# Australia and New Zealand Forest Histories

## Short Overviews
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# Contents

# Preface

One of the principal ways in which the Australian Forest History Society pursues its aim of advancing historical understanding of human interactions with Australian forests is through the dissemination of scholarly research, studies and information on Australian forest history by publications. Until now the Society's publications have comprised our regular newsletter, and the much more substantial proceedings of our national conferences.

*Australia and New Zealand Forest Histories*, a new 'occasional' series of which this is the first edition, has been added to the Society's publication repertoire to enable the dissemination of more substantial works of historical scholarship than are appropriate for the newsletter, but independently of the conference series. It is intended that further editions of *Australia and New Zealand Forest Histories* will be produced whenever the need or opportunity arises—that is, occasionally. The series title reflects the geographical extension of the society's activities which has happily occurred in recent years with the increasing participation of forest historians from across the Tasman Sea.

The current edition, entitled 'Short Overviews', is a collection of papers on several important aspects of Australian forest history. They were originally prepared for a special Australian edition of *News of Forest History*, the publication of the Forest History Research Group of the International Union of Forest Research Organizations (IUFRO). That publication was circulated internationally to members of the Research Group prior to the IUFRO World Congress held in Brisbane in August 2005, with the intention of providing delegates with a concise and informative introduction to the history of Australia's forests. With the kind permission of IUFRO, and believing the papers to have wider relevance, the Australian Forest History Society has republished these papers as the first edition of *Australia and New Zealand Forest Histories*.

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President, AFHS

# Historical biogeography of Australian forests

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*Key words:* biogeography, Gondwanaland, evolution, Eucalyptus, Acacia, Casuarinaccae, conifers, mangroves, *Melaleuca*, rainforests, open-forests, soil nutrients

## Introduction

Forests cover only a small proportion of the Australian landscape. The present-day vegetation has evolved from the tropical to temperate rainforest vegetation (and associated wetlands) that grew on the nutrient-poor lateritic soils of the super-continent, Gondwanaland, which existed until the late-Cretaceous to early Tertiary periods, around 100 million years ago. When the Australian Tectonic Plate separated from Antarctica, the climate of southern Australia became cooler as the circum-global current developed in the expanding Southern Ocean. The centre of the continent became progressively drier, imposing seasonal water stress on the Gondwanan rainforest vegetation. Many species of *Eucalyptus,* and the phyllodinous *Acacia*, as distinct from the leafy species predominant in Africa, among others, evolved to occupy the phosphorus-deficient soils of the arid to humid climatic zones in tropical, subtropical and temperate Australia.

Although the dense rainforest and open eucalypt forest/woodland vegetation in the moister part of Australia had long been recognised and differentiated by the Indigenous people, and later by European settlers, it was not until the ecologist Ludwig Diels visited at the beginning of the 20th Century that Australia's forests were formally described (Diels 1906). Diels recognised *tropische Regenwald* (tropical rainforest), *subtropische Regenwald* (subtropical rainforest), *antarktische Regenwald* (cool temperate *Nothofagus* rainforest), *sklerophyllen-Wald* (sclerophyll forest), and *savannen-Wald* (savanna forest). The adjectives *sklerophyllen* and *savannen* described the main characteristic of the understorey strata (sclerophyll-heathy and savanna-grassy) of the eucalypt forest/woodland that flourished respectively on nutrient-poor and medium-nutrient soils in south-west Western Australia, South Australia, central New South Wales and south-east Queensland. Victorian foresters unfortunately believed that the adjective *sklerophyllen* referred to the sclerophyllous leaves of eucalypts, not to the heathy understorey, and proposed the terms 'dry sclerophyll forest' and 'wet sclerophyll forest' to distinguish the eucalypt forests of the drier climates from the tall eucalypt forests that flourished at the edge of the rainforests (Patton 1930). The use of this ill-defined descriptor for our eucalypt forests persists today.

A structural classification of forests based on Foliage Projective Cover and height of the overstorey has been widely adopted in Australia (Specht 1972). Rather than sketching the projection of the foliage canopy of each open-structured eucalypt tree, a precise measure of the foliage cover of the whole forest is obtained using vertical cross-wire sighting tubes. Forests with greater than 70% cover are termed 'closed-forests', between 70% and 30% are 'open-forests', and less than 30% are 'woodlands'. Those woodlands with a grassy understorey are commonly termed 'savanna'. The foliage cover of the overstorey of a mature forest is primarily governed by the evaporative conditions of the environment in which it is found. Stand height is divided into >30m ('tall'), 10-30m, and 10m ('low') and is correlated with the annual production of vertical foliage shoots per hectare which is itself correlated with actual water and nutrient supply. These environmental factors give rise to the present-day distribution of forest and woodland vegetation in Australia. Rainforests

and tall open-forests intermingle along the east coast in higher rainfall areas, with tall open-forests also occurring in south-west Western Australia (Figure 1). The height and density of the forests decline with increasing dryness of the atmosphere, characteristically with distance inland.

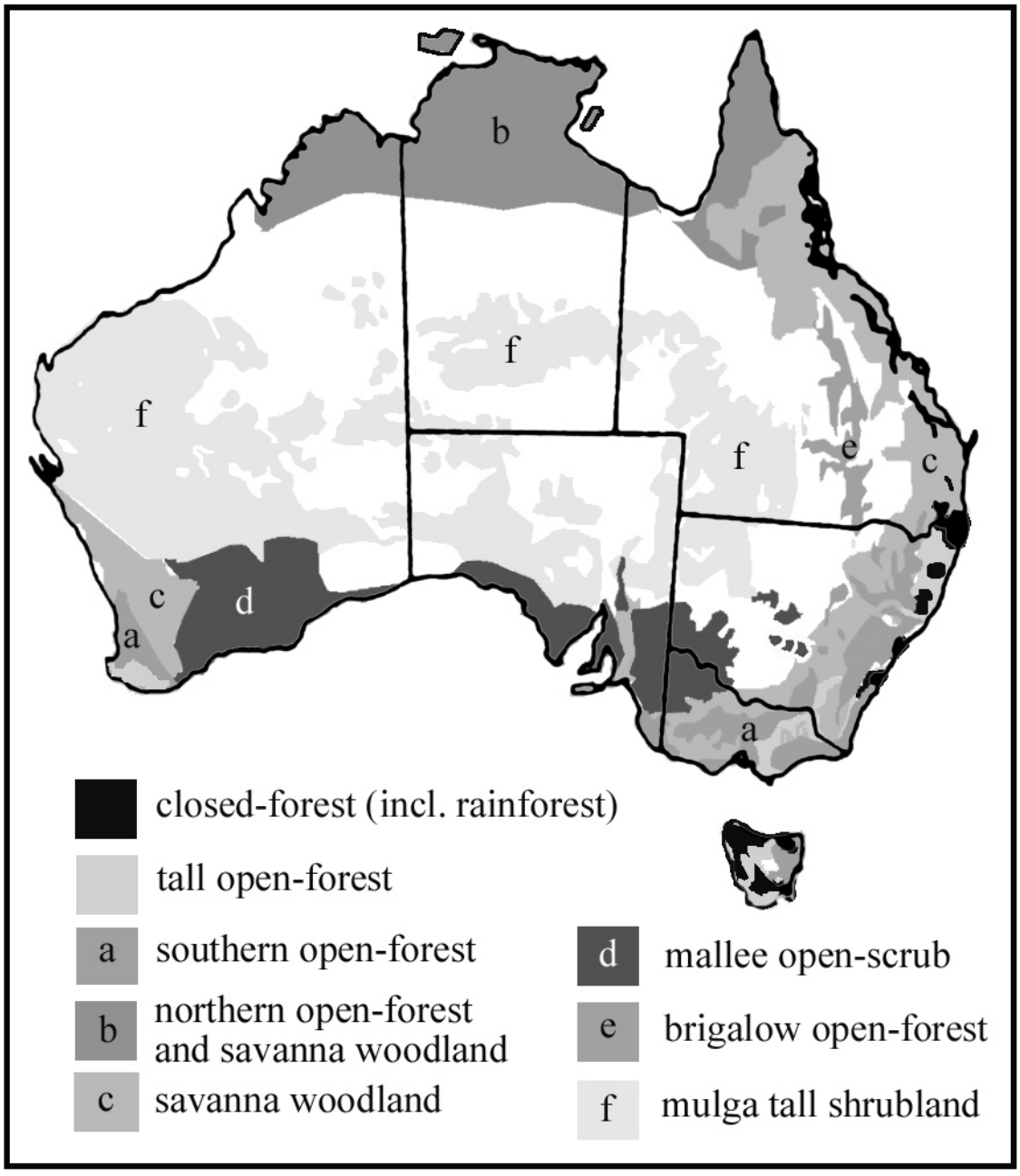


Figure 1: The distribution of major forest and woodland formations in Australia classified primarily according to Specht (1972). Mallee vegetation (mostly dominated by *Eucalyptus*) is so named for the multi-stemmed nature of the woody dominant. With the exception of rainforest, the majority of forest dominants are of the genus *Eucalyptus*. *Acacia harpophylla* dominates the brigalow open-forest, and *A. aneura* in the mulga. Adapted from Specht and Specht (2002).

## Gondwanan biogeography

One of the most important influences on the nature of the Australian flora is its origin, more than 100 million years ago, on the super-continent of Gondwanaland (Figure 2). Gondwanaland comprised proto-Australia, South America, Africa, the Indian sub-continent, and Antarctica (Veevers 2004). Australia then shared with the other proto-continents the major orders and families of flowering plants that had evolved on the nutrient-poor, lateritic soils of Gondwanaland, namely: the cool temperate *Nothofagus* rainforests; the tropical rainforests, including gymnosperms recorded as fossil woods from the Triassic period over 200 million years ago; at least five Gondwanan *Acacia* species; many related genera of Myrtaceae, Proteaceae and Restionaceae; and many tropical grasses, including the widespread *Themeda triandra*.

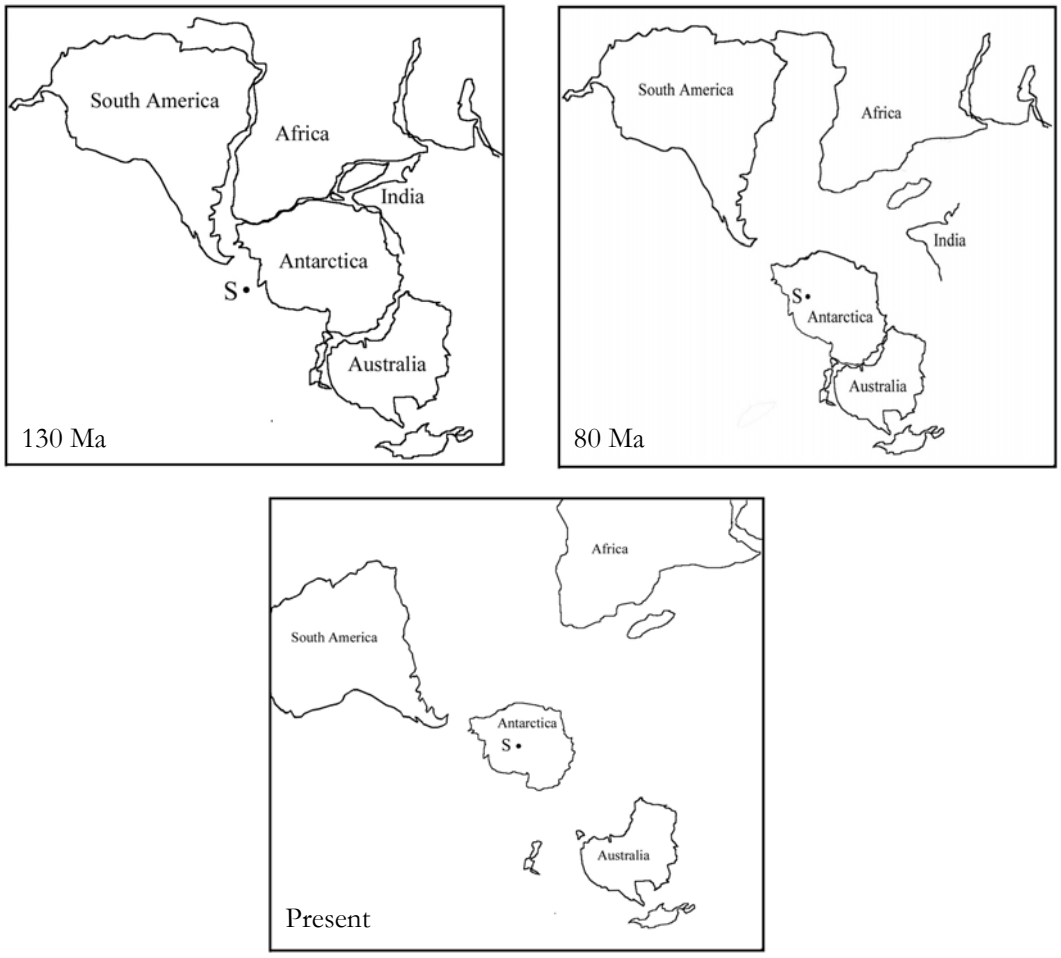


Figure 2: The break-up of Gondwanaland, the southern hemisphere super-continent formed by the union of proto-Australia, Antarctica, South America, Africa and India and associated islands (e.g. New Guinea, New Zealand and Madagascar). Separation started around 100 million years ago (Ma) and by 80Ma only Australia and Antarctica were still connected. Adapted from Smith and Briden (1977).

Joseph Hooker (1860) in his introductory essay to the *Flora Tasmaniae* considered that the flora of Australia comprised three elements: (1) the Antarctic cool temperate flora that was represented by the southern beech, *Nothofagus*, found in south-eastern Australia and New Zealand, and Chile, and later found also in New Caledonia and New Guinea; (2) the genera that had evolved in Australia; and (3) some 500 woody species in 273 genera (especially located on sandstone outcrops) that occurred in western Bengal to central India and also in northern Australia. This last group was believed to be continuous from Australia to India via Indonesia and Malaya and was termed the

Indo-Malayan element in the Australian flora. Critical research some one-hundred years later, however, indicated that about 26% of the species in the open-structured vegetation common on the lateritic earths and sandstones in monsoonal Australia and the Indian Peninsula had not been recorded in the intervening islands of Indonesia or in Malaya. These biogeographical regions of Australia and India had been separated since the break-up of Gondwanaland, so this vegetation, together with the tropical and subtropical rainforest, must be regarded as Gondwanan, not Indo-Malayan.

## The evolution of species of *Eucalyptus* (Myrtaceae)

By 80 million years ago, the major tectonic plates of South America, Africa, India and Antarctica-Australasia had separated (Figure 2). The climate of southern Australia, when it still adjoined Antarctica, was subtropical, while that of the north was even warmer. In response to the expansion of the sea floor, separation of Australia and Antarctica started around 125 million years ago, initially very slowly, speeding up to 60-70mm per year by 55 million years ago and was complete by 40 million years ago. Australia moved northward relative to the South Pole, eventually colliding with the Sundaland Micro-Plate (Indonesia, Philippines, Malaysia, southern Thailand) about 15 million years ago. Wetland forest trees such as *Melaleuca* species and mangroves soon invaded the islands of Sundaland. *Casuarina equisetifolia*, growing on the strand-line, colonised coastal dunes to the north. Wind-dispersed plants such as *Rhododendron* subgenus *Vireya*, and *Gaultheria* were blown northward from highland New Guinea. Seeds of *Eucalyptus deglupta*, not wind-dispersed, were somehow transported from highland New Guinea across Melanesia to Ceram, Sulawesi, and Mindanao in the southern Philippines.

As the Australasian Plate drifted northwards and the circum-global current developed in the Southern Ocean, the subtropical southern part of the continent became cooler. The northern part of the continent became warmer, with a monsoonal, wet-dry climate, as it gradually approached the equator. The centre of the continent, which had a humid to partly humid climate during the Early Tertiary period, 70 million years ago, became increasingly dry.

As the climate became drier, the extensive temperate to tropical rainforest floras were restricted to the most humid climates of eastern Australia and to soils that are optimally wet during every month of the year. The genus *Eucalyptus* (Myrtaceae) appears to have evolved in the Early Tertiary period across the southern part of the continent, the earliest pollen appearing about 34 million years ago, and extending from New Zealand in the east and to the Ninety-East Ridge in the west. Some of the fossil pollen grains of the Early Tertiary resemble those of *E. spathulata* (in the subgenus *Symphyomyrtus*), now a stunted mallee species growing in south-west Western Australia. Fossil leaf impressions indicate that tropical *Corymbia* (bloodwoods and spotted gums), until recently considered a subgenus of *Eucalyptus,* evolved at the periphery of the rainforests, even as far south as Tasmania (Ladiges *et al.* 2003).

Species of *Eucalyptus* and their allies evolved to occupy virtually all habitats not occupied by the remaining rainforest, and scattered eucalypts occupy even the most arid landscapes of Australia. In the Middle Tertiary, the low-lying landscapes of southern Australia were submerged by the ocean, thus isolating the continuous Early Tertiary flora into western, central, and eastern floras. Multi-stemmed mallee species of eucalypts occupied the soils that developed on the deep limestone deposits. The pattern of mallee distribution was further influenced by the calcareous loess (and cyclic salt) from the sea-bed that was exposed when sea-level fell during the Quaternary Ice Ages.

A suite of eucalypt species, including many bloodwoods in the genus *Corymbia*, is extensive across the monsoonal north of Australia; some of these species (with a summer foliage growth rhythm) extend southward into subtropical Queensland in eastern Australia. These tropical eucalypts overlap with a southern suite of eucalypt species that have today a spring foliage growth rhythm in subtropical Queensland. As the continent drifted northwards, this subtropical suite of eucalypts survived in cooler southern Australia with a shift in its foliage growth rhythm from spring into summer, the driest season of the year. The same summer foliage growth rhythm is also found

in the eucalypts of south-west Western Australia where the subtropical parents to the north have not survived the aridity.

## The evolution of other tree species in Australia

### *Acacia species (Mimosaceae)*

Many phyllodinous species of *Acacia* are now widespread in Australia: blackwood (*Acacia melanoxylon*) in moist rainforest from Tasmania to northern Queensland; shrubby *Acacia* species in the understorey of eucalypt forests from northern to southern Australia; dominant in subtropical brigalow (*A. harpophylla*) and gidgee (*A. cambagei*) communities in central Queensland; dominant in mulga (*A. aneura*) tall shrublands across the arid centre of the continent (Figure 1). These Australian species appear to have been derived from the thorny African-Indian species of *Acacia* subgenus *Acacia,* several of which still survive in northern Australia.

### *Casuarinaceae*

Tree species of the Australian family Casuarinaceae also extend through the eucalypt forests of the humid zone (*Allocasuarina littoralis, A. verticillata, Casuarina cunninghamiana, C. glauca*) into the subhumid zone (*Allocasuarina luehmannii*) and arid zone (*Casuarina cristata*), and even into the centre of the continent *(Allocasuarina decaisneana*). The coastal *Casuarina equisetifolia* has colonised shorelines from south-east Asia to Polynesia.

### *Conifers*

There are few conifers in Australia, these being confined to three families, the Podocarpaceae (two genera and six species), the Araucariaceae (three genera and six species), and the Cupressaceae (four genera and seventeen species). Several northern-hemisphere pines have been introduced since European settlement.

The Araucariaceae developed in the Triassic period, over 200 million years ago, and were present in both hemispheres by the Jurassic and early Cretaceous periods, 100 million years ago. On the break-up of Gondwanaland, their range on the remaining continents was greatly reduced to the rainforest areas, while they flourished on Asian-Pacific islands, such as New Caledonia where the greatest diversity of this genus exists today (thirteen species of *Araucaria* on New Caledonia compared with the two in Australia, and five of *Agathis* compared with two in Australia; Enright and Hill 1995). The two extant species of *Araucaria* in Australia are *A. cunninghamii* and *A. bidwillii*. *Agathis microstachya* and *A. atropurpurea* are found in the tropical north of the continent, while *A. robusta* extends into south-east Queensland. *Araucaria cunninghamii* has been an important timber species historically, and is one of the few non-eucalypt species grown commercially in plantations in Australia today. The third Australian genus has only one species, the Wollemi pine, *Wollemia nobilis*, which is one of the world's rarest trees, occurring only in two populations close to Sydney.

The termite-resistant native pines (*Callitris* spp: Cupressaceae) are related to the African genera, *Widdringtonia* and *Tetraclinis*. Tree species of this genus now thrive in pure stands over much of the eastern half of Australia: *C. intratropica* (monsoonal northern Australia); *C. columellaris* (humid, coastal islands of south-eastern Queensland); *C. endlicheri* (humid, western highlands of New South Wales); and *C. glaucophylla* (subhumid zone from southern Queensland to South Australia).

### *Mangrove vegetation*

Mangroves are especially valuable timbers in coastal wetlands of New Guinea and Indonesia. The north-eastern corner of the Australasian Tectonic Plate (including New Guinea) appears to be the centre of speciation of mangroves, whence the genera *Avicennia, Bruguiera, Ceriops, Rhizophora, Sonneratia* and *Xylocarpus* have spread around the world (Saenger 2002).

### *Melaleuca* species (Myrtaceae)

Tree species of *Melaleuca* (paperbarks) are found in seasonally waterlogged woodlands and forests in the high rainfall regions of Australia; the genus extends northward through New Guinea into south-east Asia. *M. rhaphiophylla* grows with *Eucalyptus rudis* in wetlands of south-west Western Australia. In South Australia, stunted trees of *M. halmaturorum* are confined to brackish wetlands; wetland forests of *M. quinquenervia* extend from central New South Wales into south-eastern Queensland, from where tropical wetland paperbarks *M. leucadendra* and *M. viridiflora* continue northward along eastern Queensland into the monsoonal north of the continent. *M. cajuputi* extends from northern Australia through Indonesia to south-east Asia and India (Ladiges *et al.* 2003).

## The effect of soil nutrient status on our Gondwanan inheritance

Conditions in Gondwanaland produced soils whose quality greatly affected the development of Australian vegetation. The tropical climate induced extreme leaching and clay degradation in soils; a wet season followed by a drier season induced fluctuating anaerobic and aerobic conditions that led to the precipitation of oxides of iron, aluminium and silica at the junction of the A and B horizons. Widespread lateritic (iron rich), bauxitic (aluminium rich) and silcrete (silicon rich) soils, containing a high percentage of the clay mineral kaolinite that 'fixes' phosphates (and molybdates) within its clay lattice, covered the peneplain surface of Gondwanaland. Lateritic podsols extremely rich in kaolinite occur in western Victoria, in the Fleurieu Peninsula and Kangaroo Island of South Australia, and in south-west Western Australia. They 'fix' applied phosphatic fertiliser very firmly, a problem in the fertilization of pine plantations established on those sites.

Mountain-building after the break-up of Gondwanaland induced erosion in the lateritised, peneplain landscape. The clay mineral kaolinite that dominated the Gondwanan lateritic soil profile was redistributed amongst the Tertiary soils that developed in the dissected landscape; all of the major soil groups found in Australia today contain a high percentage of kaolinite throughout their profiles. Even the soils that have developed on the Tertiary basaltic outflows that erupted periodically when eastern Australia drifted northward over a 'hot spot' have been degraded to kaolinite in the deep red loam soils, many of which now support rainforest communities. It is only on the soils that are derived from the Recent basaltic outflows (those from volcanic activity which occurred less than 10,000 years ago) in which the clay minerals have not yet been degraded to kaolinite, that fertility is high.

Foliar nutrient analyses of overstorey trees indicate that four distinct plant nutrient groups can be defined: (1) on very nutrient-poor soils extremely low in available phosphate; (2) on nutrient-poor soils with a sclerophyllous understorey of heathy species; (3) on medium-nutrient soils with a savanna understorey of grasses and herbs; (4) on nutrient-rich soils, often cracking clays, which inhibit the establishment of seedlings of overstorey trees, allowing the grasses to flourish.

Australian forests, both closed-forests (rainforests) and open-forests dominated by eucalypt species, evolved on the infertile soils that formed on the super-continent of Gondwanaland more than 100 million years ago. The potential for growth of forests on these ancient soils and their derivatives is thus markedly reduced. Fast-growing, tall eucalypt species such as *E. globulus*, found at the edges of rainforests, rely on the input of nutrients released from the soil after fire. In particular, these species appear to require nitrate rather than ammonium ions as their nitrogen source. Plantations of introduced *Pinus* species such as *P. radiata*, grown on soils unsuitable for agriculture, need the addition of superphosphate (and sometimes trace elements such as zinc) for their establishment. Phosphate pollution, from urban and rural land-use, has a gradually detrimental effect on the survival of the long-lived species that are the dominants of much of Australia's native vegetation.

The forests of Australia today reflect the environmental changes that have occurred throughout time: in climate, geology, and geographic position. Although the link between climate and forest types was well understood by the start of the 20th century, it was not until the 1940s that the full limitations of the soil on forest distribution began to be appreciated. Understanding the complex historical biogeography of Australia has greatly advanced since the 1960s when the discovery of

sea-floor spreading and the development of the theory of plate tectonics confirmed the older idea of continental drift. It is clear that understanding the ancient origins of Australia's forests is important in the current endeavours to manage them sustainably.

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Tree ferns by the Huon River, Southern Tasmania
Photo: Montgomerie

# Indigenous Australians and forests

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*Key words:* archeology, ecology, Sunda, fire, paradigms, ownership, settlers, colonisation, traditional ecological knowledge, logging, employment, environmentalists, Mabo, cross-cultural partnerships

## Introduction

Indigenous associations with forests are situated in the past and in the present. Future associations will occur in a world dominated by non-Indigenous systems but they must still be cognisant of the enduring influence of pre-European traditions. Because the temporal scale is some 50,000 years a cross-disciplinary approach is required to examine the scales and complexities of the role of forests, forestry and forest based industries in shaping the Indigenous past and its future. Current political agendas in Indigenous affairs in Australia aim to reduce dependency on government welfare by developing strategies to encourage a greater involvement in forest-based industries. This is a good case study for exploring how traditional and historical factors are informing the decisions of Indigenous peoples as they realign themselves to meet the challenges of the future.

## Early forest use

Contemporary images of traditional Aboriginality tend to depict life in the desert or on the coast, not in the forest. Because there was no traditional 'pan-Aboriginal' culture, indeed the society was characterised by its great diversity in language and localised customs, it is inappropriate to make generalisations about the role of forests and woodlands in traditional society. Nevertheless, evidence from the past does not lend support to images of either predominantly coastal or desert dwellers. Archaeological research, historical records and museum collections demonstrate that the flora and fauna of forests and woodlands has featured strongly in diet and material culture throughout the long pre-European history of the first Australians. Those familiar icons of Aboriginal culture; bark canoes, spears, boomerangs, didgeridoos and shields, just to name a few, are all manufactured from the products of the forest. Forest animals were food for all but desert dwellers and some, such as possums, provided skins for warm cloaks worn by Aboriginal people in the colder southern climes. Understorey forest plants were reliable foods, usually collected by women; their tubers were roasted, berries eaten raw and seeds ground into a paste. Plants also provided raw materials for weaving baskets, pigments for art, and were a source of many medicines.

Forests were part of the landscape created by the ancestral beings of the Dreamtime that connects the past with the present and continues to give spiritual meaning to Indigenous people. For example, Nyungar people living in the forests of south-west Western Australia had dreaming stories for specific forest products, such as the fungus dreaming and the macrozamia (a cycad) dreaming. Individuals linked to particular dreamings were responsible to protect their species and could not eat them. Rituals ensured the well-being of the species and imparted a religious dimension to sustainable use of resources. The main trees of the southwest forests, the karri (*Eucalyptus diversicolor*) and the jarrah (*E. marginata*) were part of women's dreamings, implying that women played a significant role in forest management through ritual activity, although this is not apparent elsewhere in Australia. Forests and the landforms comprising the Bunya Mountains were

(and still are) sacred to the Indigenous people of southeast Queensland. The bunya pine (*Araucaria bidwillii*) and its bountiful harvest once supported large inter-tribal gatherings from late January to March when the highly nutritious nuts were ripe. Such gatherings and the food that supported them were an essential part of traditional systems of trade and exchange of goods, marriage and ceremonial activity.

Forest resources were plentiful and diverse, but the people needed intimate biological knowledge and great skill to use them, because mistakes could be fatal. Many plants, such as the macrozamias and particularly rainforest plants, were highly toxic and required weeks of leaching in water before they could be eaten. Men had to know the wood properties of a tree used for manufacturing a bark canoe to ensure that it would not become waterlogged. Hunting possums demanded skill in tree climbing and knowledge of the habits and ecology of the target species, and there are numerous other examples of what is now called traditional ecological knowledge. This was at the core of the socio-cultural systems passed through the generations by stories, songs and ceremonies.

The narrative of Aboriginal forest history challenges the myth of Indigenous people as only desert or coastal dwellers. But, like all narratives of Aboriginal history, it is constantly being contested and rewritten. Most of the information comes from archaeological research, oral history and extrapolation from ethnographic and ethnohistoric records. The theoretical contexts in which the information is combined, analysed and presented have their own epistemologies that maintain scientific rigour and credibility, but once in the public arena, reconstruction of the past invariably takes on a political and social agenda. Aboriginal associations with forests have been at the core of fierce debates in Australia over the last decade or so in relation to the impact of traditional burning regimes on the structure and floristic composition of forests. This debate has used not only the conventional techniques of archaeology, and palaeoecology, but also artists' impressions of the landscape in the late 18th and early 19th centuries, and historical records of early settlers.

## The first foresters

It is likely that the first Australians were already familiar with at least some of the forest ecosystems they encountered before they set out (either accidentally or deliberately), from the ancient continent of Sunda (South East Asia and Indonesia) some 50,000 years ago. Seafaring adventurers seemingly took advantage of low sea levels during a Pleistocene glacial cycle to island-hop between stretches of water in some sort of watercraft. Current archaeological and palaeoecological evidence indicates that on landing on the Sahul northwestern coast of the greater Australian landmass (now New Guinea), they experienced a climate and vegetation not vastly different from whence they had come. Northern tropical rainforests merged southward into monsoonal eucalypt woodland that provided a suite of resources and raw materials quite familiar to the Sunda ex-patriots and assisted them adapt to a new land.

Some theories favour a coastal model of colonisation, while others suggest that the distribution of forests and woodlands and their associated fauna was a key determining factor. Aborigines had spread across most of Australia by 25,000 years ago and had adapted to all but the most arid environments. Successful survival and population expansion was achieved through developing intimate relationships with the land and its resources through socio-economic systems that we now know to be unique and enduring. Their adaptive ability was not only critical across space; massive climate changes from around 25,000 years ago brought cold, dry conditions that shrank forests and expanded the shrubby grasslands, supporting browsing and grazing fauna. Forests expanded again under the warmer and wetter conditions from around 10,000 years ago with concomitant socio-economic changes that favoured exploitation of forest ecosystems. A spectacular example of human response to changing forest patterns comes from Kutikina cave in remote south western Tasmania. First occupied around 20,000 years ago, the dense archaeological deposits indicated targeted hunting of red-necked wallabies, a species of grasslands and plains. About 14,500 years ago the site was abandoned, presumably in response to rainforest expansion and the arrival of a new suite of unfamiliar resources.

Major changes occurred around 6,000 years ago when the sea stabilised at its current level, with many more archaeological sites occurring along coastlines and the appearance of new stone tool technologies. Postulated population increases have been linked to intensification of plant use, especially cycads, in the wet tropical rainforests. Rising sea levels and population increases may have led to movement inland and an increase in the use and occupation of forests, although this has yet to be fully tested.

The presence of many sites, although often just small scatters of stone artefacts of unknown age show that all of Australia's forest ecosystems have been used by Indigenous people. The extent to which they were inhabited rather than just utilised for resources varies across the continent and remains a question for archaeologists and anthropologists. In northern Australia, the tropical rainforests were inhabited by people so morphologically and culturally distinctive that it was once thought they represented a separate race, called the 'rainforest people'. By contrast, cryptic archaeological evidence of an Aboriginal forest history in the tall open forests of near coastal regions was interpreted originally as representing a mere extension of the littoral economy into the coastal lowland, although more recent research has demonstrated a greater focus on hinterland resources.

## Fire

Not surprisingly, a hunter-gatherer society in tune with nature did not leave an obvious impact on the natural environment in the same way as slash and burn agriculturalists or industrialised societies have. The rich archaeological and ethnographic record includes evidence for many exploitative activities, but quarrying rock, gathering shellfish, and hunting game does not suggest any long-term environmental impacts. This view changed when well-known archaeologist, the late Rhys Jones opined in 1969 that all of Australia's forests were a product of Aboriginal burning practices through 'fire stick farming'(Jones 1969). Although there was limited archaeological or paleoenvironmental evidence to give this claim scientific credibility and it rested mainly on a few observations of 'smokes' in the records of early explorers, the theory was captivating. Subsequent research by archaeologists and biogeographers has produced fairly unequivocal evidence that the burning practices of Aboriginal people have had an impact on the species composition and structure of some forest types in some locations in Australia especially over the last 10,000 years. The highly polarized nature of the extensive literature on the subject shows that the jury is still out on the extent to which Aboriginal people changed forest ecosystems through burning. Traditional knowledge about firing the vegetation is still extant amongst many Indigenous people in northern Australia and is being integrated with scientific principles in land management programmes. The situation is somewhat different in southern Australia where Indigenous people's knowledge is fragmented and they feel uneasy about the reliability of their memories, disconnected from the past by a history of violent dispossession. Although Indigenous people agree that fire was used for a wide range of economic and social reasons in traditional times, their views on the role of fire in contemporary land management are just as diverse and influenced by contemporary issues as those of the wider community.

## Forest paradigms

Paradigms of the relationship between Aboriginal people and forests have changed over time but have always been socially and politically constructed. The white settlers' early paradigm considered hunter-gatherers to be passive recipients of nature's bounty who eked out a miserable existence in a savage and uncivilised manner with no notion of land ownership. This suited them as they claimed the land for the British Crown and assumed that the Aborigines would eventually die out or become assimilated into white society. Disease, guns and dispossession assisted them, but somehow the Aborigines survived, although they lost most of their forest estate to colonial expansion. Interestingly, the parallel conservation and timber industry histories enabled some forests to remain uncleared or to be only selectively logged, although for very different reasons. To many Aboriginal communities, these islands of naturally vegetated land within a landscape transformed by colonial

history are places where spiritual connections can be renewed and traditional activities can be remembered and practiced. But today forests are valued by many people for many reasons in very different paradigms that involve 'fighting over the scraps of what was once a holistic indigenous landscape' (Bauman in Howitt 2004:9).

The 1960s heralded sweeping changes in attitudes to Aborigines. A constitutional amendment referendum in 1967, supported by over 90 per cent of Australians, opened the way for Aborigines to be included in the census. In 1972, a Labor government replaced the policy of assimilation into mainstream society with one of self-determination. The 1960s also saw the beginning of a land rights movement and gave a glimpse of just how important reconnection with the land was going to be in addressing the wrong doings of the past. By the late 1970s, archaeological research at Lake Mungo in western New South Wales had turned up cultural deposits radiocarbon dated at 30,000 years BP, giving Aboriginal occupation of the continent a respectable antiquity even by world standards. Reconstruction of past lifestyles drawn from the careful observations of near-traditional life by people such as Donald Thomson in Arnhem Land (Thomson 1983) and interpretation of evidence from an increasing number of archaeological sites were instrumental in bringing about major paradigm shifts. They were fuelled by the human rights movement and a growing awareness of Indigenous cosmologies, especially by alternative lifestylers (hippies). This paradigm hinted of the 'noble savage' who was a consummate land manager, completely in harmony with the environment. They used resources in an entirely sustainable way based on a unique knowledge of the natural environment implemented through complex cultural and religious systems.

This somewhat romantic ideal has since been modified, although it is still held by some deep ecologists and very green conservationists who advocate that implementing traditional ecological knowledge held by Indigenous people is the only solution for a sustainable future. However, this does not acknowledge that although hunter-gatherers had impacts orders of magnitude less than all other socio-economic systems, their primary goal was still one of procurement of resources and not of conservation. An uncritical acceptance of Indigenous cosmologies does not recognise that much knowledge has been lost over the last two hundred years and that Indigenous knowledge systems are constantly incorporating new information as part of a dynamic process.

While it is true that colonial history in settler societies is about what Debbie Bird Rose calls a dual war—against nature and the natives—movements for social justice and environmental conservation seemed to have run parallel rather than be integrated. An incident in a New South Wales south coast forest brought them together and eventually created a powerful force in the struggle for Indigenous social justice and self-determination. With the passage of the 1967 referendum and removal of white managers from Aboriginal reserves, strong Aboriginal leaders began to emerge on the south coast. Through the NSW Aboriginal Land and Rights Council and then the NSW Aboriginal Land Council, they agitated for local Aboriginal communities to have title to the old reserves. A Select Committee on Aborigines was established in 1978 and it chose the Aboriginal reserve at Wallaga Lake near Narooma for its first public hearing. Elders, Guboo Ted Thomas and Percy Mumbler, used this opportunity to express their objections to the NSW Forestry Commission's proposal to log Mumbulla Mountain or Biamanga, a mountain of immense spiritual significance to the Yuin people of the far south coast (Chittick and Fox 1997). Thomas took the battle to the NSW Premier who listened but wanted archaeological and anthropological investigations to corroborate Yuin assertions of sacredness. In a landmark victory, 7500 hectares of state forest and adjacent crown land was subsequently legally protected under the *National Parks and Wildlife Act 1974* as an Aboriginal Place. This was the first time that white settlers had legally acknowledged a contemporary spiritual connection to the tall open forests in Australia. Today, Biamanga and another sacred mountain, Gulaga (Mount Dromedary), not far north of Biamanga are protected within national parks that have been handed back to their traditional owners.

Aboriginal people were not drawn into the conflicts and debates over management of public forests in the 1980s, aside from voicing concerns about impacts of forestry operations on cultural sites. Green groups that claimed that they had the same world view were unsuccessful in forming alliances with Indigenous people. In New South Wales and Victoria at least, Aboriginal reluctance

to protest against logging operations was because of a loyalty towards the forestry industry. Although the written history is sparse, the oral history is rich about employment of Indigenous people in the sawmills and forests in the mid-20th century. Oral history researchers working for the Australian Heritage Commission in the isolated rural area of East Gippsland in Victoria in 1993 noted that:;

> …references to itinerant work mention Aborigines cutting timber for firewood, fence posts and ring barking for clearing land. The majority of present day Gippsland people know of family members who have worked in timber mills. In the early days, Aboriginal families would camp in the bush while the men worked at cutting wood in isolated areas (Goulding 1993: 13).

Similarly in NSW numerous oral history references to employment in the industry add weight to a comment by an Aboriginal elder from the south coast that, 'one of our biggest employers for work though was the sawmills' (Waters 2004:79). Charcoal burning and wattle bark stripping were some other forest industries that employed Indigenous people in Victoria.

The historical association between Aborigines and forests was recognised by the NSW Government in 1970 when a new Aboriginal reserve was gazetted at Kiah near Eden on the far south coast. The idea of the reserve was to provide temporary accommodation to encourage Aboriginal people to work in the new chip mill constructed nearby. The Government funded training programmes to equip men to be self-employed in the timber industry as fallers and pulp woodcutters. Although this innovative scheme foundered, some of the men later found permanent employment elsewhere in the timber industry. Aborigines have been involved in clearing forests for agriculture in Western Australia and Queensland, but more oral history research is needed in other States to determine the role of forestry in post-contact Indigenous history and conversely, the contribution that Indigenous forest-based labour has made to rural economies. There are no reliable figures to determine the level of Indigenous employment in forest based industries during the 1980s but it is likely to have been low and confined to individuals and the occasional Commonwealth government funded programme. Reduced employment levels could be due to a general downturn in the forest sector, but new requirements for formal education would have been a real barrier for Indigenous people.

## Forests post-Mabo

In 1992 the High Court ruled in *Mabo v Queensland* (Mabo (No.2)) that the pre-existing rights of Indigenous Australians in respect of land and waters may survive under the common law as native title. This was the long-awaited legal recognition that the Australian continent was first inhabited by Indigenous people with a valid system of land ownership governed by laws and customs that had not been extinguished by claiming the land for the British Crown in 1788. Northern Territory elder Galarrwuy Yunupingu aptly summed up the attitude of the white invaders:

> we learned about the strangers' laws because they, with very few exceptions, refused to learn about our laws. We learned that their law told them a story called *terra nullius,* which meant that if you go to a land where the people don't look like you or live like you, then you can pretend they don't exist and take their land (Indigenous Law Resources website 1998).

The ruling proclaimed that native title could potentially exist on all land still in public ownership, although later tweaking by the conservative government reduced its power over pastoral leases. The person who prompted this momentous legal landmark was Eddie Mabo, an elder of the Torres Strait Islands who was concerned about losing access to his traditional fishing grounds. This quietly spoken, modest man did not live long enough to reap the benefit, but he left a legacy for all Indigenous Australians. The court ruling and the subsequent *Native Title Act (Clth) 1993* affected much more than fishing grounds and has changed irrecoverably the way Australia's legal system must accommodate Indigenous land rights.

Indigenous organisations currently own, directly or indirectly, about 20 per cent of Australia's land. While some ownership has been achieved through the native title process, state based land rights legislation has also been significant, particularly in the Northern Territory where Aboriginal

people now own almost 50 per cent of the land. Before someone can be recognised as a valid native titleholder, they have to demonstrate unbroken familial ties and traditional knowledge of an area. In one of the great ironies of history many Aboriginal groups in southern Australia, who have arguably been the most dispossessed by British settlement are unable to meet the native title criteria. A recent, unsuccessful claim by the Yorta Yorta people over the red gum forests of the Murray in south-eastern Australia is a sad reminder of historical legacies. Despite submissions to the native title tribunal from Yorta Yorta elders that clearly demonstrated the depth of their spiritual attachment to the forests and knowledge of its processes it was decreed that native title had been extinguished.

The struggle for social justice and self-determination for Indigenous people through recognition of their prior ownership will operate through very different mechanisms in northern and southern Australia. Approximately 13 per cent of forests and woodlands occur on land owned by Indigenous organisations (although in some States, the trees and forest products remain the property of the Crown) but are confined largely to Queensland and the Northern Territory. There, Indigenous communities who own forests are finally empowered to choose the best forest management option for them. In some cases they prefer to conserve the traditional landscape, while in other cases their overwhelming priority is to look for financial benefits that can pay for housing and health. Most would like a mixture of customary and economic activities where the former, such as knowledge of bush foods, can be used to derive economic benefit through sustainable activities, such as eco-tourism. This is the preferred option of a small community on western Cape York Peninsula where small-scale mobile sawmills provide employment and an economic base for the community, while the forest provides food and raw material for domestic use and increasingly, for the tourist market. By contrast the Tiwi people of the remote Melville and Bathurst Islands north of Darwin, entered into a business arrangement with a large company to cultivate a fast growing species of *Acacia*. The company rents the land to grow *A. mangium* plantations that will yield woodchips after eight years. Training and employment programmes in plantation management are anticipated to provide long term benefits to the Tiwi community and to this end the partnership won the Northern Territory 2004 Prime Minister's Award for Excellence in Community Business Partnerships. But clear felling the native forests for the new plantations concerns some Tiwi Islanders and conservation groups. It demonstrates Indigenous pragmatism in the face of extreme economic marginalisation in contrast to the conventional understanding of 'Indigenous caring for country'.

There are very few Indigenous owned forests in most of southern Australia. However, Indigenous rights and interests may still be extant over forests owned by state agencies, either in timber production forests or in conservation reserves. This puts Indigenous communities in a strong position to negotiate with government agencies about participating in management and planning for the forest estate. Government agencies have responded in the post-Mabo era by entering into joint management arrangements for national parks, involving employment, training and special rights for indigenous owners for hunting and gathering on the parks. State forestry agencies have improved their consultation processes and are employing Indigenous cultural heritage officers. In some places, Indigenous organisations have negotiated access rights for cultural activities and have contracts for firewood collecting and other cottage type industries. In this current era of multi-use forest management, there are also opportunities for Indigenous people to run bush tucker tours and other activities utilising customary knowledge of forests.

Land ownership presents opportunities for other types of forestry. As the Tiwi example has shown, where rainfall and soils are appropriate, an expanding plantation industry has an eye on Indigenous owned land. If mechanisms for cross-cultural partnership can be established that recognise the aspirations of the other then there is potential for forestry to assist addressing social and economic disadvantage. The challenge for corporations, driven by profit, is to understand that Indigenous concepts of business are not always about financial gain; there are social and family obligations that must be met, sometimes at the expense of delivering a product. At the same time Indigenous business people must appreciate the priorities of their partners.

## Bearings of the past on an Indigenous forestry future

The question arises whether the forestry industry can assist marginalised and disadvantaged Indigenous Australians to achieve economic independence and improve social conditions especially in remote areas. The Commonwealth Government has recently completed a National Indigenous Forestry Strategy to assist this process. If this strategy is to succeed it must pay attention to what Aboriginal people are saying at the local level, where the influence of history on current views and attitudes towards forests and forest industries can be most clearly seen. A study by Scott Cane into Aboriginal attitudes towards forests was commissioned by the Resource Assessment Commission in 1990 as part of its Forest and Timber Inquiry. This well executed consultation process revealed information that is important for placing forests and forestry in broader contexts for delivering both social justice and sustainable land management. First and foremost, Aboriginal people see forests as part of land, once owned and managed entirely by Aboriginal people and stolen from them by the British. They want to participate in management of forests, because on the whole they believe that they are better land managers than white people. Forests also contain evidence of an ancient culture, providing a tangible link with the past. Aboriginal people want control over protection of their cultural heritage and want access to forests for hunting and gathering and other activities critical to self-determination and cultural revival. The capacity to derive economic benefit was seen as a right, preferably incorporating customary knowledge and traditions. Economic development that allowed for cultural traditions to be respected and utilised was a strong theme in subsequent consultations and will be the major challenge for Indigenous forest policy development.

The presence of the Indigenous voice in discourses about forestry has broadened the debate to consider justice, history and rights in addition to those of forest ecologies and sustainability (Howitt 2004). Substantial changes are needed in the industry to meet this challenge, including knowledge of history and how it influences the aspirations of contemporary Indigenous society, as individuals, communities and nations.

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Eucalypt forest in the Connondale Range, Queensland, 20 years after logging
Photo: T. Johnston

# Milling Australia's forests

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*Key words:* pioneer sawmills, transport, water, rail, road, technology, sawmilling, logging, social history, heritage

## Introduction

When the First Fleet arrived in Australia in January 1788, Aboriginal people were using wood and bark for spears and digging implements, carrying water, constructing canoes, providing shelter, and for the indispensable fire which enabled food to be cooked and provided warmth at night. Sawpits were constructed at Botany Bay on 21 January and, when the site of the settlement was shifted to Sydney Cove, orders were given to dig fresh pits on 26 January. On the following day, a box of splitting wedges and a dozen cross-cut saws were unloaded. The timber industry in Australia could be said to begin on this date when the first timber sawn in the newly established Colony of New South Wales was produced manually over sawpits using convict power. Timber was the most important building material available and Australia's foundations could be said to have been constructed largely in indigenous timber. Sawing timber was such slow, hard manual labour that splitting and hewing probably produced the bulk of the timber used. Timber sawing continued on a 'subsistence' level for decades. The only method of transporting logs or sawn timber was the power of muscle – either convict or bullock and later horse. This was insufficient to overcome the long distances and difficult terrain of the new Colony. The water power that had pioneered world sawmilling in Europe and the American colonies was in short supply in Australia, and could be used only on parts of the east coast of the mainland and in Tasmania. It was within these constraints that the first sawmills struggled to make their presence felt.

## The pioneer sawmills and water transport

Powered sawmills were established in Tasmania in 1825, Western Australia in 1833, NSW in 1838, Victoria in 1841, South Australia in 1848, and Queensland in 1853. The Northern Territory had little commercial timber and a low population compared with the other States, and forest industry was less of a priority. Many of the very early sawmills were associated with grain mills, working on each raw material on a seasonal basis. Timber being cleared from land intended for agriculture provided a convenient synergy where both occurred close to a waterway. Water transport was essential in those early years. In Tasmania, the Derwent estuary carried timber from sawing stations farther afield to the main settlement of Hobart. In Victoria, a coastal trade developed in the 1850s supplying Melbourne with stringybark and mountain ash timber from sawmills at Apollo Bay and Wilsons Promontory. In NSW, the extensive waterways of Sydney Harbour supplied the means to transport timber to the growing city until sawmilling moved north and south along the coast. Rivers were used where navigable to bring out the valuable red cedar of the Richmond and Clarence Rivers, but the coastal trade remained the most important form of water transport. In Queensland, the Brisbane River was use to transport hoop pine logs to the sawpits and sawmills of the young settlement prior to dispatching sawn timber to Sydney. As sawmilling moved south from Perth to the valuable forests of jarrah and karri in the south-west, coastal shipping brought timber north

from Bunbury, Hamelin Bay and Flinders Bay. Before long, this WA coastal trade had expanded into one rare in Australia where the durable hardwoods were exported directly overseas.

## The Bureaucrat's domain

In the early years of Australian sawmilling, control of the forest resource was very much in the hands of the sawmillers. So long as the annual site licences and jinker licences were paid, there was little supervision. Much timber was simply wasted. Only the best trees were taken, and there was no follow-up silvicultural treatment to ensure regeneration. Land selection policies discouraged the retention of timber and, with no way to get it to market, millions of hectares of timber were simply ringbarked and burnt by settlers Australia-wide. Ironically, some of these areas are now being replanted with the realisation that timber was the crop best suited to the land after all.

This situation persisted throughout much of the nineteenth century. It was only during the 1890s that it was realised that some form of control had to be implemented if Australia was to become self-sufficient in timber. Individual States struggled with this problem until a string of quasi-independent forest conservancy bureaucracies were established: in South Australia (where the shortage of timber was most desperate) in 1875; in Victoria and Queensland in 1907, in NSW in 1909, in Western Australia in 1919, in Tasmania in 1921, with a national body founded in 1927. The 'Imperial model' of Forestry was imported from Europe via India, and it was within this framework of increasing official control that Australian sawmilling and timber transport developed.

## Rail transport and the Australian timber industry

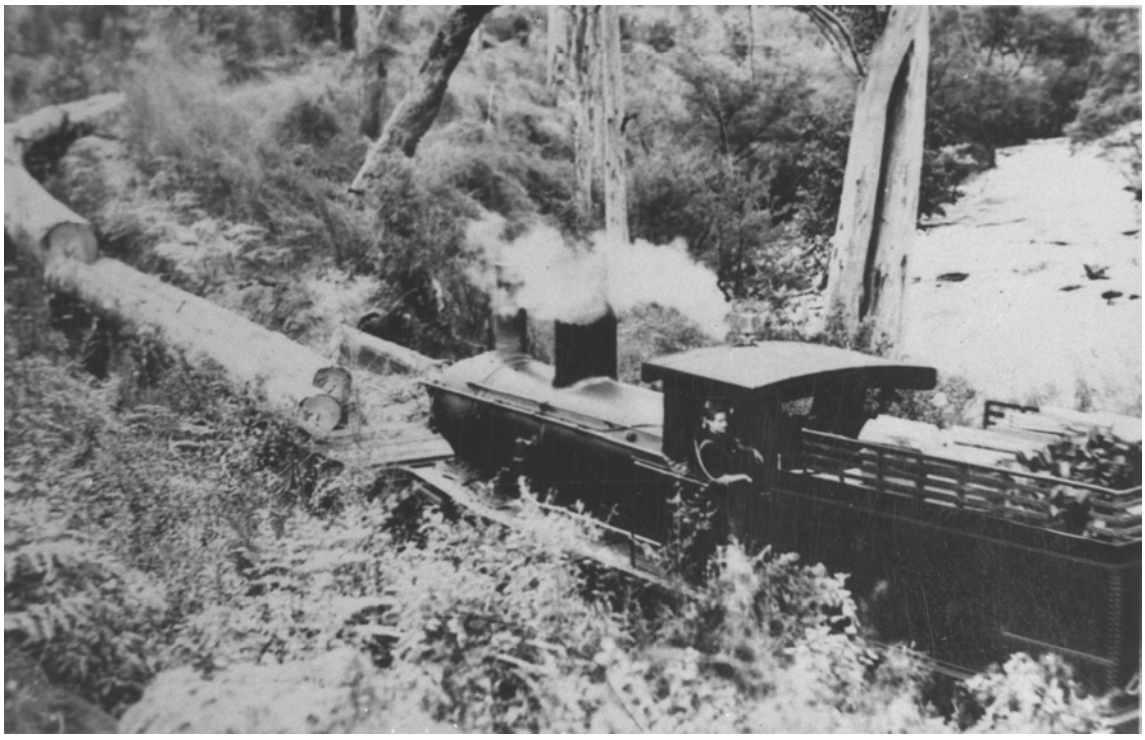
The first steam railway in Australia, opened in Melbourne in 1854, heralded an Australian revolution in timber transport and enabled the fledgling sawmilling industry to move inland away from the coast. Whilst some water transport remained important into the twentieth century, local timber transport by water had its last gasp in coastal NSW and the Red Gum trade on the Murray River. The railway enabled regional sawmillers to become more independent of seasonal conditions, since timber could be sent away at almost any time of the year. At the same time that the first railways were being built, gold rushes, especially in Victoria, provided an important new market for almost every type of timber. By the end of the first golden decade, the population of Victoria had grown from less than one hundred thousand to in excess of half a million. The boost given to Victoria's finances allowed money to be raised for new railways heading north-west from the capital towards the Central Goldfields. At the same time, the first experiments were being carried out with linking sawmills with railheads by the construction of timber tramways.

Australian timber tramway technology borrowed from European and American traditions but on a smaller scale more suited to the timber resources of Australia. Tramways were used most intensively in Tasmania, Victoria and Western Australia and, to a lesser extent, in NSW and Queensland. In Victoria, the first tramways dated from the mid-1850s and were concentrated around the central goldfields, supplying sawn timber, pit-props and firewood to the mines. A variety of track-laying methods were used, with 'principal and stringer' dominating in the 1860s and 1870s. Sawn wooden rails were laid over the decked principal and stringer foundation, sometimes capped with iron plates where sharp curves or heavy traffic contributed to significant wear. Haulage was exclusively by horse and bullock power until the introduction of the first steam tramway locomotives: in Queensland in 1870, in Western Australia in 1871, and in Victoria in 1873. All three were Australian-built. Others followed, mostly imported standard-design narrow-gauge industrial locomotives with rod drive running on iron rails. In the Victorian bush, the principal and stringer tramway was extinct by the twentieth century, having been replaced by a foundation of split timber packing laid transversely with sawn wooden rails running longitudinally. Most log trams were operated with horses. The grade was usually in favour of the load, allowing logs to be delivered to the mill by gravity controlled by a brakeman, with the empty trucks being returned to the bush by horse teams.

Few Australian timber tramways developed to the extent demonstrated by the American model from which they were largely drawn. However, each major timber-producing State had its

exception: in Tasmania, the Huon Timber Company; in Victoria, the Victorian Hardwood Company; in NSW, the British-Australian Timber Company; in Queensland, Lahey's at Canungra; and in Western Australia, the powerful combine created by the amalgamation of eight sawmilling firms that formed Millars Karri & Jarrah Company. All of these companies approached the American scale in terms of locomotive numbers, track length and standard of construction. The long-term timber leases offered by the WA Government in contrast to the short-term licences generally available almost everywhere else encouraged investment in infrastructure. As a result, tramways were of the same gauge as the WA government railways and used similar locomotives, mostly of conventional drive and wheel arrangement, and the WA tramway system most closely approached American practice.

A number of American steam-powered geared locomotives were imported into Australia—at least sixteen of the 'Shay' type and fourteen of the 'Climax' type hauled timber on Australian tramways, with a number of geared locomotives also built locally locally. Local production of steam-powered tramway locomotives seems to have been concentrated in Tasmania, where a large number of geared and chain-driven types were manufactured, some from former steam road vehicles. Some were built by local engineering firms, others by the sawmillers themselves. In Victoria, locomotive production was, apart from two geared steam locomotives, largely limited to internal-combustion engined rail tractors. The first of these was introduced at Warburton in 1911. In the 1920s, the rugged and widely available Fordson tractor power plant formed the basis of a large number of rail tractors produced by the Melbourne firms of Malcolm Moore and Day's Engineering. These were widely used on the east coast for timber transport from the late 1920s until the late 1940s, by which time the timber tramway was largely displaced by road transport.



Above: A log train on the 1067mm gauge Goodwood Company's line west of Noojee in Victoria. This is typical of the larger-scale timber tramway systems in Australia, and was based on West Australian practice.

Photo: Rex Jones, author's collection.

## Road transport

Following the First World War, road transport found increasing favour with sawmillers. While timber from small sawmills had always been dispatched on rough, rutted roads behind bullock teams and steam traction engines, it was the internal-combustion engine that wrought a revolution in timber transport. The timber industry's move away from tramway and railway and towards road transport would have been impossible had it not been for the development of the crawler tractor, which not only revolutionised the logging industry, but made possible for the first time the economic production of side cuts for gently graded forest roads. The smaller sawmillers were the first to embrace road transport, followed by those cut off from a railhead. The larger and well-established sawmillers already had a significant investment in tramways terminating at railway stations and were loath to see this investment wasted. For forest managers, there were certain advantages both for the management of the forest and sawmill operations in the use of road transport. Roads enabled fast and easy access for supervision and fire-fighting, and provided ready extraction routes for forest produce. The easier access also tended to increase the royalty rate that could be charged for logs 'at the stump'. Once milling moved on from an area, the roads remained a permanent asset for both fire protection and silvicultural purposes. Roads also provided an access route for the extraction of secondary forest produce such as piles, poles, and pulpwood not worth extraction by tramway, further maximising revenue from the forest.

However, the greatest cost savings were for the sawmiller and the timber merchant. Where a mill could be sited close to an existing road, the cost of an export tramway was saved. As most forest mills had a limited life, this meant that the mill did not have to carry the large capital outlay necessary to construct such a tramway. A short road built into the mill itself was relatively inexpensive to construct and meant that there were no transshipment costs associated with the outer terminus of an export tramway. Road transport, therefore, opened up remote forest areas that could not otherwise be economically exploited. Roads could also surmount grades impossible for a tramway without the installation of cable-worked inclines which could prove to be bottlenecks in the timber production process.

Where obtaining an order for sawn timber was conditional on fast delivery, road transport beat rail transport hands down. Speed was not the only advantage; transport direct from the mill to the building site reduced double handling to and from rail trucks and at break-of-gauge stations. Road trucks could carry back-loading of mill supplies cheaply and, when a mill was closed temporarily for some reason, could be put to other work while a tramway system would have remained idle. Road transport was also more flexible for city timber merchants. Rail trucks carried around 12 cubic metres of timber and demurrage was charged while the trucks were unloaded and therefore unavailable for use by the railways. The sudden influx of 12 cubic metres of sawn timber could strain the yarding resources of a small city mill or timber merchant. Motor truck loads of between 3.5 cubic metres and 4.7 cubic metres allowed more flexibility, both as far as yarding and special orders for certain classes and sizes of timber were concerned.

While road transport of sawn timber offered economic advantages to the industry and the consumer, transport of logs by road had the potential to change the way in which forests were logged and the entire social framework of the sawmilling industry. Sawmills would no longer be restricted to operating in areas where almost every tree was of commercial value and warranted the construction of logging tramways through an area of forest solely allotted to one sawmiller. Isolated patches of bush with road access could be logged and every tree of commercial value taken to a sawmill located in a central position in a forest district or in a town. When coupled with the mobility of crawler tractors, which were slowly replacing steam winches in the late 1930s, motor log-trucks promised a new way of working forests—timber could now be allocated on the basis of a given volume of logs from a district rather than from a set area with definite boundaries allotted to one sawmiller. The transport of logs by road also meant that there would be additional pressure to charge royalties on log volume rather than on the volume of sawn timber after conversion. The construction of an efficient network of roads also allowed forest managers to construct working plans to utilise and regenerate the forest more efficiently. Where the sawmiller chose the mill site

and planned his own investment in tramways, utilisation was based on what the sawmiller thought best for himself. Where the forest manager planned and built a network of roads, it had greater control over the way in which the forest was worked. A system of graded logging could then be introduced whereby the sawmiller removed the best logs for conversion to high-grade sawn timber, the case miller followed and removed the inferior and smaller logs for case timber and, finally, the pulp operator followed and removed the remainder for conversion to paper pulp. Today's 'integrated harvesting' would be impossible without an efficient road system.

The social implications of effective roading were even more far-reaching. Up until the introduction of logging by motor truck, sawmills were of necessity located close to their resource. Large numbers of people, including women and children, had to live close to the mills in isolated locations, far from hospitals and good schools and often under adverse climatic conditions and under threat from bushfire. With the mills removed from the forest to townships, hardship was reduced, and often a better class of labour was available to the sawmill owner.

While motor trucks made deep inroads into export tramway and railway transport during the 1930s, logging by motor truck in general made little headway until after the Second World War. Today, forest roads are well-constructed to handle what is today increasingly the standard logging truck, the B-double.

## Sawmilling technology

The first Australian sawmills consisted of little more than a power source (either a waterwheel or a steam engine) and a single saw, usually reciprocating. Logs would be 'spotted' by adzing a flat face on one side and then broken-down into large flitches, each with a flat face to provide the basis for further sawing. Once reduced to flitches, the saw would be replaced with one with finer teeth, and the flitches ripped into sawn timber. The next step in the evolution was to introduce separate breaking-down and rip benches into the sawmill, allowing the daily output to be roughly doubled if enough logs were available. In the nineteenth century, the breaking down saw was usually vertical and reciprocating. By the twentieth century, the vertical reciprocating saw was increasingly displaced by the twin circular saw of North American practice. A mill with a large twin-cylinder portable steam engine, twin breaking-down saws and two rip benches, could turn out between 14 and 23 cubic metres per day if the log supply was adequate. However, apart from the few larger sawmilling companies already listed in the tramway section, this was largely where Australian sawmilling practice stopped for fifty years. From the 1890s to the 1940s, Australian sawmilling was dominated by small family owned firms often financed by a large city timber merchant, which guaranteed to take a significant portion of the mill's output. The short-term nature of the three-year licence prevalent in most of Australia discouraged further investment, and the small size of the local market limited opportunities to expand. The refractory nature of Australian hardwoods, which were difficult to cut and season, contributed to a lack of exports and a constant battle with imported timber, notably Baltic and North American softwoods. As a result, the large electrically-lit, multi storey American bandsaw mill made only rare appearances in Australia, and those that did either operated only for a short period due to lack of an extended log supply or operated at a significant loss. As a result, several generations of Australian sawmillers followed in their grandfathers' and fathers' footsteps in small family firms before a number of factors brought an end to this practice.

In January 1939, devastating fires in Victoria and, to a lesser extent, Tasmania and southern NSW, destroyed a large number of sawmills and the resource on which they worked. In Victoria, the race was on to salvage the fire-killed mountain ash before the timber rotted. At the same time, the Second World War created a huge national demand for timber and a simultaneous dearth of labour, materials and machinery for sawmilling. Even forest managers were in short supply due to the formation of Forestry Companies and their transfer overseas as part of the military effort. Small sawmills increasingly fell into the hands of timber merchants to which they owed their continued financial existence. Following the War, sawmills were forced out of the forest as a boom in employment reduced the number of men willing to live at remote sawmills. Simultaneously, a ready supply of cheap machinery provided the mechanism by which logs could be transported to regional

sawmilling centres clustered around railheads, where electricity was available to power the saws. The efficiencies of scale quickly reduced the number of sawmills as entrepreneurial owners bought up licences of small, struggling sawmills, and aggregated the log supply. In Victoria, the wholesale destruction of the timber along the Great Dividing Range caused the sawmilling industry to largely relocate to the east of the State while the Ash regrowth matured. Today, a reduced number of sawmills owned by a few large timber companies operate on a diminished resource constrained by the demand for paper pulp, the application of sustainable yield requirements, and pressure from the environmental movement to cease logging in Australia's native forests.

Above: Hayden's sawmill under construction in the Otway Ranges, Victoria, in 1919. The mill is typical of most Australian sawmills in the first half of the twentieth century. The mill is yet to be roofed. Note from the right to the left of the picture: the log yard with logs ready to be rolled onto the breaking-down bench track, the drive shaft for the saw benches, the skids to slide flitches from the breaking-down to the rip bench, the twin-cylinder portable steam engine and, just to the left of the engine, the excavation for the export tramway. This mill was capable of cutting about 12 cubic metres of sawn timber per day. Beyond the sawmill, rough accommodation is under construction for the mill workers. Note that the forest has recently been ravaged by fire, a common occurrence in the fire-adapted Australian bush.

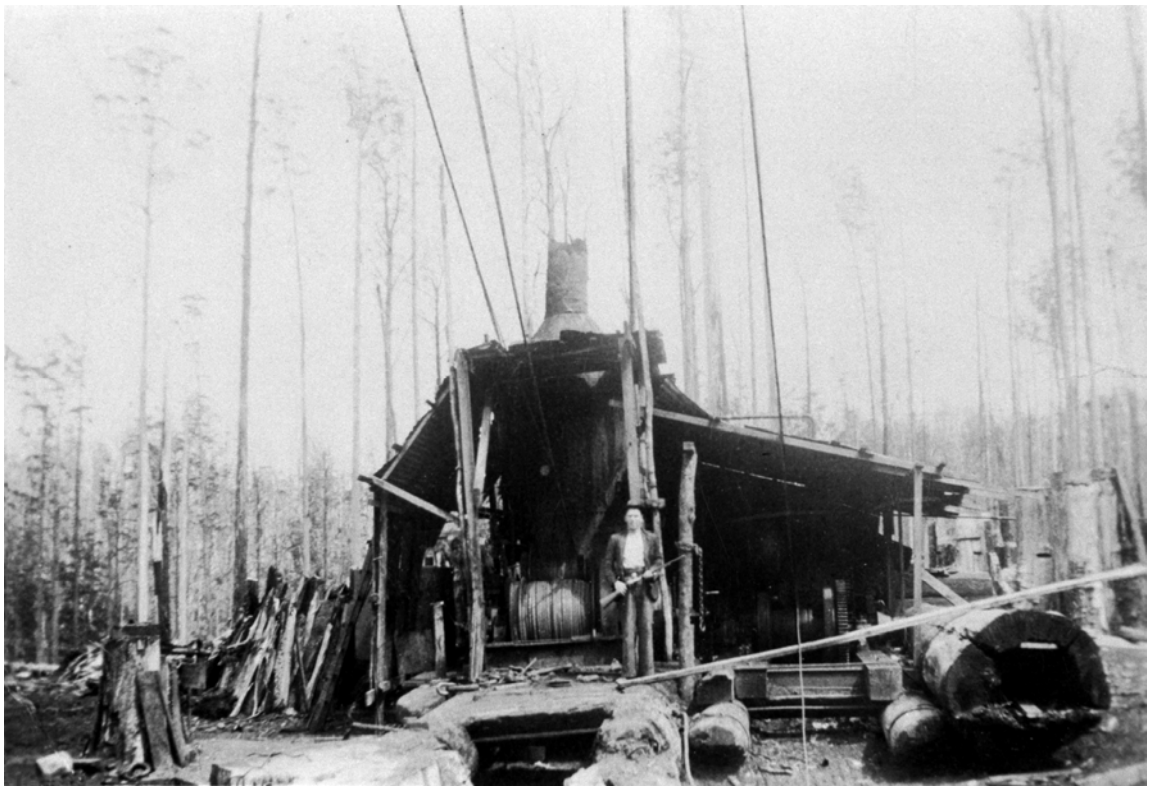
Postcard: author's collection

## Logging technology

The first logs drawn from Australian forests were carried on the shoulders of a convict 'centipede'. Bullocks quickly replaced convicts until, in turn, being displaced by horses for hauling logs from the bush to the landings on the log tramways. For most of the nineteenth century, Australian logging continued to rely on muscle-power until America signposted the way to the future. Sawmillers in North America shared a common problem with their cousins in Australia—large trees and difficult terrain. In 1882, John Dolbeer patented his steam logging engine based on marine winch technology. Twenty years later, the technology had matured into the standard North American

logging engine consisting of a large vertical boiler and twin-cylinder engine driving multiple winch drums with aerial haulage of logs on complex ropeways commonplace.

Only two years after Dolbeer's ground-breaking patent, a steam log hauler was in use in the southern forests of Tasmania, with a second introduced by 1888. In 1902, The Huon Timber Company imported a huge Lidgerwood logging engine and obtained a second engine from the Washington Iron Works. Local manufacture was taken up by Russell Allport & Coy, which became a major winch builder dominating the Tasmanian market. Steam logging technology had moved to Victoria by 1901 with a double-drum winch installed in the Otway ranges. In 1913, Alfred Harman of Port Melbourne patented a double drum logging winch with a cast steel frame that was to become 'standard issue' to Victorian sawmillers. In 1926, two Victorian sawmillers purchased the logging engines of the Huon Timber Company. After these engines were installed at Starvation Creek near Warburton, they provided a feast of logs for the sawmills of their new owners and, perhaps for the first time, sawmilling in Victoria became unsustainable as the forests were cut-out at a rate that astounded the local Forest Officers. Further American logging engines were introduced into Western Australia by the Kauri Timber Company. Following the 1939 bushfires, two of these engines were moved to Victoria where they became an important part of timber salvage operations. However, the days of steam-winch technology were already numbered as something more flexible had already become available.



Above: A Washington Iron Works multiple-drum winch installed at Starvation Creek, Victoria, for the Federal Timber Company in the 1940s. American steam logging technology at its best working in an Australian mountain ash forest.
Photo: Des Morrish, author's collection

The first all-crawler tractors were introduced into Australian forests in the 1930s. Following the Second World War, the ready availability of these tractors quickly ousted steam as a force in log haulage. When fitted with an auxiliary PTO winch, these tractors could remove logs from relatively steep terrain. The tractors were at first used to take logs to tramway landings. However, when fitted with a blade controlled by hydraulic rams, the tractors could also be used to construct roads

relatively cheaply. This meant that motor trucks could be used to move logs direct from the forest landing as well as transport sawn timber away from forest sawmills. The major drawback was that the initial investment in a crawler tractor was relatively large. While a double-drum steam winch and boiler could be purchased for around £1000 in 1936, a new Caterpillar tractor fitted with a blade cost between £1860 and £2590, almost equalling the cost of equipping a small sawmill. The new technology was therefore only available to successful sawmill owners who commanded sufficient spare capital to make the purchase. This tended to make the smaller sawmills even less competitive and was one of the factors which led to the emergence of larger sawmilling companies during the late 1940s in what had once been an industry dominated by small family-owned enterprises.

## Social history and heritage

Most bush sawmills were isolated, with the only connection to the outside world being via a rough bush tramway. All timber left via this tramway, and all food that could not be grown in a bush garden came in over it. Mill housing was usually provided by the sawmill owner. Single men were housed in small huts, the minimum size of which was laid down by the Timber Workers' Union. Married couples were accommodated in larger houses, often some distance from the huts of the single men. All buildings were constructed of rough-sawn timber and unlined except with hessian or newspapers. Large wooden chimneys lined with corrugated iron and stones served the dual purpose of a fireplace for warmth and a place to cook food. A number of the larger sawmill settlements boasted a school for the children and, perhaps, the luxury of a rough tennis court surfaced with crushed ants' nest. Social life was largely what the inhabitants made of it.

Today, the remnants of mill housing, mill foundations, and immense sawdust heaps are all that remain to remind us of the bush sawmilling era in Australia. The heritage value of such sites has only recently been appreciated, and the implementation of the *Regional Forest Agreement* process in the 1990s saw intensive field-work at historic sawmilling sites in all States except NSW. As a result, a large number of historic sawmill and tramway sites have been added to the Register of the National Estate as a permanent reminder of the history of sawmilling in Australia's forests.

## Further reading

Dargavel, J (editor) 1988. *Sawing Selling & Sons: Histories of Australian Timber Firms*. Canberra: Centre for Resource and Environmental Studies, Australian National University.

Dargavel, J. 1995. *Fashioning Australia's Forests*. Melbourne: Oxford University Press.

Additional information was drawn from the regional sawmilling histories published by the *Light Railway Research Society of Australia:* http://www.lrrsa.org.au/Lrr_Pubs.htm To date, there has been no comprehensive published overview of sawmilling in Australia, gaps in particular relating to South Australia, Tasmania, Queensland and New South Wales.

# Forestry

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*Key words:* devastation, mining, clearing, grazing, conservancy, state forestry, silviculture, plantations, sawn timber, pulpwood, woodchips, environment, biodiversity, economics

## Colonial struggle for forest conservancy

In 1803, only five years after the First Fleet had landed in what was to be Sydney, Governor King thought that clearing forests on the banks of the Hawkesbury River was causing erosion and flood damage. He ordered that the valuable cedar trees were not to be cut and asked the few landowners to plant trees. He could order and ask, but to little effect against the settlers' urgency to clear land for farms and cut timber for use or sale. So it continued on an ever-increasing scale for much of the nineteenth century as the population increased and new colonies were commenced. The discoveries of gold in Victoria in 1851 and later elsewhere, not only accelerated economic development, but led to the forests in the goldfields being quickly cut out for mining timber, fuelwood and building material. They presented wealthy scenes of forest devastation.

It was waste that stimulated calls for 'forest conservancy'. A report to the Victorian Parliament in 1865 called for more 'economical use of the native forests', fearing that 'there will soon be difficulty in getting timber for the uses of the miner, in any forests adjacent to the gold workings'. The Colonial Botanist in Queensland complained of the 'most reckless waste and needless destruction of our most valuable trees … by timber-getters, settlers and others, through ignorance of their value'. The government botanists were important in making such calls as they were part of the small scientific community of the colonies and were well-regarded for their introductions of new species for agriculture and gardens. They were also connected to the world's scientific community through extensive correspondence and the exchange of herbarium specimens, seeds and plants; Ferdinand Mueller in Victoria was the outstanding example. Many other officials, doctors, clergymen and private citizens advanced the case for forest conservancy in meetings of learned scientific societies and the press.

The power of colonial Governments rested on their control of the land, all of which had been taken from the Indigenous people without treaty or recompense when the British invaded. Governments progressively allotted or sold parcels of land to the settlers, but still had huge areas of unallocated Crown Land, including forest. They controlled the timber cutters and sawmillers to some extent by licensing them to take wood from Crown Land, and declared some timber reserves that would not be made available to the settlers until the wood had been cut. While these measures raised revenue, they did not provide for the long-term management of the forests.

## Starting state forestry

The need for forest management—for forestry—was urged more strongly from the 1880s. The colonial Governments brought advisers from parts of the Empire where forestry was well-established: an Indian Conservator of Forests, F.D'A. Vincent in 1887; the Indian Inspector-General of Forests, B. Ribbetrop in 1895; and D.E. Hutchins from South Africa in 1916, for examples. But their recommendations to set up state forests ran counter to the dominant settler

interests in clearing forests to make farms. In 1901, the Colonies became the States of a federal Australia but retained control of their lands and forests. They resorted to the time-honoured delays of setting up Royal Commissions of inquiry: Victoria in 1901, Western Australia in 1903 and New South Wales in 1907. However they all eventually passed *Forest Acts*—Tasmania was the last to do so in 1920—that set up state forestry on the imperial model. The most suitable areas were to be located, demarcated and permanently reserved as state forests to be managed by distinct forest services staffed by a cadre of trained foresters. Conservation reserves and national parks were also being established during the period.

Although state forestry had been established in legislation, there were major difficulties to be overcome before it was well-established in practice. The new, small Forestry Departments found it difficult to have state forests declared against the ethos of agricultural development firmly held by the large, well-entrenched Lands Departments. The national target of having 10 million hectares of state forests that was set in 1920, was not achieved until the 1960s when there were roughly equal areas of forest managed as state forests by the forest services, kept as unoccupied Crown Land by the Lands Departments, and held by private owners.

The forest services hoped to bring the forests under systematic, planned management according to the principles of sustained yield set out in the European and imperial forestry text books, such as Schlich's *Manual of Forestry*. But their hopes were unrealistic. The industry was not used to being controlled and could exert political pressure to gain rights to wood resources, irrespective of forestry plans. More fundamentally, the sustained yield model itself could not resolve imbalances between demand and supply. If demand was inadequate, no plan could get wood cut. For example, plans to rehabilitate the devastated goldfields forests by thinning out the regrowth came to nought when markets for small wood collapsed in the 1930s. More widely, many of the mixed-species foothill forests were picked over for sawlog trees, leaving so many unsaleable trees that satisfactory regrowth was inhibited; a situation that did not change until the pulp and woodchip export industries expanded, as described later. On the other hand, if demand was greater than the sustained yield calculations, the forest services were put under considerable pressure to increase the allowable cut. For example, the need for construction timber during the economic boom after the Second World War led to many forests being cut heavily. Generally, Australian forests were overcut for sawlogs well into the 1980s forcing inevitable reductions in production during the 1990s.

Planned management needed good information about the extent of the forests, the quantity of timber and the growth rates of the stands. Strip surveys were started in the 1910s that provided detailed maps of the forests and assessed the standing volumes of timber. This was a major undertaking. For example, Queensland crews traversed 7704 kilometres of survey lines in one year (1940/41), almost all in straight lines, irrespective of topography and the density of the vegetation. Growth estimates could not be made from stem analysis as few of the trees show regular annual rings in the wood. Permanently marked plots to measure growth by successive measurements started to be installed from the 1930s, but there were only a few.

Victoria prepared formal working plans for each of its state forests from the late 1920s, and was covering over 250,000 hectares a year during the 1930s. But the effort and the whole concept of patiently planning for sustained yields in the formal European and imperial manner to obtain an orderly succession of age classes was overtaken by disastrous fires in 1939. Almost two million hectares were burnt in Victoria, and there were further large areas burnt in New South Wales and the Australian Capital Territory. The mountain ash trees (*Eucalyptus regnans*) which were the largest and most valuable resource were killed. The industry was relocated to other forests and it was not until sixty years later that the burnt ash forests could be used again, and then only a limited manner.

There were other great tasks to start state forestry. One was to 'open up' the country with roads for logging and trails for fire protection. Another was to find silvicultural systems for Australia's many different types of forest. Continuing research resulted in the first textbooks on how eucalypts grow and on their silviculture being published in 1955 and 1996, by Jacobs and Florence respectively.

The state forests needed managers. By the 1910s there were about 200 forest field staff with considerable practical experience gained from controlling the timber cutters and sawmillers, fighting fires and other operations. Victoria had set up a Forestry School at Creswick with a practical emphasis in nursery work and establishing plantations, as well as work in the native forests. More advanced training was needed, but the small numbers warranted only one school. The national Australian Forestry School was started in 1926 and moved to its own building in Canberra in 1927, the year that the Federal Parliament sat in the new capital for the first time. Although Victoria raised the standard of its course, an invidious and acrimonious distinction arose between the two groups of foresters that lingered into the 1970s. Each formed a friendly cadre of foresters united by the difficulties they faced in starting state forestry.

The Great Depression of the 1930s halted any expansion of forestry, and the Australian Forestry School was almost forced to close. However, funds to provide relief work for unemployed people were used to establish plantations, construct fire-fighting trails and cull unwanted trees in some of the forests. When economic conditions started to improve at the end of the 1930s, the Second World War again delayed forestry's expansion.

## State plantations

Australia started importing Baltic and North American softwoods to meet its demands for building and joinery timber during the gold rush boom of the 1850s and has continued to do so to the present day. The colonial botanists had introduced many exotic conifers and demonstrated that some could be grown successfully in Australia. Recommendations that the Colonial Governments should create softwood plantations to replace imports were often included with the arguments for forest conservancy and state forestry. State forest nurseries were established from 1872 and small plantations commenced. The number of species tried was gradually reduced to the most successful: Monterey or radiata pine (*Pinus radiata*) in South-east Australia, maritime pine (*P. pinaster*) on the coastal dunes of Western Australia, Cuban and slash pines (*P. carribaea and P. elliottii*) and indigenous hoop pine (*Araucaria cunninghamii*) in the humid coastal regions of southern Queensland and northern New South Wales.

The success of plantations was most important to South Australia which had few native forests. The Colony sought foresters—then called arboriculturalists—trained in British and particularly in Scottish estate plantations. It appointed a member of the Scottish Arboricultural Society, John Ednie Brown, as its first Conservator in 1878. He established nurseries and trial plantations, extending some into the more arid regions in the mistaken belief that forests would increase rainfall. The English forester, Walter Gill, who succeeded him in 1890, expanded the area of radiata pine plantations mainly in the south-east where land was available, the rainfall at 700 mm a year was higher than in most of the rest of the Colony, and the trees grew well on the deep sands. With 40 years of experience and a firmly established Woods and Forests Department, South Australia was able to secure funds from the Overseas Settlement scheme to plant 2000 hectares a year for a decade from 1926. By 1939 it had built up an estate of 37,000 hectares and had over 40 percent of the plantations in the country.

Although the trees grew well, the Adelaide market, accustomed to Baltic timber, did not accept the poorer quality radiata pine. The Woods and Forests Department started its own small sawmills, but it was not until kiln-drying was introduced at new, larger mills in the 1930s that the timber finally became accepted. There were further problems. The radiata pine plantations needed to be thinned two or three times during their rotation of 35-40 years if they were to be commercially successful, but there was no market for the small thinnings. A small pulp mill was built in 1941, but it was not until the 1960s when particle board and other mills were built that a mature industry could be said to have developed based on the plantations started 80 years earlier.

## A confident forestry

The 1950s and 1960s were decades of rapid and confident development in Australia. The population increased to 12.8 million as 2.5 million refugees and immigrants arrived, and plenty of

babies were born. In 24 years (1947-1971), 1.8 million homes were built which doubled their number and created an intense demand for sawn timber. For the first time, manufacturing surpassed rural and mining production to make Australia an industrial nation. Its economy needed all types of paper and demanded the wood to make it. Forestry flourished. At last, the forest services had the funds and support from State Governments to manage the state forests energetically. They expanded their staff, trained more foresters, adopted new technologies, developed research and were able to operate effectively within the structures of government; as noted earlier, it was in the 1960s that they finally achieved their goal of having 10 million hectares of state forests declared.

The forest services met the demand for sawn timber by opening up previously inaccessible forests and by making the sawmillers take poorer quality logs from previously cut areas. It was the ready availability of bulldozers and earth-moving equipment that not only facilitated logging, as Evans discusses in Chapter 3, but also enabled fire trails to be constructed through mountainous areas. The services built more fire towers, installed radio communication, bought fire tankers and trained crews. Nevertheless, occasional disastrous, uncontrollable fires were an enduring feature, as for example in 1983 when 30 percent of South Australia's pine plantations were killed in a single day.

The forest services became more knowledgeable about their forests as they replaced their laborious strip surveys with aerial photography, statistical sampling, and computerised inventory systems. However, their classic goal of sustained yield to be achieved through systematic, planned management remained elusive. They had allowed the sawmillers to cut too much for far too long, or had been politically unable to stop them. More fundamentally, they had rarely received enough money for the logs they sold to regenerate most of the mixed-species foothill forests adequately. In the 1960s demand was forecast to increase, but supply would inevitably decrease. They had to do something, if imports were not to escalate; indeed, Max Jacobs, Director-General of the Forestry and Timber Bureau argued in 1964 that Australia should become self-sufficient in wood. The Federal Government started to take more interest in forestry and supported the States in strategies to establish more plantations to cover the expected shortages, and find pulpwood markets for the otherwise unsaleable trees so that the native forests could be regenerated as future tree crops.

### *Plantations*

The success of the South Australian pine plantations in creating the resource for industrial development created considerable enthusiasm for planting by both governments and industry. In 1967 the Federal Government started to provide deferred-repayment, low-interest loans to the States for planting. They quickly met the agreed targets and exceeded them by planting more from their own funds. They selected land for planting by converting less productive parts of the native forests under their control to the exotic pine species.

Bond-selling companies had established plantations in South Australia and Victoria from the 1930s, but most had been financially disreputable. Some landowners, water supply authorities and schools had also planted small areas. These had demonstrated the growth of plantations across a wide range of sites outside the boundaries of the state forests. In the 1960s the pulp and paper companies started to establish plantations on their own land, supplemented by some leased from Governments. They brought fresh energy to mechanising operations, tree breeding, soil cultivation, chemical fertilisation and weed control; all the techniques of intensive agriculture became part of forestry.

The strategy of increasing production from softwood plantations proved remarkably successful. The plantations were only providing about 15 per cent of the country's sawlogs in the 1960s, but by 2000 they had far outstripped the native forests and were providing 64 per cent. Planting new areas continued so strongly that the total area was doubled between 1980 and 2000. Whereas the States had established most of Australia's plantations, private investment took a rapidly increasing part from the 1990s. This was due to the general trend for the States to privatise public utilities—

Victoria sold all its public plantations, and to a rapid expansion of planting eucalypts to be managed on short rotations to produce pulpwood and export woodchips.

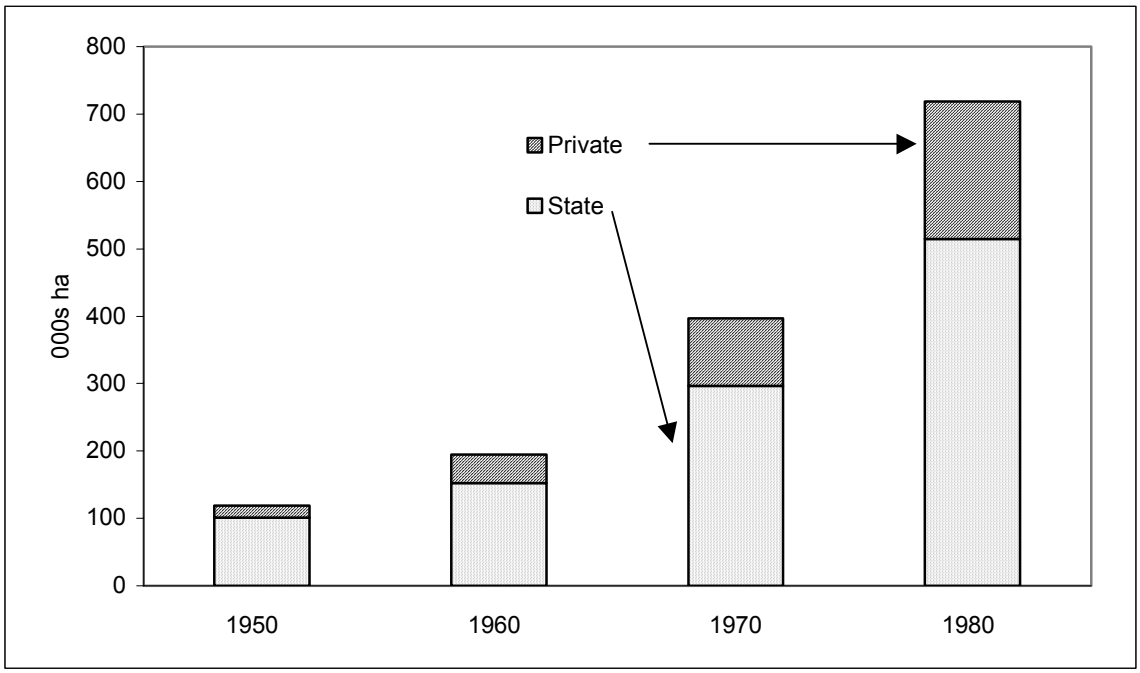


Figure 1. Area of state and private coniferous plantations, 1950-1980. Note: smaller areas of hardwood plantations were also established that amounted to 47837 ha in 1980.

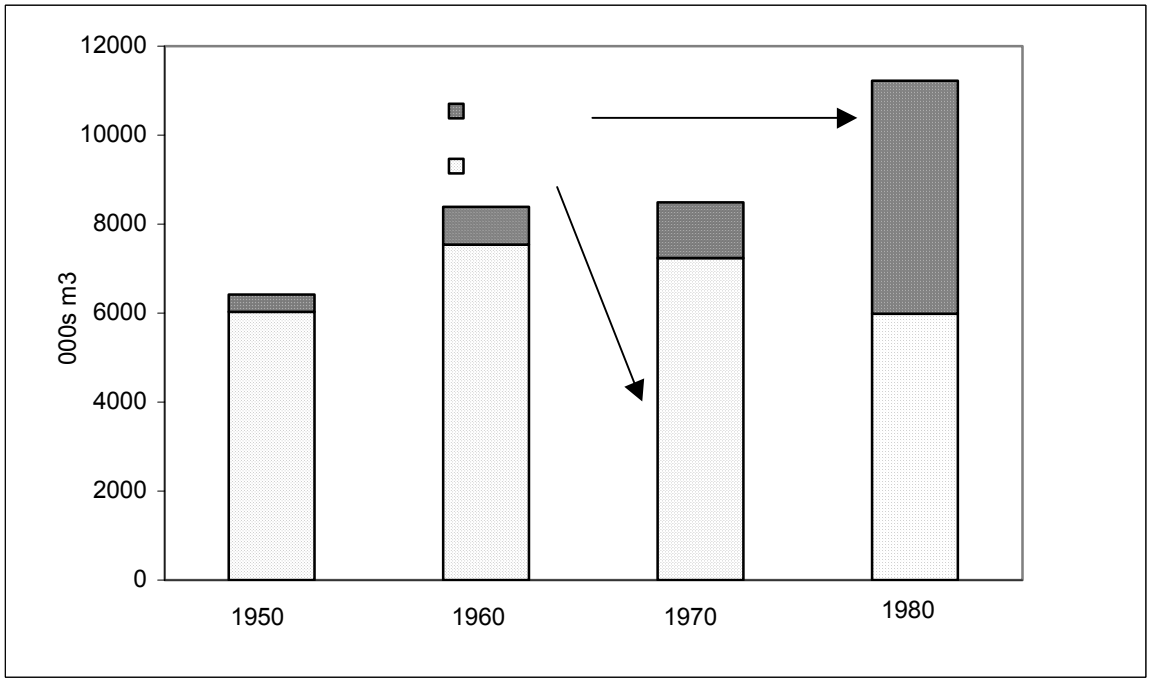


Figure 2. Volume of hardwood removed from the native forests, 1950-1980. Note: Sawlogs includes veneer logs, and pulpwood includes woodchip exports.

### *Pulpwood and export woodchips*

The increasing demand for pulpwood from the 1940s could be met from the Australian forests and plantations once government and industry research had developed the pulping techniques that enabled eucalypt wood to be used. Importantly, the techniques were gradually developed to enable

most of the species and old trees to be used. The wood was supplied from forests in those regions of Victoria and Tasmania where the pulp and paper mills had been built. A silvicultural system of clear-felling and burning the debris enabled the light-demanding eucalypts to be regenerated successfully. Even the most difficult sites could be re-established if aided by aerial sowing of seed or sometimes by planting seedlings. When compared to the intensive plantation systems, it was a minimal, cheap system; stumps and burnt debris were not removed, the soil was not cultivated, the new crop was not being genetically improved, the trees were not spaced regularly, fertilisers were not applied, nor were weeds controlled chemically. It produced even-aged stands suited to industry, but they grew much more slowly than plantations.

Initially, the stands to be felled were cut in two stages: first to remove any sawlogs, then to remove all the remaining trees as pulpwood. From 1948 the two operations were combined and the two types of logs obtained in one pass. This not only made the subsequent regeneration easier to conduct, but enabled sawlogs to be recovered from some areas where otherwise it would not have been possible; an important matter as sawlog resources in the native forests dwindled.

In the 1960s Australia's technology for successfully pulping the eucalypts attracted Japanese companies who were urgently looking to import wood for their pulp mills. Five large woodchip export mills were built between 1970 and 1976 and a few smaller mills followed. They drastically changed the face of Australian forestry as the total quantity of hardwood being cut from the native forests virtually doubled, even as the yield of sawlogs was declining.

The silviculture of clear felling and natural regeneration was applied to the areas being cut for woodchip exports as well as for the expansion of the domestic industry. But logging was not confined to cutting over areas that had been selectively logged before, the frontier of exploitation was still being pushed back into more remote areas to provide hardwood sawlogs. It still is in Tasmania amidst acrimonious environmental controversies.

## Environmental controversies

The worldwide environmental controversies over forests were particularly vehement in Australia. They escalated from the 1970s into major political issues in national elections, even as recently as 2004, due partly to the electoral system which gave the emerging environmental movement considerable influence, and partly to the structure of Australian forestry that had been built up over the previous century. The structure that had served it well, left it badly placed to adapt to change or deal with conflict. It was identified with state institutions and could be readily subjected to political pressure. Its close-knit cadres of foresters were employed within the hierarchies of governments or companies and had a conformist and conservative stance that reacted angrily to criticism. And it came aplenty.

The rapid transformations of native forest landscapes being bulldozed for pine plantations or clear-felled for woodchip exports created the scenes of apparent devastation that attracted widespread condemnation from the proliferating environmental organisations. Forestry was criticised for its environmental impacts, economic costs and social effects. The forest services were seen as having been captured by industry in a wood-production ideology, and the foresters were depicted by their most vituperative critics as being devious, hypocritical, secretive, misrepresenting the facts, poor at making decisions, neglectful of economics, propagandists and so forth. Not surprisingly the forestry organisations became bitterly opposed to the environmental movement, but at its root was a clash of values.

Forestry was forced to change, and when it did not do so sufficiently its organisations were replaced politically until it did. It made three main changes during the 1980s and 1990s. First, the practice of clearing native forests to establish pine plantations gave way to purchasing already cleared agricultural land. Only in Tasmania, and to a small degree in the Northern Territory, does clearing native forests for plantations linger on. Second, forestry's long-held but elusive goal of the sustained yield management of timber was recast as multiple use management. Rhetorically, it aimed to sustain all the uses and values of the forests. Practically, the standard of logging in the native forests was raised considerably by detailed coupe-by-coupe planning and the introduction of

Codes of Forest Practice for the loggers. This was driven initially by the need to preserve some habitat for the arboreal animals and reduce erosion, but it was soon extended to cover all the wildlife, heritage sites and many other values. While this ameliorated the immediate impacts, the forest structure was changed for the long-term. Third, as such long-term change was considered unacceptable for the rainforests and old-growth stands, most of them were removed from forestry management and placed in conservation reserves.

## A more diverse forestry

Australian forestry became more diverse during the 1990s as the Federal Government, international agreements, the globalised economy, and the politically fashionable 'isms' of management and economics all changed it irrevocably.

At the most fundamental level, the definition of a forest changed. The various definitions that had been used by each State generally meant tall forests that might be used by the wood industries. Instead, Australia adopted a definition very similar to that of the UN's Montreal process. Instead of considering just some 43 million hectares of mostly tall forests, the new definition considered 162 million hectares, much of it in low, sparse vegetation that Australians commonly call 'woodland' and use for extensive grazing. But it is unclear whether changing the definition of 'forest' will lead to any significant re-conception of 'forestry'.

However, the widespread problems of dryland salinity, deteriorating rivers and the loss of biodiversity in the agricultural landscapes meant that the rate of deforestation—0.54 million hectares a year in the 1980s—could no longer be ignored. Its effect on climate added to the problems. There were two responses. A lively farm forestry and Landcare movement emerged that operated at individual and local levels. It was actively supported by Governments from 1989 and now comprises about 4500 groups of people. While the movement has raised consciousness about the causes and nature of the problems and many groups have been effective locally, it does not address the scale of the problems. For example, farm forestry only offsets about one-hundredth of the deforestation each year and only restores some of the habitat. State Governments, with their long history of promoting land clearing for agricultural development were loath to legislate against deforestation, but finally managed to halve the rate to 0.24 million hectares a year by 1998.

Industrial planting increased sharply, following changes in the tax law. The rate of all planting reached record levels of nearly 87,000 hectares a year during in the 1990s, offsetting slightly over one-third of the rate of deforestation. The expansion of private investment added new ownership structures to the existing types of state and private plantations. They included joint ventures between State agencies and companies, various schemes for companies to lease land on which to grow their trees, and contract growing arrangements. Much of the expansion was in eucalypts to be managed on short rotations for the export woodchip market. Foreign investment became a significant feature of what had been a notably Australian sector as Victoria's state plantations and several of the major processing companies were sold to American, European and Asian companies.

The management of both the natural forests and plantations became far more sophisticated during the 1990s as advanced planning methods were developed, and research led to intensive methods for plantation management. More disciplinary skills were needed and recruited into multi-disciplinary teams that include, but are not restricted to foresters.

## Future as history

The history of Australian forestry has always contained tensions, contradictions and paradoxes that it has faced as best it could by adapting to, resisting or being overcome by changes as they arose. Three are noted here as construing its future.

First is the ancient tension between the demands of a restless society and forestry's goal of managing the forests in a sustainable manner. It has passed through different phases—sustained yield, multiple use management, ecologically sustainable management, and so forth—but these have been more endeavours than achievements. It contains a contradiction that has always lain at the heart of forestry: the detailed prescription of silviculture, stand-by-stand, cannot be reconciled with

the regulation of the yield from the forest as a whole. Foresters have always had to grapple with this problem, but now have to deal with many more uses and values than in the past.

The second, also ancient and related to the first, concerns the relations between the state and the economy. Australian forestry developed almost exclusively as a state affair, yet limited or boosted by economic circumstances. It was the sole responsibility first of the Colonies and States (from 1901) until the 1960s when the Federal Government took a more active role and in the 1980s became a powerful force. Now it is being influenced by a raft of international agreements and is being increasingly incorporated into the globalised economy. The increasing scale of the relationships, and the paradox between the simplifying economic tendencies, and the international emphasis on local biodiversity will form part of the dynamic of forestry's future.

The third tension in Australian forestry is that between the continued management of the native forests and the expansion of the plantation estate. The balance for wood production has altered markedly in favour of plantations, while the native forests have been increasingly valued for their environmental protection values. Controversies over this balance seem an enduring part of Australian forestry.

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Environmental conflict: http://cres.anu.edu.au/fffweb/
*State of the Forests Report 2003*: http://www.affa.gov.au/

# National parks and forest conservation

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*Key words:* The National Park, Yellowstone, Ku-ring-gai Chase, recreation, scenery, definition, bushwalking, conservation, national parks associations, legislation, management, wildlife, fauna

## Introduction

Many forms of protected area are used for the conservation of Australia's forests and other terrestrial ecosystems. Of these, national parks are the most prevalent. About 60 million hectares, nearly 8 per cent of the total land area of Australia, is managed as protected areas, and in most States the great majority is designated as 'national park'. In Queensland, for example, 95 per cent of protected land is national park. National parks are also the best known form of natural area protection, partly because the term 'national park' has been used in Australia since the late nineteenth century, and partly because public access and public recreation have always been important aspects of national parks. By contrast, preservation is paramount and visitation is often discouraged in other forms of protected area, such as 'nature reserves'.

After the first Australian national park was dedicated in New South Wales more than a century ago, the idea was gradually adopted in the other States. Other forms of protected area were created from time to time in response to evolving conservation priorities. Because land management remained a State responsibility after Federation of the six colonies to form the Commonwealth of Australia in 1901, unique systems for the protection of natural areas developed in each State. In addition, the Commonwealth developed its own system for the management of reserves on land controlled by it separately from the States. Despite the resulting complexity, the national park is common to all of these unique systems, and is therefore a useful basis on which to examine the history of the conservation of Australia's forests. Because of the complexity of the subject, the following tends to focus mainly on New South Wales and to a lesser extent on Queensland.

## Escaping from the cities

Australia's first national park, 'The National Park', was created in 1879 on the southern outskirts of Sydney, NSW. The name bestowed upon this 7,300 hectare expanse of forest—or 'bushland' in Australian idiom—asserts its position as the first such public reserve in the continent. It probably also reflects some knowledge on the part of its originators of Yellowstone National Park which had been created several years earlier in the United States of America. Despite the similar names, however, the two 'national parks' were very different in nature and served quite different purposes.

The Yellowstone region was a little known wilderness until the end of the 1860s when the first purposeful exploration of the area, then mostly in the Territory of Wyoming, was undertaken. Out of expeditions in the late 1860s and early 1870s arose the idea of preserving the outstanding natural features of the region—its geysers, hot springs, canyons and waterfalls—by setting it apart as a public reserve. This was achieved remarkably quickly with the passage of the Yellowstone Park bill through Congress early in 1872. Through this legislation an area of nearly one million hectares was 'reserved and withdrawn from settlement, occupancy, or sale' and 'set apart as a public park or

pleasuring-ground for the benefit and enjoyment of the people'. Control of the new 'national park' was vested in the federal government.

Much of the credit for creating The National Park in New South Wales has been given to Sir John Robertson who throughout the 1860s and 1870s held high office in the government of the Colony either as Premier, Colonial Secretary, or Minister for Lands. He had nurtured the park idea for several years before its realisation in 1879. It is uncertain what influence the Yellowstone experiment had had on Robertson's thinking, but it seems improbable that he was unaware of it and unlikely that the choice of the title 'national park' for Sydney's reserve was mere coincidence. Nevertheless, there were some significant differences between the two.

The National Park was only 20 kilometres by land and 40 kilometres by water from the centre of Sydney, the Colony's major city with a population of about 200,000 in 1879. Yellowstone was in a remote and sparsely populated region; the Territory of Wyoming was created only four years before the park, in 1868. The National Park was created as a public reserve within the provisions of the Lands legislation of NSW, not by special legislation as at Yellowstone. The term 'national park' might seem odd today when applied to a creation of a colonial rather than a federal (national) government, but it makes sense when one considers that New South Wales at the time was self-governing, and arguably a nation in its own right; federation was still more than twenty years in the future, unlike in the United States where it had been achieved nearly a century before.

Whereas Yellowstone National Park was created to protect the area's natural features from imminent commercial exploitation, albeit allowing for their simultaneous public enjoyment, The National Park was principally to afford the people of Sydney a means of sport and recreation, although admittedly in pleasant surroundings. Indeed, it has been suggested that if The National Park had a model, it was probably the large common-type parks, such as Hampstead Heath, which were being created on the outskirts of expanding London to provide open space for various forms of public recreation. Although New South Wales was sparsely populated in the late nineteenth century, it was already highly urbanised, with nearly one-third of the population residing in Sydney by the end of the 1870s. This concentration of population in an expanding industrial city—with all the related health and crowding problems—led to an early desire for areas of open space, in natural surroundings, to be set aside within the metropolis for the enjoyment and for the health of the people. Although not itself an urban park, The National Park was created in a climate of public opinion that undoubtedly was influenced by the public health and early town planning arguments of Sydney's urban parks movement of the 1870s.

It is evident from the wide guidelines within which the trustees of The National Park were to manage the area that preservation of the park in its natural state was a very low priority. They were empowered to use the park for: ornamental plantations, lawns and gardens; zoological gardens; race-course; cricket, or any other 'lawful game'; rifle butt or artillery range; exercise or encampment of Military or Naval forces; and bathing-places. They could also grant licences to mine for and to take away coal, lime, stone, clay, brick, earth or other mineral (except gold or silver). Moreover, throughout the existence of the trust (1879-1967), its first duty to develop the park as a recreational area was funded by the exploitation of many of the park's natural resources, including the felling of timber, the extraction of gravel and clay, the taking of grass-tree (*Xanthorrhoea* sp.) gum, the grazing of sheep and cattle, and the acclimatisation of exotic fish and mammals, mainly deer. The passage of time, however, would see the function of The National Park, and of national parks in Australia generally, shift markedly away from public recreation towards preservation of unspoiled 'nature'.

Although initially it did not take the name 'national park', Ku-ring-gai Chase, which was dedicated in 1894, served the same purpose for residents of Sydney's northern suburbs as The National Park did for those in the south. Situated on Broken Bay, the mouth of the Hawkesbury River, Ku-ring-gai Chase was a similar distance north of Port Jackson as The National Park on Port Hacking was in the opposite direction. The two parks were of comparable size, and both comprised similar sterile dissected Hawkesbury sandstone plateaux, vegetated with heath and scrub, and affording spectacular marine landscapes. The trustees of Ku-ring-gai Chase were from the outset concerned with 'the opening up of the place and the convenience of visitors', and they did this by

constructing roads, horse paddocks, walking tracks, and water supply dams. By the turn of the century visitors came to the park 'to camp, or fish, or botanise, or merely to enjoy that pleasant vagabondage which comes gratefully to the man doomed to seek his sustenance in cities' (Hoben 1900).

Three years before the dedication of Ku-ring-gai Chase, an area of bushland in South Australia was set aside as that colony's first national park, and the second in Australia. The site, the former Government Farm at Belair on the southern outskirts of Adelaide, was dedicated in 1891 'for the sole purpose of a public national recreation and pleasure ground' and became known as The National Park. It fulfilled the need for more 'breathing space' for the expanding city, and was developed with tennis courts, ovals, pavilions and walking trails, and decorated with stands of ornamental trees.

Like the citizens of Sydney and Adelaide who found solace in the bushland of their respective national parks, the people of Brisbane in Queensland, also sought respite from civilisation in nature, and several national parks were created during the early years of the twentieth century in the mountains which encircled their capital. The first, Witch's Falls National Park, at Tamborine, south of Brisbane towards the border with New South Wales, was proclaimed in 1908. Later that year, Bunya Mountains National Park was created in the ranges to the north-west of the capital. Cunningham's Gap National Park, to the south-west, followed in 1909. Lamington, Queensland's largest national park at the time at about 19,000 hectares, was proclaimed in 1915. It is adjacent to the border with New South Wales and embraces a series of elevated plateaux 'clothed by nature with the most luxuriant draperies of rich tropical vegetation', 'abounding in wealth of lovely fresh water streams', and 'perpetually laid in cool, refreshing breezes'. Earliest calls for reservation of this area identified its suitability as a 'national sanatorium or park' which would afford 'a convenient and refreshing retreat for those [Brisbane residents] not constitutionally fitted to bear the high temperatures generally registered in summer' (Maguire 1900).

## Scenery spectacular

Although most of the earliest Australian national parks were created primarily for public recreation, there was a growing concern in the late nineteenth century for the protection of scenic landscapes, albeit largely for their interest to hikers or 'bushwalkers' and tourists. The earliest formal use of the term 'national park' in Australia in the specific context of the protection of a scenic natural feature was probably the creation in 1892 of Tower Hill National Park in southern Victoria. Tower Hill is the spectacular crater of an extinct Pleistocene volcano. Degradation of the area, however, led to the 'downgrading' of the national park to a 'state game reserve' in 1961.

In New South Wales, the term 'national park' was being used in the titles of several public reserves by the early 1930s. In addition to the original park which had been created principally to provide recreational opportunities close to the capital city, others had been created in the early twentieth century in areas remote from any major centre of population, where they protected and allowed the viewing of distinctive landscape features. These seem more in the spirit of Yellowstone than The National Park.

The first of these new national parks to be created was the Mount Warning National Park. Mount Warning is one of the principal landscape features of the Tweed valley, in the far north-eastern corner of New South Wales near the border with Queensland. It was described in 1875 as 'one of the most picturesque mountains imaginable, tower[ing] over everything as if proclaiming himself the sovereign of the district' (*Richmond River Express*, Casino, 7 August 1875). In 1909 an area of land centred on the mountain was reserved from sale 'for public recreation and preservation of native flora'. A larger reserve for 'public recreation' was created in 1928 and this became known as Mount Warning National Park. It was officially opened to the public in August 1929 at a ceremony performed on top of the mountain by the State's Attorney-General. Two years later, an area of land along the Great Escarpment around Point Lookout, one of the highest points on the New England tableland at more than 1,500 metres above sea level, was reserved for public recreation. From here views could be had of 'some of the most magnificent scenery in this State, if

not Australia'. It was renamed as the New England National Park and was formally opened in 1937 by the Governor-General.

Ten years earlier, in 1927, another area of scenic escarpment land in north-eastern NSW had been dedicated as Dorrigo Mountain Reserve for the preservation of native flora. By 1930 this reserve was being referred to by its trustees as the Dorrigo Mountain National Park. Technically, however, it remained a reserve for the preservation of native flora, not for public recreation like the Mount Warning and New England National Parks, so it continued to be known formally by the less grandiose title of Dorrigo Mountain Reserve.

## Legal meaning of 'national park'

Although the three scenic reserves in northern New South Wales were all referred to as 'national parks' by the early 1930s, the term had no legal meaning in that State. It remained informal and arbitrary until 1967 when the new *National Parks and Wildlife Act* limited its use to parks created under that Act. The earliest national parks in that State, therefore, in the main, relied for their security on various sections of the general land laws (although Kosciusko State Park is a notable exception). The National Park, the first, was reserved from sale in 1879, pursuant to the *Crown Lands Alienation Act 1861*, and later in the same month was dedicated 'for the purpose of a National Park' pursuant to the same Act. Ku-ring-gai Chase was dedicated for 'public recreation' in 1894 in accordance with the *Crown Lands Act 1884*. From 1913, until the *National Parks and Wildlife Act 1967* came into effect, the legislation for creating such reserves was the *Crown Lands Consolidation Act 1913* which provided for the reservation and dedication of Crown lands for various public purposes. Only two national parks had been created in New South Wales prior to the 1913 Act.

Reserves created under these acts were often temporary, and could be revoked upon the decision of the Minister for Lands. At best, if they had been 'dedicated' to some public purpose, they could still be revoked by the Minister, but 'proposals' for revocations had to be laid before both Houses of Parliament where they could be rejected by resolution. Thus, prior to 1967, 'national parks' in NSW were created in accordance with the Crown lands legislation, either reserved or dedicated for a particular purpose, usually for 'public recreation'. Some areas reserved or dedicated for the preservation of native flora and fauna became known as national parks, but this was less common. Management of a 'national park' so created could be placed in the hands of a trust created for the purpose, and regulations could be framed within which the management would be carried out. Although there was no legal definition of the term 'national park' its use was nevertheless usually applied to relatively large areas of land of particular significance.

As in New South Wales, the earliest national parks in Victoria were generally created under provisions of the prevailing land legislation (especially the *Land Act 1898*) and managed, if at all, by local committees appointed for the purpose. From 1898 several areas were set aside as 'sites for national parks' in Victoria, and these included most notably: Wilson's Promontory and Mount Buffalo in 1898, and Wyperfeld, Mallacoota Inlet, and Wingan Inlet in 1909. Similarly, in Western Australia, when John Forrest National Park (then 'The National Park' to Western Australians) was created on the eastern outskirts of Perth in 1900, it was a reservation under the general land legislation, not the creation of a specific statute. Moreover, the term 'national park' was not to be found in any Western Australian legislation at that time.

By contrast, the first Queensland national parks were created under the provisions of the *State Forests and National Parks Act 1906* which, although principally concerned with the creation of timber reserves, was the first general legislation in Australia to provide specifically for the proclamation of national parks. Elsewhere in Australia, and like Yellowstone, some early national parks had been created by specific legislation. The National Park at Belair in South Australia, for instance, was the creation of the *National Park Act 1891*. In Victoria, the reserve encompassing Tower Hill was given the status of 'national park' by a special act of parliament (the *Tower Hill National Park Act*) in 1892.

Tasmania's first national park, Mount Field (simply 'National Park' to Tasmanians at the time), was established in 1915 under provisions in the *Crown Lands Act 1911*. In that year, however, the

new *Scenery Preservation Act 1915* changed the system for national parks, and the park was revoked and re-proclaimed under the new legislation. The 1915 Tasmanian legislation is notable because it was the first in Australia to create a specialised body—the Scenery Preservation Board—for the central control of national parks and other conservation reserves.

## The bushwalking conservation movement

An important aspect of the developing Australian national park movement in the early twentieth century was the activities of various outdoor recreation organisations, particularly walking clubs, which became increasingly numerous around the 1920s. An early development in this respect was the formation in 1914 of the Mountain Trails Club, the initiative of three bushland adventurers of whom one was Myles J. Dunphy. The Mountain Trails Club was an association of 'mountain trackers who preferred the mountains and bushland at vacation time' and its objects referred to such things as the 'lasting enjoyment of the trail', 'the craft of trailing raised to a high level', 'wholesome recreation', 'full application of all the senses, cultivation of faculty of observation, powers of endurance and self-reliance', and a 'regard for welfare and preservation of natural beauties that lie about' (Thompson 1986). It was expected that a mountain trailer would 'reject main roads and beaten tourist routes', but this became advisable for other reasons by the 1920s with the proliferation of the motor car. Walkers had at first mostly used the roads, but they took to the bush as cars became a hazard, and they broadened their interests to include 'the preservation of the bush in which they walked, and their right of access to it'. Many more camping and walking clubs appeared in the 1920s, and in 1927, under the auspices of the Mountain Trails Club, the Sydney Bush Walkers was formed, originating the term 'bushwalking'.

In 1932 a number of bushwalking clubs united under the banner of the NSW Federation of Bushwalking Clubs in order to co-ordinate the campaign to have an area of coastal land immediately to the south of The National Park, and known as the Garrawarra Primitive Area, set aside 'for the purposes of recreation and preservation of its remarkable scenic, forest, jungle and beach attractions'. This campaign succeeded in having the area reserved, and it was later incorporated into the national park. More significantly, however, the year 1932 also saw the formation of the National Parks and Primitive Areas Council, a body with representatives from Sydney Bushwalkers and other like-minded groups.

The National Parks and Primitive Areas Council had among its objects the location of areas suitable for national parks, primitive area reserves, and other such public reserves. It would be an 'independent designing and steering group' to promote current park projects and to 'initiate and design others'. The Council's first project was a proposed Blue Mountains National Park which had been originated by Dunphy, and first brought under the notice of the authorities in June 1932. The first definite step towards the formation of this park occurred in 1937 when an area of nearly 40,000 hectares in the 'Southern Blue Mountains' was reserved for the preservation of native fauna and flora. This, however, was only a small proportion of the proposed national park, and a long battle ensued to achieve further reservations in the Blue Mountains area.

As well as pursuing the reservation of the Blue Mountains National Park, the National Parks and Primitive Areas Council proposed and campaigned for the creation of further reserves around Sydney and in many other parts of the State. These included the Snowy-Indi National Park, which was proposed in the 1930s and was to include contiguous areas in Victoria and New South Wales. This scheme was partly realised in 1944 with the establishment the Kosciusko State Park in New South Wales, under the *Kosciusko State Park Act*. In 1936 a proposal for a 'National Monument Reserve' in the Warrumbungle Mountains was submitted to the Government, and this was realised in 1953 with the reservation of the Warrumbungle National Park. Attention was mostly focussed, however, on the main populated area of the State, from the Hunter valley to the Illawarra, and centred on Sydney.

## National parks associations

In addition to its object of locating and promoting areas suitable for new national parks and primitive area reserves, the National Parks and Primitive Areas Council advocated placing them under central control, 'distinct from shire and municipal parks, state forests, forest reserves, national forests and flora reserves'. Advances were first made to the State Government to create a national parks authority in 1935, but war intervened and it was not until the mid-1950s that an organised attempt to achieve legislation for the uniform administration of national parks began in New South Wales. In February 1957, a public meeting was held in Sydney at which a Central Region National Parks Association was inaugurated. A similar meeting in Newcastle in November 1956 had led to the formation of a Hunter-Manning Region National Parks Association. The NSW Federation of Bushwalking Clubs and representatives of the Sydney Bush Walkers, among other groups, had orchestrated these meetings. The two regional National Parks Associations subsequently elected delegates to a proposed State Council which was formed at a meeting in Sydney in April 1957.

The National Parks Association, like the National Parks and Primitive Areas Council over twenty years earlier, had two fundamental objectives: to define the term 'national park' so as to 'answer the problems of security, purpose, use and misuse', and to establish a national parks authority to administer all national parks throughout the State. It was a principle of the Association that a national park should be dedicated expressly to 'the recreation, inspiration and benefit of all the people', and 'not combined with other purposes' such as the harvesting of timber.

In Queensland, a national parks association was established in 1930, and was the only such organisation in Australia at that time. The first president of the National Parks Association of Queensland was Romeo Lahey, one of the principal campaigners for the establishment of Lamington National Park. The aims adopted by the Queensland association included the preservation in their natural condition of the existing national parks of Queensland, securing the reservation of further suitable areas, and the education of public opinion to a fuller appreciation of the necessity for and value of national parks. Unlike its New South Wales counterpart, the Queensland association did not need to campaign for centralised management of national parks for this had already been achieved through the passage of the *State Forests and National Parks Act* in 1906 (albeit that Queensland's national parks were managed jointly with state forests by the Forestry Service).

The Victorian National Parks Association was established in 1952 with the journalist and naturalist Philip Crosbie Morrison as its first president, and it pressed for the enactment of national parks legislation in its State and for the establishment of an agency for centralised national park management.

## National parks legislation and centralised management

In New South Wales the *National Parks and Wildlife Act* became law on 1 October 1967, ten years after the National Parks Association was founded and began its campaign. This new legislation provided for the reservation 'for the people' of nineteen national parks and state parks. State parks were less significant areas, but these were renamed national parks under amending legislation in 1974. Most parks comprised or included lands that had been reserved or dedicated for similar purposes under the *Lands Acts* at various times since the late nineteenth century. Some, including state parks, had been known popularly as national parks for many years, even though this term had no legal meaning before 1967. The legislation created a single agency, the National Parks and Wildlife Service, to care for, control and manage the original nineteen parks and any new ones created in the future. It replaced the numerous trusts that had been created under various acts to manage the parks separately. Reserves under the new act would be irrevocable except by another Act of Parliament passed for the purpose. For the first time, New South Wales had a comprehensive legislative framework through which national parks could be created and managed.

A similar pattern occurred in three other States. In Victoria, at the urging of the Victorian National Parks Association, a *National Parks Act* was created in 1956, and under it was formed the National Parks Authority, with Crosbie Morrison as its first director, to administer the State's national parks. In South Australia the *National Parks and Wildlife Act 1972* transferred control of national parks to the National Parks and Wildlife Division of the Department of Environment. Until then they had been the responsibility of the National Parks Commission, established under the *National Parks Act 1966*. In Western Australia, the *National Parks Authority Act 1976* established the National Parks Authority, prior to which the National Parks Board, which reported to the Minister for Lands, had controlled national parks.

In Queensland, where national parks legislation had been enacted in 1906, management of national parks continued to be undertaken by the Forestry Service until 1975 when this responsibility was transferred to the newly established National Parks and Wildlife Service. This was the first time that Queensland national parks had been managed by a dedicated nature conservation agency. In Tasmania, the Scenery Preservation Board controlled national parks from 1915 until 1971 when the *National Parks and Wildlife Act 1970* incorporated it with the Animals and Birds Protection Board into a new National Parks and Wildlife Service.

## What about the wildlife?

One of the purposes of national parks from an early stage was the protection of native fauna. By the 1890s it was widely feared that Australia's unique fauna was 'rapidly becoming extinct'. When Ku-ring-gai Chase was established in 1894, it was proposed to create a wildlife preserve where Australian marsupials and other fauna might 'roam and breed in safety'. At small cost a reserve would be created which would 'delight millions yet unborn', and perhaps become 'the only place the future Australian will be able to see a kangaroo outside of his national coat of arms' (Hoben 1900; *Sydney Morning Herald*, 22 September 1902). This concern for the Australian fauna grew until the Wild Life Preservation Society of Australia was formed in 1909. Its objects included 'preserving intact the typical fauna' of the country.

Fauna protection tended to be the domain of independent streams of legislation, and separate forms of reservation. In New South Wales, for instance, a long stream of fauna protection legislation culminated in the *Fauna Protection Act 1948* under which areas of land across the state were dedicated as reserves for the protection, propagation, and study of native fauna. Fauna protection became the responsibility of the National Parks and Wildlife Service when that body was formed in 1967; at the same time, the 'faunal reserves' established under the 1948 Act were renamed 'nature reserves', better expressing the perceived need to preserve the environment as well as, and in order to, preserve the fauna. In 1999 there were 288 nature reserves in NSW, encompassing more than 700,000 hectares, less than a fifth of the area devoted to national parks.

## Conclusion

By the end of the 1970s, all States of Australia had specialised national parks legislation and centralised national parks management agencies. They controlled about 10 million hectares of land designated as 'national parks'. The area has more than doubled since then to be nearly 24 million hectares in 1999. This expansion has partly been the consequence of the development since the 1970s of an increasingly articulate, well-informed and campaign-hardened conservation lobby. An increasing emphasis on the conservation of biodiversity has led to the more systematic reservation of areas of land representative of the widest range of ecosystem types. More recently, this process has been driven by the Federal Government acting under international conservation obligations, and in the particular case of forests, it has involved the large-scale transfer of land previously used for timber production into the national park estate. Despite the strengthening in modern times of the ecosystem protection role of national parks in Australia, they continue, however, to provide space for public recreation, thus retaining that fundamental and vital element of their nineteenth century *raison d'etre*.

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# Australian Forest History

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*Key words:* ecology, fire, Aborigines, settlers, perceptions, industry, labour, social history, forest services, conservation, environmentalism, public history, cultural heritage, historiography

## Australian forest history

The focused writing of Australian forest history is mostly a product of the period since the 1980s when it emerged as a distinct sub-field of Australian environmental history. Both were stimulated by the rise of environmental awareness. Two publications, widely different in style and content were important in stimulating interest in Australian forest history. One was a regional history of the Pilliga cypress pine forests of central New South Wales by farmer and historian Eric Rolls (*A million wild acres: 200 years of man and an Australian forest* (1981)). The other was an authoritative history of the development of forestry administrations in Australia by L.T. Carron, a forester, and (then) academic in the Forestry School at the Australian National University in Canberra (*A history of forestry in Australia* (1985)). Forest history has its own distinct identity and multi-disciplinary following and is probably the strongest component of environmental history writing in the country. This paper briefly explores the main themes and directions in the writing of Australian forest history. It does not purport to be exhaustive but aims to provide an introduction to the literature.

The disciplinary diversity of those writing forest history parallels the diversity of interests that have become involved in forest policy and management in Australia since the 1970s. Prior to then, forest policy and management were largely the preserve of the timber industry and its workforce, the Forest Services and (mainly) State governments. This changed dramatically through the late 1960s and 1970s when, in a short period of time, spectacular conflicts developed over the future of various forested areas throughout the country and particular forms of forest exploitation, e.g. export woodchipping.

Though environmental history is a relatively recent addition to historical studies, historical geography has a much longer lineage as a recognized sub-field in geography. In Australia, the strongest focus in historical geography has been on pioneer settlement, regional development, resource appraisal and public policy with a bias towards farming and pastoralism. Much of this involved dealing with the tree cover and the work of Australian historical geographers is potentially of much value to current forest historians. In particular, a number of historical geographers have written about settlement of the inland where 'woodland' and 'mallee' covered vast areas of the country.

## Australian forest history in context: ecological history and fire history

Ecological history (including fire history) draws together studies in palynology, botany, biogeography, climate, dendrochronology and a range of earth sciences. Environmental historians and historical geographers are expanding the dialogue between these sciences and the humanities to reconstruct past environments and human impacts. An understanding of Australian forests can only be gained by recognizing that they have ancient origins and their distinctive ecology evolved with the drift of what became the Australian continent away from the landmass of Gondwana

about 135 million years ago. The continent moved north and became dryer. The cool and warm rainforests were gradually replaced by sclerophyllous (hard-leaved) vegetation such as eucalypts and acacias. However, some Gondwanan elements remain in the rainforests of Tasmania and the mainland east and northern coasts. There are particular remarkable elements of the cooler and wetter past, for example, the wollemi pine (*Wollemia nobilis*) from the Blue Mountains near Sydney and the relict plants of Palm Valley (near Alice Springs) in central Australia including the red cabbage palm (*Livistona mariae*).

Since the end of the Cretaceous (65 million years ago) Australia's climate has been drying, and over the last 2 million years the geological record shows the continent was subject to periodic fires. Palynological studies indicate a significant increase in fire in the recent period, thought to be related to the arrival of Aboriginal people in Australia around 50 000 years ago, the commonly postulated time span for human presence in Australia. By the time of this arrival, the major vegetation formations present at the time of European settlement were probably established across the continent.

A major area of interest within ecological history is fire from the time of the first Aboriginal settlement to the present. It is part of the study of fire ecology and relates to the modern dilemmas in managing forested landscapes. Massive landscape-scale fires ('bushfires') often ignited by lightning strike still sweep parts of the continent (south-eastern mainland Australia in 2003, Eyre Peninsula in South Australia in 2005) and are of great interest to biological and earth scientists, and forest historians amongst others. While there is no doubt that Aboriginal people burnt the vegetation, the precise effects are unclear and the available evidence does not support the hypothesis that Aboriginal burning forced the evolutionary diversification of the Australian flora. Fire history and fire management have become politically charged topics in Australia in relation to management of public lands (state forests and national parks) and controls over tree clearing on rural land.

## People and the forests: Aborigines and European land settlement post-1788

Aside from the 'burning question', the relationship of Aboriginal people with the forests has been the focus of some recent forest history writing. The recognition that Aboriginal people lived in, harnessed the resources of, and incorporated trees into the 'Dreaming' is mainly a product of the period since the 1970s and owes much to the work of archaeologists in government agencies. The role of Aboriginal people in shaping the detail of the pre-1788 forested landscape is much debated. Aboriginal associations with forests were recorded in the 19th century and are well known, for example, the feasting and ceremony associated with the bunya pine (*Araucaria bidwillii*) in Queensland. There is a long but not well-documented history of Aboriginal people being employed in forestry activities. While there has been significant publication on the effects on Aboriginal people of over 150 years of agricultural and pastoral advance (where forests were mainly cleared), there is less on the situation where forests remained under state control. The cases of Mumbulla Mountain and Mt Dromedary (Gulaga) in south-eastern New South Wales show the maintenance of cultural associations with place, despite long dispossession.

Historical geographers and environmental historians now share an interest in the themes of pioneer settlement, regional development, resource appraisal and public policy. With regard to forest history, there are broadly two 'frontiers'. The first is the pastoral and later agricultural advance across the inland 'woodland'. The second is the clearing of the taller, denser coastal forests for agriculture. The Australian pastoral industry began in the early 1800s when access was gained to the temperate eucalypt woodlands and natural temperate grasslands inland of the Great Dividing Range in south-eastern Australia. Because of the wide spacing of the trees and high proportion of grass, it was possible to stock many areas without the initial felling or ringbarking of trees. In the second half of the 19th century intensification of this inland settlement began and 'close settlement' schemes commenced for the more heavily forested coastal areas. This continued for 100 years. Agrarian idealism permeated public policy for land settlement in all the Australian colonies (these

became States after federation in 1901) and continued as late as the 1960s in some States. There is a significant literature on this theme, but it is biased towards the wetter coastal forests, and the history of forests on inland freehold and leasehold lands is not well developed. Detailed historical accounts of vegetation change are included in some local and regional history publications, though these are often not widely available.

## European perceptions of forests

A major theme in Australian forest history is how the forests were perceived. The forest landscapes varied greatly across the continent. There were relict rainforests, medium to tall, open to closed forests (dominated by eucalypts) and large areas of woodland (dominated by eucalypts and acacias with some callitris and casuarinas) interspersed with grasslands and shrubland. Perceptions of the tree cover in the popular and official descriptions, as well as those used in the biological sciences, forestry and government departments have varied over the last two hundred years. For example, in Queensland, rainforest was commonly referred to as 'scrub' with terminology such as 'hoop pine scrub' and 'good scrub soils'. In northern New South Wales rainforest was officially referred to as 'brush'. Importantly, before the understanding of plate tectonics and continental drift, the Australian rainforests were considered to be a late invading flora from the tropical north (an aberration in an otherwise dry, inhospitable continent!). Only very recently has their evolutionary significance been identified in the knowledge that they are the original flora and this forms the basis for the inscription of important sites on the World Heritage List. The interface between history, ecology, heritage and public policy that this involves has drawn the interest of a number of forest historians.

In contrast to the rainforests, the open tree cover of inland areas of Australia where tree canopies are separated to varying degrees have been officially described, since the commencement of systematic survey and mapping as 'woodland' or 'open woodland'. Where these trees are multi-stemmed, the woodland is termed 'mallee'. Commencing with Australia's first *State of the Forest Report* in 1998 a new definition of forests based on (but not exactly the same as) that agreed in the *National Forest Policy Statement* of 1992 has been adopted. The most significant difference from previous definitions is the incorporation of 'woodland' and 'mallee' in the definition of forests. From the foregoing it is evident that care needs to be taken when examining data on Australia's forest past and present.

The link between forest perceptions and popular and official descriptions and terminology for both the tree cover and types of wood has received some attention but has not been thoroughly traced by forest historians.

## Industrial and labour history

Wood was a vital resource in early colonial Australia and, although products of the industrial revolution such as fencing wire and corrugated iron made an impact from the second half of the 19th century, its importance continued well into the 20th century. The timber industry developed and evolved through a number of stages related to changing technology, timber demand, availability of alternative products, resource availability, land use policy, capital investment and changing perceptions of forest values. Except for the research into forest tramways, industrial history of the forests was largely non-existent before the 1980s. There has been a substantial body of research since then, including the history of sawmilling, particular timber firms, industrial archaeology, the structure of the timber industry and its relationship with the state. Labour history is often included with the industrial history but overall is less well known. However, there are a number of interesting studies of particular timber cutting activities (e.g. the 'woodlines' of the Western Australian Goldfields) and the effects on workers and communities of the cessation of logging in highly contested forests (e.g. the north coast of New South Wales).

An active stream of research prior to the 1980s was the regional studies undertaken by members of the Light Railways Research Society of Australia. Usually based on detailed field

research, the industrial archaeology of the timber tramways was extended into many other aspects of the sawmilling industry for the period 1850 to 1950

## Social and economic history

Social history, in particular of logging towns and mill settlements, has received some attention and is often associated with industrial history, including the tramways, and with fire history. There has been some use of oral sources. Economic history is less well represented in Australian forest history, except as part of industrial history.

## State intervention: history of the forest services

Intervention by the state in the timber industry began in the second half of the 19th century as sawmillers investing in steam-powered mills looked to the state to reserve forest against the agricultural advance, allocate the resource amongst competing mills, and make a start on regeneration of the forest. As well as the needs of the industry, there was a discussion in scientific circles and by some bureaucrats and politicians of the need for forest conservation and management. By 1920 all Australian States had passed *Forestry Acts* and there was a sprinkling of professionally trained staff. However, there was not a national vision of what these new agencies and their staff should do. Powerful Lands Departments, with their mission to settle the land with farmers, were not readily disposed to see potential farmland 'locked away' in forest reserves. It was not until the 1960s that the State Forest Services were well established, by which time 'closer settlement' had ceased to be a force in public policy. The first and still the only comprehensive history of the Forest Services is that by Carron noted earlier. Much has been written about the Forest Services since, especially in relation to the more recent forest conservation conflicts. There are also histories of the State Services commissioned by the agencies or written by former employees.

## Forest conservation and modern environmentalism

Forest conservation and modern environmentalism were an inspiration for the interest in forest history from the 1980s and have become an important focus of research and writing from a number of disciplinary perspectives. From the earliest European settlement in Australia, it is possible to trace a discourse about the effects of settlement on the landscape. A major component of this concerned the tree cover. There were 19th century concerns about ringbarking, reckless exploitation and waste of timber resources, ideas of 'rain following the plough' and 'forests attracting rain', the establishment of the first national parks and reserves. Initiatives in the latter part of the 19th and early part of the 20th centuries were not followed in the following decades, however, by sustained reform of environmental management practices or widespread public agitation for such.

The late 1960s and early 1970s witnessed the birth of modern environmentalism in Australia related to a wider tide of social change in the Western world. The flooding in 1972 of the extraordinarily beautiful Lake Pedder in Tasmania for hydro-electric power generation was instrumental in sharpening conservation awareness. In the following year the publication of *The Fight for the Forests* by Richard Routley (later Sylvan) and Val Routley (later Plumwood), philosophers from the Australian National University, catapulted forest policy and management into centre stage and it has remained there for most of the subsequent three decades. This publication (and enlarged editions in 1974 and 1975) was a sustained critique of hardwood forest woodchipping (for export) and clearing of native forest to establish exotic softwood plantations. In particular, it attacked the 'wood production ideology' of the State Forest Services. The publication dealt a blow to the forestry profession from which it never recovered and became a reference point for numerous subsequent forest conservation campaigns. By the 1980s rainforests assumed a prominent place in changing aesthetic appraisals of the Australian natural environment and this response was deepened by the popularisation of scientific discoveries. Protracted disputes followed including the *cause celebre*

of the early 1980s, the conflict over the proposed Gordon-below-Franklin Dam in the rugged rainforest country of south-west Tasmania.

## National forest policy, public history, cultural heritage in forests

In 1989 the Commonwealth (i.e. federal) Government established the Resource Assessment Commission following pressure by mining, forestry and business interests to develop a better process in the face of ongoing environmental disputes. The Commission was disbanded in 1993 but during its term conducted a major enquiry into forest policy and management reporting in 1992. Also in 1992 the *National Forest Policy Statement* was launched, described as a 'national approach to the sustainable management and use of Australia's forests'. A central feature of the policy is the Regional Forest Agreement process, the largest inter-governmental planning activity related to the environment ever undertaken in Australia. The process involves the formulation of agreements between the Commonwealth and State governments for future management of specific forest areas taking into account economic opportunities, conservation and heritage values, and social impacts of various economic strategies. The process has attracted much interest, bringing an interface between forest history and public policy. A component of its comprehensive regional assessments has been the inclusion of cultural heritage as part of the suite of forest values. These studies have made important contributions to the growth of Australian forest history and knowledge of human use of forest areas.

The foregoing has highlighted recent Commonwealth government involvement in forestry matters. This increased Commonwealth role can be traced from the 1970s when forestry issues became significant socially and politically. This is notable because Australia is a federation of six States and two Territories with roles established by the Constitution. In general, responsibility for land use decision-making and environmental management, including forestry has lain with State governments. Commonwealth government intervention in State environmental management (including forest management) was possible through particular provisions of the Constitution. Since the peak of Commonwealth intervention in the 1980s, a more co-operative approach has characterised very recent Commonwealth–State relations. Commonwealth–State conflicts, changes in public policy and electoral effects have been explored in many disciplines. Where forest issues are involved, this analysis is a significant part of forest history of the recent period.

This raises the question of whether or not Australia ever had a national forest policy prior to the *National Forest Policy Statement* of 1992. Within the first decade of Federation (1901), the heads of the fledgling State Forest Services were discussing issues that demanded 'collective consideration in the interests of the whole Commonwealth'. In the 1920s the Commonwealth established a Forestry Bureau and a national professional forestry school in Canberra. Throughout World War II the Commonwealth exercised complete control over the demand and supply of wood as a material of war. In 1964 the Australian Forestry Council was formed with an objective to formulate and recommend a forest policy for Australia. Finance was one way to influence policy nationally, and from the late 1960s the Commonwealth encouraged an expanded softwood planting program (for 'self sufficiency' in softwoods) with loans under several Softwood Forestry Agreement Acts 1967–78. This was reinforced in the FORWOOD 1974, a production development plan based on an analysis of likely future supply of and demand for wood. This recommended a national policy of self-sufficiency and a coniferous plantation program. Plantations have not yet received much attention in Australian forest history.

## Other themes: biography; studies of particular forests, tree species or forest regions; studies of timber firms, and historiography

As well as the themes discussed above, other writing in forest history includes: biography; studies of particular forests, tree species or forest regions; studies of timber firms, and historiography (philosophical and theoretical perspectives on the writing of forest history). A number of biographical studies are included in the conference proceedings of the Australian Forest History

Society (see below). Studies of forests, forest regions and tree species include: inland cypress pine (*Callitris* spp.) forests, rainforests (from Tasmania to northern Australia), brigalow (*Acacia harpophylla*) forest of sub-humid eastern Australia, the Western Australian jarrah (*Eucalyptus marginata*) and karri (*E. diversicolor*) forests, Victoria's mountain ash (*E. regnans*), red cedar (*Toona ciliata*) and hoop pine (*Araucaria cunninghamii*). There are a number of studies of timber firms including short histories, as part of industrial and social history (including tramway history) and books on particular firms. There are significant gaps that will be difficult to fill given the structure of the industry until the fairly recent period. The conference proceedings of the Australian Forest History Society provide an introduction to historiography in relation to the writing of Australian forest history.

## Australian Forest History Society Inc.

An important stimulant to the writing of Australian forest history was the formation of the Australian Forest History Society in 1988. The society was formed to bring together those with an interest in forest history and a series of conferences have been held between 1988 and 2004 enabling the sharing of research and knowledge. The aim of the Society is 'to advance historical understanding of human interactions with Australian forest and woodland environments'. The Society's conferences have also accommodated contributions from an active group of New Zealand forest historians. An indication of the interest in forest history is the set of substantial edited collections from these conferences (see list at end of bibliography).

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