



Autumn 2018
Vol 29 No 234

Australian Plants

Featuring Rainforest

\$6^{.50}





Contents

Editorial	Merle Thompson	195
Australian Plants Awards	Ben Walcott	196
Fifty Shades of Green – the magic of rainforest	Lawrie Smith AM	200
Rainforests of the Gondwana Rainforests of Australia World Heritage Area	Bill McDonald & John Hunter	206
Northern NSW rainforests in photographs	Hugh Nicholson	210
A case-study of rainforest restoration adjacent to Dorrigo National Park.	Craig Stehn	214
The Rainforest app – to have and to use where ever you go!	Gwen Harden	222
Rainforest in Tasmania	Dick Burns OAM	227
Exploring Tasmanian Rainforests during the ANPSA Conference, January 2018	Dr Eddy Wajon & Pamela Finger	232

Cover photos by Dr Eddy Wajon

Front: Walking in the cutting, Bird River Track near Queenstown, south-west Tasmania

Back: *Dicksonia antarctica* along the Nelson Falls Track

Australian Plants articles

Australian Plants is published quarterly to promote knowledge of Australian plants.

Editors: John Aitken and Merle Thompson

Layout: Lachlan McLaine

Contributions and offers to produce an issue are welcome. Please contact:

Editors, 'Australian Plants'

PO Box 263, Cremorne Junction NSW 2090

E-mail office@austplants.com.au

All published materials are copyright, as directed, by the authors and photographers. Permission to reprint material must be obtained from the copyright holder.

Opinions expressed in this publication are those of the authors and may not represent official policy of the Australian Plants Society NSW Ltd

Australian Plants No. 234 Issue of Volume 29, which comprises issues 230–237.

Published quarterly and available nationally in 2500 copies by the Australian Plants Society NSW Ltd

© Australian Plants Society NSW Ltd 2018 ABN 87002680408 ISSN 0005-0008

Printed by Elect Printing, Fyshwick, ACT Print post approved 100009857

Editorial

Merle Thompson

Every two years the Australian Native Plants Society (Australia) honours two people with the Australian Plants Award. The award recognises people who have made an outstanding contribution to the knowledge of Australian plants. There are two categories – professional and amateur. Some people have expressed the idea that the word “amateur” is somewhat downgrading but it simply means that the person does not earn their living by working in, for example, botany or horticulture relating to Australian plants. Recipients are presented with a citation and a beautiful silver medallion.

At the Biennial Conference in Hobart in January 2018 the people so honoured were Alexander Floyd in the professional category and Diana Snape in the amateur category. They are both very worthy recipients as you can see from their citations which appear on the following pages.

From a personal perspective I have met Diana and her husband, Brian, at several biennial conferences over the last 25 years and have found them to be a wonderfully caring, friendly couple with an absolutely amazing depth of knowledge and the generosity of spirit to share their passion and knowledge and brilliant concepts of design.

I only met Alex for the first time last September when, even though he is now in his 90's, he was leading people around the rainforest section of the Coffs Harbour Botanic Gardens and sharing his knowledge of rainforest plants. But my association with Alex actually goes back to the late 1970s, although I was not really conscious of his name. It was my early days of learning about Australian plants and I had (and still have) a set of the “little green books” on the families of rainforest plants written by Alex and published by the, then, Forestry Commission of NSW.

That occasion was the Australian Plants Society NSW Annual Get Together and the theme for the talks was the rainforests of the north coast of NSW. The theme of this issue is taken from that seminar and three of the articles are based on those presentations. What a wonderful juxtaposition of ideas that Alex was then the APA awardee.

But rainforests occur over a much wider area of Australia. Rainforests of a very different nature occur in Tasmania, the venue for the Biennial Conference in January. And in another special juxtaposition some conference presentations featured aspects of rainforest and places visited on the conference tours enabled participants to experience them first hand. These rainforests are also featured in this issue.





**Australian Native Plants Society
(Australia) Inc.**

**Australian Plants Award – Professional
Category**

**Presented to Alexander Floyd OAM
Biennial Conference 2018, Hobart**

Born in Victoria in 1926, Alex entered the University of Melbourne in 1947 reading, and excelling in, botany. He began his professional life with the Australian Forestry School in Canberra in 1949. After graduating with a B.Sc. (For.) in 1951, Alex joined the Forestry Commission of New South Wales as a forester based in southern New South Wales. After a two year period as Forest Ecologist and Assistant Botanist in Papua New Guinea, he returned to the Forestry Commission of NSW in 1956 as a silviculturalist based in Coffs Harbour where he spent 15 years as the officer-in-charge of the Forestry Research Centre and gaining his Master of Science in Forestry in 1961.

It was from this time that Alex's interest in rainforests became evident with the publication of his ***N.S.W. Rainforest Trees*** in twelve parts (1960-1983), issued as 'Research Notes' of the Commission and providing a comprehensive account of rainforest species of NSW, Victoria and southern Queensland. It would be ultimately published by the Forestry Commission in 1989 and republished in 2008 by Terania Rainforest Publishing as ***Rainforest Trees of Mainland South-eastern Australia***. With a writing style that has simplified the botany and given a standardized description of trunk, bark, branchlet and leaf, the book is widely considered the indispensable reference since its initial publication.

Because of this expertise, Alex was seconded in 1976 to the NSW National Parks and Wildlife Service in order to undertake a review of the conservation status of the State's rainforest communities. When in the mid 1970s and early 1980s battle lines were drawn between the conservationists and sawmillers, it was foresters of the Forestry Commission in the middle. Of particular note was his role in providing much research data and advice in the identification of 'rainforests' and the appropriateness of logging in the Terania Creek Basin dispute. It was to prove decisive in the eventual outcome.

Alex has been acknowledged by having a number of plants named after him. Interestingly (and maybe tellingly) while most are found in the

rainforest and identified in his major published work (*Floydia praealta*; *Bosistoa floydii*; *Cryptocarya floydii* and *Endiandra floydii*), of the others: *Alexfloydia repens* is a grass and is found close to Coffs Harbour, while *Acacia floydii*, *Homoranthus floydii* and *Zieria floydii* are found in other parts of the State and are not rainforest flora.

On 26 January 2008, Alexander Geoffrey Floyd was awarded the **Medal of the Order of Australia** for service to botany, particularly through research and identification of sub-tropical rainforest plants and through support for the North Coast Regional Botanic Gardens, and to conservation and environmental education.

Alex has been a member of APS NSW since March 1996 and is currently a member of the Coffs Harbour District Group. In 2016, Alex was awarded Life Membership of APS NSW in recognition of his outstanding contributions in accordance with the objectives of APS NSW.

ANPSA President Benjamin Walcott



Alex sharing his knowledge and love of rainforests with a group.





**Australian Native Plants Society
(Australia) Inc.**
**Australian Plants Award – Amateur
Category**

Presented to Diana Snape
Biennial Conference 2018, Hobart

Diana gained a Master of Science degree at the University of Sydney and taught science at the University and at secondary schools in Sydney and Melbourne. She wrote her first book, *Meet the First 30 Elements* in 1989, a chemistry text for junior high school students published by Science Teachers Association of Victoria.

Diana joined the Australian Plants Society (then SGAP) in New South Wales in 1960. When she and her husband moved to Melbourne in 1967 Diana joined APS Victoria.

Diana was a member of the Open Garden Scheme selection committee and actively promoted the scheme in Victoria. She and her husband created a beautiful landscaped Australian plants garden in Hawthorn East which has been featured in *Landscape Australia*, *Australian House and Garden* and in overseas publications.

Diana and her husband Brian support the Royal Botanic Gardens, Victoria and also the Australian Flora Foundation research fund which fosters research on Australian plants. The Snape Reserve at Dimboola, Victoria was acquired by Trust for Nature in 2002 and named to honour the personal generosity of Diana and her husband. It is a 754 hectare property adjacent to the Little Desert National Park.

Diana founded the ANPSA Garden Design Study Group in April 1993. This study group became popular almost immediately and grew to a membership of over 200 in 1996. The group remains very active with sub- groups formed in several areas of the country. As Leader /Newsletter editor for 10 years, Diana ensured the publication of 41 newsletters each containing about 20 pages. The newsletters contained articles from Diana and other group members.

Diana led the Melbourne sub-group from 1993 until 2017, almost a quarter of a century!



Diana with Ben Walcott in the display area at the conference
Previous page: Diana addressing the audience after her presentation. Photo: Rosemary Verbeeten

Diana has written many articles for *Growing Australian*, the Australian Plants Society Victoria Newsletter as well as other Australian Plants Society journals. With over 70 articles published, Diana's skill to communicate through the written word is clearly evident.

Diana is the author of two books on garden design and the use of Australian native plants: *Australian Native gardens: putting visions into practice* published by Lothian in 1992 which kindled the interest to form the ANPSA Garden Design Study Group and *The Australian Garden: Designing with Australian Plants* Published by Blooming Books first in 2003 and reprinted in 2008, with some input from other study group members, which has sold over 10,000 copies. Diana was among the first to promote through her books and talks the idea of an Australian garden using Australian native plants. Employing her depth of experience, knowledge and expertise in using Australian plants in garden design, Diana is able to demonstrate how to achieve vistas of harmony and beauty in every situation and climate.

ANPSA President Benjamin Walcott



Fifty Shades of Green – the ‘magic’ of rainforest!

Lawrie Smith AM

Lawrie has been a member of this Society for almost five decades, being elected President of both ANPSA and Native Plants Queensland. During his career as a landscape architect since 1972, he has primarily concentrated on the provision of specialised parkland, botanic gardens and open space developments, as well as major national and international exhibitions all of which display and introduce people to the unique quality and value of the Australian flora and environment.

Rainforest in Australia is a limited, finite resource offering diversity of species with varied uses. These remarkable communities have been exploited over the past two centuries, since the wise and sustainable land stewardship by the indigenous peoples was largely displaced by less caring settlers from abroad.

Almost every Australian bioregion variously supports verdant notophyll species with a direct connection, however ancient, to what we describe as rainforest. From the cold temperate climate of Tasmania to the heat and humidity of tropical Far North Queensland, rainforest and dry rainforest exists in expansive areas or often only in small pockets, to provide a green canopy to shade the forest floor beneath.

A growing awareness of the value and diversity of rainforest plants is encouraged through the living collections in the Botanic Gardens of Australia, particularly those along the eastern seaboard. Each Garden establishes, researches and interprets the values of the specific rainforest flora of their bioregion, and this often also includes species of more distant bioregions.

The composition, botanic qualities and amenity value of each rainforest collection is unique to, and defined by, the associated local climatic and bioregional conditions. Collectively these regional botanic gardens offer in their collections a comprehensive range of characteristic rainforest types, each with an individual palette of varied species.



Davidsonia pruriens

These ex-situ collections are invaluable in terms of the general conservation of rainforest species established in the various Gardens. Equally importantly is the available information and interpretation of specimens to educate the public about their particular site preferences, physical characteristics and opportunities for application in horticulture.

Gardens typically establish species in ecological groupings that approximate the natural rainforest density and conditions where specimens compete for sunlight and nutrients. The resulting growth is ‘natural’ upright, tall, open habit in trees, shrubs and covers, which is not easily translated by the public when selecting plants from the forest to use in a more open situation such as a residential garden or even a city park.

Consequently, it is important to develop in parallel, research and demonstration gardens of selected rainforest species to trial and interpret their suitability for use in amenity horticulture. These gardens will of necessity, be varied in size and site relationships, to comprehensively inform the observer of the specific plant characteristics and suitability. For instance: plantation of specimen shade trees in a well-spaced arboretum setting; growing selected species formally as screens and hedges; trialling smaller specimens suited to trimmed low planting for understory use or as bedding cover; shade tolerant specimens for feature shade house culture; other selected species with special cultural or artistic as well as botanic value.

Many attractive, unique and useful rainforest species are simply overlooked in favour of the better known, often exotic, species, purely because there are few well-accepted locations where such comparisons between mature specimens can be easily made. This is where any Regional Botanic Garden is so well placed to carry out the research, demonstration, information and promotion of this unique Australian plant community.



Rainforest is far more than just a sea of foliage, resplendent in ‘Fifty Shades of Green’ which pales into insignificance in comparison with the vibrant primary colours of the new foliage, spectacular flowers and enticing fruits.

Alloxylon flammeum





Many rainforest species will thrive in more open conditions in cultivation and may change their form; tall upright trees grown as feature specimens will often become short, dense and floriferous without the close competition that results in their usual erect form in nature.

New foliage, flowers, fruits can be produced at any time, often triggered by specific microclimate conditions – so you never know when your rainforest garden will produce colour – intermittent, irregular, and unexpected colour will surprise and please!!

Rainforest colours are vibrant, sometimes fluorescent to ensure that birds, animals and insects can see the flowers and fruits across the foliage in the ‘fifty shades of green’.

The word “rainforest” primarily conjures up images of the moisture, heat and humidity of the tropical and subtropical areas but ‘rainforest’ in many types extends from Tasmania to Cape York. That is the importance of Australia’s Regional Botanic Gardens in assisting the selection of appropriate bioregional species for use in establishing specialised gardens in that region. The basic message is, it will be difficult if not impossible to establish a rainforest garden of plants originating in the Queensland wet tropics in temperate Australia.

The diversity and versatility of rainforest species offers an extensive palette of plants to use as dramatic horticultural subjects in landscape and garden design; this is ideally demonstrated in the extensive Subtropical Rainforest established in Roma Street Parkland in central Brisbane. Descriptions of some of the more useful or unusual specimens follow, but choose wisely to ensure that the micro-climatic requirements of the selected plant match your local site conditions.



Roma Street Parkland,
Brisbane – Rainforest and
Lake Precinct

Alloxylon flammeum Pictured on page 200
The brilliant scarlet flowers massed over the deep green upright canopy make the Tree Waratah an ideal specimen tree

Davidsonia pruriens Pictured on page 199
Davidson Plum offers interest in the tall erect trunk covered in pink flowers followed by large purple plums that make delicious jam.

Deplanchea tetraphylla
Hundreds of florets create large golden crowns displayed terminally on many branches of the Golden Bouquet tree.

Dillenia alata
The Red Beech tree has distinctive red papery bark on contorted trunks with brilliant yellow guinea flowers scattered over the canopy

Phaius australis
Southern Swamp Orchid spikes up to two metres tall emerge from the dense clumps of upright pleated leaves to provide a long display of magenta and cream flowers

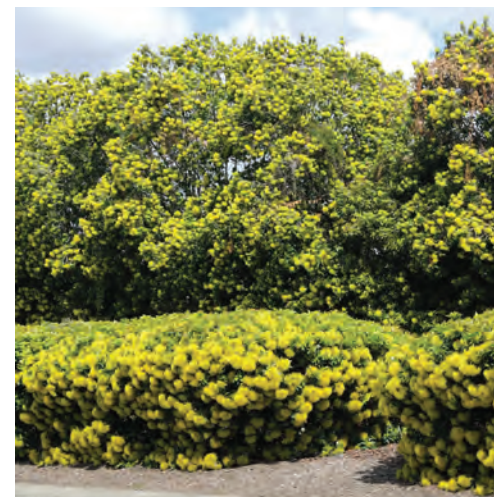
Xanthostemon chrysanthus
Useful as a specimen tree or a clipped hedge, the Golden Penda is widely used in landscape for its green and gold contrast



Deplanchea tetraphylla



Dillenia alata



Xanthostemon chrysanthus



Phaius australis





Elaeocarpus grandis (angustifolius)

Blue Quandong is perhaps the most evocative rainforest tree; stately, upright, deep green leaves turning brilliant red randomly, massed white bell flowers and lustrous purple/blue marble fruits scattered over the forest floor.

Graptophyllum ilicifolium

Mount Blackwood Holly is an ideal screen or formal hedge which seemingly bursts in to flame with its scarlet fuchsia like flowers from every leaf axil.

Brachychiton bidwillii

Little Kurrajong has an ornate branching habit, decorated when deciduous from ground level to canopy top by clusters of iridescent pink flowers.



Elaeocarpus grandis (angustifolius)



Graptophyllum ilicifolium



Brachychiton bidwillii

Syzygium wilsonii

The fist size purple flowers dusted with gold adorn the dense green weeping foliage of the Powder Puff Lilly Pilly providing an ideal screen

Curcuma australasica

Cape York Lily or native turmeric is a herbaceous perennial ginger, dormant in winter, the brilliant pink 'flowers' pop up in spring followed by the pleated leaves.

Castanospermum australe

The vivid flowers of the Black Bean are displayed along the branches inside the canopy and are best seen when looking up from under the tree

Tecomanthe sp. Roaring Meg

This dramatic vigorous climber from the Daintree is perhaps Australia's best flowering vine with large clusters of vibrant pink bell flowers produced along all the stems from ground level to the upper tips.

Proiphys amboinensis

In shaded moist conditions the Cardwell Lily forms clumps of large rounded pleated leaves to 400mm diameter which is a perfect foil for the spherical clusters of white perfumed flowers more than one metre tall.



Proiphys amboinensis



Syzygium wilsonii



Curcuma australasica



Castanospermum australe



Tecomanthe sp. Roaring Meg





Rainforests of the Gondwana Rainforests of Australia World Heritage Area

Extract from Bill McDonald and John Hunter (2010). Vegetation. In: (Kitching, R., Braithwaite, R. and Cavanaugh, J. editors) *Remnants of Gondwana*. Surrey Beatty & Son, Baulkham Hills, NSW. Pp. 129-134. *Reproduced with permission.*

The rainforests of the WHA have a rich tree and shrub flora (more than 350 species), although diversity and structural complexity vary widely between different types (Adam 1987). The sheltered microclimate within rainforests also permits the occurrence of a range of particular life forms and physiognomic features. They include epiphytes (both vascular and cryptogamic), palms and ferns, lianes and buttressed stems.

Four principal rainforest types are recognized within the WHA, based on the classification developed for NSW rainforests by Baur (1965). These are:

- (i) subtropical rainforest
- (ii) dry rainforest
- (iii) warm temperate rainforest and
- (iv) cool temperate rainforest

Within these four major groups, Floyd (1990) recognized eighteen floristic alliances with a total of fifty-seven sub-alliances in NSW.

The classificatory system and terminology used for NSW rainforests is relatively simple, in contrast with the structural-physiognomic system developed for Australian rainforests by Webb and co-workers (Webb 1958, 1978), but the two are closely correlated. The NSW terminology perhaps puts undue emphasis on climate as a determinant of rainforest distribution, while other environmental factors are also important, particularly geological substrate and soil type.

Subtropical rainforest (complex notophyll vine forest, notophyll vine forest, araucarian notophyll vine forest (Webb 1978))

Subtropical rainforest is the most structurally and floristically diverse rainforest type in the WHA. It prefers the richer volcanic and alluvial soils with more than 1,300 mm rainfall annually. Subtropical rainforest has a tall uneven canopy with up to 3 layers and 10- 60 tree species. Canopy leaves are usually in the notophyll or mesophyll size ranges. Characteristic features include large emergent strangling figs, palms, large woody vines, epiphytes and stem buttressing.

This rainforest type is divided into two sub-forms – lowland (or warm) subtropical rainforest and cool subtropical rainforest. In northern NSW (and the adjacent SE Queensland) the two sub-forms are segregated along an altitudinal gradient, with cool subtropical rainforest generally found above 800-900 m. With increasing latitude, cool subtropical rainforest descends to lower altitudes and displaces the lowland subtropical rainforest.

Prominent species in lowland warm subtropical rainforest include *Argyrodendron* spp. (particularly *A. trifoliolatum*), *Pseudoweinmannia lachnocarpa*, *Dendrocnide excelsa* and *Castanospermum australe*. Emergent species include *Ficus* spp. (especially *Ficus macrophylla*), *Lophostemon confertus* and *Araucaria cunninghamii*.

In the WHA, cool STRf differs from lowland STRf in its lower species diversity and in the greater predominance of certain species, particularly *Sloanea woollsii*, *Karrabina benthamiana*, *Dysoxylum fraserianum*, *Ackama paniculosa* and *Cryptocarya erythroxylon*.

Lowland subtropical rainforests have been largely destroyed by clearing for agriculture, notably that of the Big Scrub which occupied approximately 75,000 hectares and has been reduced to a dozen or so fragments totalling less than 1,000 hectares. The largest areas remaining are in the foothills and lower slopes of the Lamington and Springbrook plateaus, the Tweed Range and Levers Plateau.

Extensive areas of cool subtropical rainforest occur in Lamington and Border Ranges National Parks as well as the Main Range and Richmond Range NPs. Other less extensive areas occur at lower altitudes in Dorrigo, New England and Barrington Tops NPs.

Littoral rainforest is considered a derivative of subtropical rainforest and is found in small stands on coastal sand dunes and headlands. In relatively sheltered situations, it may form a low forest 10-20 m high, but with increasing exposure it is reduced to a dense wind-sheared thicket. The largest remaining stand in NSW is found in Iluka Nature Reserve, which forms part of the WHA.

Dry rainforest (araucarian notophyll vine forest, araucarian microphyll vine forest, low microphyll vine forest, low microphyll vine thicket)

This term is applied to rainforests with a relatively simple structure, generally with two distinct tree strata – a low to medium height closed canopy above which is a discontinuous layer of emergents. The major emergents in the WHA are *Araucaria cunninghamii*, *Brachychiton discolor* and *Flindersia australis*. Other locally important species





include *Ficus* spp., *Ehretia acuminata* and *Grevillea robusta*. The canopy is often quite diverse and some species are semi-deciduous (eg. *Flindersia australis*) or deciduous (eg. *Brachychiton discolor*). Leaf sizes are often smaller (microphylls). Large vines are common and vascular epiphytes may be rare or sometimes locally common. There are no palms and bryophytes and ferns are usually scarce.

Dry rainforest is generally found on fertile soils under lower and more seasonal rainfall conditions than subtropical rainforest. It also occurs on shallow rocky soils on steep slopes.

Major areas of dry rainforest are found on basaltic soils on the western McPherson and Main Ranges and along the Richmond Range. These rainforests share many of the structural features and species of subtropical rainforest. They have an irregular canopy 5-20 m tall with emergent *Araucaria cunninghamii* up to 40 m or more in height.

Structurally simpler forms of dry rainforest are found where soil moisture and/or nutrients are more limiting. They are often found in small patches on steep scree slopes, often along drainage lines. This is the major rainforest type in the gorges of the escarpment in the upper Clarence, Macleay and Manning River catchments.

The rainforest canopy is relatively even and low (10 – 20 m) with one to a few dominant tree species. *Backhousia sciadophora* (shatterwood) is particularly common, and there are also areas in which *B. myrtifolia* (grey myrtle) predominates.

Warm temperate rainforest (simple notophyll evergreen vine forest)

Warm temperate rainforests have a much simpler structure and floristic composition than subtropical rainforest. The canopy is generally even and dominated by 3 - 5 or even a single tree species. Leaves are generally smaller than those of subtropical rainforest (notophyll and microphyll). Buttressing is rare and most of the trees have relatively slender columnar trunks. Large woody vines and vascular epiphytes are present but not abundantly so, while small wiry vines are common. Ferns and both ground and epiphytic bryophytes may be abundant.

Ceratopetalum apetalum occurs in and frequently dominates most stands of warm temperate rainforest up to 800 m altitude, but at higher altitudes it is replaced by *Doryphora sassafras*, *Quintinia sieberi* and *Schizomeria ovata*.

The most extensive areas within the WHA are found on acid soils in Washpool and Gibraltar Range National Parks. Other areas are found on the Tweed Caldera (Lamington, Springbrook and Nightcap NPs),

Dorrigo, New England and Werrikimbe NPs. Here they occur adjacent to subtropical rainforests, but occupying less fertile substrates, eg. rhyolite or metasediments.

Cool temperate rainforest (microphyll fern forest)

These communities have an even simpler structure than warm temperate rainforest, normally with a single species in the canopy and very few tree species in the lower strata. Leaf sizes are very small (microphyll and nanophyll). Tree ferns, ground ferns, bryophytes and lichens are abundant and conspicuous. Epiphytes and vines are rare.

CTRf is typically dominated by *Nothofagus moorei*, which is found entirely within the WHA. On exposed ridges it may form a dense low forest (10-20 m high) (eg. McPherson Range), but in more favourable sites it forms a tall forest with a canopy up to 45 – 50 m high (eg. Mt Banda Banda in the Hastings catchment). These taller forests often have a lower tree layer of, eg. *Doryphora sassafras*, *Orites excelsus*, *Elaeocarpus holopetalus* and *Ceratopetalum apetalum*.

In some areas such as Gibraltar Range and Mt Hyland, *Nothofagus moorei* is absent and the cool temperate rainforest is dominated by *Doryphora sassafras* and (Mt Hyland) *Elaeocarpus holopetalus*.

Most stands of cool temperate rainforest occur in cool, frequently wet and misty sites at high altitudes (mostly at or above 900 m altitude), with annual rainfall in excess of 1750 mm. In some areas however, eg. eastern Dorrigo and western Lamington and Border Ranges NPs it may be found at considerably lower altitudes as a scattered fringe along creeks.

Major areas of cool temperate rainforest, with altitudinal transitions to STRf, can be seen in Border Ranges and Lamington NPs, New England NP and Barrington Tops NP.

References

- Adam, P. (1987). *New South Wales Rainforests. The Nomination for the World Heritage List*. NPWS, Sydney.
- Baur, G.N. (1965) Forest types in New South Wales. Forestry Commission of NSW Research Note 17. Forestry Commission of NSW, Sydney.
- Floyd, A.G. (1990). *Australian Rainforests in New South Wales*. Surrey Beatty, Chipping Norton.
- Webb, L.J. (1959). A physiognomic classification of Australian rainforests. *Journal of Ecology* 47: 551-70.
- Webb, L.J. (1978). A general classification of Australian rainforests. *Australian Plants* 9: 349-363.





Northern NSW rainforests in photographs

All photos by Hugh Nicholson

Hugh and Nan Nicholson are the proprietors of *Terania Rainforest Publishing*. Their publications include *Australian Rainforest Plants Vols I-VI*; each of which contains information on over 100 rainforest species with information on their appearance, distribution and behaviour in the wild and their use in the garden. They have also re-published Alex Floyd's *Rainforest Trees of Mainland South-eastern Australia* and made significant contributions to the app described on p222. Previously they conducted a nursery for 20 years in which they propagated rainforest plants and for many years have been involved in activism to preserve the rainforests of northern New South Wales.

Sub-tropical rainforest



Nightcap
National Park



Fruits of *Synoum glandulosum*,
Scentless Rosewood



Pittosporum revolutum



Strangler fig on *Lophostemon confertus*

Dry rainforest



Araucaria cunninghamii (Hoop Pine) and *Brachychiton discolor* in Mallanganee Nature Reserve



Gaultheria viridicarpa, Green waxberry



Eucryphia moorei



Hoya australis



Lichen





Warm temperate rainforest



Ceratopetalum apetalum (Coachwood)



Omalanthus populifolius (Bleeding Heart)



Amyema pendula



Bryophytes

Cool temperate rainforest



Barrington Tops National Park *Nothofagus moorei* (Antarctic beech)



Davidsonia jerseyana (Davidson's Plum)





A case-study of rainforest restoration activities on an abandoned paddock adjacent to Dorrigo National Park.

Craig Stehn – Jaliigirr Biodiversity Alliance.

The Jaliigirr Biodiversity Alliance (jaliigirr is Gumbaynggirr for tree) is a voluntary partnership of 20 key natural resource management stakeholders. The Alliance has been established to support the voluntary contributions of organisations, landholders and community and Aboriginal community, to improve and protect the biodiversity of the diverse landscapes between the Dorrigo Plateau, the hinterland and the coastal plains of the mid north coast of New South Wales. Craig is currently on the executive of the Alliance and has previously worked on the projects.

Case-study summary

This case-study documents and assesses rainforest restoration activities undertaken in an abandoned paddock adjacent to Dorrigo National Park over a 20-year period between 1996 and 2016.

Site history

Vegetation clearing has been widespread on the Dorrigo Plateau in northern New South Wales. The rainforest communities that once existed on the rich plateau basalts are now restricted to isolated gullies or areas not suitable for agriculture, and many of the remaining remnants are affected by grazing and weed invasion. Dorrigo National Park is the most significant remnant of this previous vegetation.

In 1975 the National Parks and Wildlife Service gained control of three abandoned paddocks along Dome Rd, adjacent to Dorrigo National Park. These paddocks had previously been leased out for grazing and were mostly cleared, with only occasional remnant trees. Pasture areas were dominated by kikuyu (*Pennisetum clandestinum*) and small leaf privet (*Ligustrum sinense*) regrowth.

Restoration goals

The original vegetation, and the target community for the restoration project, was sub-tropical rainforest dominated by *Sloanea woollsii*, *Argyrodendron actinophyllum*, *Ficus watkinsiana*, *Dendrocnide excelsa*, *Orites excelsa* and *Planchonella australis* (Floyd (1990) STRf Suballiance No. 7).

Restoration activities

In early 1997 6 ha was cleared of small leaf privet (*L. sinense*), deep ripped, fenced and then planted with 17,500 tube-stock (13,500 *Acacia*

melanoxylon, 4,000 mixed rainforest species). A further 4,000 *A. melanoxylon* and 1,500 mixed rainforest species were planted in 1999 to cover seedling mortality.



Dorrigo National Park restoration site: Clearing to left shows the main restoration site (Photo 1973)

Revegetation methods used

Two different revegetation methods were trialled at the site. These methods were:

- Single species, *A. melanoxylon* planting at 2 m x 2 m spacing (13,500 plants across 5 ha).
- Mixed species rainforest island plantings (26 islands at 20 m x 20 m) (4,000 plants across a total of 1 ha).

Rainforest restoration models

These planting techniques are examples of two approaches to rainforest reafforestation that were commonly used in the late 1990's.

1. Framework Model: The framework model utilises hardy, fast-growing rainforest pioneers to quickly “capture” a site and outcompete aggressive ground-layer species that may act as a barrier to regeneration. These framework species then act as a catalyst for on-going rainforest recruitment and the building of species diversity by attracting seed dispersing animals to the site (Goosem and Tucker 1995).





The single species *A. melanoxyton* planting is an example of a simplified framework model. Most framework plantings include multiple rainforest pioneer species (typically 4 – 20) with some diversity of fruit types and life forms included in the initial species mix. Although the *A. melanoxyton* planting had limited diversity, the close (2 m) spacing resulted in a closed canopy after approximately 4 years and provided frost protection and shading across the site.

2. Maximum Diversity Model: The maximum diversity model includes a diverse mix of mature phase rainforest species with a smaller proportion of fast growing early successional species (Kooyman 1996). By including these mature phase species in the original planting there is less reliance on ongoing seed dispersal to build diversity over time. The mixed species rainforest islands are examples of the maximum diversity model. A total of 26 different species were included in each of these plantings, and mixed species islands were spread throughout the *A. melanoxyton* planting to attract seed dispersing animals across the entire site.

Assessing restoration success

Plant survival: Seedling losses due to frost were high within the first 18 months, with 29% of the acacias and 37% of the mixed rainforest species needing replacement. Plant losses continued across the site after the initial replanting in 1999, with the mixed species plots suffering



Aerial view looking north-west of revegetation area in REGEN 1. Photo taken in 2007 – Tim Scanlon.

Subscriptions to Australian Plants

Australian Plants may be received by membership or subscription.

Membership: Contact the Secretary of the following Societies: Canberra, New South Wales, South Australia, Tasmania and Western Australia.

Annual subscription: \$27.50 including postage to your address.
Three-year subscription: \$82.50. Overseas subscription \$45.00.

Contact: Subscription Officer PO Box 3066 Bowenfels NSW 2790;
Email: merleaps@bigpond.com; Fax: 02 6351 2384

Binders: To fit the holes drilled. \$6.50. Packaging and postage in Australia is \$9.00 for 1–2 binders. For 3+ issues P&P advised on order.

Past Issues: Limited supplies of recently published past issues are available at \$5.00 plus \$2.00 postage in Australia for 1–3 issues. For 3+ issues P&P advised on order.

Contact the Australian Plants Society NSW Ltd
PO Box 5026 Old Toongabbie NSW 2146
Phone (02) 9631 4085 or Email office@austplants.com.au

Mail Order Book Services: Contact Society Secretaries for information on services available.

Note to subscribers

Please refer to the envelope in which you receive your journal. This will show the date of expiry of your subscription and your subscriber number – a 5-digit number shown above your name.

Use the form on the following page to renew your subscription if it is due. Include your subscriber number, especially if you are paying by credit card as this number is used instead of your name for security reasons when processing your payment.

Do not use this form if you are a member of the Canberra, NSW, South Australia, Tasmania or WA societies (as listed on page 3 of this insert) and you receive the *Australian Plants* journal as part of your membership or if you pay your subscription via SGAP Queensland.

Payment by Direct Deposit.

ANZ Bank

Account Name – Australian Plants Society NSW Ltd

BSB: 012 352 Account No: 302 301 693

It is essential that the depositor can be identified.

WE REQUIRE THAT YOU RECORD YOUR SUBSCRIBER NUMBER AND YOUR SURNAME ON THE DEPOSIT SLIP.

New subscribers should record their surname and send a completed form noting the date of deposit.

Note: Online payment is now available on the Australian Plants Society NSW website www.austplants.com.au. Existing subscribers please contact Subscription Officer for login information.





Australian Plants journal subscription

NEW ☐ RENEWAL ☐ GIFT ☐

Rate WITHIN AUSTRALIA is \$27.50; OVERSEAS rate is AU\$45.00.

Your subscription will cover four issues commencing with the next issue or from the end of your current subscription.

Please refer to notes on previous page before completing this form.

Name

Address

State Postcode

Telephone () Fax ()

Email Subscriber number

Payment methods: For direct deposit or online see Insert P1 Or

I enclose Cheque ☐ Money order ☐ for AU\$

Cheques should be made out to the Australian Plants Society (NSW).

Overseas cheques, unless in Australian dollars and drawn on an Australian bank account, will NOT be accepted due to the high bank fees.

OR

Please charge my: Mastercard ☐ Visa ☐ Amount:

PLEASE PRINT ALL DETAILS VERY CLEARLY

Card Number:

Card Holder's Name:

Expiry Date: Amount:

CVV/CSC: (The last three digits printed on the signature panel on your card)

Card Holder's Signature:

The completed form should be either:

Posted to: Australian Plants
PO Box 3066 BOWENFELS, NSW, 2790

OR Faxed to: Australian Plants (02) 6351 2384

Australian Native Plants Society (Australia) and member society contacts

Australian Native Plants Society (Australia) Inc. (ANPSA)

President: Riitta Boevink E-mail: executive@anpsa.org.au
Secretary: Mary Slattery E-mail: anpsa2018@gmail.com
Email: executive@anpsa.org.au
Website: http://anpsa.org.au

Australian Plants Society NSW Ltd

President: John Aitken
Secretary: Heather Miles
PO Box 5026, Old Toongabbie NSW 2146 Tel. 0499 073 001.
Email: office@austplants.com.au
Website: www.austplants.com.au

The Australian Native Plants Society, Canberra Region Inc.

President: Lucinda Royston
Email: president@nativeplants-canberra.asn.au
Secretary: vacant
Email: secretary@nativeplants-canberra.asn.au
Website: nativeplants-canberra.asn.au

Native Plants Queensland

President: Ian McMaster
Secretary: Paul Taylor: PO Box 586 Fortitude Valley QLD 4006
Email: secretary@npq.org.au Website: www.npq.org.au

Australian Plants Society, S.A. Region Inc.

President: Margaret Lee E-mail: president@australianplantssa.asn.au
Secretary: Ms Ali Ben Kahn, PO Box 304, Unley, SA 5061.
Tel. (08) 8388 3004 (h) Email: secretary@australianplantssa.asn.au
Email: secretary@australianplantssa.asn.au
Website: www.australianplantssa.asn.au

Australian Plants Society Tasmania Inc.

President: Mark Geeves
Secretary: Mary Slattery, PO Box 3035 Ulverstone 7315
Email: apstsec@gmail.com
Website: www.apstas.org.au

Top End Native Plants Society

President: David Liddle E-mail: topendnativeplantsociety@hotmail.com
Secretary: Louise Becker: PO Box 135 Palmerston NT 0831
Website: www.topendnativeplants.org.au

Australian Plants Society Victoria Inc.

President: Chris Long Email: apsvicpresident@gmail.com
Secretary: Helen van Riet PO Box 357 Hawthorn Vic 3122
Email: apsvicsecretary@gmail.com Website: https://apsvic.org.au/

Wildflower Society of Western Australia Inc.

President: Geoff Corrick
Secretary: Kerry Smith, PO Box 519 Floreat WA 6014.
Office: Perry House, 167 Perry Lakes Drive
Tel. / Fax: (08) 9383 7979 Email: wildflowers@ozemail.com.au
Website: www.wildflowersocietywa.org.au/



Errata

Many of the authors in *Australian Plants* are not trained botanists, nor are the editors. While we aim for accuracy, occasionally mistakes in identification do occur.

In *Australian Plants Vol 29 No. 233* in the article 'Kakadu – a Walking Adventure' by Ralph Cartwright on page 149 an incorrect photograph was inadvertently used.

Nymphaea violacea is depicted with pink flowers whereas this species generally has blue or white flowers. The correct image is shown below.



Eleocharis sphacelata and *Nymphoides indica* are described as floating plants. They appear to float but are attached and not free floating.

Matters of nomenclature and origin

Name changes in botany are the result of on-going research and re-consideration of plant material, particularly with more modern techniques. The horticultural industry and, especially, individual gardeners and native plant enthusiasts are not always familiar with the changes.

Two matters have been raised in relation to information in *Australian Plants Vol 29 No. 233*:

Page 163: *Leptospermum scoparium*. This species occurs in both New Zealand and Australia, but this type of double flowering pink/red cultivar is generally bred from a New Zealand parent.

Baeckea virgata 'Dwarf' on pages 174 and 177. The plant depicted is Australian but the name *B. virgata*, is no longer applied to Australian species. It is now applied to a species which occurs only in New Caledonia. Plants are, however, still sold in many nurseries, locally and online using the name *B. virgata*. The plant depicted will now be known as one of the species within the genus *Sannantha*.

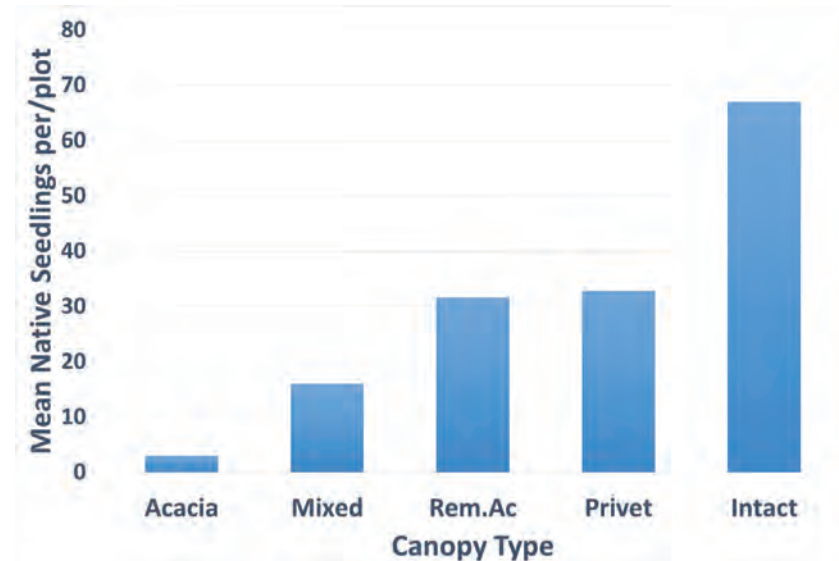


Figure 1: Mean native seedling regeneration under acacia plantings (Acacia), mixed rainforest plantings (Mixed), remnant mature Acacia (Rem. Ac.), stands of small leaf privet (Privet) and intact rainforest (Intact).

the highest losses. Plot diversity is now greatly reduced in most of the mixed species plots and many of the rainforest islands are now hard to differentiate from the pure acacia planting.

Natural regeneration and recruitment rates: Long-term restoration success requires the re-establishment of the natural processes of seed dispersal and recruitment to the site. To assess levels of natural regeneration, 5 monitoring plots (25 m²) were established in the acacia planting and mixed species plots, in 2007. Additional monitoring plots were also established under remnant large *A. melanoxylon* trees; within adjacent areas of intact rainforest; and in areas dominated by small leaf privet (*L. sinense*). Within each of these plots native seedling abundance (<30 cm in height), canopy cover (%) and living ground cover (%) were recorded.

Although replication was limited, monitoring results show distinct differences in all three variables across the five canopy types. Native seedlings were uncommon under the pure *A. melanoxylon* planting (mean number of seedlings per plot = 3) (see Fig. 1.). Mixed species plots had an average of 16 seedlings per plot, while remnant acacias and stands of privet had an average of 32 and 33 seedlings respectively. By contrast, plots within intact rainforest had an average of 67 seedlings per plot from 18 different rainforest species.





Barriers to regeneration

Competition from exotic grasses and ground layer species creates a significant barrier to the germination and recruitment of seedlings of native rainforest species. Most rainforest restoration projects aim to overcome this barrier by establishing plants on the site to outcompete these ground layer species.

Canopy Cover: Mixed species rainforest plantings had a higher level of canopy cover compared to the *A. melanoxylon* planting (48% vs 27%). Canopy cover was higher again under stands of privet (62% cover) and intact rainforest (82% cover) (see Fig. 2.).

Living Ground Cover: Levels of living ground cover were directly related to the mean percentage canopy cover in the monitoring plots (see Fig. 3.). Acacia plantings after 10 years of growth still had high levels of living ground cover (73%) with the exotic grass, kikuyu (*Pennisetum clandestinum*), dominating most sites. Mixed species plots and remnant acacias had similar levels of living ground cover (30% and 25%), as did stands of privet and intact rainforest (both 9% cover).

Persistence of Kikuyu: Assessment at 10 years post planting showed many areas under the acacia canopy to be dominated by kikuyu.

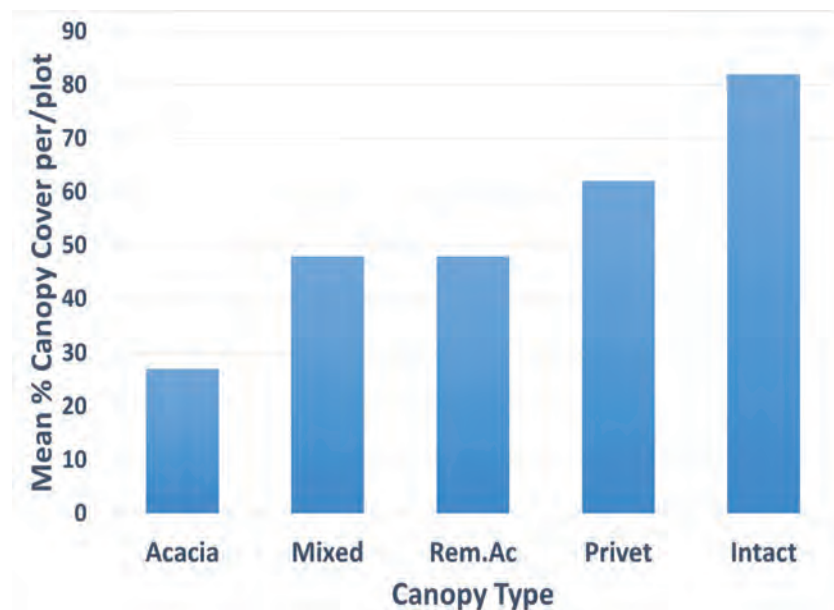


Figure 2: Mean % canopy cover under acacia plantings (Acacia), mixed rainforest plantings (Mixed), remnant mature acacia (Rem. Ac.), stands of small leaf privet (Privet) and intact rainforest (Intact).

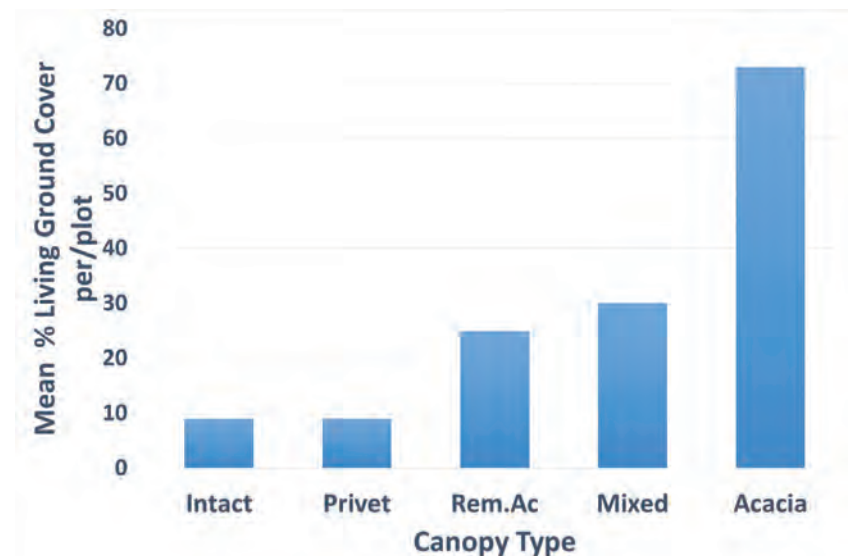


Figure 3: Mean % living ground cover under acacia plantings (Acacia), mixed rainforest plantings (Mixed), remnant mature acacia (Rem. Ac.), stands of small leaf privet (Privet) and intact rainforest (Intact).

It is likely that the use of a single pioneer species across the site has exacerbated this issue, as canopy cover levels for *A. melanoxylon* would typically peak 3-5 years after planting. Similar declines in canopy cover have been noted for several other rainforest pioneers (e.g. bleeding heart, macaranga and sarsparilla) in north Queensland revegetation trials (Freebody 2007). Including a higher proportion of mid- to late- successional species, and a more diverse mix of species, may have avoided this decline in canopy cover over time due to their more complex canopy architecture (Florentine & Westbrooke 2004, Freebody 2007).

Future directions

Supplementary planting: While the levels of canopy cover under the mature acacias may have been insufficient to outcompete many ground layer weeds, it has provided protection from frost and climatic extremes. Many rainforest species that would not have survived on the site initially could now be planted to increase diversity, canopy cover and habitat values across the site.

Acacia control: A lack of recruitment under acacia dominated plantings has been found in several mature (5-17 years) north Queensland plantings (Freebody 2007, and see Hopkins 1990). Thinning of one third of the acacia canopy has been found to result in a significant





increase in native rainforest recruitment at these sites and could be trialled at little cost across the acacia plantings.

Reducing ground layer competition: In 2007 all kikuyu and ground layer herbs and grasses were controlled in several 10 m x 10 m trial plots across REGEN 1. Although these plots have never had return monitoring, several can still be located, and qualitative assessments suggest that rainforest seedling recruitment has increased in these plots in response to the more open ground layer.



Ground layer control plot. Photo taken in 2008, one month after control. Prior to control, plot had 90% living ground cover. This photo also shows substantial thinning in the lower portion of the acacia canopy.

Alternatives to planting

Planting costs: Rainforest plantings can quickly capture a bare site and stimulate on-going natural regeneration, but this change comes at a substantial cost. A hectare planted with 2,000 tube-stock without tree guards, mulch mats or fertiliser costs ~\$16,000. Including wallaby guards and mulch mats can increase costs from ~\$16,000 to ~\$36,000. On-going weed control, replacement planting, and tree guard removal can add an additional \$20,000 per hectare over the first 5 years of establishment (See Catterall and Kanowski 2010, for an assessment of alternative rainforest restoration approaches).

Management of woody regrowth: An alternative to tree planting is the management of woody regrowth. Unassisted woody regrowth can kick-start rainforest restoration in a similar way to a “framework” planting. Costs of this approach are substantially cheaper (up to \$3-5,000 per/ha per/year) and have the potential to improve biodiversity values over large areas. Non-native species such as wild tobacco (*Solanum mauritianum*) and small leaf privet (*Ligustrum sinense*) grow readily and can be used to stimulate natural recruitment and provide cover to native seedlings. Their judicious use and on-going management could provide a cost-effective alternative to broad-scale planting.

References

- Catterall C.P. and Kanowski J. (2010) *Rainforest restoration: approaches, costs and biodiversity outcomes*. Reef & Rainforest Research Centre Ltd, Cairns.
- Catterall C.P. (2015) *Woody weeds and rainforest habitat restoration – benefits and risks*. Coffs Harbour City Council.
- Freebody K. (2007) ‘Rainforest revegetation on the Atherton Tablelands, Wet Tropics, north Queensland: Planting models and monitoring requirements’. *Ecological Management & Restoration* 8, 140-43.
- Goosem S. and Tucker N. I. J. (1995) *Repairing the rainforest: Theory and practice of rainforest reestablishment in North Queensland’s Wet Tropics*. Wet Tropics Management Authority, Cairns.
- Hopkins M.S. (1990) ‘Disturbance – the forest transformer’, in *Australian Tropical Rainforests – Science, Values, Meaning* (eds L.J. Webb & J. Kikkawa), pp. 40-52. CSIRO, Melbourne.
- Kooyman R. (1996) *Growing rainforest: Rainforest restoration and regeneration, Recommendations for the humid subtropical region of northern NSW and south-east Qld*. Greening Australia, Brisbane.

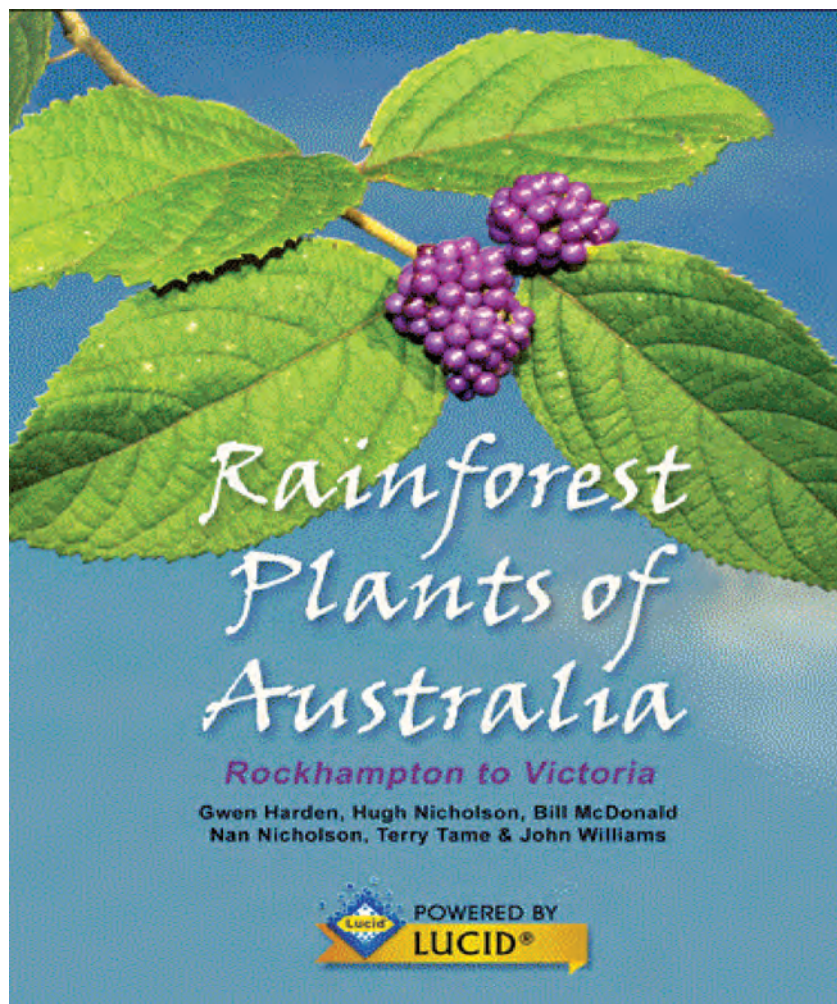




The Rainforest app – to have and to use where ever you go!

Gwen Harden Honorary Research Associate, Royal Botanic Gardens and Domain Trust, Sydney

Have you ever wandered through a rainforest and wondered what the trees and vines are? How can one identify these mysterious plants when the leaves, flowers and fruit are so high up in the canopy? If the trees have distinctive bark or buttresses or if you gather the fruit or flowers from the forest floor it is now relatively easy to identify them



while you are in the field. For other plants you can collect fallen leaves from the ground beneath the tree or look for smaller plants in, or on the edge of, the forest.

These identifications can be made in the forest by using the Rainforest app, thus overcoming the need to carry several heavy books into the field or making copious notes of significant features. And, as so often happens after jotting down detailed notes in the field, you have neglected to note the one most crucial feature that was needed to complete the identification at a later date!

These identifications can now be done in the field with the Rainforest app which is NOW available for your mobile device! Once this app is installed on your smart phone or tablet an internet connection is not required, so it can be readily used in the field!

Once arriving at a name, one can check the description of the species and scroll through the various coloured images for that species in the app to confirm your identification. Sometimes it is difficult to get down to one species; in that case one can compare the images of the remaining species (if only a small number remain) and arrive at a satisfactory result.

The rainforest app, *Rainforest Plants of Australia*, is based on the computer key of the same name (distributed as a USB, by Gwen Harden, Hugh Nicholson, Bill McDonald, Nan Nicholson, Terry Tame and John Williams). This, in turn, was based on the familiar 'Red' and 'Green' books (*Rainforest Trees and Shrubs* and *Rainforest Climbing Plants*) by Gwen Harden, Bill McDonald and John Williams.

Gwen Harden, Hugh Nicholson, Bill McDonald and Nan Nicholson have continued their collaboration with Lucid so that the rainforest key and information that could be accessed on computers (via the USB) is now available to you on your mobile device.

The app identifies trees, shrubs and climbing plants that occur naturally or have become naturalised (including exotic weeds) in rainforest from Rockhampton to Victoria. At the core of this app is an interactive identification key powered by Lucid. The key includes 1,140 plant species that grow in rainforest of eastern Australia. To help confirm identification the app provides line drawings, over 8,000 photos and extensive information on each species, including previously unavailable botanical details. To assist the user in working the key and accessing the content of the app a customised image gallery walk-through tutorial is available on opening the app. The introductory sections include





information and images on rainforest and the types of rainforest used in this app. Hints are provided on how to identify rainforest plants as well as an outline of the special features and terms used to separate the many species that on first sight appear to be inseparable!

It will empower everyone who is interested in conserving rainforests and learning more about rainforests and rainforest species, from professionals to those who are not familiar with the use of keys or botanical terminology.

- Features used for identification in the key include leaf, flower, fruit, seed and bark features as well as geographic distribution, rainforest type and plant family
- Covers mainland eastern Australia, south of Rockhampton through N.S.W. to Victoria
- Coastal rainforest types to drier inland vine thickets
- Keys out and describes 1140 species of trees, shrubs, mistletoes and climbing plants
- Over 8,000 coloured images, illustrating significant features; can be enlarged and zoomed in and out for more details
- Includes 104 species naturalized in rainforest, of which 33 are listed as 'declared noxious weeds'
- This interactive, illustrated key is powered by Lucid
- Updates will be automatically downloaded to your phone or tablet.

This app will enable you to have this powerful identification key and information system in your pocket (or bag) at all times and in all places. It makes identifications so much easier so that in the field immediate identifications are possible (no need to make all those extra notes in case you missed an essential feature that was later found to be essential to complete the identification). This fantastic resource is a source of information for all those concerned about rainforests, their biodiversity, distribution and conservation. The app will be vital for researchers and teachers at universities, TAFEs and schools, horticulturists, environmental consultants and government agencies, community groups and landowners, bushwalkers, gardeners and anyone with an interest in rainforests or rainforest plants. Both plain English and botanical terms (explained in an illustrated glossary) are used throughout the app to make it applicable to as wide an audience as possible.



Fact sheet for *Alloxylon pinnatum*

A typical fact sheet for a species includes images and line drawings and description (full description can be viewed by scrolling down). Images can be enlarged by clicking on them and each has a descriptive caption. Parts of images can further be enlarged by zooming in on particular features.





If you want additional details or wish to purchase the app go to the relevant app store, either Google Play Store for Android devices or Apple iTunes for iOS (Apple) devices for more information and to buy! The cost of the app is \$49.99. It can be downloaded on to all your devices (e.g. current smart phone, old smart phone and tablets) as long as they have the same email address. So there will be no problem transferring the app to any new mobile device, as long as it is of the same kind (i.e. Android or iOS).

If you are interested in running a workshop to introduce you to the app, please contact me on gwenharden@yahoo.com.au.

Before long you will wonder how you ever lived without it!



Epiphytes on Red Cedar Photographer: Hugh Nicholson

Rainforest in Tasmania

Dick Burns

Dick has been a resident of Tasmania since 1970. He has explored many of its wonders, by road or as a curious bushwalker. Dick is a life member of the Australian Plants Society Tasmania (APST) and has held various positions within ASGAP (now ANPSA) and APST. In 2007 he was honoured with the Australian Plants Award (amateur).

This article is based on one Dick wrote for *Australian Plants* in 2004 and is re-produced in order to explain the contrasts between the northern NSW/ southern Queensland rainforests and those of Tasmania.

Introduction

Among the generally recognised distinguishing features of rainforest are a closed canopy, more than 70% complete.

- soft, non-sclerophyll leaves, often with large blades.
- ability of plants to germinate in low light.
- limited or no ability to cope with fire.

Tasmania's rainforests are classified as cool temperate rainforest.

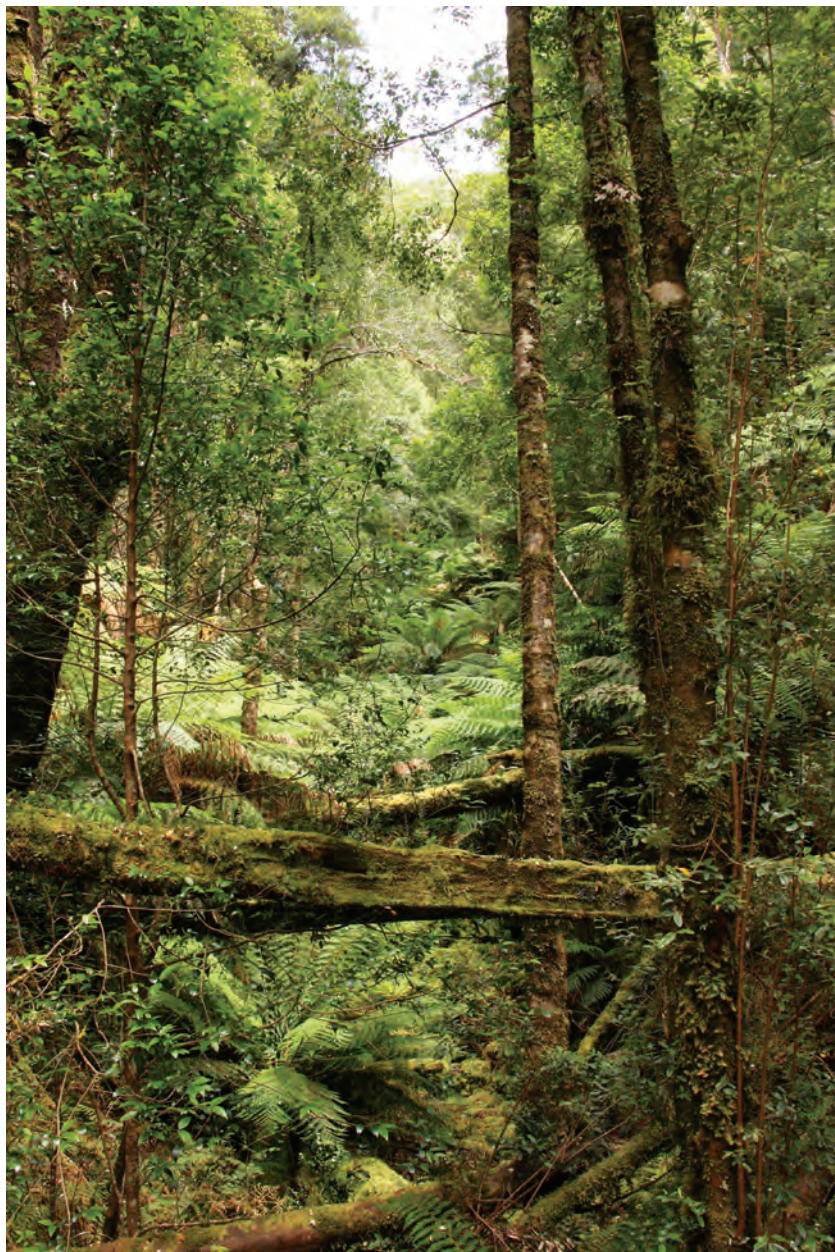
The structure of cool temperate rainforest differs from the tropical rainforests of northern NSW and Queensland. Tasmania's forests mostly have only one dominant tree forming the canopy, normally *Nothofagus cunninghamii*, myrtle beech. Occasionally other species, including *Eucryphia lucida*, leatherwood, *Atherosperma moschatum*, sassafras, *Phyllocladus aspleniifolius*, celery top pine, and *Anodopetalum biglandulosum*, horizontal, become increasingly common to co-dominant on poor soils.

Lianes and parasites are mostly absent, replaced by epiphytic or ground ferns, bryophytes and lichens. Large trees form only small buttresses. Leaves of some understorey plants are large, but small, thick, simple leaves predominate, including on *Nothofagus cunninghamii*. The exposure to sun and cold in the canopy may have contributed to this adaptation. Many rainforest species have serrated leaves. *Nothofagus* is wind-pollinated.

Other flowers are predominantly small, with petal colour generally white, cream or yellow, occasionally pink or red (Epacridaceae and Telopea). Fleshy fruits however are frequently intensely coloured (eg *Cenarrhenes*, *Phyllocladus* and *Leptecophylla*).

Tasmanian rainforest has a distinctive smell. It is quiet, with few bird calls, apart from southern forests where the introduced superb lyrebird





Fern gully along Bird River track. Photo: Eddy Wajon

has spread and altered the forest floor. Often, the only sounds are of running water.

An article in *Nature Australia* by Tim Low (vol. 27, no. 12, pp. 24-25) states that Australians are starting to use 'rainforest' to describe any forest with a closed canopy, even if high rainfall is not characteristic. These are better called 'closed forest'. Closed forests in Tasmania include alpine dwarf conifer forests seen in alpine habitats and groves of the deciduous fagus, *Nothofagus gunnii*.

Tasmanian rainforest develops on soils that vary from fertile basalt-derived to those on nutrient-poor soils developed over quartzite. It requires a rainfall of well over 1,200 mm annually to establish itself, with regular summer rain. With the appropriate environmental conditions and in the absence of fire, Tasmanian rainforest becomes the climax vegetation.



Eucryphia lucida. Photo: Eddy Wajon

The island's rainforests are a reminder of Australia's past. To enter the forest is to see the remnant of an ancient forest type that was once widespread on the mainland, but largely eliminated there as the climate became drier. Gondwanan flora abounds: Tasmania was Australia's last link with Antarctica. During the Cretaceous and Tertiary periods, when forests grew in Antarctica, plants shared with New Zealand and South America included conifers from the families Podocarpaceae and





Cupressaceae, flowering plants from Cunoniaceae, Epacridaceae, Proteaceae, Escalloniaceae and the genera *Eucryphia* and *Nothofagus*. With isolation, endemism developed.

Classification

Tasmanian rainforest can be found from sea level to subalpine habitats.

Montane rainforest is normally dominated by *Nothofagus*, but *Athrotaxis*-dominated forests exist. *Athrotaxis* is the conifer with species *A. selaginoides*, King Billy pine, *A. cupressoides*, pencil pine, and the hybrid of the two, *A. x laxifolia*.

There are three main types of lowland Tasmanian rainforest

- Callidendrous rainforest ('beautiful trees') gives a park-like impression, with trees between 25 and 40 m tall and an open understorey of bryophytes, ferns and few shrubs, sometimes treeferns.
- Thamnic rainforest ('shrubby') has trees of a similar height but a more obvious shrubby understorey.
- Implicate rainforest ('intertwined') has trees below 20 m high with a dense understorey. Trees and shrubs form a continuous intermeshing network of twisted trunks and branches.

As well, Gallery rainforest ('long, narrow') forms a narrow band along watercourses, sometimes with communities other than those found in the rainforest beyond. *Lagarostrobos franklinii*, Huon pine, *Leptospermum riparium* and *Epacris franklinii* or *E. mucronulata* are distinctive features of gallery rainforest.

Dependent on which plants and which associations are found, nearly forty different communities have been recognised within these four forest types. Soil type has an effect on the species found within the community.

Rainforest distribution

The largest contiguous area of rainforest in Australia is in the north west of Tasmania, the Tarkine. This name is based on the name of the Aboriginal tribe that once lived in the region.

In the Tarkine, the Savage River National Park protects some of the tallest and best examples of undisturbed rainforest. The Park's 17,980 ha is mostly rainforest and is to be managed as a wilderness zone. Other fragments of the Tarkine are in reserves of lower conservation value, with large tracts under threat of large-scale clear-felling. Rainforest is scattered over much of the island. Pockets are even found in gullies on the drier East Coast.

The area with the reputation of very high rainfall, around Queenstown, was once covered with dense rainforest. The conversion of the vegetation around the town from lush rainforest to the 'Queenstown desert' shown on maps is a textbook example of environmental destruction. But away from the effect of the axes, smelters and sulphur dioxide, rainforest survived.

South of Queenstown is a magical 8 km stroll into West Coast rainforest down an old railway formation called the Bird River Track. You need to allow a full day to walk to the end on Macquarie Harbour: people have been known to remain fixed in one spot, entranced. The Bird River is a fast-flowing stream whose water is the distinctively

Tasmanian tannin brown. Green now envelops everything. Ferns and bryophytes cover the ground, old railway cuttings, and tree trunks, even the rocks in the river. In spring, *Acradenia frankliniae* forms great mounds of white starry flowers. In late summer into autumn, the perfume and petals of *Eucryphia lucida*, leatherwood, drift through the forest. And in late summer the pink bells of *Prionotes cerinthoides*, climbing heath hang from tree and the old cuttings.



Epacris franklinii head



Anopteris glandulosus



Acradenia frankliniae





Exploring Tasmanian Rainforests during the ANPSA Conference, January 2018

Dr Eddy Wajon

Eddy is an Environmental Scientist, photographer and book writer/ publisher with books on the wildflowers of Western Australia to his credit. He is Chair of the Wildflower Society of WA, Roadside Vegetation sub-committee and was recently appointed ANPSA Conservation Officer..

Mysterious, dark, wet places with mystical and legendary conservation connotations. That, plus towering trees, was how I pictured Tasmania's rainforests. And I was not disappointed with this image upon exploring a number of rainforest areas during the Alpine to Rainforest tour after the ANPSA Conference in Hobart.

Being from the Wildflower State, I was not familiar with the flora and vegetation of temperate rainforest, and without flowers on most species to help, I was not able to identify much of what I saw. However, after some coaching, I was soon able to recognise gigantic *Eucalyptus delegatensis* trees and as well as the distinctive, ancient Gondwanan lineage *Nothofagus cunninghamii* along the Franklin River and around the slopes of Mt Wellington.

Other iconic trees, such as the Huon Pine (*Lagarostrobos franklinii*), King Billy Pine (*Arthortaxis selaginoides*) and Celery Top Pine (*Phyllocladus asplenifolius*) were not as prominent or large as hoped, and difficult to photograph in any event, being part of the dense stand of vegetation.

The Bird River Track near Queenstown was like a dark tunnel going back in time. Lined with *Dicksonia antarctica* Tree Ferns and many un-identified trees, the banks of the cutting through which a railway line once ran were full of bryophytes, especially liverworts, and fungi such as the Honey Fungus *Armillaria mellea* and the Coral Fungus *Artomyces austropiperatus*.



Eucalyptus delegatensis



Artomyces austropiperatus



Wall of liverworts

There were very few flowering plants but we did see a Greenhood (*Pterostylis scabrida*) and some sedges including *Baloskion tetraphyllum*. However, the highlight was a beautiful *Eucryphia lucida*,





Baloskion tetraphyllum



Armillaria mellea



Prionotes cerinthoides



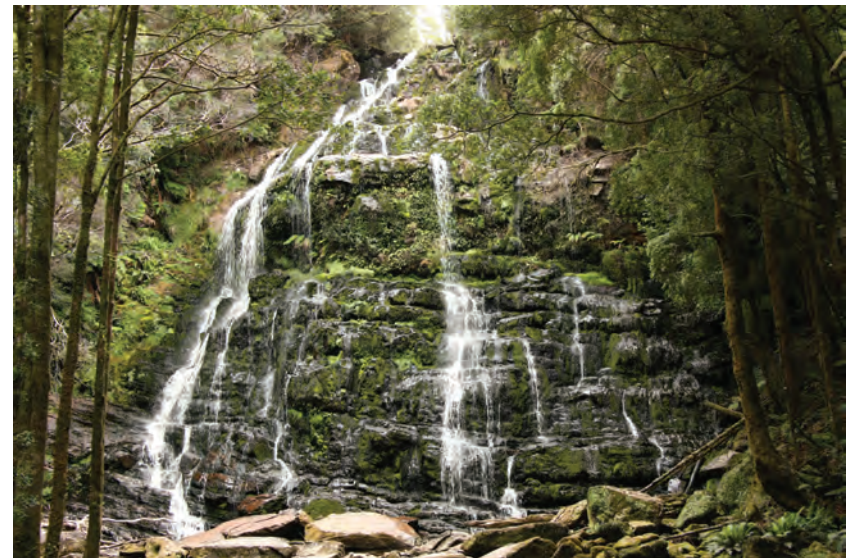
Trochocarpa cunninghamii

which we had seen along much of the Lyell Highway and the Franklin River, but not conveniently close enough to get a good look. See photograph on page 229.

Along the edges of the rainforest, where there was sufficient light, such as along road verges and in drains along the Lyell Highway and more open tracks near the Franklin River, we found more floriferous plants. The most spectacular of these were *Prionotes cerinthoides* and *Trichocarpa cunninghamii* with their bright red pendulous flowers.

Water in the rainforest was everywhere, whether in trickling creeks, damp tracks, dripping soil cuttings or waterfalls. Nelson Falls along the Lyell Highway, for example, was memorable not only for its braided, cascading water, but for the number of different ferns, fungi and herbs along the way.

Temperate rainforests are restricted to the southern, wetter parts of Australia. They can be forbidding, challenging and frightening places. But they are also magnificent repositories of our biodiversity and geo-history – places that need to be preserved, celebrated and shared.



Nelson Falls





Tasmanian Alpine to Rainforest Tour

Pamela Finger

Mackay Brach of Native Plants Queensland and recent member of the Australian Native Plants Society Canberra Region.

The science of the forests is described in Dick's wonderful words. He wasn't with us on the tour however we felt his presence throughout.

There is something about rainforest whether it be in Tasmania, Victoria, NSW or where I have made home recently in Northern Queensland a short drive from the Eungella ranges, Finch Hatton Gorge and those very precious lowland rainforests like Reliance Creek.

The magnificent trees are certainly critical for the rainforest and what gives the structure and form.

However, what makes me stop in awe are the little things: the fungi, mosses and liverworts. In the Tasmanian rainforests I got what I had hoped for and more, with the mosses covering every available surface looking like green velvet softly covering the rocks and trees. Even along the step banks the mosses blanket the surface with the water drops catching the light as they drip through.

The fungi often give the colours that the plants don't, with bright reds, yellows and whites.



King River – Bryophytes



Frankland River, Nature Trail Red Fungi



Curled frond



Diversity of fungi within a metre.

One patch of fungi on the Bird River Track had us all stopped looking and photographing in awe as the whole bank was terraced with fungi of different sorts.

Ferns have also been an interest of mine and when others are looking for flower I am quite content to examine the growth habits and, in particular, the unfurling of the fronds. In Tasmania these are the dominate understory rather than the palms of the northern Australian rainforests





Clockwise from top left:
King River – fern with pink new fronds;
King River – fruit of *Gaultheria hispida*;
Nelson Falls – *Eucryphia* snow on the mossy creek;
Nelson Falls – fungi on tree stump.



so I was in my element. The understory of ferns gave a patchwork of differing green effects and the pinks and reds of new fronds, from the magnificent *Dicksonia antarctica* to the small ground covers.

The mosses and fungi didn't keep themselves to the forest floor, with veils of mosses hanging from the trees and bracket fungi creating shelves on the trunks almost to the canopy.

It all makes for a cathedral effect (or was the cathedral effect imitating the great forests) filled with broken light reflecting on all the many greens, with the confetti (or snow) of the leatherwood flowers (*Eucryphia lucida*) strewn across the forest floor.

When flowering plants do make themselves visible (with the exception of the *Eucryphia*) it is often the fruits that you notice.

The creeks and rivers are like the aisles, again interleaved with moss-covered rocks. Through these flow the tannin coloured waters, also covered in floating *Eucryphia* petals.

Last words. What a fantastic trip and thanks to our hosts and the many that fought, and in some cases died, to make sure these areas are still here today. Remember, though, the fight still goes on for rainforests of the world. We have lost so much; we need to make sure what is left is preserved.



Bird River Track: Side table? Tree stump? No a huge Bracket fungi.



