

# A U S T R A L I A N Forest Profiles

A series from the National Forestry Inventory about forest types and major issues relating to them.

## Key Issues

- Australia has just over one million hectares (ha) of plantations, of which about 90% are softwood. The main softwood planted is radiata pine, *Pinus radiata*.
- In 1994, Australian softwood plantations supplied about 9 million cubic metres (m<sup>3</sup>) of timber products. It is estimated that by 2001 the annual yield will be 12.5 million m<sup>3</sup>.
- Softwood plantations will continue to expand under the National Plantations Strategy (Vision 2020), aimed at trebling the current plantation resource.
- Plantation and associated industries directly employ about 30 000 people in Australia.

- Plantation timber is used for products of four main types: building materials, packaging, paper, and personal care products.
- Plantations and plantation products are a sustainable and energy-efficient resource.
- Most of Australia's plantations are now planted on land that has been cleared for agriculture.
- Softwood plantations grow on a wide range of sites and reach maturity quickly.

*This brochure is about the distribution and environmental and economic aspects of Australia's softwood plantations.*



**AUSTRALIA** has always produced insufficient timber for its needs. In 1994–95, Australia imported 1.28 million m<sup>3</sup> of wood products and 1.54 million tonnes of pulp and paper products worth \$3 billion. This production deficit, and environmental constraints on the use of native hardwoods, make the future role of plantations crucial. Plantations are defined as ‘intensively managed stands of trees of either native or exotic species, created by the regular placement of seedlings or seeds’ (National Forest Policy Statement).

The relative scarcity of native softwood encouraged our early foresters to plant exotic softwood species, the timber of which is more easily worked than that of eucalypts. Plantations in Australia are dominated by radiata pine, *Pinus radiata*. This species originates from two Mexican islands and three small areas on the coast of southern California.

Australia’s first softwood trials were conducted in Victoria and South Australia in the 1860s and planting of radiata pine began in South Australia in 1876. In Western Australia, maritime pine (*Pinus pinaster*) started to be planted in 1897 and, in Queensland, the native hoop pine (*Araucaria cunninghamii*) and exotic softwoods in 1911. The first sizeable plantation established in New South Wales was at Tuncurry in 1912 and was operated as a ‘reformation camp’ using prison labour. In Tasmania, small-scale planting began in 1922 in the unforested ‘wasteland’ of the north-west and west coast. Radiata pine was the species most widely grown throughout Australia apart from Queensland where there was extensive planting of slash pine (*Pinus elliottii*) and Caribbean pine (*Pinus caribaea*).

Establishment of plantations was relatively slow until the mid 1960s, when the Commonwealth encouraged expansion of softwood plantations by giving the States 35-year loans for establishment costs. The goal was a national establishment rate of 26 000 ha per year. Establishment is expected to increase rapidly with agreement under the National Forest Policy Statement (NFPS) between State and Commonwealth ministers that the current area of plantations be tripled by 2020.

## About the Resource

AUSTRALIA is estimated to have 1.05 million ha of plantations with 0.89 million ha of these being softwoods. Nearly 43% of the softwood plantations are less than 16 years old; 61% are less than 21 years old.

Although the major softwood planted is radiata pine, other species make up 25% of Australia’s softwood plantations (Figure 1). Most of the world’s natural forests grow very slowly, at 1 to 5 m<sup>3</sup> per ha per year, but radiata pine in plantations has a mean annual increment of 10 to 35 m<sup>3</sup> per ha per year.

Plantation forests will be important in meeting our future demands for wood and fibre for several industries;

thereby reducing our dependence on imported timber and timber products.

Softwood plantations also comprise a forest resource that:

- is renewable;
- grows productively on a wide range of sites and under diverse climatic conditions;
- produces sawlogs in a relatively short time (25–35 years);
- can be managed to produce products of relatively consistent size and quality; and
- produces wood that is suitable for newsprint and cardboard, relatively easy to season and highly permeable to wood preservatives.

With proper plantation management, softwoods can be replanted, without productivity loss, after the first crop has been harvested. Some areas in Australia have second or third crops of softwoods growing profitably. Softwood plantations are highly productive in many areas where eucalypt growth and productivity is poor, and provide particular products needed by the public and industry (see *Use of the Resource* section).

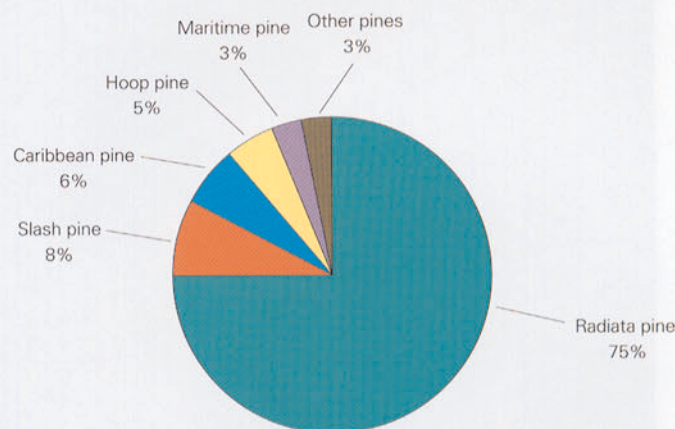


Figure 1. Percentage breakdown of species in Australia’s softwood plantations.

## Biological significance

Plantations developed in recent times largely occupy poor agricultural and grazing land cleared of trees many years ago.

Increasing the number of plantation trees has indirect benefits including:

- removing carbon dioxide from the atmosphere (carbon dioxide is a major contributor to the greenhouse effect);
- reducing the need for timber imports;
- reducing the volume of carbon dioxide released into the atmosphere and conserving fossil fuels—because wood products require less energy to produce than materials such as steel and plastic; and
- stabilising soil.

Plantations can help overcome three of Australia's biggest environmental problems: soil erosion, salinity and the loss of tree cover. Trees reduce soil erosion by binding soil, developing a thick leaf litter layer and reducing wind speed. Trees use more water than the pasture they replace and so lower the groundwater table—and thus assist in reducing salinity problems. Plantation vegetation can improve stream water quality by filtering run-off.

Loss of native forest habitat by clearing is a major environmental concern of the public. Clearing native forests for State softwood plantations is now restricted under most codes of practice for timber production to circumstances where forests need rehabilitation after degradation (e.g. by disease or insect invasion). Most forestry agencies and the private sector are encouraging

private land owners to lease or enter into sharefarming arrangements to use cleared private land for establishing plantations.

Softwood plantations are often criticised because they are monocultures of exotic trees and not a natural part of the Australian environment. It is true that softwood plantations are monocultures, like wheat, and have lower biodiversity than native forests. However, softwood plantations often have abundant bird life and indigenous insectivorous fauna. Animals found frequently in surveys of softwood plantations include echidnas, kangaroos, wombats, possums, bush rat and birds such as the yellow tailed black cockatoo.

Even though the population densities of some animals are lower than in native forest, they are much higher than on cleared land that the plantations are now replacing.

## Use of the Resource

In 1994, plantations supplied 9.6 million m<sup>3</sup> of wood while native forests supplied 10.3 million m<sup>3</sup>.

Some regions of Australia have relied on softwood plantations more than others. For example South Australia, which has limited natural timber, developed plantations at an early date and pioneered milling and drying of radiata pine. The first sawmill in South Australia was established in 1903 at Wirrabarra, milling timber for apple cases and building timbers. This was followed by several other small mills and the introduction of seasoning kilns in 1925 which helped improve the timber.

The consequent development of the industry in South Australia reflects similar progress in other parts of Australia. In the south-east of South Australia, the highest rainfall and most productive forest area in the State, development began in earnest as the resource began to mature around 1930. After a lack of interest in the commercial processing of radiata pine by the private sector, the Government established the township of Mt Burr complete with sawmilling and drying facilities to process radiata pine logs from the region. Since then the industry has continued to expand with the resource, to the point where there are now a number of internationally competitive processing facilities located in close proximity to the State's radiata forests.

About 70% of softwood plantation timber produced in Australia is used domestically. However, 39% of timber consumed locally is imported because of a shortage in domestic supplies. It is estimated that by 2030 the softwood component of domestic demand can only be met if an extra 13 000 ha are planted annually.

By 2001, softwood plantations are expected to supply 12.5 million m<sup>3</sup> of wood a year, about 87% of the total. This yield is forecast to remain largely static through 2010 to 2015.



Emus in a plantation of exotic softwoods in south-east Queensland.

# Distribution of Softwood Plantations

Most of Australia's softwood plantations are in areas with an annual rainfall greater than 700 mm and a minimum average rainfall no lower than 500 mm. Major areas are:

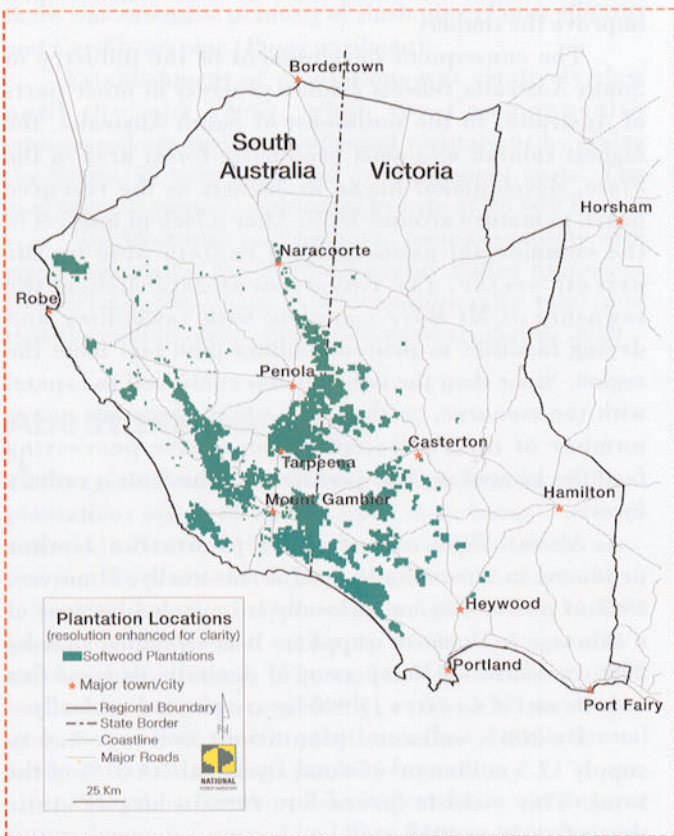
- Northern, central and southern tablelands, south-west slopes and north coast of New South Wales.
- Ballarat/Colac, Murray Valley, Central Gippsland-Bairnsdale and East Gippsland regions of Victoria.
- The green triangle region of south-east South Australia and south-west Victoria.
- Lofty Block area of the south-east of South Australia.
- South-east Queensland, central Queensland around Rockhampton and Mackay and, further north, near Ingham and Atherton.
- South-west of Western Australia.
- Parts of Tasmania.



Panoramic view of pine forests adjacent to native eucalypt forest in the Capital Territory.

## Key to Regions

- |     |                        |
|-----|------------------------|
| 1   | Western Australia      |
| 2   | Tasmania               |
| 3   | Green Triangle         |
| 4   | Lofty Block            |
| 5   | Central Victoria       |
| 6   | Murray Valley          |
| 7   | Central Gippsland      |
| 8   | East Gippsland/Bombala |
| 9   | Southern Tablelands    |
| 10  | Central Tablelands     |
| 11  | Northern Tablelands    |
| 12  | North Coast            |
| 13  | South-east Queensland  |
| 14a | North Queensland       |
| 14b | North Queensland       |
| 15  | Northern Territory     |



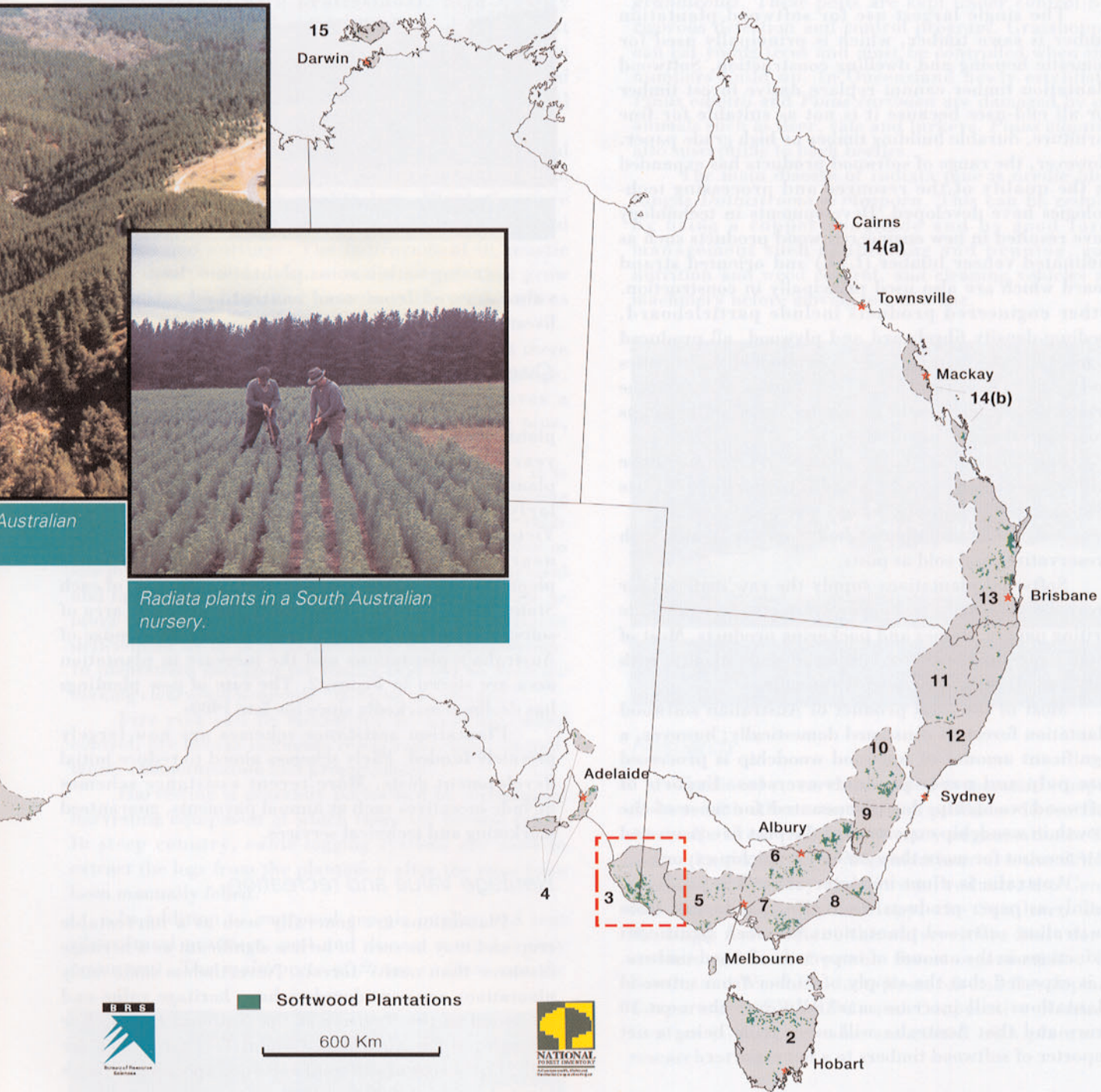
The National Plantation Inventory recognises fifteen plantation regions in Australia. The map inset shows softwood plantations in one of these, the Green Triangle region of South Australia and Victoria.



Australian



Radiata plants in a South Australian nursery.



**TABLE Area of plantations by State in 1995 ('000 ha)**

1

	NSW	Vic	Old	WA	SA	Tas	NT	ACT	Aust
Radiata pine	251.4	213.2	3.4	60.8	102.3	80.2	0.0	14.4	725.7
Other softwood	15.5	3.3	182.2	28.0	2.5	0.7	5.5	0.4	237.8
Total softwood	266.9	216.2	185.6	88.8	104.8	80.9	5.5	14.8	963.5

## Products

The single largest use for softwood plantation timber is sawn timber, which is principally used for domestic housing and dwelling construction. Softwood plantation timber cannot replace native forest timber for all end-uses because it is not as suitable for fine furniture, durable building timber or high grade paper. However, the range of softwood products has expanded as the quality of the resource and processing technologies have developed. Developments in technology have resulted in new engineered wood products such as laminated veneer lumber (LVL) and oriented strand board which are also used principally in construction. Other engineered products include particleboard, medium-density fibreboard and plywood, all produced to meet specific market needs in product characteristics and price. These processing technologies allow for the production of medium to high value softwood products from low value raw materials.

Softwood timber is also channelled into furniture and appearance-grade products because of its availability, ease of working and price.

A significant number of small logs are treated with preservatives and sold as posts.

Softwood plantations supply the raw material for processing into pulp and paper products. These include writing papers, tissues and packaging products. Most of these paper products are consumed domestically, with only a small quantity exported annually.

Most of the total product of Australian softwood plantation forests is consumed domestically; however, a significant amount of softwood woodchip is processed into pulp and paper products overseas. Exports of softwood woodchips have accounted for most of the growth in woodchip exports over the past five years and now account for more than 20% of woodchip exports.

Australia is a net importer of timber products, mainly as paper products. Increasing production from Australian softwood plantations has seen significant reductions in the amount of imported softwood timbers. It is expected that the supply of timber from softwood plantations will increase markedly over the next 10 years and that Australia will move from being a net importer of softwood timbers to a net exporter.

## Economic value

Softwood plantations assist Australia's balance of payment account primarily by reducing imports and, to a lesser extent, providing export earnings. For example, even though in 1994–95 Australia produced more than 2 million m<sup>3</sup> of softwood sawlogs from its plantations, imports of sawn softwood alone cost over \$400 million.

About 30 000 people are employed in plantation and related industries in Australia. These industries include wood products manufacturing (75%), paper and paper products manufacturing (17%), plantation harvesting and cartage (4%) and plantation management (4%).



*Radiata pine adjacent to recently harvested areas.*

Grazing within some plantations has economic value derived from weed control and income from livestock.

## Ownership

The establishment rate for State softwood plantations was stimulated by the Commonwealth 35-year loan program. The rate of private softwood plantation establishment also increased then, particularly in New South Wales, South Australia and Victoria, where incentive schemes applied. Today, nearly three-quarters of Australia's softwood plantations are publicly owned. This is also true of each State except Victoria, where more than half the area of softwood plantations is privately owned. The tenure of Australia's plantations and the increase in plantation area are shown in Figure 2. The rate of new plantings has declined markedly since the late 1980s.

Plantation assistance schemes are now largely privately funded. Early schemes aimed to reduce initial development costs. More recent assistance schemes include incentives such as annual payments, guaranteed marketing and technical services.

## Heritage Value and recreation

Plantations are generally seen as a harvestable crop and may be seen to be less significant as a heritage resource than native forests. Nevertheless some early plantations are considered to have heritage value and are listed in the Register of the National Estate. For example, in the Australian Capital Territory there are still 21 arboreta of different softwood species that were planted between 1928 and 1961.

Softwood plantations also provide many recreation opportunities. Sites throughout Australia are used for such purposes as picnicking, orienteering, car rallies, trail bike riding, horse riding, mountain biking and camping.

## Softwood Plantation Management

**M**OST of the major plantations are managed according to codes of forest management practice. These codes include the protection of soil, water, tree cover and

wildlife. Adverse physical effects on the environment can be avoided with professional, high quality management and adherence to the codes of forest practice. Otherwise, logging and roading operations can be responsible for increased sediment in waterways and poor practices can result in nutrient losses, soil compaction and an ugly landscape.

Tree breeding methods and intensive silvicultural practices are used to produce high yielding, uniform stands producing high quality logs. Plantations are increasingly being established with genetically improved seedlings and cuttings. The improvement in genetic quality has provided more uniform trees that grow faster and straighter, and have desirable traits such as higher wood density.

Most softwoods are planted as seedlings but there is growing emphasis on the planting of cuttings. Softwood plantations are generally grown over a rotation age of 25–40 years, although for hoop pine, rotation age is up to 60 years

For a successful commercial plantation, it is necessary to ensure a high survival rate of the young trees, and fast growing healthy trees during the whole rotation of the crop. Improved silvicultural practice in site preparation and weed control ensures good survival and fast, early growth. Fertiliser may be applied one or more times during the rotation to correct nutrient deficiencies or to provide increased wood production. In plantations managed for timber that will be used for making clearwood products, the trees are pruned.

Fire risk can be minimised by pruning, weed control, fire breaks including roads and tracks, surveillance, communication and preparedness.

Harvesting is generally performed by mechanised harvesting equipment of which there are several types. In steep country, cable logging systems are used to extract the logs from the plantation after the trees have been manually felled.

In addition to improved genetic quality and best silvicultural practices, pest and disease control is very important. The main pests of *Pinus radiata* are the

wood wasp *Sirex noctilio* and the bark beetle *Ips grandicollis*. These pests are kept under control by a rigorous detection and control program. Grasshoppers can eat young trees and must be controlled when their numbers build up. In Queensland newly established *Pinus elliotii* and *Pinus caribaea* are damaged by pest animals such as deer, rats and turkeys. *Pinus elliotii* is also susceptible to bark beetles.

The main disease of radiata pine is needle blight fungus *Dothistroma septospora*. This can be reduced by using a copper fungicide and by good forest management such as thinning and pruning, good nutrition and weed control, and cleaning vehicles and machinery before moving to a new site.



Softwood plantations are widely used for recreation, including horse riding.

## Research

Continual research is needed to maintain competitiveness with other countries and products. Research in Australia is carried out by many organisations. The better known of these organisations are the CSIRO Division of Forestry and Forest Products, the Centre for Forest Tree Technology, the Southern Tree Breeding Association, the universities, State forest services and several private forest organisations. The Forests and Wood Products Research and Development Corporation (FWPRDC) and Cooperative Research Centres (CRCs) are also associated with plantation research.

## Conservation

Plantations commonly include areas of native vegetation. Such areas include patches of unsuitable soil, streamside buffers, steep rocky areas and swamps.

Although the conservation values of such areas are necessarily compromised by plantation management objectives (e.g. intensive fuel management for fire protection), surveys show that they may still retain significant flora and fauna habitat values.

Linear remnants of native vegetation such as buffers along streams and tourist routes (landscaped visual buffers) act as corridors for the passage of

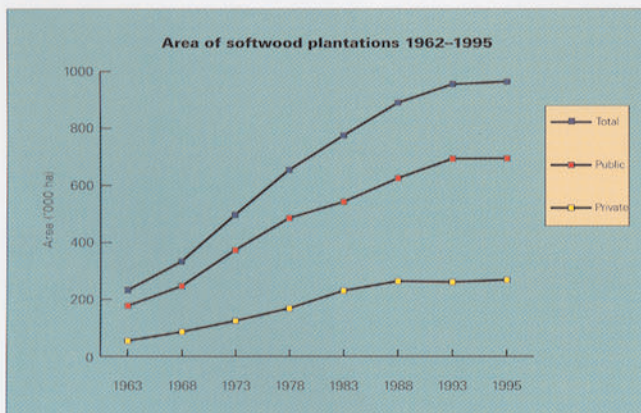


Figure 2. Tenure of Australia's softwood plantations and increase in area since the early 1960s.

wildlife through plantations, as well as refuges for wildlife that may use the plantations themselves (e.g. kangaroos that feed on firebreaks by night and shelter in plantations by day).

Few native wildlife species are able to permanently live within the plantation proper, although some species may be present in the early stages of first rotation plantations established on newly cleared sites or adjoining native forest areas. Softwood plantations provide a habitat for native wildlife but none are dependent on them for survival.

## Outlook

A favourable outlook for softwood plantation timber production is indicated by:

- a high level of acceptance of softwood plantations in many regions;
- continued demand for softwood timber products; and
- the commitment of Governments to encourage plantation investment with the intention of trebling the current plantation resource by 2020.

However, the capacity of the softwood industry to satisfy future demand for its products could be jeopardised by the present slow development of new softwood plantations.

Australia's softwood plantations provide increasing wealth for the community and help reduce the trade deficit. Timber is preferred by many Australians as a building material and the future of the wood products industry appears healthy so long as it competes effectively against substitute products and remains competitive with overseas timber industries.

The forest products sector has the capacity to become more competitive especially through improved marketing of wood products and the efficiency of the industry's operations. Timber is a renewable resource and, because many consumers are now choosing products with ecological implications in mind, this provides wood products with a marketing advantage. This renewable resource is an important source of national income today and will continue to be so for years to come. With the supply of timber from plantations expected to increase considerably over the next decade and with likely shortfalls in the world supply of timber, import replacement and export opportunities will improve for plantation-based industries. The demand for softwood woodchips is increasing and the volume produced is expected to increase. Adding value to softwood timber by converting woodchips to pulp and paper in Australia would reduce the nation's trade deficit as well as provide employment.

Industry benefits, including increased job opportunities, will flow from the creation of new plantations, the subsequent investment in plant and equipment and the consequent production and earnings.

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Front cover: *Radiata pine surrounding Cotter Dam, Australian Capital Territory.*

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