

Revegetation guide

for

Riparian areas



of the
**HASTINGS &
CAMDEN HAVEN**



a guide
to assist landholders
manage and rehabilitate riparian areas

Clearing in the Hastings

Fencing remnant vegetation



Clearing of vegetation to make way for settlement and agriculture in the 1800's changed the floodplains of NSW's coastal rivers forever.

The Hastings area was no exception. "Dense alluvial brushes, rising like gigantic green walls on both sides of the rivers", described by Government Surveyor Clement Hodgkinson (c. 1830), occupied the best land along the rivers and creeks and was effectively removed altogether.

In particular, Lowland Rainforest is virtually gone from the landscape and it is now 'critically endangered'. Many of the native animals it once supported are now left vulnerable to extinction.

Our fertile alluvial soils can only become more valuable as population increases and demands for better, locally grown, produce also increase. Even so, the concept that agriculture and conservation can sit capably side by side in the landscape is gaining acceptance. The floodplain landscape is surely big enough to accommodate both.



Excessive clearing reduces biodiversity

and Camden Haven River catchment

As machinery and drainage technology improved, this clearing extended into the lower lying parts of the floodplain.

Only recently as our collective understanding of landscape ecology has increased have we realised what has been lost. So altered are the diverse floodplain vegetation types that they are now considered 'endangered'.



Riverbank planting

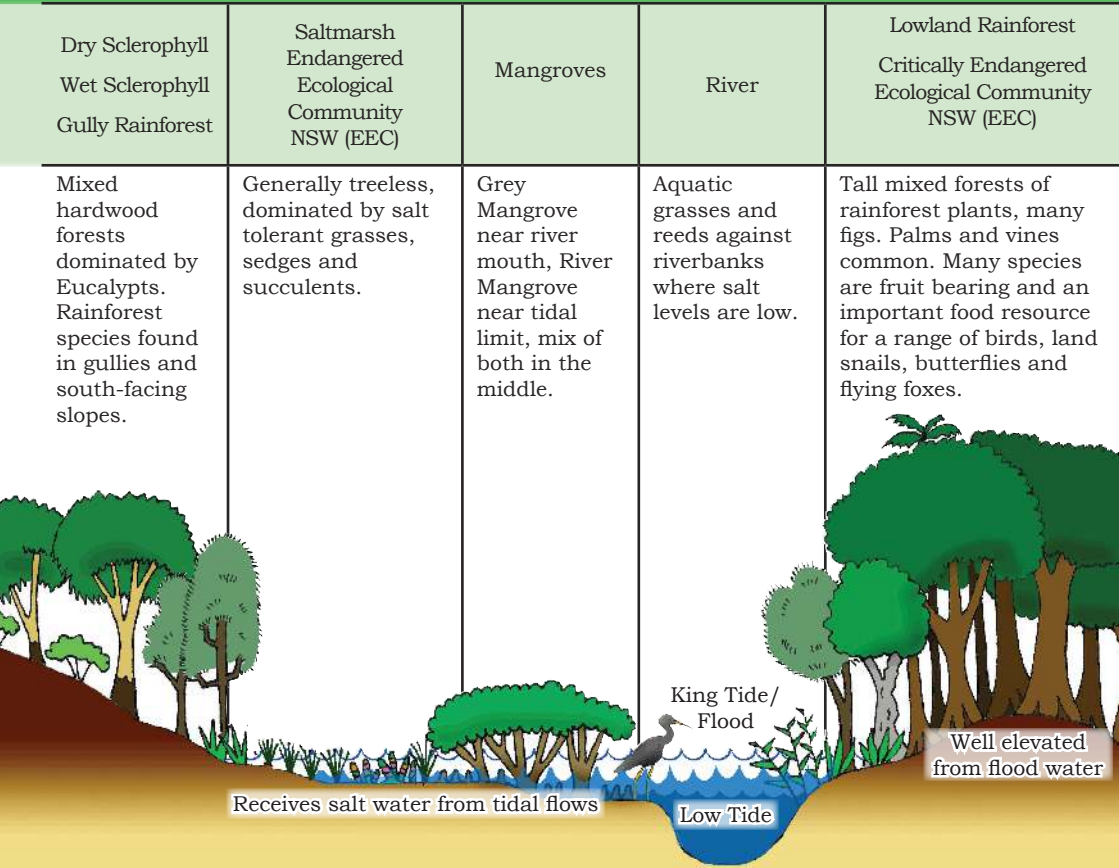


**Don't let our riparian areas be destroyed!
They need your help!**

This guide is designed to outline the main considerations for anyone interested in undertaking some restoration of the original Hastings riparian vegetation, be it modest or ambitious. Like any worthwhile goal it will require some effort, but there is assistance available in the form of information, technical support and funding incentives.

What grows where.....

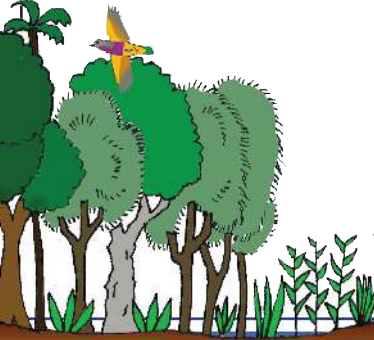
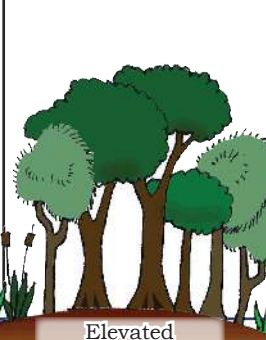

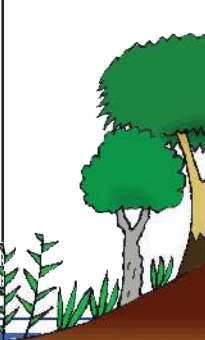
Vegetation communities differ by species that can tolerate specific conditions. The first step in any revegetation project is to determine where you are in the landscape and hence which types of vegetation are most suitable for your setting.



<i>Floodplain margin</i>	<i>Estuarine Wetland</i>	<i>Intertidal</i>	<i>River</i>	<i>River Levee</i>
<p>Inundation: * Never inundated as it sits well above flood water levels</p> <p>* Soils: Well drained, not limited by waterlogging</p>	<p>Inundation: * Frequent inundation by highest tides and floods * Tidal water salty or brackish</p> <p>Soils: * Waterlogged * Acidic or saline</p>	<p>Inundation: * Daily by tides * Tidal water salty or brackish</p> <p>Soils: * Highly saline</p>	<p>Inundation: * Native grasses and reeds sit in the shallow waters constantly on the banks of the river</p>	<p>Inundation: * Infrequently and briefly by bigger floods * Flood water fresh not salty</p> <p>Soils: * Well structured, well drained, highly fertile</p>

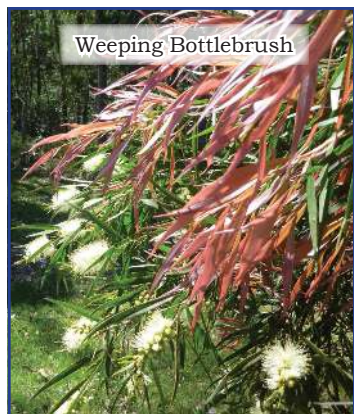
Vegetation of the Hastings.....

Many vegetation communities occurring in the Hastings have been cleared to the point they are now considered endangered or threatened. By revegetating your riparian areas, you will be supporting conservation efforts as well as returning natural systems to the Hastings area.

Swamp Sclerophyll Reedbeds Endangered Ecological Community NSW (EEC)	Floodplain Mixed Forest Endangered Ecological Community NSW (EEC)	Reedbeds	Dry Sclerophyll Wet Sclerophyll Gully Rainforest
<p>Water tolerant trees such as paperbarks and swamp oaks around the edges. Beds of reeds and grasses grow where flood waters and stands of water will sit the longest.</p>  <p>Persistent water after flood/rain</p>	<p>A mix of lowland rainforest and river species, a less closed and less diverse mix of species. Fringed by paperbarks and swamp oaks.</p>  <p>Elevated from flood water</p>	<p>Beds of reeds and grasses where flood waters and stands of water will sit the longest.</p>  <p>Persistent water after flood/rain</p>	<p>Mixed hardwood forests dominated by Eucalypts. Rainforest species found in gullies and south-facing slopes.</p> 
<i>Backswamp / Floodplain Swamp</i>	<i>Old River Levee</i>	<i>Backswamp</i>	<i>Floodplain margin</i>
<p>Inundation: * Infrequently inundated by large flood events, often for prolonged periods * Flood water generally fresh but also may be subject to acid water from acid sulphate soils</p> <p>Soils: * Generally poorly structured, infertile & acidic * Potential for acid sulphate soil development if drained or suffers erosion</p>	<p>Inundation: * Infrequently and briefly by bigger floods * Flooding water fresh not salty</p> <p>Soils: Well structured, well drained, highly fertile</p>	<p>Inundation: * Infrequently inundated by flood events, often for prolonged periods * Flood water generally fresh</p> <p>Soils: * See Backswamp / floodplain swamp info detailed left</p>	<p>Inundation: * Never inundated as it sits well above flood water levels</p> <p>* Soils: Well drained, not limited by waterlogging</p>

What to plant.....

Below is a broad list of general local native species found growing within vegetation communities of the Hastings & Camden Haven.



Intertidal & Estuarine Wetland

Intertidal Species

- Grey Mangrove - *Avicennia marina*
- River Mangrove - *Aegiceras corniculatum*
- Native Reed/Quill Rod - *Phragmites australis*
- Marsh Club Rush - *Bolboschoenus fluviatilis*

Estuarine Wetlands

- Swamp Oak - *Casuarina glauca* (wetland margins)
- Willow Bottlebrush - *Callistemon salignus* (wetland margins)
- Sea Rush/Juncus - *Juncus kraussii*
- Saltwater Couch - *Sporobolus virginicus*
- Prickly Couch - *Zoysia macrantha*

River Levee

Lowland rainforest on the Floodplain

Trees - species from Old River Levee plus the following:

- Rough Elm - *Aphananthe philippinensis*
- Bangalow Palm - *Archontophoenix cunninghamiana*
- Red Olive Plum - *Cassine australis*
- Murrogon - *Cryptocarya microneura*
- Jackwood - *Cryptocarya glaucescens*
- Black Plum - *Diospyros australis*
- Stinging Tree - *Dendrocnide excelsa*
- Native Tamarind - *Diploglottis australis*
- Rosewood - *Dysoxylum fraserianum*
- Morton Bay Fig - *Ficus macrophylla*
- Small Leaved Fig - *Ficus obliqua*
- Rusty Fig - *Ficus rubiginosa*
- Deciduous Fig - *Ficus superba* var. *henneana*
- Strangler Fig - *Ficus watkinsiana*
- Cudgerie - *Flindersia schottiana*
- Bolly Gum - *Litsea reticulata*
- White Cedar - *Melia azedarach* var. *australasica*
- Red Pear Fruit - *Mischocarpus australis*
- Red Kamala - *Mallotus philippensis*
- Black Apple - *Planchonella australis*
- Brush Cherry - *Syzygium australe*
- Giant Water Gum - *Syzygium francisii*
- Flintwood - *Scolopia braunii*
- Whalebone Tree - *Streblus brunonianus*
- Red Cedar - *Toona ciliata*



Shrubs

- Orange Thorn - *Pittosporum multiflorum*
- Rough Fruit Pittosporum - *Pittosporum revolutum*

Understorey

- Crinum Lily - *Crinum pedunculatum*
- Right-angle Grass - *Entolasia marginata*
- Commelina - *Commelina cyanea*
- Basket Grass - *Oplismenus imbecillis*

Vines

- Common Silkpod - *Parsonsia straminea*
- Native Jasmine - *Morinda jasminoides*
- Blood vine - *Austrosteenisia blackii*
- Whip Vine - *Flagellaria indica*

Specific areas.....

For a species list more specific to your local area, contact Hastings Landcare or Port Macquarie - Hastings Council.

Backswamp/Floodplain Swamp

Trees

Broad Leaf Paperbark - *Melaleuca quinquenervia*
Prickly Paperbark - *Melaleuca styphelioides*
Snow in Summer - *Melaleuca linariifolia*
Swamp Oak - *Casuarina glauca*
Swamp Mahogany - *Eucalyptus robusta*
Willow Bottlebrush - *Callistemon salignus*

Reeds And Rushes (also suitable wetland plants)

Native Reed/Quill Reed - *Phragmites australis* (wet)
Marsh Club Rush - *Bolboschoenus fluviatilis* (wet)
Cumbungi - *Typha orientalis* (wet)
Spike Rushes - *Eleocharis equisetina*/*E. sphacelata* (moist)
Tall Sedge - *Carex appressa* (moist)



Broad Leaf Paperbark

Old River Levee

Ridges of higher ground of mixed rainforest & swamp

Understorey

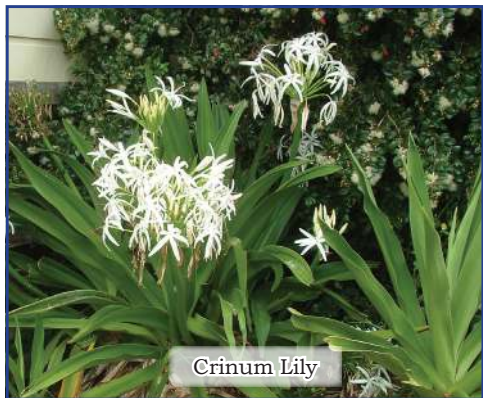
Crinum Lily - *Crinum pedunculatum*
River Mat Rush - *Lomandra hystrix*
Basket Grass - *Oplismenus imbecillis*

Vines

Common Silkpod - *Parsonia straminea*
Scrambling Lily - *Geitonoplesium cymosum*

Trees

White Aspen - *Acronychia oblongifolia*
Red Ash - *Alphitonia excelsa*
Lilly Pilly - *Acmena smithii*
Willow Bottlebrush - *Callistemon salignus*
Swamp Oak - *Casuarina glauca*
Tuckeroo - *Cupaniopsis anacardioides*
River Quandong - *Elaeocarpus obovatus*
Creek Sandpaper Fig - *Ficus coronata*
Sandpaper Fig - *Ficus fraseri*
Guioa - *Guioa semiglaucula*
Cheese Tree - *Glochidion ferdinandi*
Foambark - *Jagera pseudorhus*
Yellow Pear Fruit - *Mischocarpus pyriformis*
Celerywood - *Polyscias elegans*
Plum Pine - *Podocarpus elatus*
Muttonwood - *Myrsine howittiana*
Native Guava - *Rhodomyrtus psidioides*



Crinum Lily

Planting to improve biodiversity

The below information will help you create healthy, resilient plantings that will survive the test of time.

Now that you have determined what vegetation grows best where on your property, you need to consider what planting options are most suitable for you. When replanting or enhancing existing vegetation, consider using as diverse a mix of plants as possible from the species lists (pages 6 & 7) and consider the options below:

Fencing remnant vegetation

Existing remnants provide the ideal starting point for revegetation and provide protection for mature seed bearing plants, conserving the local genetic resource, as a source of seed material for the future and allow for seedlings to grow to maturity without stock damage. Regenerating seedlings are vital for the ongoing conservation of these stands. Large remnants and individual mature trees are also vital habitat for fauna. Initial weed control inside the fenced area will be essential.

Riverbank and estuary plantings

Enhance riverbank stability on the rivers and in estuaries with tree roots that strengthen soil in the bank. Rivers make natural corridors across the landscape. River and estuary planting enhances both terrestrial and aquatic ecosystems. These are specialised environments that require careful plant selection. Fences to reduce stock access may be damaged by floods so design and material selection is important.

Fenceline corridor planting

Make use of existing fence lines to reduce material costs. These are useful as corridors to link remnant areas of habitat useful for paddock shade for stock. A large proportion of edges mean light penetration and weed growth may be greater than for a plot (see below) and require more maintenance initially.

Plot planting

Plots can be located and sized to fit in with the landscape and the agricultural considerations. They have less edge effects which means that the developing canopy will shade the interior of the plot, reducing weed growth in the long term. These provide shelter pockets for fauna and shade for stock. Plot plantings can be any size, shape or density but will require some initial weed control while trees establish.

Individual tree protection

This has a low cost and low requirement for space and can provide 'stepping stones' for animals crossing the floodplain and ideal for providing shade for stock for trees with wide canopies (especially figs). Fencing protects against stock damage or browsing as the trees mature.



Revegetation project checklist.....

The success of any project require good planning.

Planning

- Be sure about your goals and level of commitment over the life of the project
- Ensure your project is consistent with your location on the floodplain (see pages 4 & 5)
- Consider staging your project over a number of years
- Make a plan of your project, an aerial photo from the internet is great help
- Measure & calculate your project (length of fencing, number of posts, plants etc) & cost it
- Check with Landcare or Local Land Services for funding options and technical assistance
- Contact your local native nursery providers and ask them if they have suitable species, or ask them to start growing specific plants for your project– preferably from locally collected seed. It can take between 4-12months to grow native plants– from seed collection grown to a readily plantable size. You may want to grow them yourself.

Preparing your planting site

- Be prepared to protect your plants from livestock and wild herbivores, most commonly this is achieved using strained wire or electric fencing, or with tree guards if livestock are absent, choose whichever is most appropriate for your site
- Kill the grass and weeds from around your plantings as they will rob them of water & nutrients
- In hard ground you may require a deep rip-line into which to plant

The right plants for the job

There is considerable variation between individuals in any population. This is no accident, the process of evolution will select for the best traits for a given setting. The same applies for the plants you will be using. We all have a responsibility to use plants with the most appropriate genetics. This is also known as using the right provenance and in practical terms means sourcing seed collected locally or seedlings grown locally.

- Fruit bearing plants should be sourced from seed collected between the Bellinger to the Manning River valleys. Non-fruit bearing plants should be sourced from seed collected within the Hastings.
- Never plant a species in the Hastings which wouldn't have grown there naturally!

Planting

- Plants require water and nutrients, you may have to help in supplying one or both especially to new plantings. Lack of water is the most common cause of planting failure.
- Keep weeds and especially pasture grass away from plantings by careful slashing, or using herbicides, mulch, weed mats or thick cardboard at least to the edge of the canopy or drip-line. Competition from weeds is the second most common cause of planting failure.

Maintaining your project

- Maintain a favourable environment for your plants until they can fend for themselves. This means protecting from stock, controlling weeds and watering during dry times. If you apply for funding assistance you will need to commit to maintenance for several years as a condition of that assistance.

Weed management

Following are some weeds that may compete with your native plants so should be controlled prior to planting, and controlled if they attempt to re-establish in your revegetation area.



Broad-leaf Privet

Ligustrum lucidum

Broad-leaf privet grows as an evergreen shrub or small tree to a height of 4–10 m. Pointed oval-shaped leaves occur in opposite pairs, and are 4–13 cm long and 3–6 cm wide. The upper leaf surface is dark green and glossy or shiny while the under-surface is paler with distinct veins.

Privet seeds are commonly spread by fruit-eating birds. Birds such as pied currawongs, silver-eyes and native pigeons can spread the seed widely into previously uninfested areas.



Narrow-leaf Privet

Ligustrum sinense

Narrow-leaf privet is a densely branched, multi-stemmed evergreen shrub 3–5 m tall (occasionally growing to 7 m).

Oval-shaped leaves occur in opposite pairs and are 1–7 cm long and 0.5–3.5 cm wide. Leaf tips may be pointed or round. Both leaf surfaces are mid to dull green. Leaves often have distinctly wavy margins and are held at right angles to the stems.



Camphor laurel

Cinnamomum camphora

Camphor laurel is a large evergreen tree that grows up to 20–30 m tall. The leaves have a glossy, waxy appearance and smell of camphor when crushed. In spring, it produces bright green foliage with masses of small white flowers.

The flowers are followed by green berries that turn black on ripening. The berries are consumed by a wide variety of bird species and are spread for many kilometers.

NSW Weedwise App

NSW Weedwise provides key information to help users reduce the impact of noxious and environmental weeds. The app is available free-of-charge for android smart phones on Google play and for iPhones on the App store.



Lantana

Lantana camara

Lantana is a heavily-branched, scrambling, thicket-forming shrub, usually ranging from 2–4 m in height. The plant reproduces by seeds, which are readily dispersed by birds and other animals (e.g. rodents) that eat the fruit.

Lantana is a serious invader of disturbed ecosystems including national parks and reserves. The weed can form a dense understorey competing with native flora and limiting natural regeneration.



Cats claw creeper

Dolichandra unguis-cati

Cat's claw creeper was introduced to Australia as a garden plant, and has escaped to become a major weed of native forests and riparian areas in eastern Australia. Its climbing woody stems cling to tree trunks, enabling it to grow into the forest canopy.

Cat's claw creeper competes with native plants by forming a dense above-ground mat and numerous underground reproductive tubers. It produces abundant seeds that are dispersed by wind and water.



Madeira vine

Anredera cordifolia

Madeira vine is a twining vine with wide, fleshy, heart-shaped leaves that are 2-15 cm long, and fragrant, cream-coloured flower spikes up to 30 cm long.

Successful Madeira vine control requires all tubers and bulbils to be removed or killed. Control activities are long-term, and require regular follow-up for many years. Single control activities generally cause disturbance that results in vigorous regrowth and can lead to worse infestation levels unless dedicated follow-up occurs.



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This document has been adapted from
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with the permission of Macleay Valley Landcare

Native riparian vegetation forms an integral part of a healthy functioning ecosystem and has many important ecological benefits. Riparian vegetation can include trees, shrubs, grasses and vines in a complex structure of groundcovers, understorey and canopy.

This guide serves to assist landholders restore riparian areas that have been degraded through practices such as clearing, cropping, livestock grazing and trampling, for the benefit of our natural environment and for the enjoyment of future generations.

**“Helping landholders repair our environment”
.....one property at a time**



Australian Government

National
Landcare
Programme



Local Land
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Hunter

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