

Introduction

Rarely do we acknowledge the 'evolutionary significance' of our trees. So I want to take you on an historic journey.

We start our journey not far along the broadwalk beside Lake Barrine on the Atherton Tableland in north Queensland, and stand beside the twin bull kauri trees (*Agathis microstachya*) which are 800 years old, 45 metres in height, and more than 6 metres in girth.

The evolutionary significance of these twin bull kauri trees – shown opposite and on the right – is that they represent 220 million years of evolutionary history for the Araucariaceae family – they are the one millionth plus generation of their species growing in this lush tropical rainforest. They have survived every catastrophe that nature and civilisation has thrown at them – so far. There is literally no other place on this planet where you can experience such a continuous record of their presence – or any other species of tree for that matter.

Of equal significance are the 600 hardwood species growing beside them – species which made their first appearance around 135 million years ago. Then there are the 400 species growing in the rainforest margins, including eucalypts which evolved 35 million years ago, and acacias which evolved 25 million years ago. This scenario is unprecedented anywhere in the world.

Australia's tropical rainforests are a 'cradle of biodiversity'. Their evolution rates are higher, and their extinction rates lower, than that of the temperate rainforests of the world – thus their survival is vital to our future. The Australian rainforests are the plant kingdom's equivalent of the Rift Valley in Africa to the mammals of this world.

As significant as the Araucariaceae family are, however, they are not the most ancient of the Australian rainforest conifers. That prize goes to the Podocarpaceae family – as you will come to appreciate further on in our historical journey – representatives of which have had a continuous presence in our rainforests for over 240 million years – about the same time it has taken the spiral arm of the Milky Way galaxy, on which earth and our solar system sits, to complete one revolution.

There are a number of reasons why these species have survived. The first is because Australian rainforests have been free of glaciation for 300 million years. The second is down to a 'quirk of nature'. The eastern rim of the Australian continent has benefited from the warmth and moisture delivered from the Pacific Ocean. This climatic benefit has been enhanced by the progressive elevation of the east coast as the Australian tectonic plate has jacked itself up on the Pacific plate. This has maintained the higher and better distributed rainfall on the east coast.

While rainforests cover only 2% of the earth's surface they contain 50% of the wood producing species on earth. Australian rainforests therefore extend our constructs of 'greatness' in the natural world because they also contain the most beautiful of the Australian woods.

Rainforests are home to a staggering level of biodiversity by world standards. Australia has about 5300 native wood



Robin Lake beside the bull kauri twins at Lake Barrine on the Atherton Tableland.

producing tree species, of which approximately 1200 are found in the rainforests. By comparison, the United Kingdom has 47 indigenous tree species. Western Europe, north of the Pyrenees and the Alps, contain 67 indigenous tree species. Add to this the fact that the Australian rainforests contain representatives of 12 of the world's 19 living primitive plants, plus 65% of our ferns and 30% of our orchids, and their greatness becomes real.

Our rainforests are therefore of world significance – little wonder they now command World Heritage listing. However, very little attention is paid to them, and simply locking them up, throwing away the keys, and doing nothing to unravel our understanding of the complexity of their ecosystems is not going to ensure their future on this planet.

Believe it or not, these rainforest species once covered 60% of Australia. Today, however, they are found in isolated locations, covering only 0.12% of the continent. They are found mostly in small, isolated pockets, with some larger, interspaced locations stretching from the temperate rainforests on the west coast of Tasmania, through to the subtropical rainforests of the east coast and into the tropical rainforests of north Queensland.

Fossil remains of these ancient species date back well before the time of the dinosaurs. The fossil records for conifers in Tasmania are unmatched in the world and provide ample evidence that the current southern hemisphere species are indeed remnants of the world's ancient plant flora, from a time when all the present continents were one.

The gymnosperms

Where did they evolve from and what were the environmental factors that led to their being present in our rainforests today?