Lucy Cranwell Lecture 2012

Heartwood – Totara in New Zealand's natural and cultural history

Philip Simpson, Pohara

My title is that of a book on totara that is nearing completion. My talk was an illustrated summary of the book, and the notes below are a summary of my talk.

Naming totara

Totara (*Podocarpus totara*) is named after its sharply tipped leaves. It was a word brought from Polynesia where it referred to the porcupine fish, and it was applied to other New Zealand plants too, such as the moss *Polytrichum juniperina*. Maori would have found masses of totara logs on the beach and would have soon seen living trees growing on the sand-dunes and along the river valleys. They would have immediately discovered the easy-to-split durable timber, red in hue, and would have been in awe of the giant trees unknown in their conifer-free homeland.

The gymnosperms today

Totara is a conifer in the podocarp family. The conifers survive in several ancient families including Araucariaceae, Pinaceae, Cupressaceae, Taxaceae and Sciadopityaceae, the last with only one species. Together the conifers possess over 600 species and are amazingly successful, almost worldwide. Conifers are gymnosperms, naked-seeded plants, which evolved from seed fern allies in the Triassic era, or even earlier, over 200 million years ago. Other gymnosperm groups are the cycads, ginkgo (also with only a single surviving species), and the Gnetum alliance. The cycads have adapted well to the extensive warm dry habitats of the modern world, and have over 200 species. Gnetums include the bizarre *Welwitschia* from SW Africa, an order with only one species. *Gnetum* (30 species) and *Ephedra* (50 species) have adapted well, the first to tropical rain forest where it mimics Angiosperms, and the latter, a scale leaved shrub, to the deserts of the world. As has probably always been the case, some gymnosperms are on the verge of extinction while others are evolving vigorously.

The conifers

The conifers are most pronounced in cool wet environments, represented in high latitudes, like the Boreal forest across North America and Eurasia, and the mountains of both hemispheres. In the tropics they are mostly at high altitude. They are resinous, long-lived trees and shrubs and tend to dominate in stressed habitats where Angiosperms are less adaptable, often in infertile soil. They achieve dominance by their longevity and often large size, notable examples being the redwoods, huon pine, Chilean cedar, and in New Zealand, kauri and the podocarps. Individual trees can be thousands of years old and the trunks several metres in diameter. Whereas Angiosperms generate an ecology of rapid growth, short life cycles and high nutrient turn-over, conifers tend to exclude other species and dominate the land they grow on. An ecological metaphor is that Angiosperms are hares, while conifers are tortoises.

The Podocarps

The podocarps are much more like Angiosperms than typical conifers. They participate in mixed conifer-angiosperm forests, are more shade tolerant than most conifers and most have seeds that attract birds or other fruit-eating animals, and hence can spread widely into openings in the forest. The podocarps are among the oldest living conifers and are also the most diverse, both in structural and ecological terms. While world-wide at times in their history, they are primarily southern hemisphere conifers, but extend to the north in all continents. Several of the rare restricted genera (like *Saxegothaea* and *Microcachrys*) show how fleshiness evolved from more typical cones. Podocarps flourished throughout Gondwana in the lower Tertiary, including Antarctica. Today there are generic centres of diversity in New Zealand, New Caledonia and South America, but the most species-rich areas are tropical Asia and America, dominated by the genus *Podocarpus*, with over 100 species. The southernmost section of the genus is Section *Australis*, named by David de Laubenfels (1985), with seven species, one each in Australia, New Caledonia and South America, and four in New Zealand, including totara. Species in this section are small-leaved trees and shrubs, and with the exception of lowland totara, inhabit cold, dry or wet infertile soil.

Lowland totara ecology

Unlike most podocarps and indeed most conifers, totara grows best in fertile, well-drained soil of alluvial or volcanic origin. It is widespread in New Zealand, but favours warm areas and is largely absent from wet mountains, where Hall's totara (*Podocarpus cunninghamii*) is found. Formerly totara formed pure groves along river flats or mixed forest with other podocarps on pumice soil. It is also scattered with Angiosperms such as tawa (*Beilschmiedia tawa*), and titoki (*Alectryon excelsus*), and in fact is a component of virtually all lowland forest types. Totara is moderately tolerant of cold,

drought and salt, grows rapidly, and has a finely branched canopy that can produce crops of seed in most years. Many insects are adapted to eating its resinous leaves, and the bark and crown offer habitats for a very large range of epiphytes, especially lichens. Its thick stringy red-brown bark is its most distinctive feature and a large tree in the forest is an unforgettable sight (Fig. 1). The red heartwood contains a diterpene called totarol that makes the wood durable and enables the tree to live to 1000 years or more and to attain a very large size. In pre-European times there were many large pure groves of massive trees.

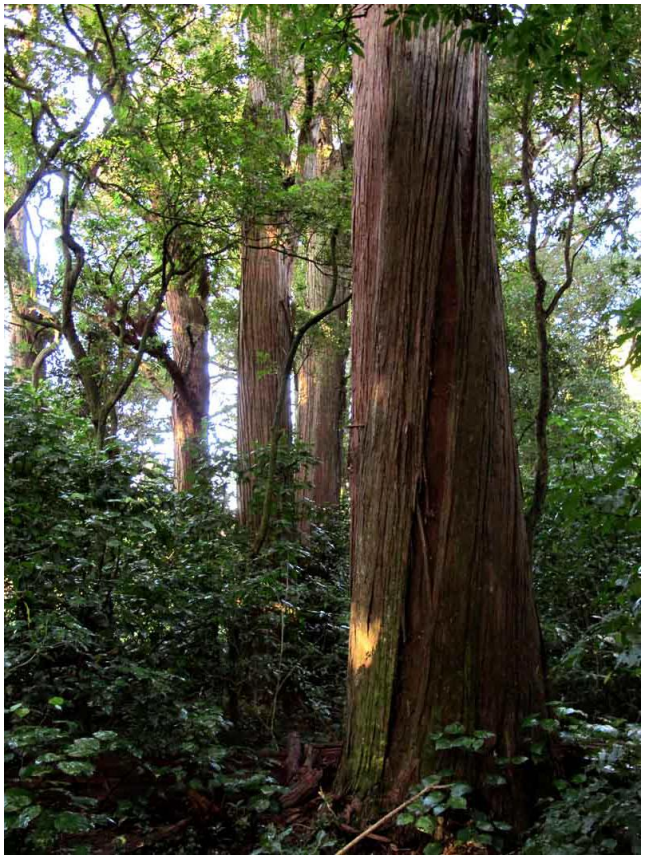

Fig. 1. Railway Reserve, Greytown, one of the rare surviving examples of old-growth totara forest, where one can walk beneath dozens of trees with their uniquely furrowed red-brown bark. Photo: Philip Simpson, 30 June 2012.

Maori values and uses

Maori voted totara their number one tree. The relatively soft durable wood, available almost everywhere in large sizes, suited their need for waka, building materials and artworks based on carving. They loved the red colour of the wood and bark, relating it to chiefliness. They likened totara trees to great people, and carefully guarded trees for future uses. The inner bark was used to make bird-preserving vessels, for cooking, and roofing, and the outer bark was tinder for fire. The wood made household items that needed durability, like food bowls, bird troughs, containers, and genealogy rods, rakauwhakapapa. The adzed panels were intricately carved with symbols that recorded personal and tribal identity. It was the anatomical structure of the wood that facilitated carving, especially the fine, even grain. Maori named totara trees and planted them widely and named places after them. Throughout New Zealand today there are innumerable places that record the importance of totara: hills, streams, and settlement sites, and many proverbs were handed down for use in oratory, referring to great people, losses and virtues. Maori revered totara and, apart from losses caused by fire, especially over much of eastern New Zealand, Maori maintained totara ecology in extremely good shape when the Europeans arrived.

Pakeha values and uses

The Pakeha quickly learned the value of totara timber. It could be split easily into posts and rails for fencing, keeping stock out of the dangerous bush. Pit-sawn planks were used for every aspect of the house, and the froe, a blade with an upright handle, was used to cut shingles for the roof. Our farms and towns were built from totara and during the Government drive to build the nation's infrastructure in 1870, totara was used to make the railways (sleepers, carriages, water tanks and fences), the wharves (piles, because totara is resistant to toredo worm), bridges, and telegraph poles. The settlers' houses were furnished with totara furniture and specialists sought the totara burr to provide a beautiful veneer finish. The boatbuilders created the totara-lined scow for coastal trading, the hull protected from toredo worm. Up to WWI the valley groves were harvested and when the Main Trunk Line was completed so too were the Central North Island totara forests, now available for the boom in State housing. Throughout our history the frenzy for land led to shocking losses from fire, because totara is particularly prone to fire. Today, virtually none of the old growth totara survives.

There are a few notable places where the totara forest can be seen, like Whirinaki, Pureora and Pohangina. But mostly the old growth is reduced to single memorial trees, and when people speak of seeing totara they are mostly referring to secondary-growth trees. Totara is unique in the New Zealand flora for being able to regenerate in farmland and survive grazing and trampling so that beautiful totara treelands now grace many of the former totara forest areas.

Conservation

It was the ongoing loss of old trees that sparked the protest at Pureora in the 1970s. Conservationists were sick of government policy that honoured contracts despite the availability of exotic timber. To make matters worse the New Zealand Forest Service clear-felled native forest to plant pine trees. With kokako as the flagship fauna and totara the flagship flora, protesters climbed the totara of Pureora in 1978 and stopped the logging. Within a few years

the old multi-purpose government administration was gone and a Department of Conservation was formed. And a few years later all government-based logging of native forest was over and a policy of sustainable use was in place for all native forests. Totara had won the day. Totara is protected in National Parks, Scientific Reserves, Conservation Parks, Scenic Reserves and QEII and Nga Whenua Rahui covenants. As yet there is no National Park that specifically protects totara, but the Central North Island forests offer an opportunity.

There is no other tree in either Maori or Pakeha culture that holds the power that totara does. We have great love for kauri and kahikatea, but totara is honoured most deeply. People covet pieces of totara timber: old piles, fence posts, recycled cladding, old logs from previous clearances or unearthed from riverbeds and swamps. The totarol is extracted for cosmetic antibacterial creams. There is a move to refine its growth characteristics so that totara may be available as a sustained crop, perhaps the only native tree with this capacity.

Maori and Pakeha cultures were shaped by totara. It was used up and ultimately wasted. It sparked protest and ultimately it was totara that ushered New Zealand into the green world it professes to uphold. We need to revere the giant survivors and cherish the totara landscapes that have grown despite us all. It is the great tree of New Zealand and indeed one of the few great trees of the world.

Reference

de Laubenfels, D.J. 1985: A taxonomic revision of the genus *Podocarpus*. *Blumea* 30: 251-278.

Auckland Botanical Society's 75th (Diamond) Jubilee 27 October 2012

Ewen Cameron and Leslie Haines

Fig. 1. Mike Wilcox addressing the Symposium audience. Photo: Philip Moll, 27 Oct 2012.

On 3 October 1987 the Auckland Botanical Society (ABS) celebrated its 50th Jubilee with a one-day symposium (see *ABS Journal* 43: 1-33, 1988), and associated displays at the University of Auckland followed by a dinner in Old Government House. The present committee decided to do something similar for the 75th Jubilee, at the Unitec campus at Mt Albert on 27 October 2012. The lecture programme attracted 90 people, and the dinner 75.

Fig. 2. Participants of the 75th Jubilee, Unitec grounds. Photo: Philip Moll, 27 Oct 2012.