

A closer look at rainforests

Forests NSW Community Programs

Introduction

Rainforest is a type of forest that is dominated by closely spaced trees with a crown cover of 80% or more. It is one of the most widespread and important types of forest in the world.

Where the world's rainforests occur

Rainforest occurs in the moist tropics and cooler temperate, high rainfall zones.

The three main geographic areas of *tropical rainforest* are:

- the Amazon basin and adjacent areas of south and central America
- west Africa
- southeast Asia and the islands extending to New Guinea.

Temperate rainforest occurs high on some tropical mountains, in southern South America, New Zealand, southeastern Australia and parts of South Africa. In eastern Australia, temperate and tropical rainforest merge together and sometimes can be found growing as distinct communities on different soil types close to each other, for example in the Dorrigo area of northern New South Wales. Basalt soils in this area support a form of tropical rainforest and shale soils support a temperate rainforest dominated by coachwood.

Rainforest in Australia

Rainforest in Australia covers a very small amount of land – just 0.5 per cent or 4.2 million hectares – and 2.6 per cent of the total area of Australia's native forests. Rainforest in Australia consists of three main types:

- *monsoon rainforest*, found in northern and northwestern Australia in areas which are seasonally dry
- *tropical rainforest and subtropical rainforest*, found along the coast and ranges of northern and eastern Australia including Queensland and northern NSW
- *temperate rainforest (including warm and cool temperate)*, found mainly in New South Wales, Victoria and Tasmania.

Where rainforest occurs in Australia

Rainforest occurs in parts of eastern Australia with high rainfall, deep soils and no fire. It contains a wide diversity (types and numbers) of different plant and animal species.

Patches of rainforest occur from the Kimberley region to Cape York, along the length of the coastal region of eastern Australia and across Tasmania.

In Queensland, rainforest is mostly subtropical with major stands in the Atherton area, west of Cairns; west of Mackay; near Bundaberg and Gympie; and along the Mcpherson Range. Warm temperate rainforest mixes with tropical and subtropical rainforest in northern New South Wales, gradually developing into cooler temperate rainforest as you move south toward the Victorian border. Victoria has rather limited patches of temperate rainforest.

Cool temperate rainforest occurs in Tasmania, particularly in the west.

Human activity can easily damage rainforest. Over the last two hundred years large areas of Australian rainforest have been cleared for agricultural, industrial and urban development. Conservation of rainforest and other unique environments involves the careful planning and management of our natural resources.

However, in parts of northern NSW and Queensland, rainforest areas have expanded replacing eucalypt forest. It is believed this is due to changes in the frequency of fires since European settlement.

Where rainforest occurs in New South Wales

Rainforest grows in scattered patches throughout eastern New South Wales, with examples of tropical and temperate rainforest types growing close together. There are four main areas where rainforest occurs:

- along the McPherson Range and adjacent ranges and valleys
- on the Dorrigo Plateau and westward to beyond point lookout
- on the catchment of the Hastings River
- on the Barrington Tops.

The area covered by rainforest in the first two of these areas has been considerably reduced by land clearing with European settlement. A fifth area, in the Illawarra district, was largely destroyed by extensive land clearing in the 1800s.

In addition to these areas, smaller stands (groups of trees) are found along the coast of New South Wales and into the escarpment of the tablelands.

The majority of people in New South Wales live within 80 kilometres of well-developed rainforest stands.

What is rainforest?

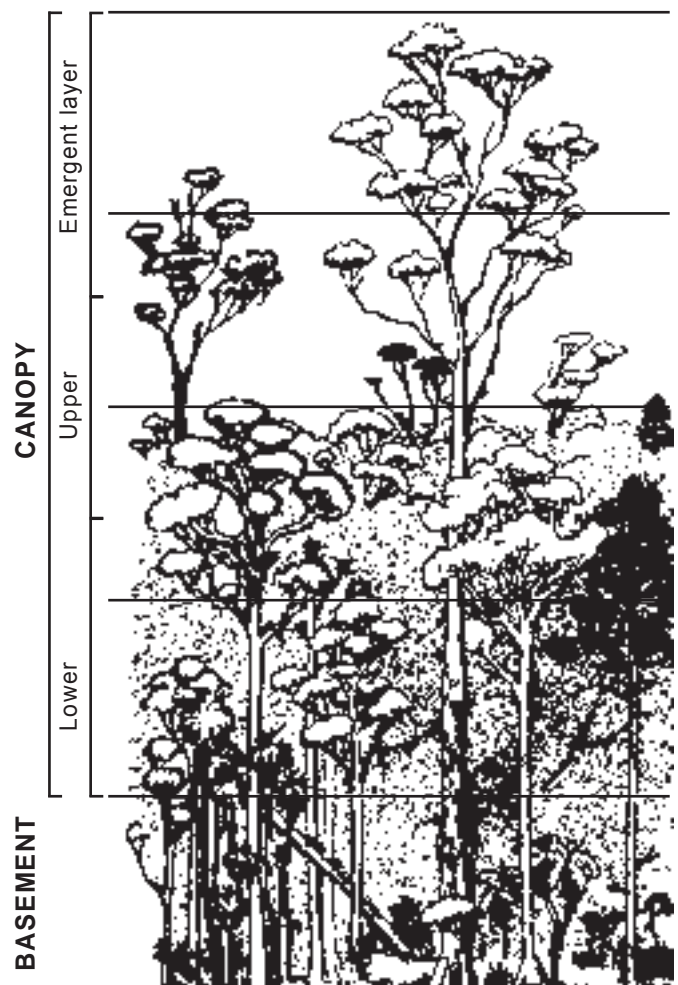
Rainforest consists primarily of trees which are largely evergreen and moisture loving, with dense crowns of leaves which shade large areas of the ground. They feature several vegetation layers or storeys, with the tallest storey reaching over 30 metres in height, sometimes reaching up to 60 metres. The dense canopy of a rainforest stops most direct sunlight from reaching the understory, creating a moist protected environment below. The ground generally has a light understory of shrubs and herbs. Between the canopy and understory,

vines and other clinging and climbing plants often grow, hanging from the trunks and branches of the tall trees. These varying layers of dense vegetation provide a range of habitats for other species. They also help to conserve water and act as an important store of nutrients.

Features of a rainforest

Many of the trees in a rainforest have unusual stem and trunk forms, such as:

- the buttressed bases on some trees, which can be quite high for some of the larger trees
- silt roots on some of the smaller trees
- the strangling habit of the giant figs which entwine rainforest trees.



Above: The various layers of a tropical rainforest

The bark of rainforest tree trunks is often encrusted and mottled with lichens – plants that grow in crust-like patches or bush-like forms on the shaded surfaces of rocks and tree trunks. As a result, the trunks of quite unrelated trees can look very similar and it can be difficult to identify these trees at first glance.



Above: Aerial roots of a strangler fig

In tropical rainforests, the leaves of trees are usually large (commonly about 20 cm long) and smooth-edged. Frequently the end of the leaf is drawn out into an extended drip tip. Newly formed leaves may be brightly coloured and hang loosely for a few days before stiffening up and becoming green. In contrast, the leaves of the trees in temperate rainforests are usually smaller with toothed margins and are often hard or leathery in texture.



Above: Buttressing on the base of a rainforest tree

Some rainforests trees bare their flowers and fruits on their branches or trunks, not in their leaf axils like most plants. This is known as cauliflory. Two examples of trees which have this feature are:

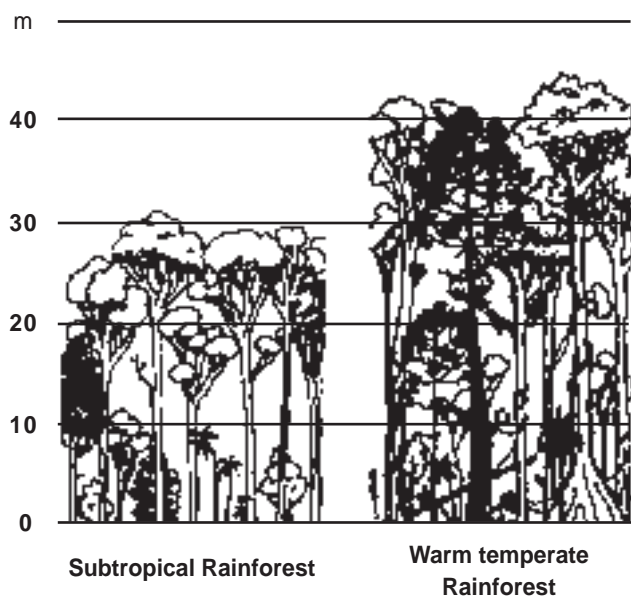
- the sandpaper fig (*Ficus fraseri*) – the leaves of which were used by Aboriginal people to smooth their wooden implements, and
- the black bean (Moreton Bay chestnut, *Castanospermum australe*) – the seeds of which were an important food source for Aboriginal people after the poisonous seed had been treated to remove the poison.

A group of plants that have adapted to the low light levels in rainforests are the epiphytes. These plants rely on the trunk and branches of trees for support. Epiphytes include many ferns and orchids. Often they look like great baskets that collect the moisture and leaf litter that keep them supplied with what they need for growth, as they grow well out of reach of the soil. Many figs start life as epiphytes but in time they send their roots down to the soil, strangling their host tree with a mass of aerial roots.

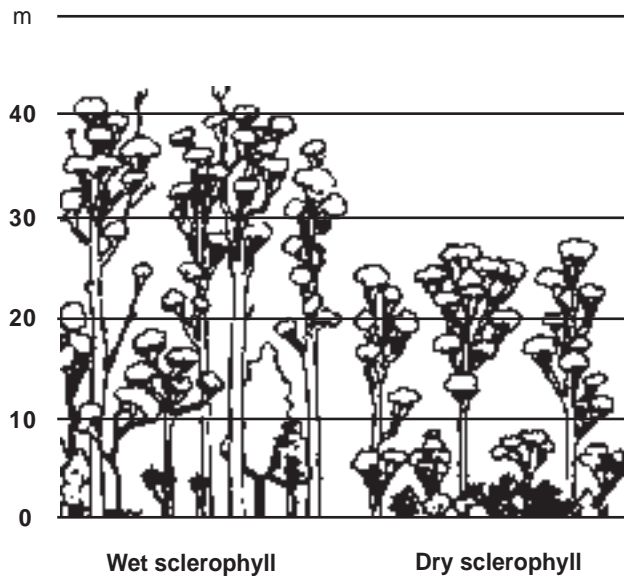
Other plants occur in rainforest. For example, vines are very characteristic. They range from wiry vines and soft little stem creepers in the undergrowth to great lianes (thick climbing vines), some up to 30 cm in diameter, which climb into the tops of the tallest trees, lacing tree crowns together and hanging in great loops back towards the ground. Vines are one of the most widespread groups of plants in the rainforest.

Palms are another typical rainforest plant. Some grow low in the ground, while others are quite tall. Most have large covers of spreading leaves. A few palms do not grow in this way, but are vines that produce valuable cane, for example, rattan and lawyer vine. Other plants also have the single-stemmed appearance of palms in the rainforest. Tree ferns and celery wood (*Polyscias elegans*) are common examples in New South Wales.

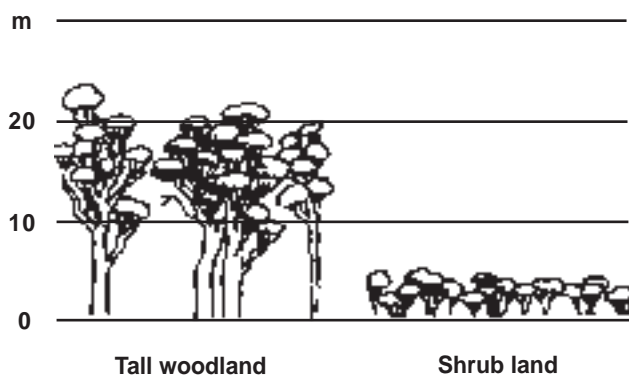
The ground layer of a rainforest is often rather bare of plants, but carries a large amount of leaf and twig litter which is constantly decaying. Ground ferns and fleshy herbs, such as ginger, occur in patches on the rainforest floor. You can also find scatterings of seedlings of the surrounding trees and vines.



Above: Some different forest types - Rainforest



Above: Some different forest types - Sclerophyll



Above: Some different forest types - Woodland

Rainforest climate

Ample moisture is needed for rainforest to occur. Usually this means a fairly evenly distributed rainfall of over 1500 mm a year, through this forest type will grow along rivers and in sheltered gullies where the rainfall is lower.

In the tropics, temperatures are constantly high with a mean of about 27°C. However, rainforest extends into temperate regions where at times snow may fall during the winter.

Rainforest soils

The diversity (large variety of plants) and density (large number of plants in an area) of rainforest suggests that it occurs on very fertile soil, but often this is not so. In tropical and subtropical areas where high rainfall occurs, the soil nutrients are rapidly carried away or leached from the top soil by rainfall. A large proportion of rainforest nutrients are

released gradually into the soil and the plants' roots rapidly absorb the nutrients again and recycle them.

When a tropical or subtropical rainforest is cleared and burnt for crop or pasture development, the crop or pasture will typically grow well for a year or two until the soil nutrients are leached away. However, crops do not store and recycle soil nutrients, making future crop growing very difficult and expensive.

Fire in a rainforest

Fire is not a feature of rainforest. Rainforest is usually severely affected by fire and may even be destroyed by high intensity fire. If destroyed, the lost vegetation will be replaced by a different type of vegetation. In the tropics, the new vegetation is often savanna-dense grass with scattered small, fire resistant trees. In Australia, fire allows a eucalypt forest to invade previous rainforest. With time, and in the absence of further fire, the eucalypt forest will die and revert back to rainforest.

The value of rainforests

Rainforests provide many important products such as:

- food plants, like bananas, passionfruit, cassava (one of the staple foods of the tropics), cocoa and spices
- drugs, such as hyoscine (used against motion sickness) and quinine
- camphor
- various insecticides
- elastic substances, including rubber and chicle (the main ingredient of chewing gum)
- edible oils, particularly the West African palm oil
- resins
- incenses
- fibres and canes, such as kapok, raffia and Malacca cane
- ornamental plants, including many orchids, ferns, palms, indoor plants and flowering trees.

Some of the world's most beautiful and useful timbers come from rainforest trees, like red cedar, mahogany, Pacific maple, Queensland walnut, coachwood, balsa (one of the world's lightest timbers) and *Lignum vitae* (one of the heaviest timbers). The timbers of rainforest trees covers virtually the full range of timber colour, strength and durability.

Rainforest communities are among the most biologically diverse of any in the world, with very large numbers of plant and animal species. Insects and other invertebrate animals are particularly numerous, with many of the species still unknown to science. Some species are dependent on very specialised environments for their existence. For example, one Australian fruit fly lives only on the rotting flowers of a rainforest hibiscus. The diversity of the rainforest is often regarded as its greatest value and conservation of rainforest biodiversity is a very important issue today.

In many rainforest throughout the world, areas have been set aside and managed as National parks or for continued growth and production of timber. In New South Wales, rainforest growing in State forest is preserved and timber harvesting is not permitted.

However, in many parts of the tropics large tracts of rainforest are still being cleared each year to provide agricultural and urban land to support rapidly growing populations. These forest areas are being cleared so the land can be used for purposes seen to be more socially and / or commercially useful. Farming in tropical rainforest areas is based on extensive land clearing and is often based on shifting cultivation, the bush-fallow system or the growth of plantations of long-lived tree crops such as rubber, cocoa or oil palm. Clearing of rainforest is regarded as one of the world's principal environmental problems. This practice is quite distinct from sustainable timber harvesting, which does not result in the clearing of rainforests in New South Wales.

Further reading

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- Dark, J.O. (1986) Trees and shrubs for eastern Australia. New South Wales University Press, Kensington.
- Floyd, A.G. (1989) Rainforest trees of mainland south-eastern Australia. Inkata Press.
- Australian Government, Department Of Agriculture, Fisheries and Forestry.
<http://www.daff.gov.au/>

Further information

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ISSN 1832-6668
Job number 7402

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (April 2008). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up-to-date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

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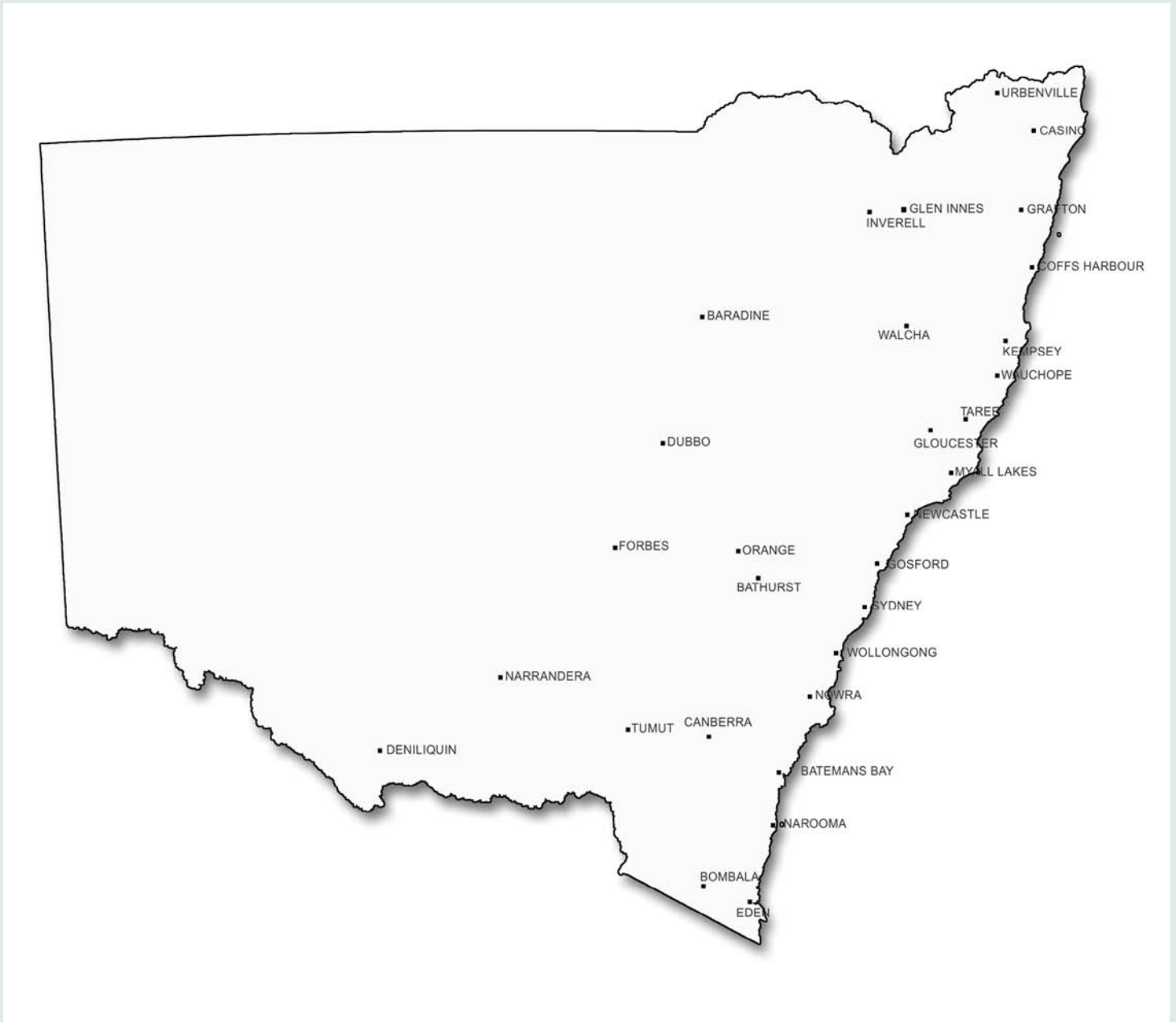
Use Primefact 492 'A closer look at rainforests' to answer the questions below. Questions marked with * require a personal response or further research.

Q1 *Why are rainforests considered a rare forest type in Australia?*

Q2 *Describe the four main types of rainforest in Australia.*

Q3 *Describe the distribution of rainforest types in Australia. **

Q4 *Map the four main areas where rainforest occurs in NSW. **



Q5 *Why are rainforest areas expanding in some locations and why have they been reduced in other locations?*

Q6 Choose one group of plants that grow in a rainforest and explain how they have adapted to grow there.

Q7 Compare the rainforest and sclerophyll forest profile diagrams. Outline some differences between:

(a) A subtropical and warm temperate rainforest

(b) A wet and dry sclerophyll forest

Q8 Rainforests always occur in good soil. True or False? Explain.

Q9 *How does fire affect rainforests?*

Q10 *What products can rainforest trees and plants provide?*

Q11 *Why are rainforests described as biologically diverse?*

Q12 *In NSW, rainforest growing in State forests is preserved and logging not permitted. True or False?*

Q13 *Why are large tracts of rainforest still being cleared in other parts of the world?*

Q14 *Find out the difference between: **

(a) deforestation and forestry

(b) clear felling and selective logging

Write a definition for each term.

Q15 *How are rainforests preserved in NSW?*

Q16 *Complete one or more of the POINTS TO PONDER from the fact sheet.*