type of fatal incident

Mechanism	Proportion (per cent)
Hit by falling objects	64
Hit by moving objects	14
Rollover of moving machinery	9
Vehicle accidents	5
Hitting stationary objects	2
Contact with electricity	2
Insect bites and stings	2
Not known	2
Total fatalities	100

Source: NOHSC (1998)

Table 109: Activity performed at the time of fatal incident

Activity	Proportion (per cent)
Felling or clearing	73
Transport	9
Observing	5
Moving goods	5
Work break	4
Eradicating weeds	2
Working – context unclear	2
Total fatalities	100

Source: NOHSC (1998)

## Further reading

ABARE (2002). Australian Forest and Wood Product Statistics, Australian Bureau of Agricultural and Resource Economics, Canberra.

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Driscoll, T.R., Ansari, G., Harrison, J.E., Frommer, M.S. and Ruck, E.A. (1995). Traumatic work related fatalities in forestry and sawmill workers in Australia. *Journal of Safety Research* 26 (4): 221–233.

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## Viability of forest-dependent communities

### Indicator 6.5c(i)

Viability and adaptability to changing social and economic conditions of forest-dependent communities

#### Rationale

Communities with a high economic and cultural dependence on forest and forest-related industries should be sustainable into the future.

This indicator provides a measure of the extent to which communities are able to respond and adapt to change successfully.



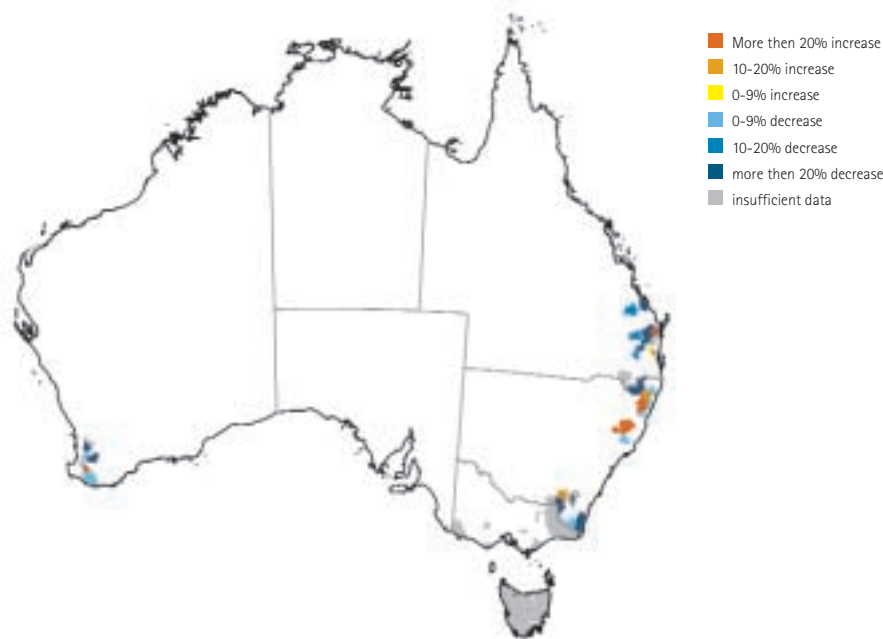
*Currently there are few specific data available to measure this indicator, though employment trends may provide a guide. The results of a nationwide survey suggest forest-dependant communities may have a decreased ability compared to other communities to respond and adapt to a changing forest industry, all other influences being equal.*

Communities rely on forests for employment, food, raw materials and cultural ties. Ensuring communities with high economic and/or cultural dependence on forests and forest industries remain viable into the future is an important part of sustainable forest management. This indicator provides a measure of the extent to which communities are able to respond and adapt to change successfully.

Presently there are few specific data available with which to measure this indicator. However, shifts in employment over time provide a partial gauge. All areas in Australia that had more than 0.1 per cent employment in 'forestry' and 'logging' were identified. A 'forestry sector-dependent' community was defined as one where forestry and logging accounted for 5 per cent or more of total employment. The employment data included growing trees for timber in native forests, plantations or timber tracts, felling trees, shaping trees for rough-hewn products such as mine timbers, posts, railway sleepers; and cutting trees and scrub for firewood. It also included gathering other forest products or distilling eucalyptus oil in the forest, along with services such as forest reforestation, conservation or plantation maintenance on a fee or contract basis, or providing forest fire-fighting services.

Figure 73 depicts an overview of the changes in forestry and logging employment between 1991 and 1996. Overall, the main feature evident through combining employment and change in employment is that the majority of areas with forestry have also experienced a reduction in employment.

Figure 73: Change in forestry and logging employment (1991–1996)



Source: Brooks *et al.* (2001)

Note: due to changes in the boundaries of Statistical local areas in Victoria and Tasmania, comparative data are not available for these two states. The terms 'forestry' and 'logging' are categories in the Australia and New Zealand Industry Classification, used by the Australian Bureau of Statistics

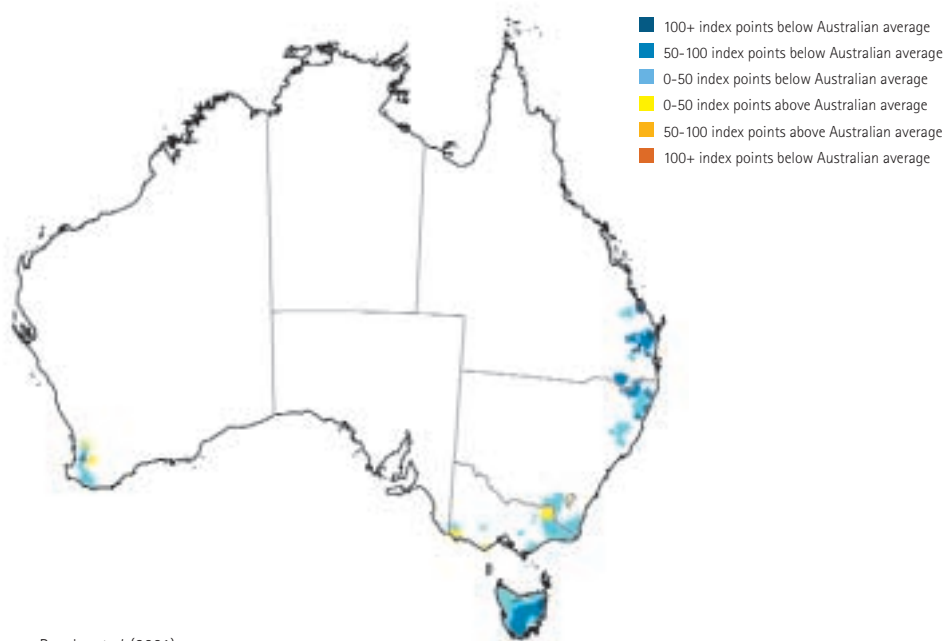
Southern New South Wales and southeast Queensland have been most affected by employment reductions during the period 1991 to 1996. These regions experienced reductions in forestry employment of 20 per cent or more, both in local areas and in the urban centres. On the other hand, Victoria had the highest number of urban centre localities that experienced increases in employment in the sector.

Interestingly, five areas in Queensland and New South Wales experienced increases. However, in each case these were adjoined by areas that concurrently displayed equivalent decreases in employment, possibly resulting from a shift in employment between areas rather than the creation of jobs in the industry. The reverse of this trend was featured in Inglewood in southern Queensland. This was the only area that experienced an increase in employment (up to 9 per cent), while the town itself experienced a reduction of more than 20 per cent in its forestry employment.

To compare the viability and adaptability of forestry communities to changing social and economic conditions, the Socio-economic Index for Areas (SEIFA) was used to determine the degree to which forestry communities differed from the wider environment (Figure 74). Produced by the Australian Bureau of Statistics, SEIFA is an index of relative disadvantage, with 1000 being set as the Australian standard. A low SEIFA index indicates an area where economic opportunities for people to seek alternative employment are low, and where people are less financially independent. Conversely, the least disadvantaged areas—those above the standard—have higher proportions of high-income earners, professional workers and more highly qualified people, as well as low unemployment rates.

Of the 66 areas where greater than 5 per cent employment in forestry and logging was identified, 58 areas fell below the SEIFA standard, placing them in the category of disadvantaged. This suggests forest-dependent communities may have a decreased ability compared to other communities in these regions to respond and adapt to a changing forest industry, all other influences being equal.

Figure 74: Index of socio-economic disadvantage



Source: Brooks *et al.* (2001)

### Further reading

ABS (1998). *Australia in Profile: A Regional Analysis*. Catalogue No. 2032.0. Australian Bureau of Statistics, Canberra.

Brooks, K., Kelson, S. and Tottenham, R., (2001). *Summary of Australian Regional Forest Agreement Social Assessments and a Recommended Assessment Methodology*. Report for Forest Industries Branch, Agriculture, Forest and Fisheries – Australia, Canberra.



More than 11 per cent of the workforce in Bombala, New South Wales were employed in forestry and logging in 1996

coverage



currency



frequency



## Viability of forest-dependent Indigenous communities

### Indicator 6.5c(ii)

Viability and adaptability of forest-dependent Indigenous communities

#### Rationale

It is important for societal benefit to know how much Indigenous communities are dependent on forest resources for their viability and for the maintenance of their traditional values and cultural heritage.

*Indigenous people are employed in mainstream forest industries at about the same rate as the non-Indigenous population. However, there are other forest-dependent activities that not only provide cash and non-cash income, but strengthen social cohesion.*

Indigenous communities draw on resources in forests to meet a wide range of needs, including subsistence, maintenance of cultural norms, and access to markets. Many Indigenous communities in turn provide land and resource management services and maintain attributes of forests valued by the wider Australian society.

This indicator provides data on the level of dependence of Indigenous communities on forest resources for viability. It complements information reported under indicators 6.1b and 6.1f. Indigenous people have taken up mainstream employment in forestry industries at about the same rate as the non-Indigenous population (Table 110). In the large forested areas of northern Australia, Indigenous people in mainstream forestry employment number less than 50. Employment has remained relatively consistent over a 5-year period.

Many Indigenous communities seek options to engage with the market economy in ways that are sensitive to obligations to land. Examples include:

- adults engaged regularly in producing arts and crafts for sale; and
- Community Development Employment Program (CDEP) places devoted to land management activities contributing to forest condition.

Application of customary skills and knowledge in CDEP-funded work to maintain forest values makes cost-effective and socially-valuable contributions to resource and biodiversity conservation. For example, annual costs of land management programs in the Maningrida region (Northern Territory), including CDEP expenditures, average \$1.60 per hectare, comparing favourably with costs of servicing the region's major nature conservation reserves, which average \$10 per hectare to achieve equivalent conservation outcomes.

Table 110: Mainstream employment of Indigenous and non-Indigenous people in forestry-related industries

State/Territory	Total Indigenous population of employment age (15–64 years)		Number of Indigenous and non-Indigenous people employed in forestry industries			
			1996		2001	
	1996	2001	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
New South Wales	59 300	70 703	63	2 155	60	2 723
Northern Territory	27 602	30 993	0	52	39	66
Queensland	54 102	64 504	31	2 005	31	2 005
South Australia	11 828	13 750	15	755	3	868
Tasmania	7 942	9 099	66	1 730	64	1 916
Victoria	12 463	14 589	19	1 774	18	1 882
Western Australia	29 089	33 832	22	1 101	19	1 426
Total	202 326	237 470	216	9 572	234	10 700

Source: ABS (1996, 2001)

Note: Employment categories include forestry and logging as well as forestry support services (ABS categories 0300–0303)

## Further reading

Space Time Research Pty Ltd (2003a). ABS 1996 Census of Population and Housing. Australian Bureau of Statistics, Canberra.

Space Time Research Pty Ltd (2003b). ABS 2001 Census of Population and Housing. Australian Bureau of Statistics, Canberra.



Opening the fruit case of a screw palm (*Pandanus spiralis*) to extract the kernel



coverage



currency



frequency



## Land for Indigenous needs

### Indicator 6.5d

Area of land available and accessible for Indigenous people to exercise their inherent rights to meet subsistence or individual and family cultural and spiritual needs

#### Rationale

To measure the opportunities for cultural and traditional lifestyles and access to country in accordance with native title or other rights.

*Native title applications to date have resulted in about 900 000 hectares of forested areas being available and accessible to Indigenous people.*

Australian Indigenous cultures are defined by their relationships with the lands. This indicator summarises opportunities for Indigenous people to access land and to use the resources of forested lands to meet basic needs. It does not deal directly with commercial use (see indicator 6.1b) or the formal regulation of tenure and land use that protects primacy of Indigenous interests (see indicator 6.4a(i)). Issues regarding native title law, are discussed in indicator 7.1a.

Useful indicators of the extent to which Indigenous people can access and use resources on land to which they hold no formal land title are determinations under the Commonwealth's *Native Title Act 1993* (Table 111) and Indigenous Land Use Agreements (ILUAs) made under the same legislation. ILUAs are voluntary agreements between Indigenous native title claimants and the formal owners of sites subject to claim. The Federal Court determines whether native title exists and the ILUA specifies parameters for the exercise of native title rights. Increasingly, parties are seeking ILUAs or other forms of agreements to provide clarity and certainty. Many deal with 'future acts' that the formal owner of land or other interest

may be contemplating. ILUAs are accordingly a tangible expression of Indigenous people influencing, in a legally binding way, activities that have the potential to affect customary or other use.

Figures given for applications resolved may differ from determinations made because claims may be settled in other ways, with the assistance of the Native Title Tribunal.

Access by Indigenous peoples to nature conservation reserves varies across Australia. Parks and reserves where Indigenous people have been recognised as owners and are engaged in joint management or similar arrangements are dealt with in indicator 6.4a(ii).



Bark stripping stringybark (*Eucalyptus tetradonta*) forest for use in Indigenous artworks, Northern Territory



Table 111: Applications for recognition of Native Title and determinations in the Federal and High Courts over the period 1994 to May 2003

Jurisdiction	Native Title applications				Determinations by Courts			Indigenous Land Use Agreements		
	Filed	Resolved	Number recognised	Number accepted	Area recognised ('000 ha)	Per cent in forested areas	Number rejected	Number	Area recognised ('000 ha)	Per cent in forested areas
Australian Capital Territory	4	3	0	0	0	0	0	0	0	0
New South Wales	370	254	11	1	12	0	8	4	863	4
Northern Territory	211	21	2	4	1 727	37	0	15	4 782	12
Queensland	407	189	10	17	846	66	2	45	13 375	10
South Australia	47	17	1	0	0	0	1	1	0	0
Tasmania	5	3	0	0	0	0	0	0	0	0
Victoria	69	47	1	0	0	0	1	10	1	10
Western Australia	466	315	3	8	36 043	<1	1	1	4 744	<1
Federal land <sup>1</sup>	17	2	0	–	–	–	–	–	–	–
National total	1 551	851	28	30	38 616	3	13	76	23 766	11

Source: National Forest Inventory 2003

<sup>1</sup> Figures for determinations and ILUAs are included in those given for the State/Territory in which the claim was lodged.

# 6.5

EMPLOYMENT AND  
COMMUNITY NEEDS

## INTRODUCTION

The five indicators in this sub-criterion measure a range of factors connected with employment in the forest industry and related sectors. The indicators also assess the viability of communities dependent on forests. From 1993 to 2001, direct employment in the forest sector increased in total number but declined from 0.98 per cent of the national workforce to 0.86 per cent. However, the forest sector also generates considerable employment in other related industries.

In addition, this section considers how Indigenous people are able to exercise their rights to meet their needs from forested land to which they may hold no formal title.

The third theme to this section concerns workers within the forestry industry, and measures wage and injury rates. The average injury rate for the forest, wood-milling and manufacturing sectors is 39 per 1000 employees per year, compared with 24 for all Australian industry. Many injuries are connected with activities involved in harvesting. The number of employees involved in the sector is declining, but in the three years to 2001 the spending on wages increased.



Logging crew in alpine ash (*Eucalyptus delegatensis*) forest

Michael F. Ryan

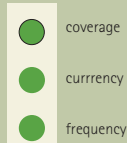
# Employment

## Indicator 6.5a

Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment

### Rationale

Employment is an important measure of the contribution of forests in meeting community needs.



*From 1993 to 2000, direct employment in the forest sector declined from 0.98 per cent to 0.81 per cent of the Australian workforce, rising to 0.86 per cent in 2000–2001. However, the forest sector generates considerable employment elsewhere, with the multiplier effect ranging from 1.57 in South Australia to 2.35 in Victoria.*

Employment is one measure of the contribution of forests to meeting community needs. Employment in the forestry sector can be direct or indirect. Direct employment refers to employment in the wood and wood product industries and to those commercial activities in direct contact with forests—for example, beekeeping, grazing, eco-tourism or forest reserve rangers. Indirect employment is employment in other sectors generated by direct forest employment. It indicates the potential multiplier effect of direct forest employment.

## Direct employment

Currently the data collected by statistical agencies have a number of limitations. The main limitation is that forest management staff working in production or conservation are not included; neither are recreation staff or log truck drivers. Therefore, while the reported figures for this indicator under-estimate the total numbers employed by the Australian forestry sectors, the changes in relation to total employment in Australia are relative to what would be expected for all participants in forests and forestry.

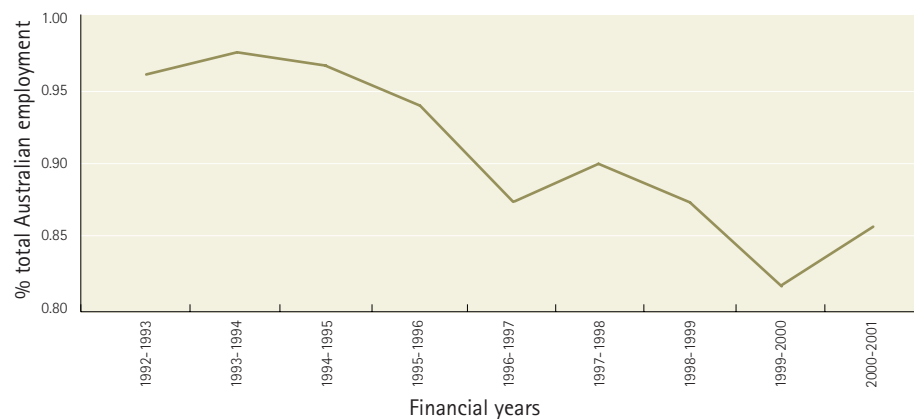
From 1993 to 2000, direct employment reported in forest sector industries as a proportion of total Australian employment declined from 0.98 per cent to 0.81 per cent. However, latest figures show a rise to 0.86 per cent for the year ended June 2001 (Figure 72; Table 102).



Michael F. Ryan

Log truck refuelling, Numeralla, Victoria

Figure 72: Forest industry employment as a percentage of total employment in Australia



Source: ABS (2002a,b); ABARE (2002a)

Note: derived from data in Table 103.

Table 102: Direct employment in the forest sector ('000 employees)

Year	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001
Forestry and harvesting <sup>1</sup>	11.3	12.4	11.4	10.9	14.0	14.1	8.8	13.4
Wood and wood products								
Log sawmilling	8.3	9.0	8.1	7.1	7.0	5.6	6.5	5.3
Resawn and dressed timber	6.7	7.1	6.4	6.9	7.4	6.2	6.2	7.9
Veneers, plywood and fabricated wood manufacturing	5.6	6.2	5.9	5.6	4.9	5.0	4.9	5.5
Wooden structural fittings and other joinery	18.0	17.2	17.1	16.4	18.7	20.1	22.2	20.2
Hardwood woodchips	0.7	0.8	0.9	0.9	0.9	0.7	0.8	0.6
Other wood products	7.6	7.8	7.4	6.7	6.5	5.7	6.2	5.7
Total	46.9	48.1	45.8	43.8	45.4	43.4	46.8	45.3
Paper and paper products								
Pulp, paper and paperboard	5.8	5.6	5.8	5.2	4.8	4.4	4.3	5.1
Paper bags (including sack)	1.0	0.9	1.0	1.2	1.2	1.3	1.4	1.2
Solid fibreboard containers	2.4	2.3	4.1	2.4	2.4	2.5	2.6	2.9
Corrugated fibreboard containers	4.8	5.3	5.7	5.6	5.4	5.5	4.9	5.9
Other paper products	3.8	3.6	3.5	3.4	3.5	3.7	3.6	4.6
Total	17.9	17.8	20.0	17.9	17.2	17.3	16.9	19.7
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Total employees	7 755.2	8 056.6	8 289.2	8 354.8	8 461.3	8 647.4	8 906.6	9 090.0
Forest and wood products as a proportion of total employees (per cent)	0.98	0.97	0.93	0.87	0.91	0.86	0.81	0.86

Source: ABS (2002); ABARE (2002a,b, 2003)

<sup>1</sup> Does not include truck drivers, managers or conservation staff.

Table 103 shows employment of foresters and park rangers in Australia from 1996–2001. It can be assumed that these employees were not accounted for in Table 102.

Improved estimates of direct employment in non-wood forest industries have been obtained as part of the economic and social assessments for Regional Forest Agreement areas. Data were collected for the beekeeping, tourism and grazing industries.

Table 103: Park ranger and forester employment (total numbers)

1996	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Other	Total
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Park ranger	38	333	168	435	106	84	351	169	6	1 690
2001										
Forester	59	427	10	309	98	342	418	272	0	1 935
Park ranger	21	382	145	399	92	53	421	78	8	1 599

Source: Space Time Research (1996, 2000)

Note: The terms forester and park ranger were defined by the individuals completing the census.

## Indirect employment

Indirect employment is usually measured at a national or State/Territory level using macro-economic models since they capture the broad structure and linkages between the different sectors of the economy.

State/Territory and national employment multipliers have been generated (Table 104). The State multipliers represent the overall State employment that is generated by an increase in employment in that State's forestry, logging, wood and paper industries.

For example, in Western Australia the State employment multiplier in the forestry and logging sector of 1.97 indicates that 100 people employed in that State's forestry and logging sector would generate additional employment of 97 people in the rest of the State's economy. Similarly, the national employment multiplier of 3.61 for the same sector implies that an increase of employment of 100 people in that industry in Western Australia provides additional employment of 261 people in the national economy. As direct employment is understated, it is likely that indirect employment is also understated.

Table 104: Employment multiplier effects of forest-related industries

	Forestry and logging		Wood and paper manufacturing		Total forest-based industries	
	State	National	State	National	State	National
New South Wales	2.25	4.20	1.66	1.24	1.88	2.72
Queensland	2.25	4.20	1.49	1.19	1.64	2.31
South Australia	1.57	3.70	1.43	1.02	1.65	2.86
Tasmania	2.26	3.77	1.29	0.61	1.44	2.24
Victoria	2.35	3.85	1.61	1.25	1.80	2.79
Western Australia	1.97	3.61	1.44	1.15	1.67	2.38

Source: ABARE (2002b)

### Case study – Small communities

Forest sector employment is especially significant in a number of small rural Australian communities. Livelihood in these communities can often rely on the employment provided by the forest sector. The Queensland Department of Primary Industries has researched the impact of forest industry employment on a small town. The town, Injune, is in Southern inland Queensland and has a population of roughly 400. Statistics suggest that approximately half of the population 'directly relies on the forest industry for all or part of their livelihood'. Approximately 70 families in Injune derive at least one income from direct employment in the forestry sector. Furthermore, around three-quarters of these families are single income families, therefore relying wholly on the forestry sector for income. Further information on forest industry-dependent communities is in indicator 6.5c.

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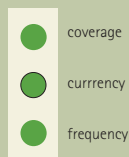
## Wage and injury rates

### Indicator 6.5b

Average wage rates and injury rates in major employment categories within the forest sector

#### Rationale

A sustainable industry will ensure high levels of workforce health and welfare and wage rates comparable with other rural industries.



*Employment and spending on wages in the forestry sector increased in the three years to 2001. The average injury rate for the forest, wood-milling and manufacturing sectors is higher than the national average. The fatality rate for the forest sector is considerably higher than the national average.*

A sustainable industry will strive to safeguard the health of its workforce and maintain wage rates comparable with similar industries. Changing injury or wage rates reflect on employment quality and desirability, and so affect the future of forest management as well as the larger community.

Table 105 provides employment data for the forestry sector. It is not practical to ascertain average wages from these data, as it does not allow for part-time workers, contractors and seasonal variation. Overall the forestry sector has seen a greater increase in spending on wages than in employment. This may be attributed to an increased emphasis on positions of a higher skill level, resulting in higher associated wages and a possible reduction of lower skilled positions. General wage increases would also have contributed to this trend.



Required safety equipment for harvesting operations

Table 105: Wages in the forest products sector (\$million)

Sector	1998–1999	1999–2000	2000–2001
Log sawmilling and timber dressing			
Log sawmilling	156	170	134
Wood chipping	37	39	19
Timber re-sawing or dressing	222	211	298
Sub-total	416	420	451
Other wood product manufacturing			
Plywood and veneer	53	53	34
Fabricated wood	143	138	191
Wooden structural component	533	654	562
Other wood products	137	145	148
Sub-total	866	990	935
Paper and paper products			
Pulp, paper and paperboard	265	270	296
Solid paperboard containers	107	120	140
Corrugated paperboard containers	–	273	353
Paper bag and sack	–	60	43
Other paper products	142	142	238
Sub-total	864	865	1 070
Total forest products sector wages	2 146	2 274	2 456
Total manufacturing industry wages	–	39 900	38 746
Proportion in forest products sector (per cent)	–	5.7	6.3

Source: ABARE (2002); ABS (2001)

## Injury rates

Some 2.36 per cent of fatal injuries and 0.27 per cent of non-fatal injuries in the Australian workplace are directly attributable to the forestry sector. While the rate of fatal injuries in the forestry sector is high and has remained fairly steady in recent times, there has been a significant drop in non-fatal injuries.

The average injury rate for the forest and wood-milling and manufacturing sectors is 39 per 1000 employees per year compared with 24 for all Australian industry (Table 106). The pulp and paper industries perform better than the average for Australian industry, again reflecting the more capital-intensive and controlled manufacturing environment for that sector. Logging and paper bag and sack industries have a very high rate of injury.

Table 107 refers to the average fatality rates in the sector. The data show a high level of fatality, particularly when compared with the figure for the Australian workforce in general, of 8.1 fatalities per 100 000 workers. It identifies logging as one of the most dangerous industries within Australia. Explanations for the high fatality rate include isolation, poor work practice, errors of judgement and equipment problems.

Table 106: Annual injury rates in the forestry sector

Sector	Injuries per 1000 employees
Forest sector (1991–1992)	
Logging	68.1
Forestry	21.2
Log sawmilling and timber dressing	
Log sawmilling	52.4
Timber re-sawing and dressing	28.3
Wood chipping	6.2
Other wood product manufacturing	
Wooden doors	56.2
Plywood and veneer	51.8
Other	51.7
Wooden containers	44.8
Wooden structural components	28.2
Average of above industries	39.3
Paper and paper-product manufacturing	
Paper bag and sack <sup>1</sup>	135.7
Other	35.9
Corrugated paperboard container	35.6
Pulp, paper and paperboard	17.6
Comparative industries (1992–1993)	
Services to agriculture	75.2
All agriculture	49.1
Agriculture	47.1
All Australian industry (1991–1992)	23.7
All Australian industry (1992–1993)	25.5

Sources: NOHSC (2000); Driscoll *et al.* (1995)

<sup>1</sup> This is a small industry and the data are based on a small sample size (19.5 per cent of the industry).

Table 107: Annual fatality rates

Position/Job Title	Deaths per 100 000 employees
Loggers	396
Forest service workers	52
Sawmill workers	30
Mining and quarrying	70
Agriculture	19
Commercial fishing	143
National average	8.1

Source: Driscoll *et al.* (1995)

The National Occupational Health and Safety Commission completed a study on activities undertaken and the mechanisms causing fatal injuries in the forestry sector. Tables 108 and 109 clearly show that felling or clearing is the most dangerous activity.

Table 108: Type of fatal incident

Mechanism	Proportion (per cent)
Hit by falling objects	64
Hit by moving objects	14
Rollover of moving machinery	9
Vehicle accidents	5
Hitting stationary objects	2
Contact with electricity	2
Insect bites and stings	2
Not known	2
Total fatalities	100

Source: NOHSC (1998)

Table 109: Activity performed at the time of fatal incident

Activity	Proportion (per cent)
Felling or clearing	73
Transport	9
Observing	5
Moving goods	5
Work break	4
Eradicating weeds	2
Working – context unclear	2
Total fatalities	100

Source: NOHSC (1998)

## Further reading

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## Viability of forest-dependent communities

### Indicator 6.5c(i)

Viability and adaptability to changing social and economic conditions of forest-dependent communities

#### Rationale

Communities with a high economic and cultural dependence on forest and forest-related industries should be sustainable into the future.

This indicator provides a measure of the extent to which communities are able to respond and adapt to change successfully.



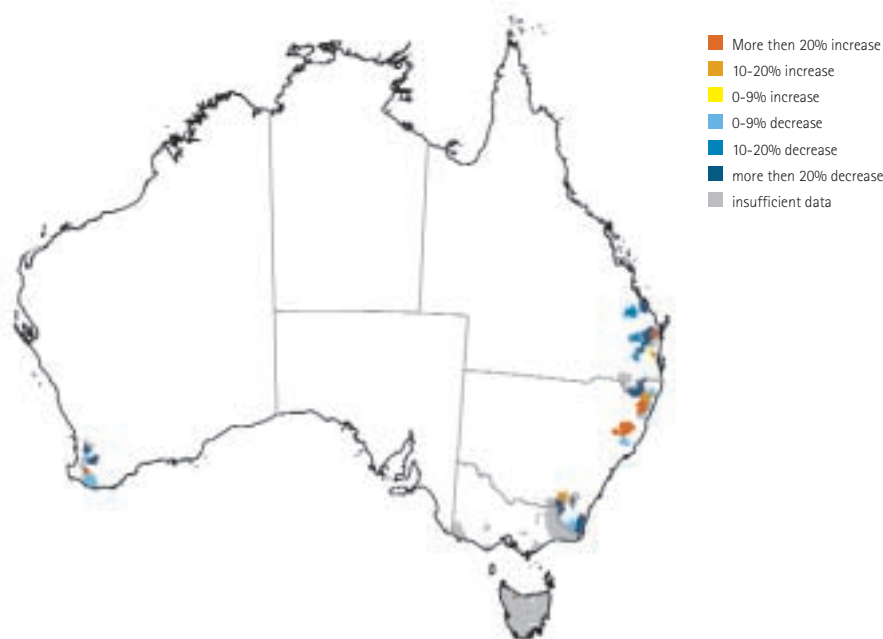
*Currently there are few specific data available to measure this indicator, though employment trends may provide a guide. The results of a nationwide survey suggest forest-dependant communities may have a decreased ability compared to other communities to respond and adapt to a changing forest industry, all other influences being equal.*

Communities rely on forests for employment, food, raw materials and cultural ties. Ensuring communities with high economic and/or cultural dependence on forests and forest industries remain viable into the future is an important part of sustainable forest management. This indicator provides a measure of the extent to which communities are able to respond and adapt to change successfully.

Presently there are few specific data available with which to measure this indicator. However, shifts in employment over time provide a partial gauge. All areas in Australia that had more than 0.1 per cent employment in 'forestry' and 'logging' were identified. A 'forestry sector-dependent' community was defined as one where forestry and logging accounted for 5 per cent or more of total employment. The employment data included growing trees for timber in native forests, plantations or timber tracts, felling trees, shaping trees for rough-hewn products such as mine timbers, posts, railway sleepers; and cutting trees and scrub for firewood. It also included gathering other forest products or distilling eucalyptus oil in the forest, along with services such as forest reforestation, conservation or plantation maintenance on a fee or contract basis, or providing forest fire-fighting services.

Figure 73 depicts an overview of the changes in forestry and logging employment between 1991 and 1996. Overall, the main feature evident through combining employment and change in employment is that the majority of areas with forestry have also experienced a reduction in employment.

Figure 73: Change in forestry and logging employment (1991–1996)



Source: Brooks *et al.* (2001)

Note: due to changes in the boundaries of Statistical local areas in Victoria and Tasmania, comparative data are not available for these two states. The terms 'forestry' and 'logging' are categories in the Australia and New Zealand Industry Classification, used by the Australian Bureau of Statistics

Southern New South Wales and southeast Queensland have been most affected by employment reductions during the period 1991 to 1996. These regions experienced reductions in forestry employment of 20 per cent or more, both in local areas and in the urban centres. On the other hand, Victoria had the highest number of urban centre localities that experienced increases in employment in the sector.

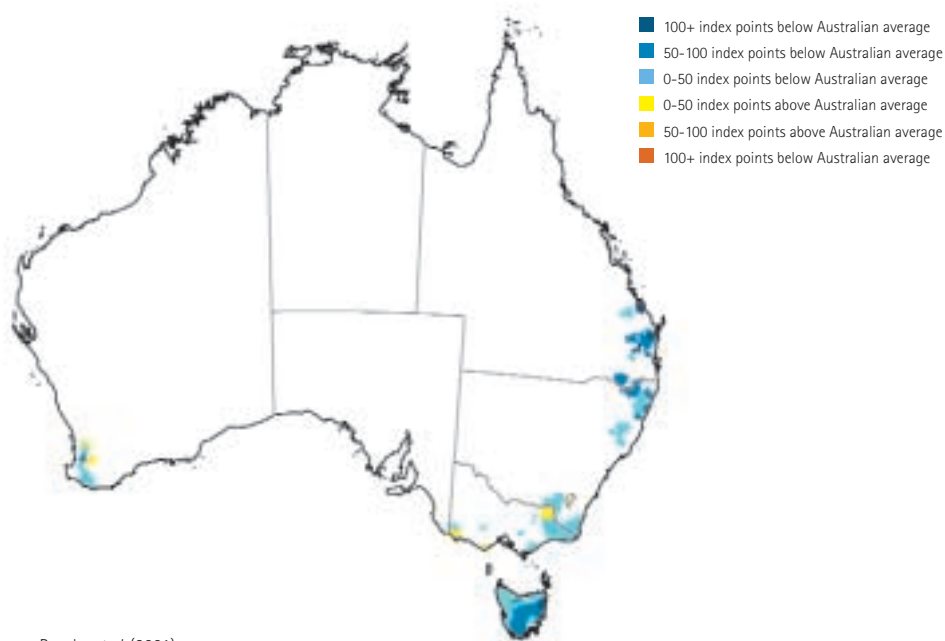
Interestingly, five areas in Queensland and New South Wales experienced increases. However, in each case these were adjoined by areas that concurrently displayed equivalent decreases in employment, possibly resulting from a shift in employment between areas rather than the creation of jobs in the industry. The reverse of this trend was featured in Inglewood in southern Queensland. This was the only area that experienced an increase in employment (up to 9 per cent), while the town itself experienced a reduction of more than 20 per cent in its forestry employment.

To compare the viability and adaptability of forestry communities to changing social and economic conditions, the Socio-economic Index for Areas (SEIFA) was used to determine the degree to which forestry communities differed from the wider environment (Figure 74). Produced by the Australian Bureau of Statistics, SEIFA is an index of relative disadvantage, with 1000 being set as the Australian standard. A low SEIFA index indicates an area where economic opportunities for people to seek alternative employment are low, and where people are less financially independent. Conversely, the least disadvantaged areas—those above the standard—have higher proportions of high-income earners, professional workers and more highly qualified people, as well as low unemployment rates.

Of the 66 areas where greater than 5 per cent employment in forestry and logging was identified, 58 areas fell below the SEIFA standard, placing them in the category of disadvantaged. This suggests forest-dependent communities may have a decreased ability compared to other communities in these regions to respond and adapt to a changing forest industry, all other influences being equal.



Figure 74: Index of socio-economic disadvantage



Source: Brooks *et al.* (2001)

### Further reading

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More than 11 per cent of the workforce in Bombala, New South Wales were employed in forestry and logging in 1996



coverage



currency



frequency



## Viability of forest-dependent Indigenous communities

### Indicator 6.5c(ii)

Viability and adaptability of forest-dependent Indigenous communities

#### Rationale

It is important for societal benefit to know how much Indigenous communities are dependent on forest resources for their viability and for the maintenance of their traditional values and cultural heritage.

*Indigenous people are employed in mainstream forest industries at about the same rate as the non-Indigenous population. However, there are other forest-dependent activities that not only provide cash and non-cash income, but strengthen social cohesion.*

Indigenous communities draw on resources in forests to meet a wide range of needs, including subsistence, maintenance of cultural norms, and access to markets. Many Indigenous communities in turn provide land and resource management services and maintain attributes of forests valued by the wider Australian society.

This indicator provides data on the level of dependence of Indigenous communities on forest resources for viability. It complements information reported under indicators 6.1b and 6.1f. Indigenous people have taken up mainstream employment in forestry industries at about the same rate as the non-Indigenous population (Table 110). In the large forested areas of northern Australia, Indigenous people in mainstream forestry employment number less than 50. Employment has remained relatively consistent over a 5-year period.

Many Indigenous communities seek options to engage with the market economy in ways that are sensitive to obligations to land. Examples include:

- adults engaged regularly in producing arts and crafts for sale; and
- Community Development Employment Program (CDEP) places devoted to land management activities contributing to forest condition.

Application of customary skills and knowledge in CDEP-funded work to maintain forest values makes cost-effective and socially-valuable contributions to resource and biodiversity conservation. For example, annual costs of land management programs in the Maningrida region (Northern Territory), including CDEP expenditures, average \$1.60 per hectare, comparing favourably with costs of servicing the region's major nature conservation reserves, which average \$10 per hectare to achieve equivalent conservation outcomes.

Table 110: Mainstream employment of Indigenous and non-Indigenous people in forestry-related industries

State/Territory	Total Indigenous population of employment age (15–64 years)		Number of Indigenous and non-Indigenous people employed in forestry industries			
			1996		2001	
	1996	2001	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
New South Wales	59 300	70 703	63	2 155	60	2 723
Northern Territory	27 602	30 993	0	52	39	66
Queensland	54 102	64 504	31	2 005	31	2 005
South Australia	11 828	13 750	15	755	3	868
Tasmania	7 942	9 099	66	1 730	64	1 916
Victoria	12 463	14 589	19	1 774	18	1 882
Western Australia	29 089	33 832	22	1 101	19	1 426
Total	202 326	237 470	216	9 572	234	10 700

Source: ABS (1996, 2001)

Note: Employment categories include forestry and logging as well as forestry support services (ABS categories 0300–0303)

## Further reading

Space Time Research Pty Ltd (2003a). ABS 1996 Census of Population and Housing. Australian Bureau of Statistics, Canberra.

Space Time Research Pty Ltd (2003b). ABS 2001 Census of Population and Housing. Australian Bureau of Statistics, Canberra.



Opening the fruit case of a screw palm (*Pandanus spiralis*) to extract the kernel

coverage



currency



frequency



## Land for Indigenous needs

### Indicator 6.5d

Area of land available and accessible for Indigenous people to exercise their inherent rights to meet subsistence or individual and family cultural and spiritual needs

#### Rationale

To measure the opportunities for cultural and traditional lifestyles and access to country in accordance with native title or other rights.

*Native title applications to date have resulted in about 900 000 hectares of forested areas being available and accessible to Indigenous people.*

Australian Indigenous cultures are defined by their relationships with the lands. This indicator summarises opportunities for Indigenous people to access land and to use the resources of forested lands to meet basic needs. It does not deal directly with commercial use (see indicator 6.1b) or the formal regulation of tenure and land use that protects primacy of Indigenous interests (see indicator 6.4a(i)). Issues regarding native title law, are discussed in indicator 7.1a.

Useful indicators of the extent to which Indigenous people can access and use resources on land to which they hold no formal land title are determinations under the Commonwealth's *Native Title Act 1993* (Table 111) and Indigenous Land Use Agreements (ILUAs) made under the same legislation. ILUAs are voluntary agreements between Indigenous native title claimants and the formal owners of sites subject to claim. The Federal Court determines whether native title exists and the ILUA specifies parameters for the exercise of native title rights. Increasingly, parties are seeking ILUAs or other forms of agreements to provide clarity and certainty. Many deal with 'future acts' that the formal owner of land or other interest

may be contemplating. ILUAs are accordingly a tangible expression of Indigenous people influencing, in a legally binding way, activities that have the potential to affect customary or other use.

Figures given for applications resolved may differ from determinations made because claims may be settled in other ways, with the assistance of the Native Title Tribunal.

Access by Indigenous peoples to nature conservation reserves varies across Australia. Parks and reserves where Indigenous people have been recognised as owners and are engaged in joint management or similar arrangements are dealt with in indicator 6.4a(ii).



Bark stripping stringybark (*Eucalyptus tetradonta*) forest for use in Indigenous artworks, Northern Territory

Table 111: Applications for recognition of Native Title and determinations in the Federal and High Courts over the period 1994 to May 2003

Jurisdiction	Native Title applications				Determinations by Courts			Indigenous Land Use Agreements		
	Filed	Resolved	Number recognised	Number accepted	Area recognised ('000 ha)	Per cent in forested areas	Number rejected	Number	Area recognised ('000 ha)	Per cent in forested areas
Australian Capital Territory	4	3	0	0	0	0	0	0	0	0
New South Wales	370	254	11	1	12	0	8	4	863	4
Northern Territory	211	21	2	4	1 727	37	0	15	4 782	12
Queensland	407	189	10	17	846	66	2	45	13 375	10
South Australia	47	17	1	0	0	0	1	1	0	0
Tasmania	5	3	0	0	0	0	0	0	0	0
Victoria	69	47	1	0	0	0	1	10	1	10
Western Australia	466	315	3	8	36 043	<1	1	1	4 744	<1
Federal land <sup>1</sup>	17	2	0	–	–	–	–	–	–	–
National total	1 551	851	28	30	38 616	3	13	76	23 766	11

Source: National Forest Inventory 2003

<sup>1</sup> Figures for determinations and ILUAs are included in those given for the State/Territory in which the claim was lodged.