

## *Rainforests*

Rainforests are very important to the world as the plants in the forest turn carbon dioxide into clean air, which helps fight pollution. Also, by absorbing carbon dioxide, the rainforests help deter the greenhouse effect. The trees of the rainforest store carbon dioxide in their roots, stems, branches, and leaves. The plants and animals of the rainforest also provide us with food, fuel wood, shelter, jobs, and medicines. In every sense, a standing rainforest supplies more economic wealth than if it were cleared, yet deforestation continues at an alarming rate and many rainforests have been cleared or harshly disturbed by logging and hunting.

Rainforests are comprised of several layers: the emergent layer, the canopy, the understory, and the forest floor. Aboriginal people have used tropical rainforests for food, medicinal purposes and wooden supplies for centuries. More than half of Australia's remaining rainforests are found in the northeast part of Queensland but Tasmania, Victoria, New South Wales, Western Australia, and the Northern Territory all have rainforests.

### *Tropical Rainforests*

While Australia's tropical rainforests make up only 0.1% of the land mass, it is home to 25% of plant genera, 30% of marsupials, 60% of bats, 30% of frogs, 23% of reptiles, 62% of butterflies and 18% of birds.

### *History of the rainforest*

In 1770, when Captain Cook sailed along the Australian coast, 3.6 million hectares of rainforest was growing in Australia. We now have only half of that area remaining today. Before Europeans arrived in Australia, changes in both the arrangement of the world's land masses and climate also caused changes in Australia's rainforest. Clearing for agriculture has been the main cause for the decline in rainforest habitat during the last 200 years. It is now estimated that Australia has lost 75% of its rainforest area since then.

### *Gondwana*

Over 200 million years ago, Australia, Africa, South America, India and Antarctica were one vast continent - Gondwana. Australia and Antarctica broke away from Gondwana about 65 million years ago and then 40 million years ago, they too separated into two continents. Australia moved northwards and the climate became drier, causing changes in both where plants grew in Australia and the type that could continue to grow in a changed climate.

The tropical rainforests we see today have evolved from those which were growing in the Gondwana land area some 60 or even 80 million years ago. There are also some plants that have arrived in Australia in the last 12 million years from over the close land links with South-east Asia.

### *Rainforests and fire*

Many of the plants of the temperate rainforests were widespread on mainland Australia from two to 66 million years ago. As the climate became drier, the frequency of bushfires increased. The rainforests contracted and many species became extinct. Species that survived did so in isolated valleys and mountain tops, ie the Wollomni pine.

With the arrival of Aboriginal people and their use of fire as a method of hunting to clear land to create re-growth of fresh grasses to attract grazing animals, the frequency of bushfires increased and the area covered by rainforests became even smaller. Now we have European land use patterns with widespread clearing for agriculture, further reducing the size of our rainforests.

Uncontrolled fires in Australian rainforests are relatively rare because there is generally no suitable fuel in the understory. However, when the margins of rainforests are exposed regularly to fire in the dry season, the trees and shrubs common on the edges of rainforest are replaced by fire-resistant gum trees and grasses. Fire, therefore, seems to be the main force defining rainforest boundaries.



*This was once a rainforest*

## *Natural disturbances*

Rainforests are subject to a number of natural disturbances which result in various changes to the forest. Some of these changes are rapid, such as recovery from damage caused by a single tree falling. Lightning strikes, landslides resulting from excessive rain and even occasional drought also periodically disturb and damage parts of the forest. Cyclones are an example of a major catastrophic natural event that occurs irregularly and can cause significant change in a rainforest. Cyclone damage is usually restricted to the canopy but it produces a lot of litter and, with dry weather conditions, fires can follow.

## *Human disturbances*

Logging, soil erosion, stream pollution, the location of roads and power lines, fragmentation due to clearing for agriculture, and the introduction of diseases, weeds and feral animals are all disturbances that humans can inflict on rainforests. Some people believe that the disturbances we are responsible for can be controlled so that the result is similar to the effect of cyclones and natural tree fall. Schemes for logging a forest on a 'sustainable' basis are designed to cause disturbance at the same level as one major natural disturbance about every 40 years. Recent research suggests that such regular and intense logging is not suitable and will in time deplete rainforest plant and animal diversity. If logging is allowed on an extensive, ongoing basis, the resulting damage includes removal of seed trees, reduction of food and nesting sites for animals, and damage to the soil surface by road construction and use of heavy machinery, which also increases water run-off and so causes greater soil erosion.



*Clearing of Tasmanian rainforests for plantations*

## *Rainforests coping with disturbances*

We do not know the age of many rainforest trees. Some emergents (the tallest of the rainforest trees) probably flower, and hence produce seeds, for the first time after 50 to 60 years. Some trees probably live for 200 to 500 years. It may take about 800 years for all the richness of a rainforest to form again in a cleared area. This regeneration is only possible if the disturbance is of a type with which the rainforest has evolved strategies to cope.

Predicting how a rainforest reacts to and recovers from disturbance is essential for forest management. However, because change occurs naturally in a rainforest and we can't yet predict the effects of disturbances, we do not have the knowledge at present to ensure that rainforests will be able to regenerate from the combination of natural and human disturbances.

## *Why we should conserve rainforests*

People have different answers to the question of why we should conserve rainforests. To some it is enough that they exist as part of the diversity of our planet and therefore we, as just one species on earth, do not have the right to knowingly destroy any ecosystem. Some people say we need to conserve rainforests because we have not studied them fully and do not understand what is there and how the whole complex system works. If we can strive to understand the complex inter-relationships of rainforests, there is a greater likelihood that we will be able to more wisely manage these and other resources of our planet.

## *Conservation for economic reasons*

Many people believe that the key to conserving any of the planet's resources is to find an economic use for them. Since rainforests have a biological richness that gives them an immeasurable aesthetic value, they have potential use in recreation and tourism as people seek to visit and enjoy such an environment.

The use of rainforests as a tourist attraction, which could form the basis of an industry, is seen as a worthwhile reason by many to fight for rainforest conservation. Some parts of the rainforest also have established and potential economic values. Apart from commodities such as timber, food and drugs already in use, there could be new foods and drugs, and a source of new genes to hybridise with some of our existing highly selected but disease-prone cultivars.



*A major tourist attraction - Skyrail over the rainforest in the Barron Gorge National Park, Cairns*

Conflicts arise when there are differences in opinion about the importance of the different types of 'values' placed on rainforests. Ideally, we should be able to manage the resource properly for as many uses as possible. Such wise management requires more research to gather the necessary information about this complex, interdependent system of plants, animals, soils and climate.

### *Types of rainforests in Australia*

#### *Tropical rainforests*

Tropical rainforests grow in Queensland between the tip of Cape York Peninsula and Ingham, near Townsville. The Australian tropical rainforest ecosystem is one of the most complex on earth. Its plant diversity and structural complexity is unrivalled on the Australian continent and represents the origins of our more familiar 'Australian' flora. Cape York Peninsula contains Australia's largest remaining area of lowland tropical rainforest.



*Fungi*

Tropical rainforests are dense, wet forests, found in high rainfall regions. The high rainfall (at least 3,000 mm or 100 inches annually) and steady warm temperatures produce luxurious forest growth. Tropical rainforests have closed canopies which allow very little sunlight (around 12%) to reach the forest floor. Tropical rainforests play a very important role in our environment as they contain an amazing range of different plants and animals. Each level of the forest from the tops of the trees to the forest floor supports its own flora and fauna and they all work together to maintain the forest. On the forest floor it is very hot, humid and stagnant for there is little circulation of the air. The forest floor is always damp and shady. The lower canopy consists mainly of young trees halted in growth from lack of sunlight. Then there is the main canopy which consists of some fully grown trees and palms. This canopy can be as high as 50 metres or 160 feet tall. Trees and shrubs generally have elongated crowns. Each leaf is set at the best angle to catch as much sunlight as possible.



*Ulysses Butterfly: (Papilio ulysses) has become a symbol of tourism throughout Northern Queensland. It is commonly found from Mackay north, but appears more prevalent in upland rainforest areas*

The Wet Tropics World Heritage Site incorporates 19 national parks, 31 state forests, five timber reserves and one Aboriginal and Islander reserve. The area extends along the north-east coast of Queensland from just south of Cooktown to just north of Townsville. These wet tropical rainforests of north-east Queensland have the richest fauna in Australia. Although the region represents about 0.1% of the land surface of the continent, it contains 30% of marsupial species, 60% of bat species, 18% of bird species, 30% of frog species, 23% of reptile species and 62% of butterfly species in Australia. Some 54 species of vertebrates are unique to the area.



*The Daintree rainforest*

#### *Subtropical rainforests*

Subtropical rainforests are generally found where the rainfall is more than 1,300mm annually and growing in fertile eutrophic parent rocks (basalt and rich shales); you'll most likely find subtropical rainforest favouring sheltered gullies from sea level to about 900 metres.



*Subtropical rainforest, Gold Coast hinterland*

There is normally a well developed multi layered canopy of between 10 and 60 species of trees, many of which will exhibit the buttressing commonly associated with rainforest trees. Strangler species, including the ubiquitous strangler fig, stands of bangalow palms, woody vines and large epiphytes such as orchids, birdsnest, elk and staghorn ferns will be obvious, and the ground cover will consist of ground ferns and large leafed herbs.



*Strangler fig*

Subtropical rainforests stretch from near Mackay in Queensland to below Wollongong in New South Wales, near Sydney.



*Waterfall in sub-tropical rainforest, Lamington National Park*

#### *Warm temperate rainforest*

Found on poorer soils consisting of rocks such as rhyolite, trachyte and slates in the Tweed (Wollumbin) volcano region, and on the more fertile eutrophic rocks in southern cooler regions, a warm temperate rainforest requires rainfall over 1,300mm per year. Distinguished by a two strata layer which creates a more even canopy of trees, only 3 to 15 species will be evident, with stranglers, palms, woody vines and buttressing rare or absent. The tree trunks tend to be slender and uniform in appearance, with distinct circular shaped communities of whitish lichens covering the bark. Tree and ground ferns are frequent, and epiphytes can be common but are not generally abundant in the numbers or species present.



*Epiphytes on ficus watkinsiana*

The commonest trees are species such as coachwood (*Ceratopetalum apetalum*), sassafras (*Doryphora sassafras*) and scentless rosewood (*Synoum glandulosum*).

Warm temperate rainforests grow in parts of Victoria, and in western and north-eastern Tasmania.

#### *Cool temperate rainforest*

The cool temperate rainforest is noted for its commonest and most often only dominant species, the Southern or Antarctic beech (*Nothofagus moorei*), which is testament to Australia's being part of the southern supercontinent, Gondwanaland, more than 130 million years ago.

Found at altitudes of 900 to 1,500 metres, cool temperate rainforests receive between 1,750mm to 3,000mm of rain annually, and are often shrouded in frequent mists when it is not raining.

While they mostly display 2 strata, you will sometimes find just one, with a uniform canopy of just 2 or 3 species. Stranglers and palms are absent, as is plank buttressing, but the tree trunks can be of massive size. Large vines and epiphytes will be rare or absent, although thin wiry vines and a few small ferns and orchids may occur. Ground ferns and tree ferns are very common and mossy epiphytes and lichens are in greatest abundance here.



*Cool temperate forest (Antartic beech)*

#### *Littoral rainforest*

Littoral rainforest is similar to subtropical rainforest, but occurs when it is close to the sea and exposed to salt laden winds. Usually on nutrient enriched deep sands or soils derived from slates and basalts, it's considered more as a distinctive series of communities rather than a subform of rainforest.

Combining the characteristics of both subtropical and dry rainforest types, it is distinguished by the prevailing wind sheared upper tree canopy, with some communities displaying prominent stands of conifers such as hoop pine (*Araucaria cunninghamii*), plum pine (*Podocarpus elatus*), and featuring species such as tuckeroo (*Cupaniopsis anacardioides*).

Three other distinctive rainforest or semi rainforest communities occur in some regions but are not generally recognised as subforms. One of these, palm rainforests, is dominated by bangalow or cabbage palm stands, and is often found in company of melaleuca (Ti Tree) swamp forests.



*A small grove of littoral rainforest in the Towra Point Nature Reserve*

### *Dry rainforest*

Dry rainforest types are distinguished from subtropical rainforest by scattered emergent species such as hoop pine, teak (*Flindersia australis*) and lacebark (*Brachychiton discolor*) trees in the upper canopy and 10 to 30 species in the lower canopy. Buttressing and palms are uncommon or absent.

Very large vines are common, and a prickly shrub layer, with species sporting delightful common names like 'wait-a-while' and 'lawyer' vine, is usually well developed. Ground cover is limited to leaf litter and sometimes a few species of large epiphytes. Dry rainforest is usually found on fertile eutrophic rock soils, and favours sheltered warm areas with rainfall around 600mm to 1,100mm per year, marked by a dry spell.

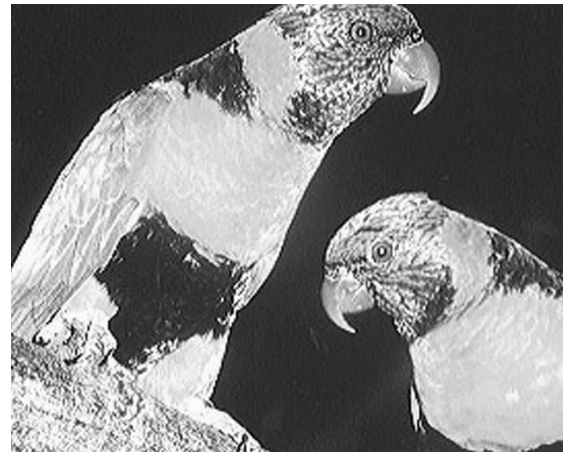


*Dry rainforest in Tasmania*

### *Australia's special conservation responsibilities*

Australia is the only country that has a full suite of rainforests from tropical to temperate; it is also the only country in the western world that has rainforests. As such, Australia has a responsibility to keep its rainforests intact. Australia is sufficiently prosperous to take a long term view and use its forests carefully and sustainably.

Fortunately in Australia our focus is now on conserving our remaining rainforest. Interest is increasing in the reforestation of once-cleared areas, in establishing plantations of valuable timber species, in the restoration of logged or degraded forests, and in management and further research into rainforests.



*Rainbow lorikeet*

Australia's spectacular tropical rainforests are home to primitive plant species, birds and marsupials found nowhere else in the world. Giant strangler figs standing 70 feet tall, crimson and green king parrots, sulphur crested cockatoos, rainbow lorikeets, bandicoots and tree kangaroos are just a few of the species filling these forests with colour and sound.



*Sulphur-crested cockatoo*

The ancient rainforests of northeastern Queensland preserve millions of years of evolutionary history. Much of Queensland was once covered in rainforests, but agriculture, farming, mining and logging have destroyed and disrupted rainforest habitat, with only a narrow belt remaining along the eastern coast. Australia moved to confront these threats faster than most tropical countries, and most of its remaining forests were protected under World Heritage designation in 1988.



*Long-nosed bandicoot (Perameles nasuta)*

This decision was quite controversial as there is a conflict between preservation and the immediate need to use natural resources. Many farmers wish to utilise environmentally sound measures, yet face the possibility of going out of business in the next decade due to economic pressures. If efforts to restore the rainforests of Queensland are to succeed, they must also provide economic benefits for the local community.

Australia remains the last continent to be discovered and is rich in biodiversity. It has so many unique and even unregistered and unnamed biological species that it's just remarkable. And we're out there hunting for them. Like the gold rush of 150 years ago that lured thousands of hopeful treasure seekers, bio-prospectors and global drug giants have staked claims to areas of forest hoping to tap jungles that harbour diverse and unique plant life.

The jungles beckon with the promise of a world-beating find worth a fortune - a cure for cancer, HIV or Alzheimers, or a chemically unique antibiotic to knock out super bugs like Golden Staph which haunt hospitals around the world.

The yield so far from Australia's northern rainforests, mainly in Queensland and Western Australia, is several new compounds for antibiotics, new pesticides which are close to commercial production and a pill that could prevent prostate cancer. Scientists caution that it takes 15 years and a huge investment to bring a new pharmaceutical to market, and only one in 1,000 discoveries make it. Agri-chemicals and dietary products are quicker to market, and even they offer pay-dirt worth hundreds of millions. Bio-prospectors range from scientists with licence claims, through to large numbers of illegal hopefuls.

### Some categories of animals that live in the rainforest are:

Arachnids - they have six legs, simple eyes, and no antennae. Some examples are spiders, mites, ticks, and scorpions.



*The wolf spider (Lycosa sp.), the most commonly sighted spider in the Daintree Rainforest*

Insects - they have hard jointed exoskeletons. The adult body has three parts: the head, thorax, and abdomen.

Amphibians - they are cold blooded and live in warmer parts of continents. They tend to be aquatic and are limited to moist surroundings.

Reptiles - they are cold blooded and limited to temperate and tropical areas. They usually creep or swim, which is similar to amphibians. Reptiles lay large shelled eggs or in some cases give birth to live young.

Birds - they are warm blooded and most species are capable of flying; however some are sedentary and some are flightless. They lay shelled eggs and care for young in a nest.



*Brush turkey (Alectura lathami)*

Mammals - they are warm blooded animals consisting of three main groups: marsupial, monotreme, and placental.



*The echidna is an egg-laying mammal known as a monotreme*



*The platypus*