

Tall trees

Tall closed forest Trees >30 m high; >70% foliage cover

T4

These magnificent forests, which survive today as only a few scattered relics in north-eastern Qld, represent the Australian equivalent of the tall tropical lowland rainforests of the Amazon and Zaire basins. With a height of up to 40 m or more and a dense closed canopy allowing very little light penetration, their 'cathedral like' atmosphere is both inspiring and belittling to human visitors. These forests are also among the most complex ecosystems on earth.

This structural form is represented by the tallest examples of the forests loosely known as 'rain-forest'. Tall closed forest is shown only on the Natural Vegetation map. It previously occupied extensive areas of the rich alluvial and basaltic coastal lowlands in the Innisfail area of north-eastern Qld. Today only small fragments survive in this area, as much of this forest type has been almost entirely cleared for plantations of sugar cane (vG4).

The mapped former stand of tall closed forest (xT4) is considered by Tracey (1982) as the optimum development of rainforest in Australia under the most favourable conditions of climate and soil on the tropical humid lowlands. Tracey categorised this type as 'complex

mesophyll vine forest' (see table below) consisting of a large number of species and having a very complex structure that involves a range of tree heights (up to 40 m or more).

Many specialised growth forms are present in tall closed forests. Vines are visually prominent on the canopy trees, and most trees have large (mesophyll) leaves. Because of its complexity, tall closed forest is mapped simply as xT4 without reference to subforms.

Most rainforest types are mapped as xM4 (discussed on page 20). These rainforests, particularly in Qld, do contain patches which exceed 30 m in height (Tracey and Webb 1975, Tracey 1982) but they are not readily separable at the scale of the map.

Where rainforest and sugar cane meet
Looking from the Walter Hill Range, north of Tully (Qld), on to cleared agricultural lowlands. The rich soils of the sugar cane fields formerly supported rainforests over 30 m high (xT4). Only remnant patches now survive—in forested valleys in this area.



A stand of tall rainforest
Photographed in the 1920s near Danbulla, on the Atherton Tableland, this tall rainforest (far right) is now largely cleared. The person standing among the vines at the base of a giant grey sassafras (*Doryphora aromatica*) is dwarfed by the immense height of this tree.



Rainforest classification

Adapted from Walker and Hopkins (1984)

The structural classification of Australian rainforests is based on a combination of descriptive features. These include predominant leaf sizes of the canopy trees, species composition, the presence of distinctive plant structures (e.g.

root buttresses) and the visual dominance of certain growth forms, either on the trees or as an understorey (e.g. mosses, ferns, palms and vines).

The terms used to describe structural

complexity and predominant leaf sizes are explained below. Forests may be classed as either 'simple' or 'complex' if they exhibit most or all of the features listed. There is a huge variety of leaf shapes in rainforests and for

a given leaf area the lengths vary according to the leaf shape. The length of the most common leaf shape, the 'lanceolate' or elliptical leaf, is given for each size category as an example.

Structure

Simple	Complex
Single or few dominant tree species	Many tree species
Few plant structures and growth forms dominant	Wide range of plant structures and growth forms
Uniform tree stem sizes and often distinct lower strata	Uneven stem sizes and no distinguishable lower strata

Leaf size

Leaf size class	Leaf area (mm ²)	Length of lanceolate leaf (mm)
Mesophyll	>4500	>125
Notophyll	2025-4500	75-125
Microphyll	225-2025	25-75
Nanophyll	25-225	<25

Tall open forest

Trees >30 m high; 30–70% foliage cover

T3

These towering *Eucalyptus* forests, which stand over 30 m tall and reach heights near 100 m in places, are the optimum development of Australia's hardwood forests. They contain some of the most commercially valuable trees and have been utilised for timber production for nearly two centuries. There are few areas within them that remain untouched by logging, yet the tall open forests have retained much of their former grandeur.

Tall open forests presently cover about 50 000 km² and exhibit a variety of understoreys, ranging from rainforest and tree-ferns to low trees and tall shrubs. The range of tree densities found within these forests, including areas of tall woodland (T2), is generalised within the open forest code. Such variations in the canopy may result from European forest management or from natural successions.

Most vegetation of this structural form is dominated by species of *Eucalyptus* and corresponds to what is often called 'wet sclerophyll forest' (Ashton 1981). It usually occurs in areas with high reliable rainfall of over 1000 mm annually. Tall open forests are found in sheltered areas of mountainous terrain in the south-western corner of WA and from Tas. to northern NSW. Smaller unmapped outliers occur as far north as the Windsor Tableland in northern Qld.

The most important species include *Eucalyptus diversicolor* in WA; *E. regnans* in Tas. and Vic.; *E. delegatensis*, *E. obliqua* and *E. viminalis* in Tas., Vic. and NSW; and *E. pilularis*, *E. saligna*, *E. grandis* and *E. propinqua* in NSW and Qld. Stands of these forests are often even-aged, due to uniform regeneration after occasional massive crown fires.

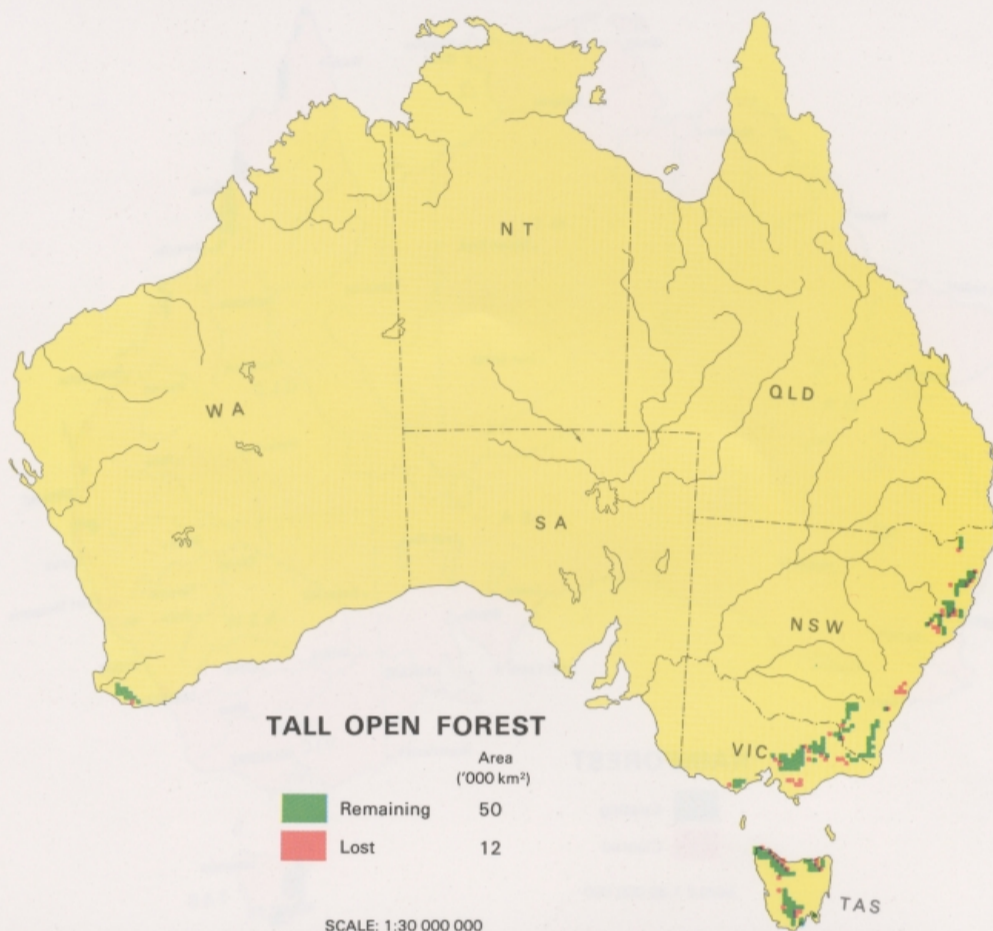
Most of these forests have a distinctive lower stratum of low trees and tall shrubs (eT3L), many of them orthophyllous (soft-leaved). Fire-determined successions within the

understoreys have been identified but, in view of the variation in the available evidence (Ashton 1981), the lower strata of the pre-European forests are assumed to have been the same as at present.

In the eastern forests the height of the lower stratum often exceeds 10 m in very moist situations, especially in Vic. and Tas. Tree-ferns are prominent in these forests, along with *Acacia melanoxylon* and the genera *Pomaderris*, *Olearia* and *Bedfordia*. Palms occur in the northern examples, and *Casuarina*, *Syncarpia* and *Callicoma* are common. The understorey in the *E. diversicolor* forests of WA is similar to those in the east, apart from the absence of ferns and the prominence of tall shrubs (eT3S).

Rainforest species do occur in the understorey of some eastern forests, though in Tas. there are areas where the lower stratum is a closed forest dominated by *Nothofagus cunninghamii* (eT3M). Within parts of these areas in Tas. the cover of the tallest stratum tends to be less than 30% (eT2M). These stands represent stages in long-term transitions where the taller relict eucalypts are being replaced by rainforest (Gilbert 1959).

The distribution of the tall open forests is somewhat more extensive on the Natural Vegetation map. Some areas have been cleared for sowing to exotic pastures (yF3, yF4, eM1yF) or to induce the growth of native pastures (eM1yG).



Karri tall open forest

In the high rainfall area of the far south-west of WA, the smooth-barked karri (*Eucalyptus diversicolor*) forms tall open forests. An understorey dominated by dense tall shrubs is a distinctive feature of many karri forests. As a result they have been generalised as eT3S on the 1:5 million scale maps.



Mountain ash forest

Looking up into the canopy of a mountain ash (*Eucalyptus regnans*) tall open forest in Vic. (far left). Mountain ash forests typically stand over 30 m tall. Australia can boast the tallest flowering plants in the world, with some individuals of this species standing nearly 100 m high in moist protected sites in Tas.