Macleay Floodplain REVEGETATION GUIDE

estuary wetland swamp rainforest river

THE MACLEAY FLOODPLAIN

Clearing of vegetation to make way for settlement and agriculture in the 1800's changed the floodplains of NSW's coastal rivers forever. The Macleay River floodplain was no exception. The "*dense alluvial brushes, rising like gigantic green walls on both sides of the river*", described by Government Surveyor Clement Hodgkinson (c. 1830), which we would now describe as Lowland Rainforest, occupied the best land along the rivers and creeks was effectively removed altogether.

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'. In particular, Lowland Rainforest is virtually gone from the landscape and it is now 'critically endangered' and 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 notion 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.

This guide is designed to outline the main considerations for anyone interested in undertaking some restoration of the original Macleay floodplain 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.

Still interested? Read on.

This publication is also available at www.macleaylandcare.org.au

Freshwater wetlands

Black Necked Stork

Tubestock

Protected Lowland Rainforest

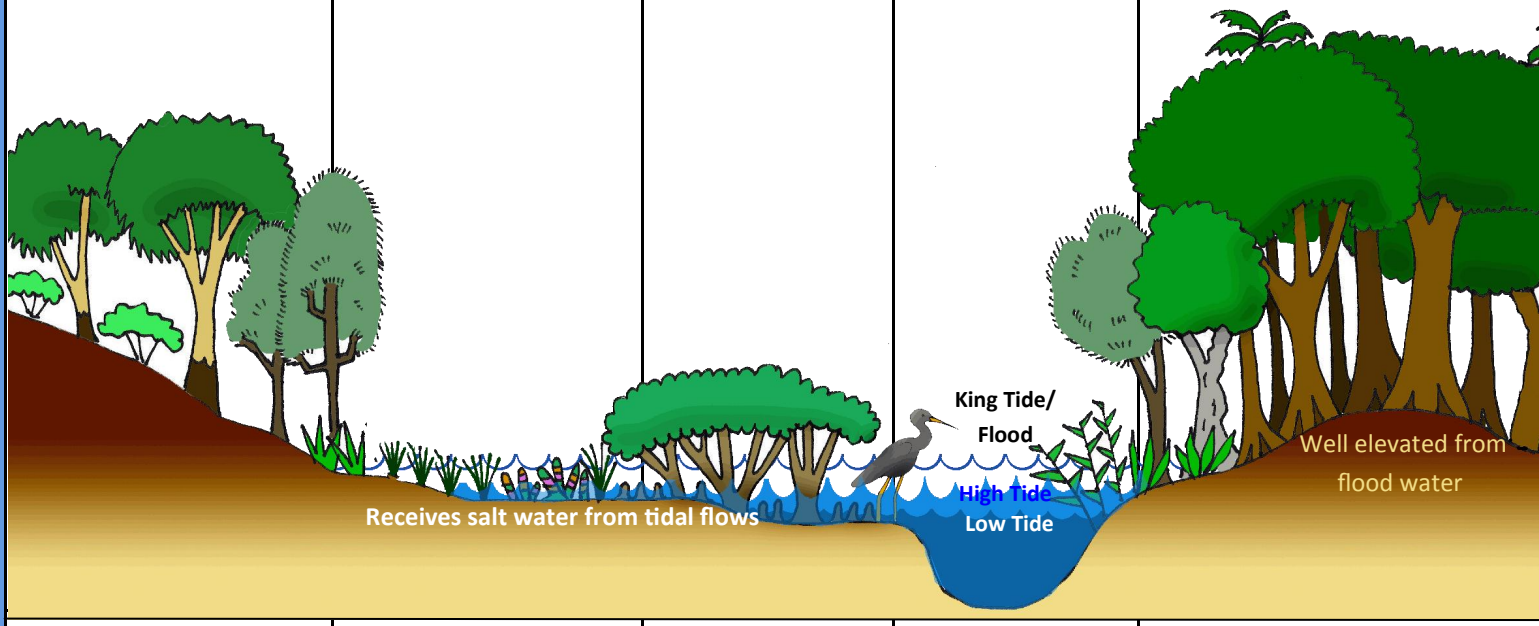
Replanting

Estuary mangroves

WHAT GROWS WHERE...

The Macleay River floodplain is not perfectly flat, and even small changes in the land's elevation change the pattern of inundation by tides and floods*. This in turn influences the type of vegetation that the floodplain can (and did before clearing) support. 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.

DRY SCLEROPHYLL/ WET SCLEROPHYLL/ GULLY RAINFOREST	SALTMARSH Endangered Ecological Community NSW (EEC)	MANGROVES	RIVER	LOWLAND RAINFOREST Endangered Ecological Community NSW (EEC) and Critically Endangered (EC)
Mixed hardwood forests dominated by Eucalypts. Rainforest species found in gullies and south-facing slopes.	Generally treeless, dominated by salt tolerant grasses, sedges and succulents.	Grey Mangrove near river mouth, River Mangrove near tidal limit, mix of both in the middle.	Aquatic grasses and reeds against riverbanks where salt levels are low.	Tall mixed forests of rainforest plants, many figs. Palms and vines common. Many species are fruit bearing and important food resource for a range of birds, land snails, butterflies and flying foxes.



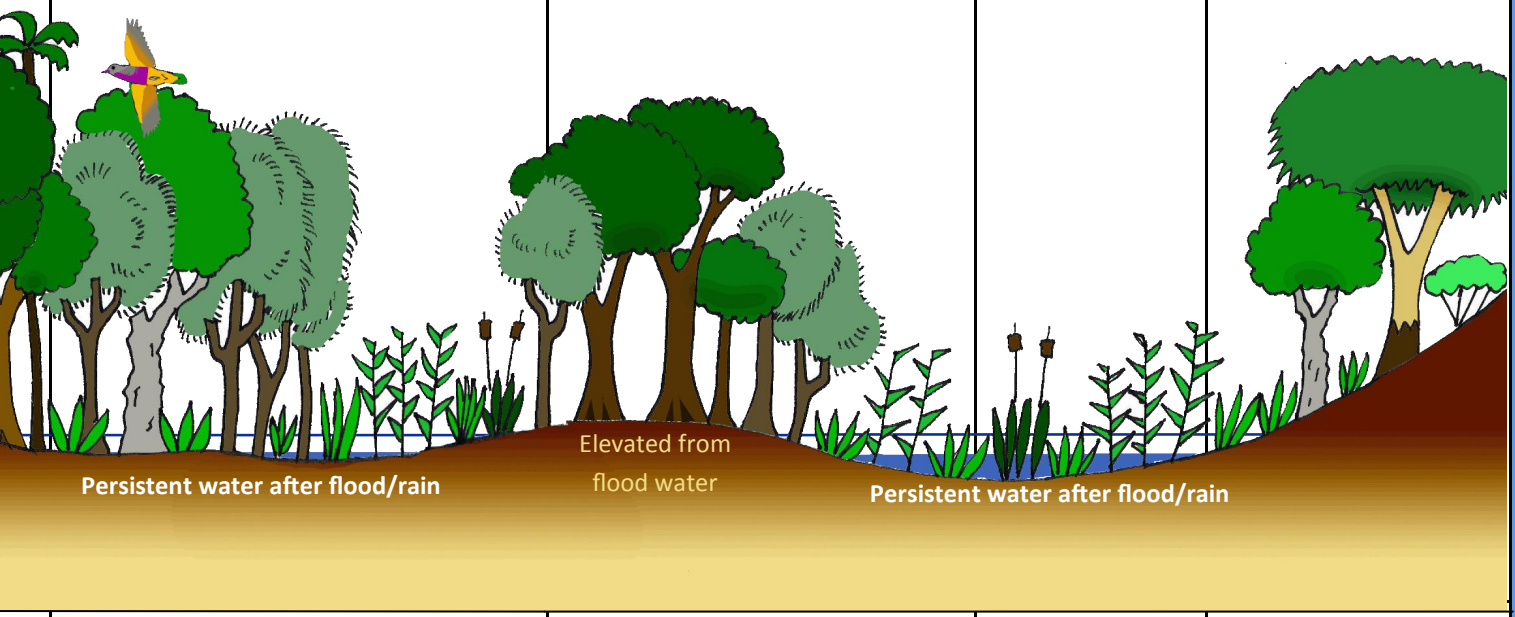
FLOODPLAIN MARGIN	*ESTUARINE WETLAND*	*INTERTIDAL*	*RIVER**	*RIVER LEVEE*
Inundation: • Never inundated as it sits well above flood water levels **Soils:** • Well drained, not limited by waterlog-ging	**Inundation:** • Frequent inundation by highest tides and floods • Tidal water salty or brackish **Soils:** • Waterlogged • Acidic and saline	**Inundation:** • Daily by tides • Tidal water salty or brackish **Soils:** • Highly saline	**Inundation:** Native grasses and reeds sit in the shallow waters constantly on the banks of the river ***For RIVER species see the** *" Revegetating the Streams of the Macleay"* guide from CMA or Landcare	**Inundation:** • Infrequently and briefly by bigger floods • Flooding water fresh not salty **Soils:** • Well structured, well drained and highly fertile

*The distribution of vegetation communities may be affected by drains, flood-gates and other flood mitigation and alter suitable species for replanting.

THE ORIGINAL FLOODPLAIN VEGETATION

A group of plant species which tend to grow together is known as a 'vegetation community'. Many of the vegetation communities which originally occurred on the floodplain have been cleared to the point they are now considered endangered or threatened. If you wish to enhance any endangered vegetation or replant these vegetation types, you will be supporting conservation efforts as well as returning natural systems to the Macleay floodplain landscape.

	SWAMP SCLEROPHYLL/ REEDBEDS Endangered Ecological Community NSW (EEC)	**FLOODPLAIN MIXED FOREST** Endangered Ecological Community NSW (EEC)	**REEDBEDS**	**DRY SCLEROPHYLL/ WET SCLEROPHYLL/ GULLY RAINFOREST**
	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.	A mix of lowland rainforest and river species, a less closed and less diverse mix of species. Fringed by paperbarks and swamp oaks.	Beds of reeds and grasses where flood waters and stands of water will sit the longest.	*as described to the far left*



	BACKSWAMP/FLOODPLAIN SWAMP	OLD RIVER LEVEE	BACKSWAMP	FLOODPLAIN MARGIN
	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 **Soils:** • Generally poorly structured, infertile and acidic • Potential for acid sulphate soil development if drained or suffers erosion	**Inundation:** • Infrequently and briefly by bigger floods • Flood water fresh **Soils:** • Well structured, well drained, highly fertile	**Inundation:** • Flood water generally fresh • Infrequently inundated by flood events, often for prolonged periods. **Soils:** *See Backswamp / floodplain swamp detailed left*	**As described to the left**

Fencing on the river bank

She-oak paddock planted fence

Boyters Lane bird hide– estuary view

Shade fig in pasture for stock

Mangroves in low tide

Topknot Pigeon in Rusty Fig

INTERTIDAL and ESTUARINE WETLAND

INTERTIDAL SPECIES

Grey Mangrove– *Avicennia marina*

River Mangrove –*Aegicerus corniculatum*

Native Reed/Quill Rod -*Phragmites australis*

Club Rush- *Bolboschoenus fluviatilis* (also found in freshwater margins)

ESTUARINE WETLANDS

Swamp Oak- *Casuarina glauca* (wetland margins)

Willow-leaved Bottlebrush- *Callistemon salignus* (wetland margins)

Juncus- *Juncus kraussii*

Saltwater Couch-*Sporobulus indicus*

Prickly Couch-*Zoysia macrantha*

Intertidal estuary with Swamp Oak on margins

Royal Spoonbill in mangroves

BACKSWAMP/FLOODPLAIN SWAMP

TREES

Broad Leaf Paperbark- *Melaleuca quinquinervia*

Prickly Paperbark- *Melaleuca styphelioides*

Snow in Summer- *Melaleuca linariifolia*

Swamp Oak- *Casuarina glauca*

Swamp Mahogany- *Eucalyptus robusta*

Willow-leaved Bottlebrush- *Callistemon salignus*

REEDS AND RUSHES (also suitable wetland plants)

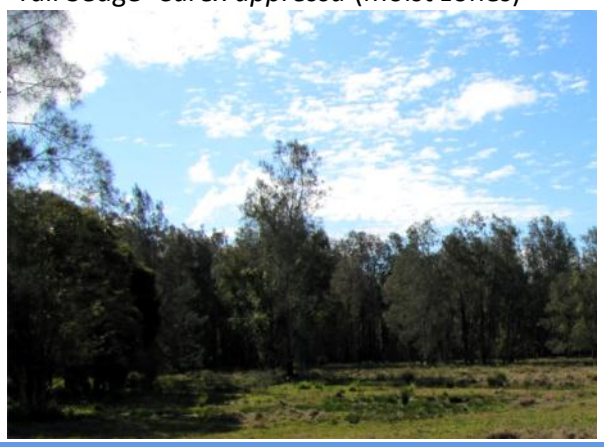
Native Reed/Quill Reed- *Phragmites australis* (wetter zones)

Native Club Rush- *Bolboschoenus fluviatilis* (wetter zones)

Cumbungi- *Typha orientalis* (wetter zones)

Spike Rushes- *Eleaeocharis equesitina/spacelata* moist zones)

Tall Sedge- *Carex appressa* (moist zones)



She Oak dominated backswamp

Purple Swamphen on wetland margin

OLD RIVER LEVEE-ridges of higher ground of mixed rainforest and swamp

TREES

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

UNDERSTOREY

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

VINE

Common Silkpod- *Parsonsia straminea*
Scrambling Lily- *Geitinoplesium cymosum*

Figbirds

Mixed forest with native grass cover

RIVER LEVEE– Lowland Rainforest on the Floodplain

TREES -species from list above plus the following:

Rough Elm- *Aphananthe philippinensis*
Bangalow Palm- *Archontophoenix cunninghamiana*
Red Olive Plum– *Elaeodendron australis*
Murrogun- *Cryptocarya microneura*
Jackwood- *Cryptocarya glaucescens*
Black Plum- *Diospyris australis*
Stinging Tree- *Dendrocnide excelsa*
Native Tamarind- *Diploglottis australis*
Rosewood- *Dysoxylum fraserianum*
Port Jackson/Large Leafed 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 sundaicus*
Red Kamala- *Mallotus philippensis*
Black Apple- *Planchonella australis*
Brush Cherry- *Syzygium australe*
Giant Water Gum- *Syzygium francisii*
Flintwood- *Scolopia braunii*
Whalebone Tree- *Streblus brunoniensis*
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 imbecilis*

VINES

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

White-banded Blue

Inside Lowland Rainforest remnant


Locally grown native plants

Now that you have determined <u>what</u> vegetation grows best <u>where</u> on your property, now you need to consider what planting options are more suitable for you. When replanting or enhancing existing vegetation, consider using as diverse a mix of plants as possible from the species lists (pages 4 and 5) 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 the 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 is 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

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 2&3)
- ☑ 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 and calculate your project (length of fencing, number of posts, plants etc) and cost it
- ☑ Check with Landcare or the Northern Rivers CMA 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 (page 8) from around your plantings as they will rob them of water and 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 Macleay River valley.
- ☑ Never plant a species in the Macleay 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

- ☑ You will have to maintain a favourable environment for your plants until they can fend for themselves. Generally this means protecting from stock, controlling weeds and supplying water during dry times. If you apply for funding assistance you will be asked to commit to maintenance for several years as a condition of that assistance. Overleaf are some weeds that may compete with your native plants that should be controlled prior to planting, and controlled as they attempt to re-establish in your revegetation area. Vines in particular are particularly threatening to young plants, and should be controlled at all times.

FURTHER SUPPORT

Macleay Landcare Network Inc
Restoration, revegetation, plant suppliers, overall project support and advice, Landcare membership, property visits, technical support
www.macleaylandcare.org.au
6562 2076

Northern Rivers Catchment Management Authority
Technical advice and funding support for environmental projects
www.northern.cma.nsw.gov.au
Kempsey 6561 4960

Kempsey Shire Council
Floodplain drainage, acid sulphate soils, other related projects, noxious weeds advice
www.kempsey.nsw.gov.au
6566 3200

Mid North Coast Weeds
Specialised information on weed identification and control
www.midnorthcoastweeds.org.au

FURTHER READING

-Acid Sulfate Soils– Keys to Success (2000) *ASSMAC and NSW Agriculture*
-Coast and Estuary Resource Kit for Nambucca, Macleay and Hastings Valleys (2007) *N English*
-Lowland Rainforest and Landholders (2012) *EPBC publication*
-Native Nurseries of the Macleay and Hastings (2011) *Macleay Landcare Network Inc.*
-Kempsey Coastal and Estuary Management Plan (2011) *Kempsey Shire Council*
-Revegetating Streams of the Macleay Catchment (2012) *Northern Rivers CMA*
-Rainforest Trees and Shrubs (2006) *G. Harden, B.McDonald, J.Williams*
-Restoring Natural Areas in Australia (2009) *R.Buchanan*
-Saltwater Wetlands Rehabilitation Manual (2008) *DECC NSW*

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NSW GOVERNMENT Catchment Management Authority Northern Rivers

CARING FOR OUR COUNTRY

Through partner projects with:

MACLEAY LANDCARE

KEMPSEY Shire Council

SOME FLOODPLAIN WEEDS TO LOOK OUT FOR

Camphor Laurel grows to a large tree spread by birds control using herbicides with cut and paint or stem injection. Planting Native Figs in branch forks can 'strangle' and overtake mature trees.

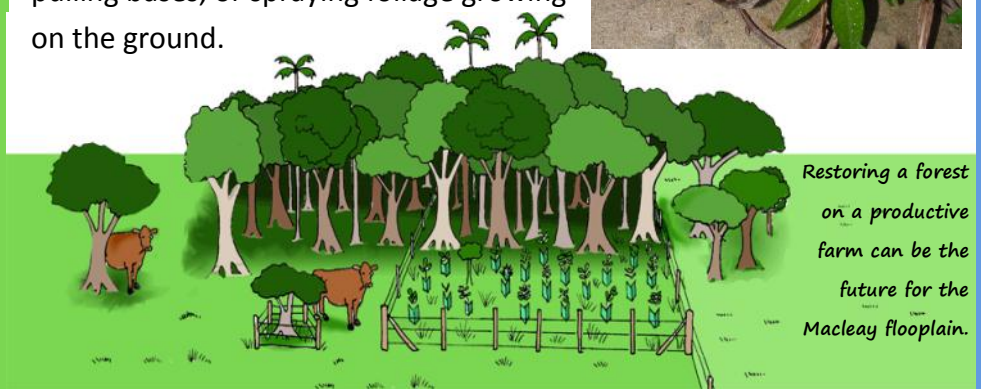
Groundsel is a daisy that grows to a large shrub– in moist conditions. Seeds are spread by the wind and sticking to mud, including on boots and tyres. Control using herbicides with cut-and-paint or foliar spray. Found in estuary and swamps.

Giant Spiny Rush– *Juncus acutus* grows to a large clump with extremely spiny tips, generally grows around the margins of the estuary- spread by water. Control using herbicides with foliar spray.

Cockspur Coral Tree grows to a small tree with thorns. Control using herbicides with cut-and-paint or stem injection. Remove all branch fragments as they can regrow easily. Flood spread by seed/fragments, prolific on watercourses.

Madeira Vine/Jalap grows to a large and smothering vine with tubers that are spread by floods. Control is difficult, but scrape and paint of stems and foliar spray can reduce growth. Flood spread, prolific on watercourses and roadsides.

Coastal Morning Glory grows to a large smothering vine that grows from segments spread by water. Treat by cutting it from tree canopies and hand pulling bases, or spraying foliage growing on the ground.



Restoring a forest on a productive farm can be the future for the Macleay flooplain.