

Regional ecosystems: Rainforest



RE 12.3.1

Gallery rainforest on alluvial plains

One of the remarkable features of the South East Queensland (SEQ) region is the way in which totally different types of vegetation can occur in close proximity. Gallery rainforest such as Regional Ecosystem (RE) 12.3.1 provides one of the best examples. It is possible to move from the dry sunny understorey of eucalypt forest to the cool shaded recesses of rainforest within a distance not much greater than a cricket pitch.

If you're walking through the bush, gallery rainforest often remains hidden from view until you suddenly come across the boundary. However, when viewed from the top of an adjacent hill, or where the country has been cleared, it appears as a dark green ribbon snaking through the landscape along watercourses. Tall figs (*Ficus macrophylla*, *F. watkinsiana*), Hoop Pine (*Araucaria cunninghamii*), Bunya Pine (*A. bidwillii*) or Weeping Lillypilly (*Waterhousea floribunda*) can often be seen towering above the dense uneven-looking canopy.

Below the dense canopy the forest is usually quite open except for sunny edges where there is a curtain of vines and branches, especially where remnant patches of rainforest abut cleared country. Some of the larger trees are buttressed and thick vines may be present. The ground has some ferns, for example Giant Maiden-hair Fern (*Adiantum formosus*) and matrushes (*Lomandra* spp.) but is mostly covered by leaf litter with the loamy soil visible among gaps in the litter.

Many different tree and shrub species are present. The trees tend to have fairly large leaves particularly those not directly exposed to sunlight. In places, large old eucalypts such as Flooded Gum (*Eucalyptus grandis*) and Brush Box (*Lophostemon confertus*) emerge above the canopy, a reminder that rainforest species can be successful invaders of eucalypt forest. Dense groves of Piccabeen Palm (*Archontophoenix cunninghamiana*) can occur in localised swampy areas.



RE 12.3.1 is usually associated with rivers or creeks and often presents as a ribbon of dark green vegetation snaking across the landscape. This is further accentuated in this image with the encroachment of housing development onto the sought-after alluvial plains.

Regional Ecosystems, or REs for short, are used in Queensland to describe native vegetation types based on where they grow, the plant species in the tallest layer and the underlying geology. There are about 150 different REs in SEQ, all of which have a unique three-part number usually starting with '12'.

For more information on REs visit www.qld.gov.au/environment/plants-animals/plants/ecosystems

Distribution

RE 12.3.1 is confined to the vicinity of watercourses, growing on levees within the banks of streams and lower floodplain terraces. Consequently, gallery rainforest is subject to periodic inundation by floodwater. Soils are deep friable loams.

RE 12.3.1 is more widespread in higher rainfall parts of the SEQ region (rainfall >1000mm); however, in drier parts it can often be seen along streams at the foot of rainforest-covered hills and ranges.

Variations and similarities

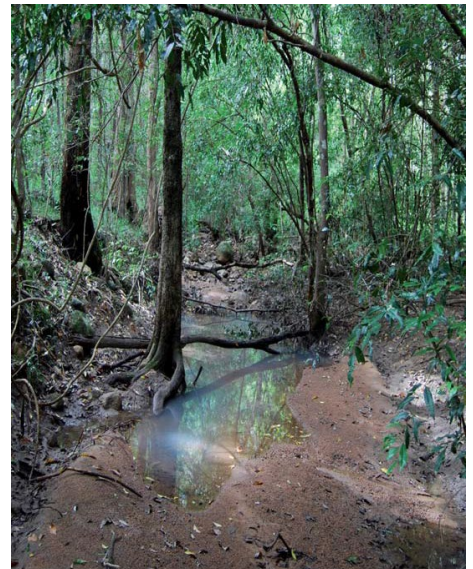
RE 12.3.1 exhibits considerable variation in height and species composition in response to rainfall. The tallest, most floristically diverse examples grow along the streams that rise in the Sunshine Coast and Gold Coast hinterlands.

Where rainfall is lower, the canopy is not as tall and species characteristic of dry rainforest are present. However, one of the special features of gallery rainforest is that in lower rainfall parts of the SEQ region, it provides a refuge for rainforest species normally associated with wetter areas; eg. Moreton Bay Fig (*Ficus macrophylla*), Red Cedar (*Toona ciliata*) and Piccabeen Palm.

A good example of this can be seen in the Palms National Park between Yarraman and Cooyar in the upper Brisbane River catchment.

Regional Ecosystems that may be confused with RE 12.3.1 include:

- **RE 12.3.2** Flooded Gum tall open forest on alluvial plains. This RE has a very similar species composition and habit, also growing along watercourses. The presence of a Flooded Gum canopy is the primary distinguishing feature. As Flooded Gums die out over hundreds of years, RE 12.3.2 can transition to RE 12.3.1.
- Other rainforest Regional Ecosystems (eg. **12.8.3**, **12.11.1**, **12.11.10**, **12.12.1** and **12.12.16**). These all occur on landforms other than watercourses. Where rainforest extends from hillslopes down onto floodplains the RE would change to 12.3.1 where it fringes the watercourse.
- **RE 12.3.7** Queensland Blue Gum (*Eucalyptus tereticornis*), Weeping Bottlebrush (*Melaleuca viminalis*), River Oak (*Casuarina cunninghamiana*) fringing forest. This fringing forest can have scattered rainforest trees present for example Silky Oak (*Grevillea robusta*) and Black Bean (*Castanospermum australe*). As a rule of thumb, 12.3.1 is distinguished from 12.3.7 by its dense, closed canopy formed exclusively by rainforest species (but taking into account that some scattered emergent eucalypts may be present).



Periodic flooding and the accumulation of sediment is common in RE 12.3.1. The deposition of sediment and nutrients is critical in sustaining the biodiverse band of gallery rainforest in drier landscapes.



Isolated pockets of RE 12.3.1 can occur in the drier, western parts of the SEQ region. These areas provide a cool, moist refuge for many animals exemplified by these flying-foxes roosting at The Palms National

Distribution map 12.3.1

Gallery rainforest can occur throughout the SEQ region but historically larger tracts were restricted to the plains and slopes east of the coastal ranges, corresponding to areas of higher rainfall. Remaining patches of RE 12.3.1 are subject to development pressures occurring on coastal plains, which results in this RE remaining as a narrow fringe of vegetation in an otherwise cleared or built-up landscape. Today only 25% of the original extent of this RE remains. Only small areas of RE 12.3.1 are protected in reserves and it is considered 'endangered' under Queensland legislation. Most patches of RE 12.3.1 that remain today contain rare and threatened plant species.

1. The Palms National Park, Cooyar

This provides an example of gallery rainforest occurring in a drier part of the region, showing how a good supply of moisture can sustain isolated populations of palms and figs.

2. Neurum Creek Conservation Park

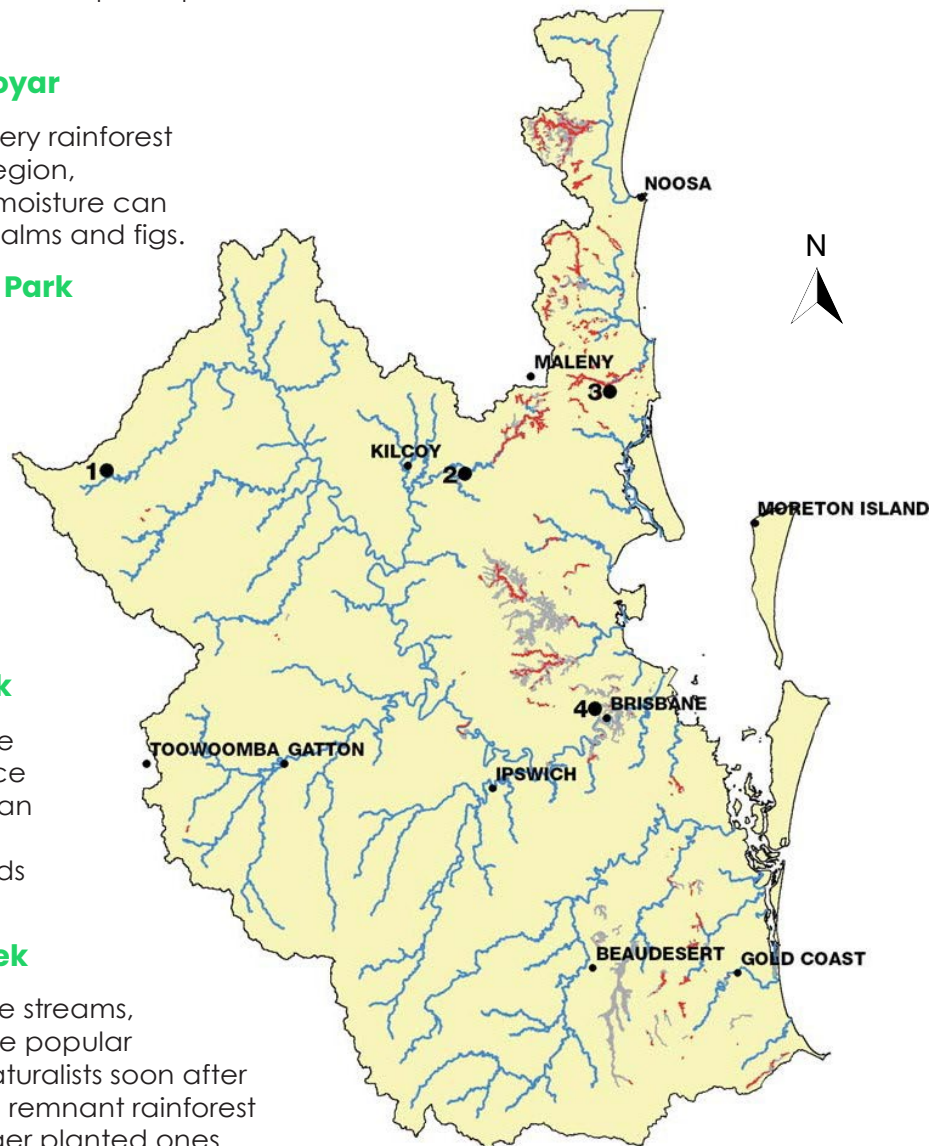
This Conservation Park and in other patches of remnant vegetation around Kilcoy, RE 12.3.1 can be seen as a narrow ribbon contrasting with the surrounding cleared grazing land, with large Moreton Bay Figs emergent above the dark, dense tree canopy.

3. Palm View Conservation Park

This Conservation Park is near the Caloundra turn-off from the Bruce Highway. This location provides an example of the luxuriant gallery rainforests of the coastal lowlands behind the Sunshine Coast.

4. Bancroft Park, Enoggera Creek

Gallery rainforests along Brisbane streams, especially Enoggera Creek, were popular destinations for botanists and naturalists soon after European settlement. Some old, remnant rainforest trees still survive, amongst younger planted ones.



■ Pre-clearing (~180 years ago)
 ■ Today's distribution

**Map is indicative only. Due to scale, some RE occurrences may not be visible.*

Vegetation Management Act (1999) status: Endangered
Level of Protection (extent in protected areas): Low

Regional ecosystem	Pre-clearing extent, or estimated amount ~180 years ago (hectares)	Current extent (hectares)	Percent of pre-clearing extent remaining	Amount protected in reserves (hectares)
12.3.1	38,322	9,858	25.7%	1,476



Emergent Hoop Pines (above) hint at the gallery rainforest (RE 12.3.1) that would have existed prior to clearing for grazing, timber-getting and European settlement.

Past to present

Early European explorers of the streams draining to Moreton Bay provided detailed accounts of the gallery rainforests they observed. Many of the botanical names given to rainforest plants are based upon specimens collected on these journeys.

RE 12.3.1 provided a valuable source of cabinet and specialty timbers after European settlement, the most famous example being Red Cedar. Patches of RE 12.3.1 above flood level were cleared for agriculture because of the fertile soil. Physical and practical constraints limited clearing in places, although there have been cumulative losses through time from clearing of adjacent floodplains and from impacts along edges of remnant patches, especially from weeds, fire and uncontrolled stock.

Natural values and functions

Gallery rainforest is structurally complex and biologically productive performing a wide range of ecosystem functions and services at varying scales. The diversity of vegetation helps to store and recycle carbon, intercept nutrients and pollutants, protect soil from erosion, filter and trap sediments, regulate ground water and provide pharmaceutical resources, many of which remain misunderstood, or undiscovered.

Gallery rainforests are bursting with wildlife. These ecosystems provide important habitat and food resources for many animals. Many plant species are bird-dispersed, and some fruit-eating birds migrate seasonally from upland to lowland rainforest. Litter-foraging animals, microbats and flying-foxes, and a broad range of insects, snails and other invertebrates are associated with pollination and decomposition cycles. Trees overhanging water provide food and shade for stream plants and animals. For example, fruits of some lillypillies (*Syzygium* spp.) are eaten by turtles and fish.

Gallery rainforests in SEQ are home to more than 30 plants and animals listed as threatened with extinction. The populations of many species are significant in a local or regional context as they are isolated from other populations by large distances. An example is the Richmond Birdwing Butterfly (*Ornithoptera richmondia*) and its host plant, the Richmond Birdwing Butterfly Vine (*Pararistolochia praevenosa*), which are now only found in small, isolated populations across their former range.



The distinctive Richmond Birdwing Butterfly relies on RE 12.3.1 as one of the primary habitats for its larval host plant, the appropriately named Richmond Birdwing Butterfly Vine.



Macadamia trees originally occurred only in the rainforests of SEQ and northern New South Wales. Wild (uncultivated) macadamia trees, which founded the international industry, are considered endangered as 80% of them have been lost since European settlement.

Management

Rainforests in southern Queensland have a tenacious capacity to establish and grow when competition for resources from invasive species is restricted and there is protection from fire. Gallery rainforest is no exception, and the high levels of moisture and fertility enable rapid growth to occur. Species can also establish beyond the edge of rainforest, leading to an expansion through time. This can be seen on public lands that were managed for timber production in the past. Here, gallery rainforest has not only persisted despite past disturbance, but has also expanded into the understorey of adjacent eucalypt forests.

The recovery of gallery rainforests following disturbances such as storm or flood damage follows a pathway in which species composition changes through time. This process is known as succession. In the initial stages, herbs, short-lived shrubs and small trees (known as pioneers) account for much of the regrowth growing from seed stock in the soil. Some long-lived hardy tree species usually establish as well and become more prominent as the short-lived pioneer species complete their growth cycle. Through time, they are joined by other long-lived trees that arrive at the site by seed carried by birds, wind and water.

Disturbance by fire, clearing, grazing and timber harvesting has assisted the invasion by Lantana (*Lantana camara*) and woody weeds that take advantage of sunlight and the fertile, moist soils. The major woody weeds of RE 12.3.1 are Camphor Laurel (*Cinnamomum camphora*), Broad-leaved Pepper (*Schinus terebinthifolia*), Chinese Elm (*Ulmus parvifolia*), Yellow Guava (*Psidium guajava*) and Large-leaved Privet (*Ligustrum lucidum*). Close to human settlements birds carry seeds from gardens and invasive ornamental species such as Ochna (*Ochna serrulata*) and Murraya (*Murraya* sp.) can invade gallery rainforest. Umbrella Tree (*Schefflera actinophylla*) is an example of a native species that did not occur naturally in the SEQ region that is now invading gallery rainforest. Invasive vines such as Cat's Claw Creeper (*Dolichandra unguis-cati*), Dutchman's Pipe (*Aristolochia elegans*) and Madeira Vine (*Anredera cordifolia*) pose a serious threat to RE 12.3.1 as they can invade and degrade intact vegetation.

Management of RE 12.3.1 should be undertaken strategically, avoiding repetition of effort and resources. Basic management elements should include a maintained fire break or broader fire suppression strategy, fencing and exclusion of livestock, and a program of weed control, particularly in response to the removal of either fire or livestock from an existing patch.

Weed control should prioritise the removal of 'transformer' weeds, such as Cat's Claw Creeper, Madeira Vine and Dutchman's Pipe, as these weeds can alter the whole ecosystem. Other weeds should be prioritised based on their extent and impact on the gallery rainforest. On-going treatment of weeds and monitoring for new infestations are fundamental to successful weed management.

The beauty and diversity of gallery rainforest inspires a high degree of enthusiasm among land managers and community groups for restoring the condition of remnants and re-establishing the ecosystem where it has been lost due to past land use and land management practices.





One approach to restoring RE 12.3.1 may include planting of pioneer species to quickly expand the extent of an existing remnant in a degraded landscape.

Restoration and regeneration

Activities that aim to restore RE 12.3.1 to an approximation of original condition will largely involve the removal of weeds, particularly woody weeds and exotic vines. Although gallery rainforest has a strong capacity to naturally regenerate, it will largely depend on how degraded the site is, how close it is to remnant gallery rainforest and the extent of available seed in the soil.

It is good practice to allow some time for the patch to recover naturally, and only undertake supplementary planting if it is required. The vegetation of patches undergoing restoration will become more complex through time. While birds, wind and floods will assist regeneration by bringing in more species, they will also transport weeds to the site. Ongoing weed control and monitoring is therefore essential.

A more intensive reconstruction approach may be required in situations where the ecosystem has been removed or severely degraded by past disturbance. It will require a staged approach, with an initial planting of pioneer species to establish a structure, followed by a gradual introduction of longer-lived canopy (tall) trees and species representative of the shaded understorey. The control and ongoing exclusion of weeds is resource intensive but can be scaled back over time as the site becomes more shaded.

Fire is not recommended in gallery rainforests as many rainforest plant species will be killed by fire. Fire protection measures should be undertaken where there is a risk of fire travelling into RE 12.3.1 from adjacent lands.

Restoration tips

- Determine the best approach for your site: nature regeneration (e.g. protection from stock or fire), assisted natural regeneration (e.g. weed control) or reconstruction (e.g. planting).
- Plan the project in detail as some activities such as weed and stock control can be labour intensive and will require considerable follow-up.
- Avoid using fire near gallery rainforest as most rainforest tree species will be killed by fire.
- Protect the edges of remnants exposed to wind and fire by planting longer-lived pioneer species and compatible eucalypts (e.g. Queensland Blue Gum, Flooded Gum) and maintaining fire breaks.
- Encourage natural regeneration where possible. Remnant trees are often key for regeneration as they are used by fruit-eating birds and flying-foxes and become surrounded by a circle of seedlings from droppings.
- If a reconstruction (planting) is required, determine appropriate species to use by observing patches that appear to be representative of gallery rainforest elsewhere along your stream. If no suitable reference sites can be found, examine historical records such as herbarium specimens, or ask your local bushcare or landcare group.
- When sourcing trees for planting, make sure that the stock is sourced from locally collected seeds or cuttings. This will reduce the risk of hybridisation and in-breeding. If you are re-introducing species that have become locally extinct, try to source stock grown from the closest comparable patch of gallery rainforest.

Trees and shrubs

Actephila	<i>Actephila lindleyi</i>
Axe-handle Wood	<i>Aphananthe philippinensis</i>
Blue or Silver Quandong	<i>Elaeocarpus grandis</i>
Black Bean or Moreton Bay Chestnut	<i>Castanospermum australe</i>
Black Plum	<i>Diospyros australis</i>
Bolly Gum	<i>Neolitsea dealbata</i>
Brown Laurel	<i>Cryptocarya triplinervis</i>
Brown Pine	<i>Podocarpus elatus</i>
Brown Tulip Oak	<i>Argyrodendron trifoliolatum</i>
Brush Box	<i>Lophostemon confertus</i>
Bunya Pine	<i>Araucaria bidwillii</i>
Grey Walnut	<i>Beilschmiedia elliptica</i>
Bumpy Ash	<i>Flindersia schottiana</i>
Creek Satinash	<i>Syzygium australe</i>
Foambark Tree	<i>Jagera pseudorhus</i> var. <i>pseudorhus</i>
Giant Water Gum	<i>Syzygium francisii</i>
Hairy Alectryon	<i>Alectryon tomentosus</i>
Hard Bolly Gum	<i>Beilschmiedia obtusifolia</i>
Hauer	<i>Dissiliaria baloghioides</i>
Hoop Pine	<i>Araucaria cunninghamii</i>
Lacebark Tree	<i>Brachychiton discolor</i>
Lignum Vitae	<i>Vitex lignum-vitae</i>
Omega	<i>Cleistanthus cunninghamii</i>
Malletwood	<i>Rhodamnia argentea</i>
Moreton Bay Fig	<i>Ficus macrophylla</i>
Myrtle Ebony	<i>Diospyros pentamera</i>
Native Guava	<i>Rhodomyrtus psidioides</i>
Palm Lilies	<i>Cordyline petiolaris</i> , <i>C. rubra</i>
Peanut Tree	<i>Sterculia quadrifida</i>



Weeping Satinash (*Waterhousea floribunda*) responds well to disturbance events such as floods and will regenerate readily in the exposed aggregate deposition.

Pepperberry Tree	<i>Cryptocarya obovata</i>
Piccabeen Palm or Bangalow Palm	<i>Archontophoenix cunninghamiana</i>
Pink Heart	<i>Medicosma cunninghamii</i>
Orange Thorn	<i>Pittosporum multiflorum</i>
Red Cedar	<i>Toona ciliata</i>
Red-fruited Laurel	<i>Cryptocarya laevigata</i>
Rose Gum	<i>Eucalyptus grandis</i>
Scaly Ebony	<i>Diospyros geminata</i>
Silky Oak	<i>Grevillea robusta</i>
Tulip Wood	<i>Harpullia pendula</i>
Walking Stick Palm	<i>Linospadix monostachya</i>
Watkin's Fig	<i>Ficus watkinsiana</i>
Weeping Satinash	<i>Waterhousea floribunda</i>
Wheel-of-Fire Tree	<i>Stenocarpus sinuatus</i>
White Fig	<i>Ficus virens</i>
White Kamala	<i>Mallotus discolor</i>

Pioneers

Brown Kurrajong	<i>Commersonia bartramia</i>
Hickory Wattle	<i>Acacia disparrima</i> subsp. <i>disparrima</i>
Blackwood	<i>Acacia melanoxylon</i>
Bleeding Heart	<i>Homalanthus populifolius</i>
Celery Wood	<i>Polyscias elegans</i>
Guioa	<i>Guioa semiglauca</i>
Kangaroo Apple	<i>Solanum aviculare</i>
Kamala	<i>Mallotus philippinensis</i>

Native Frangipani	<i>Hymenosporum flavum</i>
Native Peach	<i>Trema tomentosa</i> var. <i>viridis</i>
Maiden's Wattle	<i>Acacia maidenii</i>
Native Tamarind	<i>Diploglottis australis</i>
Pencil Cedar	<i>Polyscias murrayi</i>
Yellow Pear-fruit	<i>Miscocarpus pyriformis</i>
White Ash	<i>Alphitonia petriei</i>
White Cedar	<i>Melia azedarach</i>
White Kamala	<i>Mallotus discolor</i>

Vines, grasses, forbs, ferns and epiphytes

Bird's Nest Fern	<i>Asplenium australasicum</i>
Common Maidenhair Fern	<i>Adiantum silvaticum</i>
Crisped Silkpod	<i>Parsonsia lilacina</i>
Cunjevoi	<i>Alocasia brisbanensis</i>
Giant Maiden-hair Fern	<i>Adiantum formosum</i>
Giant Pepper Vine	<i>Piper novae-hollandiae</i>
Matrush	<i>Lomandra hystrix</i>
Native Wisteria	<i>Callerya megasperma</i>
Trim Shield Fern	<i>Lastreopsis decomposita</i>
Water Vine	<i>Cissus antarctica</i>
Water Vine	<i>Flagellaria indica</i>
Zig Zag Vine	<i>Melodorum leichhardtii</i>



Matrush (*Lomandra hystrix*) is usually found fringing watercourses and can be utilised in restoration projects to assist in bank stabilisation.

Designed and produced Healthy Land & Water, a community based, not-for-profit organisation that works to protect and restore the natural resources of South East Queensland.

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Information provided in the *Regional Ecosystems of South East Queensland* series provide a general guide and should not be taken to replace professional advice or a formal recommendation of land management.

Further Reading

SEQ Healthy Land & Water Ecological Restoration Framework - www.hlw.org.au

SEQ Land for Wildlife Notes - www.lfwseq.org.au

Queensland Government - www.qld.gov.au (search Regional Ecosystems and Planned Burn Guidelines)



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