

Aotearoa New Zealand - *sub antarctica to sub tropical*

The climate of Aotearoa New Zealand ranges from cool temperate in the south to sub-tropical on the northern offshore islands.

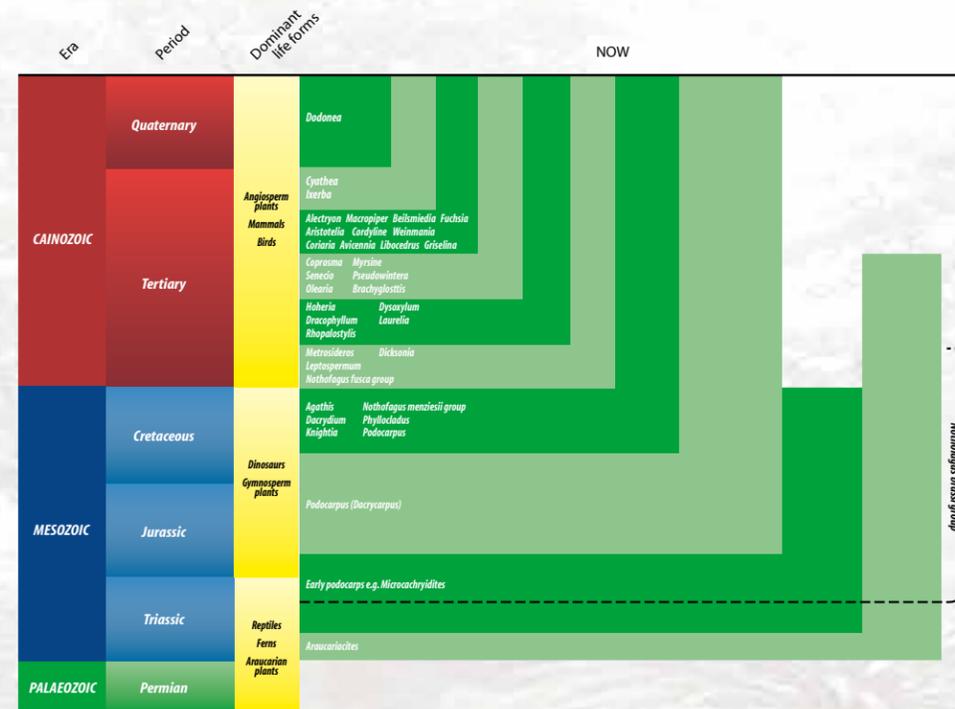
Over time, continental drift and changes in the earth's climate and the land mass exposed above sea level caused some early species to become extinct and allowed the spread of tropical flora into New Zealand from the north.

Forests that evolved from the time of the dinosaurs

The forests of New Zealand fall into two broad types, the conifer hardwood forests dominated mainly by podocarps such as the timber producing species totara, miro [*Prumnopitys ferruginea*] and rimu [*Dacrydium cupressinum*] and the southern beech forests dominated by one or more of the four indigenous species of *Nothofagus*.

The podocarps have an ancestry that goes back into the age of the dinosaurs, being found as fossils from the Jurassic period 190 to 135 million years ago. These conifers are wind pollinated and evolved before the true flowering plants.

The chart shows how far back some of the modern genera of New Zealand trees can be traced.



Maori plant use and botanical names

On their arrival in Aotearoa New Zealand around 800 years ago, the Maori found much of the land was heavily forested. Trees supplied their building and sea craft needs as well as foods, fibres, tools, medicines, and dyes.

The Maori's centuries of inhabitation of Aotearoa New Zealand prior to the arrival of Europeans allowed them to establish which plants were useful to them, and to adopt some as part of their belief structure explaining the world. One group used extensively were the podocarps, a family of conifers with fleshy covered single seeded fruits.

totara [*Podocarpus totara*] timber was prized by the Maori as being the best for building their massive war canoes, and was also the main timber used for carving. The long trunks of mature trees made it possible to build vessels that would carry up to 100 warriors. Maori custom demanded that when a totara tree was felled for timber a young seedling had to be planted

in its place in order to appease Tane, the god of the forest, for removing one of his 'children'.

kahikatea [*Dacrycarpus dacrydoides*] is a tree that grows to 48m tall with long clear trunks when mature. The fleshy part of the bright red fruit was eaten, but to harvest these the tree had to be climbed and the branches scoured. Although the kahikatea crops heavily, the price could be high, as harvesters could lose their grip and sometimes also their lives.

The Maori named trees for different characteristics and uses, so some botanically unrelated plants were grouped under a single descriptive name, such as mingi mingi or miki miki, for berry-bearing shrubs.

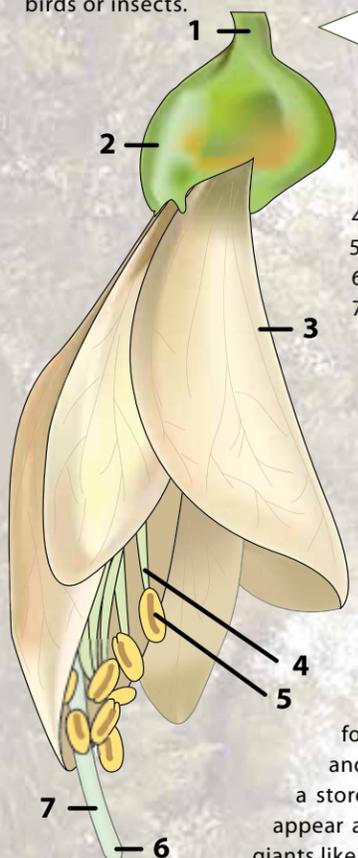
These names remain in use and sometimes have been included in the botanical names.

Specimens of these trees can be seen in the Gondwana and Aotearoa New Zealand collections.

Woody plant reproduction

Flowers contain a tree's sex organs; their main purpose is to secure cross pollination from another tree of the same species, ensuring the strength and continuity of the species.

In nature the conifers and their close relatives are wind pollinated, the flowering plants by birds or insects.



The diagram describes the parts of a flower using Sophora tetraptera, the kowhai, New Zealand's national floral emblem.

1. the pedicel; the stalk of each flower
2. the sepal; together called the calyx
3. the petal; together called the corolla
4. the stamen supports
5. the anther, which produces the pollen
6. the stigma, which receives the pollen
7. the style, which connects to the ovary

The fruit of a tree is formed after the pollen grain has grown down the tube in the style and fertilized the ovule inside the ovary.

After growing to maturity and ripening the ovary becomes the fruit coat and the ovule[s] inside contain the seed[s].

In some fruits the stalk grows around the seed to form a fleshy covering or swells to become a fleshy base as in the podocarps, such as kahikatea or the apple.

Within each seed is a miniature plant awaiting the conditions for growth; moisture or warmth. The embryonic root grows and the shoot appears with one or two leaves, the cotyledons, a store of energy to feed the seedling until the first true leaves appear and photosynthesis grows the tree, some to become forest giants like tane mahuta.

Kauri (*Agathis australis*)

The kauri, today confined to the northern part of the North Island, once grew throughout New Zealand. Its close relatives are found in the tropics today, many on islands to the near north through to Borneo. These trees grow to enormous proportions. Some larger ones were worshipped as gods by the Maori, as evidenced by the specimen known as Tane mahuta.

First used in 1772 by the French explorer du Fresne to replace his ship's mizzen mast and bowsprit, kauri and its close relatives became major timber species wherever they could be accessed. Once employed for virtually everything, kauri became scarce, and the industry declined in the 1920's. Mining kauri gum for varnish, from the enormous buried reserve left from the millions of years that these trees inhabited Northland, began to replace forestry as an economic activity.

Today, plantations of replacement trees are being grown on private land; all the trees on public land are protected. As kauri take over 100 years to mature, these are long term investments.

Occasionally buried logs of these former giants are dug out of the ground where they have lain for thousands of years and are milled.

Tane mahuta (*Agathis australis*) is estimated to be 2000 years old. Maori attributed this tree with painting the sky and earth and bringing light. A small forest grows in the crown. The branches arise from the top in mature *Agathis*

