



NVIS Fact sheet MVG 1 – Rainforests and vine thickets

Australia's native vegetation is a rich and fundamental element of our natural heritage. It binds and nourishes our ancient soils; shelters and sustains wildlife, protects streams, wetlands, estuaries, and coastlines; and absorbs carbon dioxide while emitting oxygen. The National Vegetation Information System (NVIS) has been developed and maintained by all Australian governments to provide a national picture that captures and explains the broad diversity of our native vegetation.

This is part of a series of fact sheets which the Australian Government developed based on NVIS Version 4.2 data to provide detailed descriptions of the major vegetation groups (MVGs) and other MVG types. The series is comprised of a fact sheet for each of the 25 MVGs to inform their use by planners and policy makers, as well as additional fact sheets which describe other types (an additional eight MVGs).

For more information on this series of fact sheets, including its limitations and caveats related to its use, please see: 'Introduction to the Major Vegetation Group (MVG) fact sheets'.

Overview

Typically, vegetation areas which are classified under MVG 1 – Rainforests and vine thickets:

- are closed forests characterised by trees with dense, horizontally or obliquely-held foliage in the upper layers (typically with greater than 70 per cent foliage cover)
- are often described in terms of leaf size (Webb 1959):
 - mesophyll more than 12.5cm long (45 100cm²),
 e.g. tropical rainforest
 - notophyll 7.5 12.5 cm long (2 45 cm²), e.g. warm temperate rainforest
 - microphyll less than 7.5 cm long (2.5 20 cm²),
 e.g. cloud forest
- are characterised by high, plant-species diversity declining as latitude and altitude increase
- have 'taxonomically-deep' biodiversity, with diverse representation of genera, families and orders
- are comprised of plants that regenerate in low light conditions; typically in canopy gaps
- have species composition that varies between successional stages following different kinds of disturbance
- are rarely fire-prone
- may have emergent eucalypts present within its margins or throughout, depending on disturbance history

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(Banner Photo) Tropical and subtropical rainforests, lower slopes of Mt Bellenden Ker, Qld (Photo: M. Fagg)

- have vines, epiphytes and mosses forming a conspicuous and important element of their structure in tropical and subtropical rainforests, while vines are less abundant and epiphytes are primarily cryptograms in temperate rainforests
- include a diverse range of vegetation types:
 - deciduous and evergreen cool temperate, beech forests dominated by only one or two canopy species at high latitudes and altitudes (e.g. Tasmania)
 - species-rich, tropical complex, mesophyll vine forests characterise the wet tropics of Queensland where hundreds of tree species may be found and no one species dominates the canopy
 - a series of warm temperate and subtropical forests are scattered throughout the mid latitudes
 - semi-deciduous vine thicket communities occur in drier environments on the western slopes of the Great Dividing Range
 - isolated patches of semi-deciduous monsoon forest occur in the Northern Territory's top end and the Kimberley region of Western Australia. Habitat is diverse from sandstone gorges and rock outcrops to lowland springs and stream margins, as well as coastal beach ridges and lateritic landforms
 - littoral rainforest is scattered along the coast in areas influenced by maritime winds and include elements of tropical/subtropical or warm temperate rainforest.

The considerable variation in structure and species composition of areas under MVG 1 – Rainforests and vine thickets - which result from the range of environments from northern to southern Australia, has been detailed in Webb and Tracey (1992), Specht and Specht (1999), Keith (2004) and Metcalfe et al. (2014).

Facts and figures

Major Vegetation Group	MVG 1 - Rainforests and vine thickets
Major Vegetation Subgroups (number of NVIS descriptions)	1. Cool temperate rainforest
	2. Tropical or sub-tropical rainforest
	6. Warm temperate rainforest
	62. Dry rainforest or vine thickets
Typical NVIS structural formations	Closed forest (low, mid and tall)
	Closed fernland (low, mid)
	Closed palmland (low, mid)
	Closed vineland (low, mid)
	Closed shrubland (tall)
Number of IBRA regions	36
Most extensive in IBRA region	Present: Wet Tropics (Qld)
(Est. pre-1750 and present)	Pre-1750: South Eastern Queensland (Qld, NSW)
Estimated pre-1750 extent (km ²)	50 743
Present extent (km ²)	36 469
Area protected (km ²)	22 694

Structure and physiognomy

- The uniting feature of rainforests is their 'closed' canopy, typically with foliage cover exceeding 70 per cent. The closed canopies are due to high tree densities, typically in multiple vertical layers, and leaves that are held horizontally or obliquely with contrasting upper and lower surfaces. Structural expressions vary from lush subtropical forest to dry vine thickets, all characterised by a closed and continuous canopy dominated by non-eucalypt species.
- Areas which are classified under MVG 1 Rainforests and vine thickets may have multiple tree layers. Different associations may be dominated by palms and/or vines or by deciduous species, although most are dominated by evergreen dicotyledonous trees. The height range within this vegetation group is diverse with a tree canopy exceeding 40 m in subtropical forms, or as low as three m in monsoon vine forests and cloud forests.
- Up to four structural layers may occur:
 - an emergent layer of large trees that extend above the dense canopy
 - a canopy layer that heavily shades the vegetation below
 - an understorey of mostly soft leaved shrubs
 - ground layer of shade-loving ferns sedges and herbs.

The forest floor is typically covered with deep leaf litter that is decomposed rapidly by fungi and microbes.

The emergent layer may sometimes comprise of eucalypts.

• Plant growth forms that typify various kinds of rainforest include: palms, lianas/vines, ferns—both arborescentand terrestrial-epiphytic orchids and cryptograms.

Indicative flora

 Non-sclerophyllous species dominate rainforests and vine thickets. Many of these species are representatives of the so-called 'primitive' flowering plant families such as: Winteraceae, Eupomatiaceae, Monimiaceae, Lauraceae and Cunoniaceae. Other typical plant families include: Capparaceae, Celastraceae, Dilleniaceae, Ebenaceae, Euphorbiaceae, Meliaceae, Myrtaceae, Pittosporaceae, Rubiaceae, Rutaceae, Sapindaceae, Sterculiaceae and Verbenaceae.

- Typical species which can be found in rainforests and vine thickets may include:
 - Cool temperate rainforests genera such as: Nothofagus, Eucryphia, Atherosperma, Athrotaxis, Dicksonia and Tmesipteris
 - Tropical and subtropical rainforests that include many genera such as: *Ficus, Toona, Sloanea, Araucaria, Cryptocarya, Diospyros, Syzygium, Archontophoenix, Arthropteris, Linospadix, Calamus, Smilax, Cissus, Platycerium, Adiantum, Asplenium* and *Dendrobium*
 - Warm temperate rainforests genera such as: Ceratopetalum, Doryphora, Acmena, Quinitinia, Endiandra, Caldcluvia, Orites, Marsdenia, Cissus, Blechnum and Lastreopsis.
- Dry rainforests and vine thickets are characterised by: Brachychiton, Cassine, Flindersia, Alectryon, Alphitonia, Aphanopetalum, Backhousia, Diospyros, Claoxylon, Clerodendrum, Mallotus, Wilkiea, Celastrus, Pyrrosia and Pellaea.
- Typical genera of littoral rainforests include: *Pisonia, Cupaniopsis and Euroschinus.*

Environment

- This major vegetation group occurs from sea level to altitudes up to 1500 m, mostly within 100 km of the coast, but with outliers of vine thicket extending inland.
- It is mostly confined to wetter areas or climatic refuges in eastern and northern Australia receiving more than 1200 mm of rainfall per annum, but vine scrub and dry rainforest may occur in small patches where rainfall is as low as 600 – 900 mm per annum.
- It is increasingly confined to topographically sheltered sites at the drier end of the rainfall range.
- It is a range of substrates from volcanic to sedimentary substrates of alluvial plains and coastal sand sheets with moderate to high levels of soil nutrients. Soils can exert a strict control on the structural type within a given climatic zone, although at the extremes of the tropical-monsoonal dry type and the cool-temperate wet type, the influence of soil substrates are muted.



The image above outlines the location of this MVG group in Australia.

Geography

- This major vegetation group covers a wide geographic range along the eastern fringe of the continent and across the north, while it cannot be found in central and western Australia.
- It occurs in cool temperate to warm temperate, subtropical and tropical areas in Queensland, New South Wales, Victoria, Tasmania and as small patches in north coastal Northern Territory and the Kimberley region in Western Australia.
- Examples of rainforests and vine thickets can also be found on Australian offshore islands such as Christmas, Lord Howe and Norfolk Islands.
- Its largest area is in Queensland which is estimated to be larger than 20 000 km².
- The most extensive cool temperate rainforests are found in western Tasmania, particularly in the north-west. Smaller areas are also found in favourable elevated sites

in eastern Victoria and a few small climatic refuges along the Great Dividing Range to the McPherson Ranges in south-east Queensland.

- Semi-evergreen vine thickets of the Brigalow Belt and the monsoonal vine thickets are found on the eastern coast in the transitional zone between the coast and semi-arid areas and in the seasonal tropics of northern Australia.
- Monsoon forests can be found in the top end of the Northern Territory and Kimberley region of Western Australia.
- Patch sizes vary from less than one hectare in sheltered gullies, to extensive tracts (thousands of hectares), to mosaics within Eucalypt tall open forests covering hundreds of square kilometres.
- Vegetation areas under this group may be fragmented and confined to pockets less than one ha in size occurring as a mosaic within other vegetation types, such as the monsoon rainforests in permanent soakage pockets in north-western Australia, warm temperate pockets in fire-protected moist gullies in south-eastern Australia and warm subtropical forests on cool cloudy summits with increasing latitude.

Change

- Examples of this vegetation group have been cleared in most lowland areas—about 28 per cent of the estimated pre-1750 extent has been cleared across Australia, accounting for 1.4 per cent of total clearing.
- Since European settlement, approximately

 14 000 km² of rainforests and vine thickets across
 Australia have been cleared, including rainforest
 communities in the coastal lowlands, floodplains and
 more undulating sections of the coastal ranges of eastern
 Australia. These were some of the first native vegetation
 communities to be harvested for timber, particularly
 along coastal rivers that were used to gain access and
 transport timber out for export.
- Notable examples of the tropical and subtropical rainforests cleared for timber, dairying or agriculture are the:
 - 'Big Scrub' in northern New South Wales, reduced from an estimated 75 000 ha to just 300 ha by 1900
 - Illawarra rainforests
 - hoop pine scrubs of south-east Queensland
 - tropical rainforests of the Atherton and Eungella Tablelands and coastal Wet Tropics floodplains of the Daintree, Barron, Johnstone, Tully–Murray, Herbert, Proserpine and Pioneer River
 - tropical lowlands from Cairns to Cooktown.
- Extensive areas of vine thickets, notably the softwood scrubs in the Brigalow Belt of Queensland and north-western New South Wales, have been substantially cleared for agriculture or grazing as part of Brigalow land development.

- The broad range of communities across Australia found within rainforest and vine thicket vegetation areas masks the level of regional depletion of some rainforest and vine thicket types.
- While some rainforests have regrown on abandoned agricultural land, species composition of these stands is typically low and dominated by 'pioneer' species and invasive species such as *Cinnamomum camphora* (camphor laurel) and *Lantana camara* (lantana) and many exotic vines.
- A number of processes threaten the remaining occurrences of rainforests and vine thickets: clearing; disease; changes to fire regimes; exotic species and climate change.
- Regular or intense wildfires are able to break the dense cover of foliage that is critical for preserving available moisture and which maintains a suitable local environment for regeneration and persistence of some rainforest and vine thicket species. Other effects are evident from changes in fire regimes (e.g. upslope of intensive agriculture and inundation, such as water supply and hydro-electric dams).
- Tourism, although providing a source of income for maintenance of protected rainforest areas, can also be an indirect source of threats.
- Long-term studies in the rainforests of Australia have identified some specific issues such as fragmentation, which reduces resilience and increases edge effects. They also suggest that fire can be a management tool as well as a threatening process.
- Climate change is likely to have huge, but potentially hidden, impacts across all rainforest communities, including changes to patterns of rainfall, tropical storms and fire.



Cool temperate rainforests-Atherosperma moschatum and Dicksonia antarctica, Mount Field National Park, Tas. (Photo: M. Fagg)

Key values

- Supports a huge range of Australia's biodiversity despite the fact that it covers less than one per cent of the Australian landmass.
- Contains remnant populations of a wide range of vertebrate and invertebrate species.
- Contains evidence of the biological and geological evolution of the Australian continent.
- Long-term ecological research infrastructure.
- Reservoirs of genetic diversity.
- Ecosystem function including a role as refuges from fire and climatic change for flora and fauna.
- Aesthetic values and ecotourism including bushwalking, educational sites, wilderness experiences in more remote areas of Tasmania and Queensland, and tree-top walks.
- Timber (e.g. high value cabinet timbers).
- The cultural values of rainforests attract interest from the wider community and tourists.
- Many areas are paramount to the Australian community as iconic examples of rainforest conservation (e.g. Daintree, Washpool, Gordon below Franklin). In some areas rainforest replanting has occurred (e.g. Big Scrub, Wet Tropics Tree Planting Scheme).
- Growth in recent ecotourism has led to a greater awareness of the need to manage these systems to allow both opportunities for ready access and protection of tourist values. Their value for Indigenous communities, forestry, conservation and tourism have been recognised through Regional Forest Agreements.

List of key management issues

- Clearing, ongoing and legacies.
- Fragmentation/edge effects.
- Climate change.
- Restoration in fragmented landscapes.
- Isolation and faunal barriers caused by roads/powerlines.
- Tourist/visitor access and infrastructure management (e.g. raised walkways), educational resources.
- Fire (e.g. from surrounding land uses).
- Invasive species.
- Exclusion of livestock to maintain their integrity of fragments.
- Long-term monitoring to inform future management strategies.

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Data sources

Interim Biogeographic Regionalisation for Australia (IBRA), Version 7.

National Vegetation Information System, Version 4.2.

Collaborative Australian Protected Areas Database – CAPAD 2014 – Terrestrial.



Coachwood (*Ceratopetalum apetalum*), Bindarri National Park, NSW (Photo: C. Slatyer)

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