



# Australia's forests at a glance



DEPARTMENT OF AGRICULTURE FISHERIES AND FORESTRY

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Note: All values in tables in this booklet have been rounded, hence, column and row totals may not tally exactly.

### Foreword

Forests hold many values. They supply the resource base for one of Australia's largest manufacturing industries, they are important for biodiversity



conservation, water quality and carbon storage, and they provide a magnificent background for a host of recreational activities. Our forests provide housing, furniture, paper and food, as well as employment for tens of thousands of Australians.

Australia's Forests at a Glance provides facts at your fingertips about these important aspects of our forests. For more detail refer to Australia's State of the Forests Report 2003 which can be found at my department's website at www.daff.gov.au/stateoftheforests. I trust that you will find it useful.

Senator lan Macdonald Minister for Fisheries, Forestry and Conservation

### Australia's forests in summary

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National Statistics	
Total land area	768 million ha
Total population	20 million
Forest as % of land area	21%
Total forest area	164.3 million ha
Forest per capita	8.2 ha
Native forest area	162.7 million ha
Plantation forest area	1.6 million ha
New area of plantation planted (average 1998–2002)	87 ooo ha/year
Forest area in nature conservation reserves	21.5 million ha
Forest area covered by Regional Forest Agreements	23.2 million ha

Area of native forest harvested ann	ually < 19
Total carbon in forests	10 500 N
Number of forest-dwelling species	Fauna 3 81 Flora 16 53
Total exports of wood products	\$2.1 billio
Major exports to	Japar New Zealanc China & Kore
Total imports of wood products	\$4 billio
Major imports from	New Zealand United States Indonesia 8 Finlan
Number of people employed in forest product industries	> 78 40 Approx 19 of total employmen
Value of turnover in forest product industries	\$15 billio
Forestry contribution to GDP	1%

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### National Forest Inventory

For the last 15 years, the National Forest Inventory has been collecting and communicating information on Australia's forests. It's mission is to be the authoritative source of information for national and regional monitoring and reporting and to support decision making on all of Australia's forests. It is a



collaborative partnership between the Australian and State and Territory governments and is the body responsible for undertaking national forest assessments and reporting.

State and Territory and private forest owners and managers collect primary forest data, and the National Forest Inventory is responsible for collating and translating these into national datasets. The majority of inventory and monitoring activities in native forests have focused on areas managed for commercial timber production. Australia's largest gaps in forest information are in privately managed forests and for non-timber attributes.



### What is a forest?

The definition of a forest agreed between Australian governments is:

'an area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata equal to or greater than 20%.'

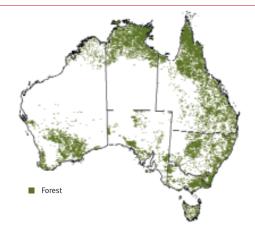
This is consistent with international definitions.

This definition includes Australia's diverse native forests and plantations, regardless of age, and encompasses areas of trees that are sometimes described as woodlands.

### Forest area

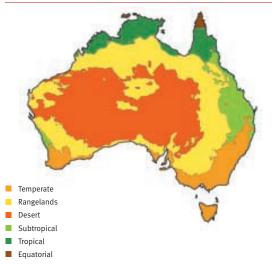
- There are 164 million ha of forest in Australia covering 21% of the continent. This is about 12 rugby fields (8.2 ha) of forest for each Australian, one of the highest areas per capita in the world (the world average is 0.6 ha).
- Australia has 4% of the world's 3.9 billion ha of forests and 5% of the world's land mass.

#### Forest area



### Australia's climate

### Climate classification of Australia by rainfall and temperature



Source: Bureau of Meteorology

### Types of forest

- Forests can be classified by their dominant genus and structure (height and crown cover).
- Australia has few native conifers, therefore 99% of our native forest area is broadleaf. In contrast, about 60% of plantations are exotic conifers. Native forests are dominated by eucalypt species (78%), followed by acacia species (10%) and melaleuca species (4%).
- Climate and soil properties broadly determine the distribution of different forest types across Australia, although other factors, such as fire, are also important.
- With the exception of mallee eucalypt, forest distribution is mainly confined to regions where average rainfall exceeds 500 mm per year. Plantations are mostly found in areas where average rainfall exceeds 700 mm per year.

### Forest types ('ooo ha) Acacia 16 488 Callitris 2 330 Casuarina 2 039 Eucalypt 127 025 Mangrove 749 Melaleuca 7 056 Other 2 780 Rainforest 4 214 Total native forest 162 680 Hardwood plantation 638 Softwood plantation 988 **Total plantation** 1628 Total forest 1 164 290 1 see page 66

### Old growth forests

- Old growth forests are ecologically mature forests where the effects of disturbances are now negligible.
- The total area of old growth forest in Australia is unknown.
- In Regional Forest Agreement (RFA) areas where forest assessment has been more extensive:
  - more than 5.2 million ha, or 22%, are classified as old growth
  - about 70% of these old growth forests are protected in nature conservation reserves, with some of the remaining 30% available for timber production

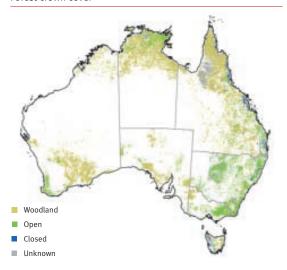
Area of old grov	viii ioiest ii		veyed for kir	
		ʻooo ha		%
	Area of forest surveyed	Old growth forest	Old growth forest in reserves	Old growth reserved
South-East Queensland	3 230	270	196	<b>7</b> 3
South-West Western Australia	2 121	331	331	100
Victoria	5 744	841	571	68
New South Wales	8 989	2 536	1 742	69
Tasmania	3 169	1 239	851	69
Total	23 253	5 217	3 691	71

#### Forest crown cover

Crown cover is determined by measuring the area of ground covered by tree canopies. A line around the outer edge defines the limits of an individual canopy, and all the area within is treated as 'canopy' irrespective of gaps and overlaps.

Closed forest (81-100% crown cover)	4 644
Open forest (51-80% crown cover)	45 603
Woodland forest (20-50% crown cover)	Total 102 526

### Forest crown cover



## Native forest ownership and tenure

**Multiple-use forests** – managed for a range of values including timber harvesting, water supply, conservation, recreation and environmental protection. This can include informal reserves where timber harvesting is prohibited.

Nature conservation reserves – crown lands that are formally reserved for environmental conservation and recreation.

**Private land** – held under freehold title and under private ownership.

**Leasehold land** – crown land held under leasehold title and generally regarded as 'privately managed'.

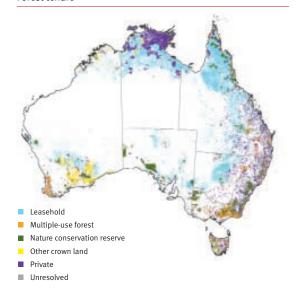
Other crown land – crown land held for a variety of purposes.

**Unresolved tenure** – where tenure is unknown or difficult to classify.

13% of forested land is under Indigenous ownership, mostly in the Northern Territory, South Australia and Western Australia.

							*	200		
Native forest area by tenure category ('ooo ha)	a by t	enure c	ategory	(*000	ıa)					
Tenure	ACT	MSM	K	plo	SA	Tas	Vic	WA	Aust	%
Leasehold land	11	9 470	16 313	35 581	5 255	0	46	8 920	75 596	46
Multiple-use forest	0	2 496	0	2 925	0	1062	3 312	1 600	11 395	7
Nature conservation reserves	106	4 471	12	2,000	£76 £	1105	3 050	3 805	21 401	13
Other crown land	0	1 055	890	1 131		80	207	9 387	13 143	0 00
Private land	0	8 523	15 511	10 213	822	922	1 298	1 639	38 928	24
Unresolved tenure	0	643	110	883	454	0	23	14	2 127	1
Total	117	26 658 32836	32836	55 734	55 734 10 866	3 169	7 935	25 365	25 365 162 680	100
		The second			48		1000000			

#### Forest tenure



### Forest biodiversity

- Australia is one of the 17 most biologically diverse countries in the world. There are internationally recognised areas of high and significant biodiversity in south west Australia, in the Queensland wet tropics, in some Tasmanian forests and some regions of eucalypt forest.
   Some, but not all, of these areas include forests with noted high flora and fauna species richness.
- Despite the overwhelming dominance of the Eucalyptus genus, our forests are very diverse. Eucalypt forests (more than 700 species) range from the multi-stemmed mallee of the desert to the tallest flowering plants on earth.
- There are 16 532 plants and 3 817 animal species that are forest-dependant. The number of species is increasing over time due to more comprehensive research and reporting.

### Forest in protected areas

- Nearly 21.5 million ha or 13% of Australia's forest estate
  is formally protected in nature conservation reserves. This
  is an increase in the area of forest in nature conservation
  reserves of 22% since the last national assessment in
  1998. Forest may also be conserved within leasehold land,
  multiple-use forest or private land, via covenants.
- 15% of Australia's native forests are reserved under the International Union for the Conservation of Nature and Natural Resources (IUCN) conservation reserve categories.
- In RFA regions, 34% of forest is in nature conservation reserves.



### Contribution to global carbon

- Carbon exists in the atmosphere and on land in vegetation and soil.
- Forests take up carbon from the atmosphere during photosynthesis and release it during respiration or when harvested, burnt or cleared.
- Forests can be managed to increase carbon stocks and offset emissions from burning fossil fuels.
- In 2000, the total carbon stock in forests was estimated to be 10 500 Mt. Forests took up 21 Mt in growth, released 15 Mt in harvest (including fuel wood), resulting in a net carbon sink of 6 Mt. However, forest clearing released 18 Mt of carbon that year, giving an overall balance for land use change and forests of 12 Mt. This represented 7% of greenhouse gas emissions from all sources.
- From 1990 to 2000, carbon uptake in forests increased by 9%, harvest emissions increased by 18% and land clearing emissions decreased by 63%.

### Recreational use of forests

Most public forest is available for recreation and tourism, regardless of whether it's primarily managed for conservation, environmental protection or timber production. Both native and plantation forests provide a wide range of recreational opportunities:

- · Walking and running
- Fishing
- Picnicking and playing
- Swimming and water sports
- Riding and walking animals
- Cultural heritage appreciation

- Camping
- Cycling
- Climbing
- Motor vehicle use
- Caving
- · Nature study sites

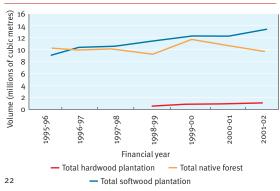


### Forest harvesting

More than 24 million cubic metres of logs were harvested in 2001-02, of which about 40% were from native forests and the remainder from plantations.

The National Forest Inventory estimates that less than 1% of native forests are harvested for timber products annually. In addition, a range of non-wood forest products (e.g.berries, mushrooms, game, honey, wildflowers and tree ferns) is harvested for commercial purposes in increasing quantities.

#### Volume of logs harvested annually



### Australia's plantation forests

Australia has over 1.6 million ha of plantations. Governments and industry share a goal of expanding this to 3 million ha over the next 16 years through the 'Plantations for Australia: The 2020 Vision' strategy (www.plantations2020.com.au).

Plantation forests developed rapidly between 1950 and 1980 as a result of government investment in softwood plantations. Since 1990, our plantation estate has increased by nearly 60%, largely through private investment.

Softwood plantations provide timber for building and construction and pulp for a wide range of paper products such as tissue and newsprint. Hardwood plantations are primarily comprised of fast-growing eucalypt species harvested after 10-15 years for pulpwood. This is used for a range of paper products in Australia and overseas. A proportion of hardwood plantations has been established to produce sawn timber and other solid wood products.

As well as wood products, plantations provide a range of environmental values including water quality improvement, biofuel, dryland salinity mitigation, carbon sequestration, and habitat for native plants and animals.

### What is a plantation?

#### Plantations are:

'intensively managed stands of trees of either native or exotic species, created by the regular placement of seedlings or seeds'.

Two main species groups are identified by the National Plantation Inventory:

- Softwood, comprised mainly of Pinus (pine) species
- Hardwood, comprised mainly of Eucalyptus (eucalypt) species

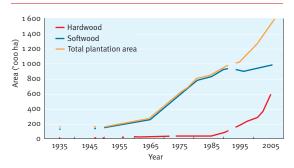
### Area of plantation

- There were 1.6 million ha of plantation in Australia in December 2002. Of this total, 638 337 ha (39%) were hardwood species and 987 864 ha (61%) were softwood species.
- Plantations provide over 70% of the sawnwood produced in Australia, yet comprise 1% of the forest area.

#### Plantation area by State and species group



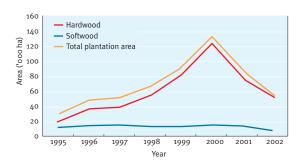
### Plantation area by year and species group



### Plantation expansion

Commercial plantation establishment has averaged 87 ooo ha each year for the last five years. Most plantation expansion has occurred as a result of planting hardwood species over softwood species.

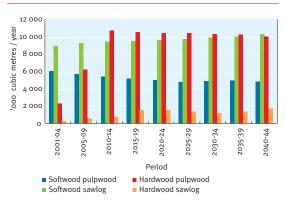
#### New areas of plantation by species group



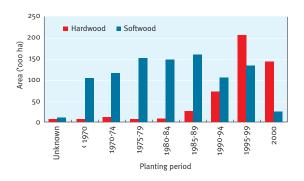
### Future wood availability from plantations

Australia will experience substantial increases in the availability of hardwood pulpwood over the next 40 years, together with significant increases in both softwood and hardwood sawlogs.

### National forecast of plantation wood availability



### Plantation age class

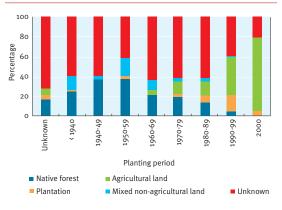




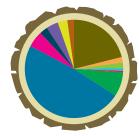
#### Previous land use of plantations

There has been a marked decline in the establishment of plantations on native forest land, and a marked increase in plantation establishment on agricultural land.

### Proportion of plantation area by previous land use



### Common plantation species



#### Hardwood

- E. globulus 21%
- E. globulus and E. grandis 2%
- E. nitens 2%
- E. regnans 1%
- E. dunnii 1%
- Minor and unidentified 8% hardwood

#### Softwood

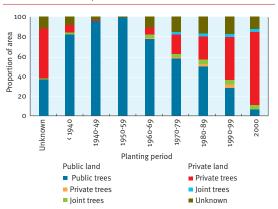
- P. radiata 49%
- P. elliottii 5%
- P. pinaster 3%
- P. caribaea 4%
- Araucaria species 3%
- Other softwood species 2%



### Plantation forest ownership

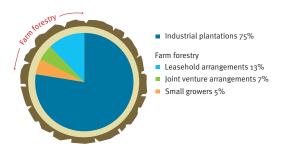
- There is a range of plantation ownership arrangements in Australia, and these are reported using a set of categories that acknowledge both tree and land ownership.
- Plantation ownership has undergone a transition from predominately publicly owned to predominately privately owned.

#### Plantation ownership



### Farm forestry

- The National Plantation Inventory makes the distinction between 'industrial' plantations, those greater than 1 000 ha and 'farm forestry' plantations, those less than 1 000 ha.
- Farm forestry is also a growing sector in plantation establishment. It is estimated that about 20% of current plantations have some degree of ownership by the farm forestry sector.
- More than a third of the farm forest resource has been planted since 1995.



### Australia's forest industry

As one of the country's largest manufacturing industries, employing more than 78 ooo people, the forest and wood products industry contributes significantly to the economic and social wellbeing of rural and regional Australia.

Forest-based industries are well placed for growth into expanding wood and fibre markets of the Asia–Pacific region. Australia's growing plantation forest resource base and buoyant domestic timber market provide a solid platform for import replacement and the development of export opportunities.

Australian governments and industry are working toward sustainable management of the forest estate by providing for an appropriate balance of commercial, environmental and community values in forests. The 1992 National Forest Policy Statement and subsequent initiatives have resulted in a range of actions to achieve sustainable management objectives, these include:

 Regional Forest Agreements – 20-year plans for the conservation and sustainable management of our native forests

- The Australian Forestry Standard an objective accreditation of sustainable forest management to demonstrate timber producers' sustainable management credentials in the international market
- Codes of practice and management plans which govern planning for soil and water quality, harvesting, access to forests, conservation of natural and cultural heritage, fire management, and pest, disease and weed control
- Private Forestry Development Committees, which are community-based groups that work to support sustainable and commercial private forestry activities and target important natural resource management issues, such as conserving biodiversity and reducing salinity.

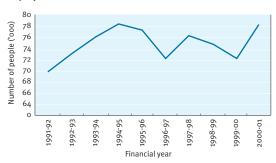


- Contribution of the forest industry to the economy
- The value of primary forest production was \$1.3 billion in 2002. The value of wood production, including downstream processing, contributed 1% of GDP to the economy, or \$6.6 billion in 2002. This was slightly higher than the value of wool production. The value of turnover in forest product industries in 2002 was \$15 billion.

#### Investment

 Since the early 1990s, the forest sector has attracted over \$6.5 billion in domestic and foreign investment.

### **Employment**



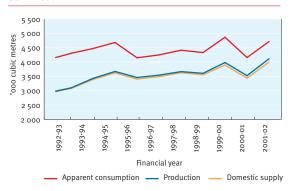
 It is estimated that 66 of 1 353 Australian Bureau of Statistics 'statistical local areas' are economically dependent on forestry and logging.

### Domestic consumption, production and supply of wood products

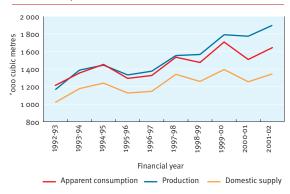
In Australia, consumption of paper and paperboard and wood-based panels trended upwards while consumption of sawnwood changed little over the decade to 2002-03.

Production trended upwards in all categories over this period.

#### Sawnwood

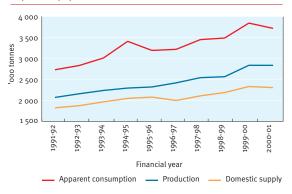


### Wood-based panels





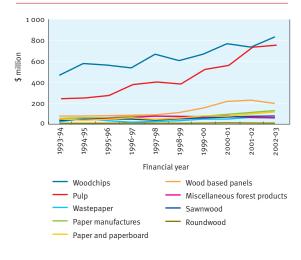
### Paper and paperboard

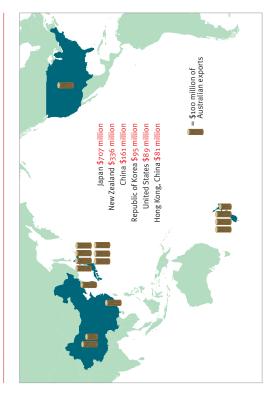




### Forest product exports

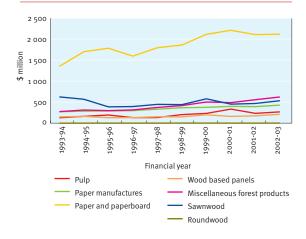
### Value of forest product exports



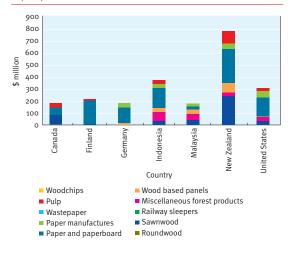


### Forest product imports

### Value of forest product imports



### Top import countries - 2001-02



### Number of wood processing facilities

There are an estimated 1 140 sawmills currently operating in Australia, with 75% producing high-value, small volume hardwood products. The remaining 25% are softwood sawmills, many at world-scale levels of production, producing timber mainly for structural manufacturing.

A breakdown of other wood processing facilities producing other products include:

Product	No. facilities
Chip	24
Pulp	1
Pulp/Paper	7
Paper	15
Hardboard	2
Log export	8
Laminated Veneer Lumber	1
Medium Density Fibreboard	7
Particleboard	9
Plywood/Veneer	12
Posts/Poles	27
Value Added	7
Total	120

### Proportion of sawmills by State (with wood input of greater than 20 000 m³)



- New South Wales 23%
- Northern Territory 0%
  - Queensland 30%
  - South Australia 4%
  - Tasmania 15%
- Victoria 17%
- Western Australia 10%
- Australian
   Capital Territory 1%



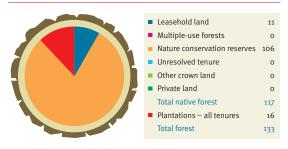
# State and Territory summary



# Australian Capital Territory

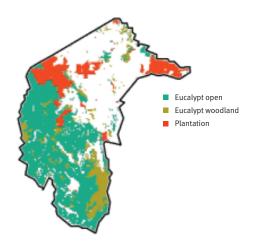
Population	322 900
% forest cover	55
% of Australia's native forest	0.07
% of Australia's plantation forest	0.98
% of Australia's land area	0.03
Land area	240 000 ha

### Australian Capital Territory forest area by tenure ('ooo ha)



Bush fires in January 2003 burnt approximately 88% of the Australian Capital Territory's native forest estate and 63% of its plantation estate.

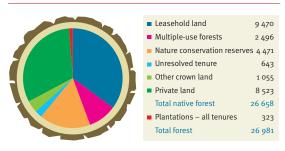
### Australian Capital Territory forests by type



### New South Wales

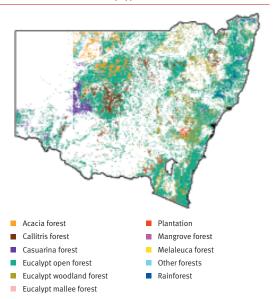
Population	6 686 600
% forest cover	34
% of Australia's native forest	16.39
% of Australia's plantation forest	19.84
% of Australia's land area	10.4
Land area	80 160 000 ha
<u> </u>	

### New South Wales forest area by tenure ('ooo ha)



The largest plantation owner in Australia is State Forests NSW.

### New South Wales forests by type



# Northern Territory

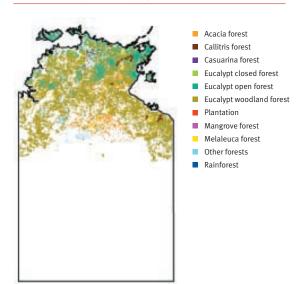
Population	198 400
% forest cover	24
% of Australia's native forest	20.18
% of Australia's plantation forest	0.43
% of Australia's land area	17.5
Land area	134 620 000 ha

### Northern Territory forest area by tenure ('ooo ha)



Approximately 47% of forests in the Northern Territory are under Indigenous management – the highest proportion in Australia.

### Northern Territory forests by type



# Queensland

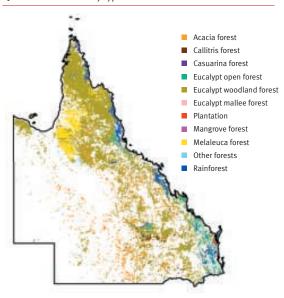
Population	3 796 800
% forest cover	32
% of Australia's native forest	34.26
% of Australia's plantation forest	12.78
% of Australia's land area	22.5
Land area	172 720 000 ha

### Queensland forest area by tenure ('ooo ha)



66% of Australia's World Heritage classified rainforest is in Queensland.

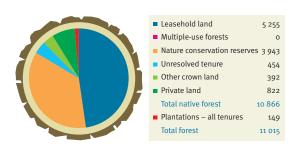
### Queensland forests by type



### South Australia

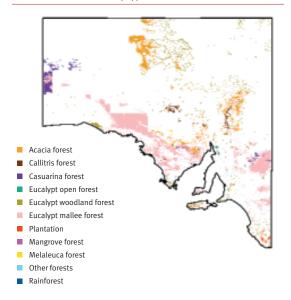
Population	1 527 400
% forest cover	11
% of Australia's native forest	6.68
% of Australia's plantation forest	9.15
% of Australia's land area	12.7
Land area	98 400 000 ha

### South Australia forest area by tenure ('ooo ha)



All South Australian wood resources come from plantations.

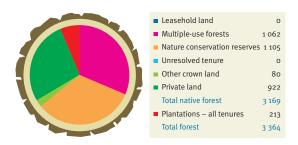
### South Australia forests by type



# Tasmania

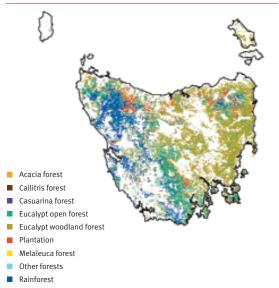
Population	477 100
% forest cover	50
% of Australia's native forest	1.95
% of Australia's plantation forest	13.08
% of Australia's land area	0.9
Land area	6 780 000 ha

### Tasmania forest area by tenure ('ooo ha)



In Tasmania, wood and paper product manufacturing is the second largest manufacturing employment group.

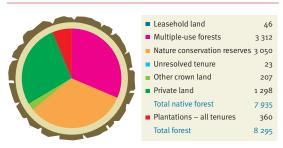
### Tasmania forests by type



## Victoria

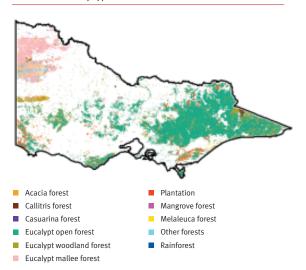
Population	4 917 400
% forest cover	36
% of Australia's native forest	4.88
% of Australia's plantation forest	22.11
% of Australia's land area	3.0
Land area	22 760 000 ha

### Victoria forest area by tenure ('ooo ha)



Victoria has the largest area under plantation of any State or Territory.

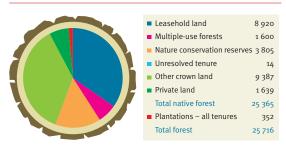
### Victoria forests by type



### Western Australia

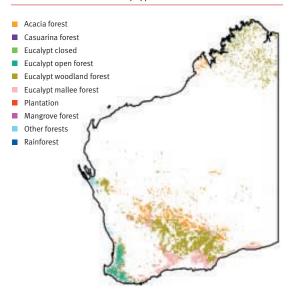
Population	1 952 300
% forest cover	10
% of Australia's native forest	15.59
% of Australia's plantation forest	21.62
% of Australia's land area	33.0
Land area	252 550 000 ha

### Western Australia forest area by tenure ('ooo ha)



The forests of Western Australia evolved in geographic isolation and therefore contain many species unique to this State, such as the Jarrah, Karri, Marri, Tingle and Tuart.

#### Western Australia forests by type

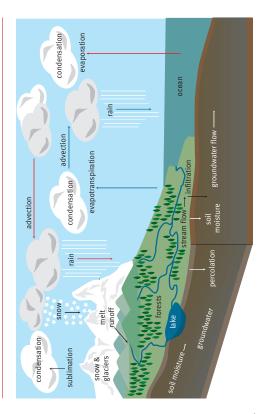


# Focus issue – plantations and water

- Plantations can affect the quantity and reliability of water flowing into rivers.
- Trees and other vegetation play a significant role in the way water is intercepted and moves through the soil, across the land and into the atmosphere (see water cycle diagram on page 63).



Forests and the water cycle



- Water runoff is generally lower in forested catchments than those under pasture or other annual crops. The difference is undetectable where the annual rainfall is less than 500 mm but increases so that, where annual rainfall is 1500 mm, the difference can be great – 2 ML/ha/yr.
- Greater water use by tree crops means that plantation development in a predominantly cleared catchment could reduce river flows.
- The impact depends on the extent of catchment under plantation, the arrangement of the plantations and their age and management. For example, an analysis of plantation areas in the Murray–Darling Basin shows that even in the most heavily planted areas, plantations only cover just over 2% of catchments and most catchments have far lower proportions.
- The impacts on water yield can be reduced by the targeted location and design of plantations. Trees planted higher in the landscape have a lesser effect on streamflow than those planted closer to the stream. This effect could be a useful way to help minimise adverse impacts on streamflow. However, there is a trade-off with plantation productivity as trees on higher slopes often grow slower.

- There is a wide range of social, environmental and economic benefits associated with plantations. The benefits and impacts of plantations should be considered in developing policies relating to water use. For example, in some areas where there are high saline water tables, high water use will be of benefit to reduce salinity impacts.
- The challenge is to revegetate parts of selected catchments, to achieve commercially viable plantations that contribute to regional economies and salinity reduction, with as little impact on water flow as possible.



# More information

More information or additional copies of this booklet are available from the National Forest Inventory, Bureau of Rural Sciences. GPO Box 858. Canberra ACT 2601

Phone: (02) 6272 4021

Fax: (02) 6272 3882

Email: nfi.info@brs.gov.au

Internet: www.daff.gov.au/nfi

Most of the data in this publication was sourced from Australia's State of the Forests Report 2003, which is available to download free from the internet at www.daff.gov.au/stateoftheforests

To purchase a hard copy
Phone: 1-800 020 157 or

Email: salesbrs@brs.gov.au

The report contains full references for source data and figures.

¹ 'Total forest' area for Tasmania is sourced from the Tasmanian RFA Review (2001) and does not include more recent NPI 2003 plantation figures. Therefore the total native forest area for Tasmania is a slight overestimate due to some clearing of native forest for plantation establishment after June 2001.



Photos throughout by Michael F. Ryan Photo page 19 by Grant Wardell-Johnson





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Forests hold many values.

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