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## Eucalypt forests



Argyle apple (*Eucalyptus cinerea*) blossom

Eucalypts are iconic Australian forest trees. There are more than 700 species, some of which are still to be named. Almost all eucalypt species are native only to Australia.

Eucalypts evolved from rainforest ancestors and adapted to an environment where nutrient-poor soils were common and the land was becoming

more arid. They now thrive mainly in temperate and arid environments. Fire has also been an important environment factor and they have evolved many strategies to recover or regenerate after fire.

Three genera are generally referred to as 'eucalypts': *Eucalyptus*, *Corymbia* and *Angophora*. 'Eucalypt forests' in this report refer to those forests dominated by *Eucalyptus* or *Corymbia*. Forests dominated by *Angophora* are covered in the 'Other Forests' profile in *Australia's State of the Forests Report 2003*.

The name 'eucalyptus' is derived from the Greek words *eu*, meaning 'well' and *kalyptos*, meaning 'covered'. 'Well-covered' refers to the bud cap that covers the stamens (male floral parts) and falls off when the tree flowers. Many eucalypts produce a resinous gum – hence the common name 'gum tree'. The majority of eucalypts produce large numbers of small flowers grouped into flower clusters. The flowers of most eucalypt species attract insects, while some species develop fewer, larger, coloured flowers that attract birds and sometimes mammals.

Eucalypts belong to the *Myrtaceae* family, along with bottlebrushes, tea-trees and paperbarks.

Eucalypts form the overstorey and dominant components of a wide range of forests:

- closed forest (with a crown cover of 80% or more)
- open forest (with a crown cover of 50–80%)
- woodland forest (with a crown cover of 20–80%)
- mallee forest.

These subtypes are each covered separately in more detail later in this profile.

Eucalypts also occur as emergent trees from shrublands and grasslands in most regions, from high rainfall to semiarid, and from sea level to subalpine environments. Unless their canopy cover exceeds 20%, they are not covered by the 'eucalypt forest' category in this profile.

The forests of southeastern Australia contain more dominant eucalypt species than the forests of southwestern Australia or the woodlands of northern Australia. In the southeast, the more variable topography results in major changes in species groupings.

However, in southwestern and northern Australia, where the topography is more regular, a few species of eucalypts dominate wide expanses of forest, such as woollybutt (*Eucalyptus miniata*), stringybark (*E. tetradonta*) and jarrah (*E. marginata*). However, many other species occur in localised areas.



Blackbutt (*Eucalyptus pilularis*) regrowth

Australian forest profile

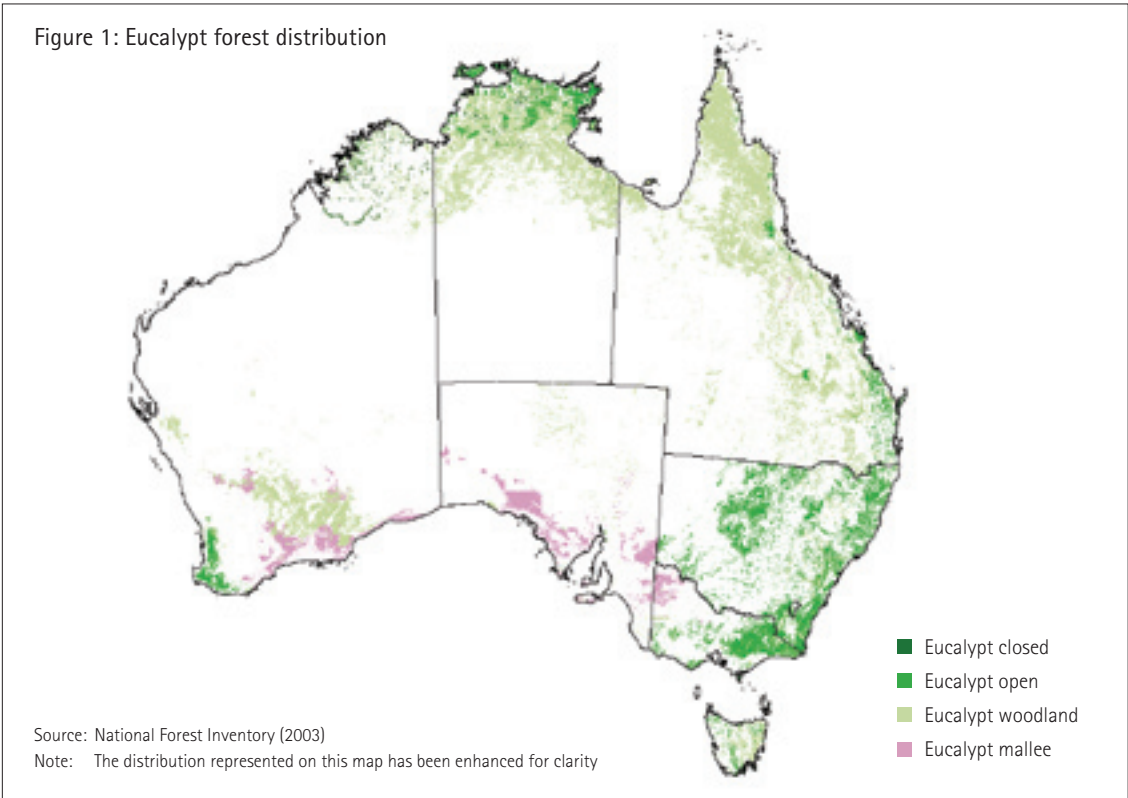
## Where are Australia's eucalypt forests?

Almost all eucalypt species are native only to Australia. Four tropical species are restricted to Timor, New Guinea, Sulawesi and Mindanao. Eucalypts dominate more than 127 million hectares of forest in Australia. More than half the area of eucalypt forest is woodland and there is a substantial area of open forest (Table 1). The dominance of Australian native forests by eucalypts is apparent in Figure 1.

Table 1: Area of eucalypt forest by crown cover compared with total native forest (hectares)

	Woodland	Open	Closed	Unknown crown cover	Total
Eucalypt mallee	10 400 000	1 929 000	0	0	12 329 000
Eucalypt woodland	76 983 000	0	0	0	76 983 000
Eucalypt open	0	37 623 000	0	0	37 623 000
Eucalypt closed	0	0	90 000	0	90 000
Total eucalypt forest	87 383 000	39 551 000	90 000	0	127 024 000
Total native forest	102 526 000	45 603 000	4 644 000	9 907 000	162 680 000

Source: National Forest Inventory (2003) *Australia's State of the Forests Report*



Below (left to right): Bee hives in private native forest; Bees on honeycomb; Bird watching



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## Values and uses

### Wood

The most important native timber trees in Australia are eucalypts. The timber is used for many purposes, predominantly sawlogs, veneer logs, poles, piles and girders and pulpwood. Wood from eucalypts is extensively used for fuel. Eucalypts of the arid regions grow slowly and produce wood that is among the densest timber in the world.

### Environmental

Because of their extent, eucalypt forests are extremely important to the conservation of biodiversity and the maintenance of ecosystem processes over large areas of the continent. Eucalypt forests support most of Australia's native plant and animal species. Australian termites and eucalypts may have evolved together, with the trees providing food and the termites helping to return nutrients to low fertility soils.

Hollows in eucalypt trees created by fire, fungi, insects, drought or wind damage provide habitats for a wide range of wildlife, such as small mammals, lizards, insects, spiders and birds. Large areas of eucalypt forest provide water catchment protection.



Echidna (*Tachyglossus aculeatus*)



Stacking jarrah boards for export, southwest Western Australia

### Indigenous

Indigenous people use a great range of materials from eucalypt forests. The seeds of many species are ground and made into cakes, while the forests also provide fruit and nut trees, berries, tubers of rushes and yams, grass seeds, honey from native bees, wallabies, possums, snakes and lizards. The root bark of mallees – shrubby, multistemmed eucalypts (see image on the following page) – is roasted, pounded and chewed, and flowers of some eucalypts are soaked in water for sweet drinks. Eucalypt bark is used for paintings and to construct shields, canoes, coolamons (bowls), drinking vessels, cladding for huts and blankets, and torches. The wood is used for fuel and fashioned into spears, digging sticks, clap-sticks, clubs and boomerangs. Resins are used for making adhesives, medicines and wound dressings.

### Other uses

Many eucalypt forests provide nectar and pollen for honey production and beeswax.

Eucalypt forests, particularly open forests, are used extensively for recreation and tourism activities, such as camping, bushwalking and bird watching.

Below (left to right: spotted gum (*Corymbia maculata*) forest, southern New South Wales; closed forest of stringybark (*Eucalyptus tetradonta*) Gunn Point, Northern Territory; red stringybark (*Eucalyptus macrorhyncha*) and long-leaf box (*Eucalyptus goniocalyx*) forest



## Eucalypt mallee forest

Mallee eucalypts have multiple stems arising at ground level from a large woody structure known as a lignotuber or ‘mallee root’. Eucalypt mallee forest includes vegetation dominated by mallee trees greater than 2 metres tall. It does not include vegetation where mallee eucalypts are clearly shrubby in form.

Although a complete inventory of mallee species has not been compiled, it is likely that there are at least 200–250 eucalypt species of mallee form. The highest species richness occurs in southwestern Australia where as many as three-quarters of the eucalypts are mallees. In this region, many mallees may have evolved into this form as the climate became more arid.



White mallee (*Eucalyptus dumosa*) Lake Mungo National Park, New South Wales

## Where are Australia’s eucalypt mallee forests?

Most mallee communities are located in areas where the average annual rainfall is 250–400 millimetres (Figure 2) and rainfall is predominantly in winter with a very dry summer. Such climates are referred to as Mediterranean. Where rainfall is higher, mallees are replaced by woodlands of single-stemmed eucalypts, sometimes of the same species. Where rainfall is lower, mallee forests are usually replaced by acacia forests or shrublands.

Figure 2: Eucalypt mallee forest distribution



Source: National Forest Inventory (2003)

Note: The distribution represented on this map has been enhanced for clarity

Table 2: Tenure of eucalypt mallee forest, by State and Territory (hectares)

Tenure	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Leasehold land	0	1 000	0	114 000	2 168 000	0	0	305 000	2 588 000
Multiple-use forests	0	1 000	0	0	0	0	161 000	13 000	175 000
Nature conservation reserves	0	14 000	0	2 000	3 004 000	0	812 000	1 512 000	5 345 000
Other crown land	0	0	0	0	165 000	0	17 000	2 830 000	3 013 000
Private land	0	6 000	0	3 000	640 000	0	182 000	309 000	1 140 000
Unresolved tenure	0	0	0	1 000	66 000	0	0	0	67 000
Total eucalypt mallee	0	23 000	0	122 000	6 044 000	0	1 171 000	4 969 000	12 329 000

Source: National Forest Inventory (2003) *Australia’s State of the Forests Report*

## Ownership and management

The majority of mallee forests occur in South Australia (49%) and Western Australia (40%), while the remainder occur in northwestern Victoria, Queensland and New South Wales (Table 2). A substantial proportion of mallee vegetation is within nature conservation reserves (43%), the majority in South Australia.

Almost all mallee forest is used for extensive cattle grazing and there is little active management for wood production, because the productivity and volumes per hectare are low.



Open eucalypt forest on plains and open melaleuca forest along rivers characterise areas of the Kimberley, Western Australia



## Eucalypt woodland forests

Woodland forests have open canopies with crown cover ranging from 20–50%. The classification includes open woodlands, which are called savanna in some parts of the country. Nearly half of all Australia's forests are classified as eucalypt woodland forest.

### Where are Australia's eucalypt woodland forests?

Woodland forests occur in four main areas of Australia: a broad band across tropical northern Australia; subtropical and warm temperate eastern Australia; the warm, temperate southwest; and the cool, temperate southeastern Australia, including Tasmania (Figure 3).

Almost half of Australia's woodland forests occur in Queensland, with large amounts also in the Northern Territory (28%) and Western Australia (17%). The tropical woodland forests grade from very tall to very low and are often widespread. The understorey of eucalypt woodlands in northern Australia may include palms, cycads and grasses. The majority of eucalypts are evergreen trees, but there are a few that lose their leaves seasonally in the seasonally inundated cracking clays of northern Australia. The trees in these forests lose all or part of their leaf canopy under conditions of water stress, but flower and have a growth flush before monsoonal rains usually start. This characteristic is called 'drought deciduousness' because of its relationship to the annual dry season.

In the temperate regions, the natural distribution of woodland forests coincides with the core of Australia's agricultural regions; as a consequence, most woodlands are now remnant patches in an agricultural landscape.

Red river gum (*Eucalyptus camaldulensis*) is the most widely distributed eucalypt and occurs in all Australian mainland states; however, it forms some of its most extensive forests along the Murray River and its tributaries in New South Wales and Victoria, where it relies upon periodic flooding and underground water.

Figure 3: Eucalypt woodland forest distribution



Source: National Forest Inventory (2003)

Note: The distribution represented on this map has been enhanced for clarity

### Ownership and management

Most of the woodland forests occur on leasehold or private lands, but 7% are in nature conservation reserves and 4% in multiple-use forest areas (Table 3). In Western Australia, 43% of woodland forests occur on other crown land.



Fragmented forest in an agricultural landscape

Table 3: Tenure of eucalypt woodland forest, by State and Territory (hectares)

Tenure	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Leasehold land	5 000	178 000	12 980 000	24 294 000	1 043 000	0	5 000	4 862 000	43 367 000
Multiple-use forests	0	156 000	0	1 908 000	0	361 000	249 000	205 000	2 878 000
Nature conservation reserves	17 000	580 000	2 000	2 276 000	194 000	465 000	466 000	1 538 000	5 538 000
Other crown land	0	138 000	695 000	742 000	107 000	63 000	44 000	5 509 000	7 298 000
Private land	0	1 400 000	8 172 000	5 477 000	130 000	739 000	294 000	818 000	17 030 000
Unresolved tenure	0	22 000	51 000	503 000	287 000	0	6 000	4 000	873 000
<b>Total eucalypt woodland</b>	<b>21 000</b>	<b>2 475 000</b>	<b>21 900 000</b>	<b>35 199 000</b>	<b>1 761 000</b>	<b>1 627 000</b>	<b>1 063 000</b>	<b>12 937 000</b>	<b>76 983 000</b>

Source: National Forest Inventory (2003) *Australia's State of the Forests Report*

## Eucalypt open forests

Open forests are dominated by trees with an open canopy – that is, they have a crown cover between 50 and 80%. Eucalypts dominate the overstorey of nearly all the open forests of southern Australia. They occur in three major zones: coastal and subcoastal southeastern Australia, Tasmania, and southwestern Australia.

Open eucalypt forests are often quite diverse and there may be up to 10 eucalypt species per hectare in the open forests of southeastern Australia. In contrast, other forests – such as in southwestern Australia where jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) are dominant – there are large areas with only one main tree species (for example, the northern jarrah forest).

### Where are Australia's eucalypt open forests?

Eucalypt open forest occurs in all States and Territories of Australia. The largest expanses are in New South Wales, the Northern Territory and Victoria (Figure 4). In general, open forests occur in areas of moderate temperature and rainfall – where average annual rainfall exceeds 600 millimetres – and where the phosphate level of the soil is relatively moderate by Australian standards.



Mountain ash (*Eucalyptus regnans*) and grey gum (*Eucalyptus punctata*) open forest, Kingslake, Victoria

Figure 4: Eucalypt open forest distribution



Source: National Forest Inventory (2003)

Note: The distribution represented on this map has been enhanced for clarity

Tall open forests (those at least 30 metres tall) are distributed in a discontinuous arc of high rainfall country from northeast Queensland to southern Tasmania. In eastern Australia, a gradual replacement of dominant species occurs down the coastline. Tall open forest is also found in southwestern Australia, but not in the low rainfall gap of 2 100 kilometres between western Victoria and southwestern Australia.

### Ownership and management

The largest proportion of eucalypt open forests occur on private land (38%) although the distribution by State and Territory on private land varies considerably, from no reported occurrence in the Australian Capital Territory to 88% in the Northern Territory (Table 4).

The States with the largest areas of eucalypt open forest in nature conservation reserves are New South Wales (17%) and Victoria (28%). The Australian Capital Territory and South Australia, which have much smaller total areas of forest, have the highest proportions in nature conservation reserves (93% and 39%, respectively).

Table 4: Tenure of eucalypt open forest, by State and Territory (hectares)

Tenure	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Leasehold land	7 000	6 862 000	607 000	586 000	4 000	0	38 000	61 000	8 163 000
Multiple-use forests	0	2 048 000	0	337 000	0	481 000	2 830 000	1 370 000	7 066 000
Nature conservation reserves	89 000	3 315 000	3 000	562 000	17 000	228 000	1 518 000	489 000	6 220 000
Other crown land	0	800 000	120 000	85 000	10 000	11 000	135 000	160 000	1 320 000
Private land	0	6 455 000	5 215 000	1 720 000	12 000	128 000	793 000	159 000	14 481 000
Unresolved tenure	0	242 000	15 000	96 000	1 000	0	15 000	1 000	371 000
Total eucalypt open forest	95 000	19 722 000	5 960 000	3 385 000	44 000	847 000	5 328 000	2 240 000	37 623 000

Source: National Forest Inventory (2003) *Australia's State of the Forests Report*

## Australia's tall trees

Tall open forests – also known as wet sclerophyll forests – are open forests dominated by trees at least 30 metres tall. This forest type contains some of the greatest quantity of plant biomass per unit area found in terrestrial ecosystems, and also includes trees that are among the tallest in the world.

Mountain ash (*Eucalyptus regnans*) is the world's tallest flowering plant and can reach more than 100 metres in height. It is mainly found in the mountains of eastern Victoria and Tasmania. While enormous mountain ash trees were reported in the late 1800s, the methods of measurement were somewhat suspect. The tallest record of an Australian tree was a mountain ash measured to be 132.6 metres in 1872 in the Strezlecki Ranges, Victoria. The world's tallest living tree is now a coastal redwood (*Sequoia sempervirens*) in California, USA, which is 112 metres tall.



Old growth mountain ash (*Eucalyptus regnans*) forest, Victoria

## Eucalypt closed forest

In northern Australia, eucalypts can form a forest with more than 80% crown cover in wet or sheltered areas at the margins of, or within, open eucalypt forests. These forests are referred to in this report as closed eucalypt forest (Figure 5).

Although forming a distinct forest type, closed eucalypt forests are generally comprised of species typical to northern Australian open forests, such as stringybark (*Eucalyptus tetradonta*) and woollybutt (*E. miniata*).

More than 70% of these forests are classified by height as medium closed eucalypt forest (10–30 metre canopy height), with the remainder being low closed eucalypt forest (2–10 metre canopy height).

### Ownership and management

Most of the closed eucalypt forests occur on private or leasehold land in the Northern Territory and on other crown land, nature conservation reserves and leasehold land in Western Australia (Table 5).

Figure 5: Eucalypt closed forest distribution



Source: National Forest Inventory (2003)

Note: The distribution represented on this map has been enhanced for clarity

Table 5: Tenure of eucalypt closed forest, by State and Territory (hectares)

Tenure	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Leasehold land	0	0	12 000	0	0	0	0	10 000	22 000
Multiple-use forests	0	0	0	0	0	0	0	0	0
Nature conservation reserves	0	0	0	0	0	0	0	7 000	7 000
Other crown land	0	0	3 000	0	0	0	0	19 000	22 000
Private land	0	0	36 000	0	0	0	0	1 000	37 000
Unresolved tenure	0	0	0	0	0	0	0	1 000	1 000
Total eucalypt closed forest	0	0	51 000	0	0	0	0	39 000	90 000

Source: National Forest Inventory (2003) *Australia's State of the Forests Report*





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Canopy of karri (*Eucalyptus diversicolor*) and jarrah (*Eucalyptus marginata*) forest, southwest Western Australia



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# Eucalypt

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