SEQ Catchments
Healthy Land – Healthy Water

Riparian Revegetation

Lessons from the Lockyer

Creek vegetation needed to slow erosion

Erosion occurs naturally in a landscape, particularly along streams where the massive force of flood waters is concentrated. However, since European settlement estimates are that the rate of erosion of stream banks in the Lockyer catchment has increased by a factor of two to ten.

Increased erosion can contribute to the more rapid siltation of many of the weirs and waterways in the Lockyer catchment area, the collapse of many stream banks, the decline in water quality in the Brisbane River and the increase in sediment deposits in Moreton Bay.

Waterways and wetlands provide many functions within the environment. They are responsible for feeding water into underground aquifers, providing habitats for fish, birds and other wildlife, and helping to maintain water quality for recreation and other uses.

Stream bank vegetation is vitally important to enable waterways to continue to have the ability to provide all of these services. Within the Lockyer catchment land managers (both private and public) have undertaken some stream bank and floodplain revegetation projects, yet despite these efforts, much more work is required to protect and restore vegetation on creek banks and waterways.

Trees holding their section of banks while bare areas slump – Lockyer Creek, near Gatton.

General recommendations for riparian revegetation

A riparian planting can reduce flow velocities, directly reinforce riverbanks and intercept and slow surface runoff. Some basic principles to be remembered when undertaking riparian revegetation are:

1. The roots of most riparian species typically develop a central root ball that is about five times the diameter of the trunk. Root densities decline rapidly beyond the root ball. Typically there are few roots extending beyond the canopy drip line, or deeper than two metres under the stream bank surface. The extent of root reinforcement may be further limited by high water tables and/or heavy textured sediments and soils.
2. Many groundcovers will not grow below the low-flow waterline. Sedges, rushes and reeds however can grow on the margins of water, offering stability. Generally, they will not survive for long periods in water that is more than half a metre deep. They flourish in low velocities (about 0.2 metres per second) but will withstand short periods of inundation and even high velocities of floods.
3. It is usual to establish groundcover on a bank even though it is susceptible to trampling and other grazing pressure. Although the roots of grasses are seen at depths of over a metre on exposed stream bank profiles, the bank reinforcement potential is low. However, grasses do play a key role in reducing surface erosion which contributes fine soil particles to waterways.
4. The width of a riparian planting to provide bank stability will vary depending on a range of factors. A general rule is a planting should extend 5 metres back from the crest of the bank and then a metre for every metre of creek depth. This formula may vary depending on soil type. For example, on more cohesive clays the riparian width could still be effective if it is reduced.
5. The effect of revegetation will not be immediate; it could take up to twenty-five years for mature vegetation to establish.

Depending on the erosion type, different strategies for prevention are also applicable:

1. **Mass failure/slumping** – use deep rooted species (trees in particular) as they are more capable of reinforcing banks against mass failure.
2. **Scour** – vegetation on the bank face can reduce scour by both strengthening the bank and providing a physical shield. Vegetation can also create backwaters that slow the flow against the bank face. Understorey species (e.g. grasses, sedges, low shrubs) are particularly effective in reducing scour.
3. **Rain splash, rill erosion, crumbling** – all types of vegetation can be used to help reduce these forms of erosion.

The above recommendations are a summary of a decade long program of river studies undertaken by Land and Water Australia, and were summarised in their journal Rip Rap 2007.

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Australian Government
Department of the Environment, Water, Heritage and the Arts

HEALTHY WATERWAYS
Because we're all in the same boat

Case study 1

Dry year – low input success

Sandy Creek – Gatton Bypass

Land Owner:	Revegetation area:	Landuse:
State government	250m of creek frontage	Public land

SEQ Catchements Lockyer Community Contact Officer, Fiona Bengtsson checks growth of three year old trees at Sandy Creek, Gatton By-pass.

The Department of Main Roads was involved in creating a wildlife corridor along the banks of Sandy Creek in 2004. The corridor is 250 metres long and is comprised of four rows on the alluvial terrace of Sandy Creek near the Gatton Bypass.

The Department of Main Roads' aims were to successfully create a riparian buffer strip with limited ongoing input.

The Process

The fine sandy soils present at the site were completely dry prior to planting. To combat this, the ground was ripped and approximately 250 water well holes were dug. Into these wells, 20 to 30 litres of water was applied rapidly.

A few days after the initial watering, the trees were planted out. Endemic species were chosen for the site. These included Forest Red Gum (*Eucalyptus tereticornis*), Ironbark (*Eucalyptus crebra*) and Swamp Mahogany (*Lophostemon suaveolens*).

With the absence of rain, a second watering was required. This was undertaken a month after the initial planting and provided 20 to 30 litres of water per tree applied into the wells.

Fortunately, adequate rain was received in October and, as such, the only maintenance required was weed control. The rapid growth of Green Panic (*Panicum maximum var. trichoglume*) at the site following this rainfall was an issue which was controlled with a glyphosate spray around each tree. In late January, another weed control was undertaken using both physical and chemical control methods. There was no further maintenance required for weed control at the site as there were no further significant rainfall events to facilitate weed growth. However, had it been a wetter year, weed control would have been required for up to nine months.

Two types of seedlings were used for the site; hiko trays with a root ball of 40 millimetres in diameter and net pots about half the size of hiko trays. Prior to planting, the tree seedlings were dunked in tubs to saturate the root ball.

With limited ongoing management of the site it was important that:

- the seedlings had plenty of actively growing roots (indicated by white roots),
- the seedlings were accustomed to the weather,
- the pots were internally ribbed ensuring that there were no circular roots to encourage root spread.

Once the tree seedlings were placed into the moist soil, the soil was firmed well around them to ensure good root-soil contact. Then a cover of 50 millimetres of soil was introduced over the root ball and around the stem to hold moisture content while the roots penetrated more deeply. This initial root growth takes about one to two weeks.

Planting into moist soil and covering the root ball were critical steps to help overcome the need for watering-in on the day of planting and during the period following.

The fast growing Forest Red Gum was particularly successful at the site as its ability to grow quickly above the weeds reduced competition for resources. It is thought that some of the slower growing species, such as Swamp Mahogany had less success due to weed competition.

Two and a half years after the revegetation of the site, it has been labelled a success with a number of trees reaching three to four metres in height.

Case study 2

Good survival on a floodplain

Laidley Creek

Land Owner:	Revegetation area:	Landuse:
Gordon and Donella Van Der Est	600m	Cattle holding

Forest Hill farmer Donella Van Der Est with a 3 year old forest red gum beside Laidley Creek.

In a riparian planting on Laidley Creek, Forest Hill, the trees are four to six metres high after only three years and the survival rate has also been high. But from their first riparian planting cattle producers Gordon and Donella Van Der Est are constantly evaluating and improving the processes used.

The Van Der Ests moved to their fifty-five hectare holding seven years ago. When they arrived, their 1.2 kilometre frontage of Laidley Creek had virtually been stripped of trees. Isolated individual trees of Weeping Bottlebrush (*Callistemon viminalis*) and River She-oaks (*Casuarina cunninghamiana*) were all that remained.

A short distance downstream a clump of Forest Red Gums (*Eucalyptus tereticornis*) and Callistomens give an idea of what Laidley Creek originally looked like in years gone by.

The Process

In late 2004, the creek was fenced on both sides to exclude cattle and a 600 metre block on the southern side of the creek was ripped, slashed and sprayed out in preparation for planting. This area was chosen as the soil is prone to collapsing, forming potholes and tunnels which can result in the collapse of banks of the stream.

The trees were planted in late October, using a narrow post hole digger to form holes in the rip lines. Species used were Forest Red Gum (*Eucalyptus tereticornis*), Black Tea Tree (*Melaleuca bracteata*), River She-oaks and Weeping Bottlebrush. The most successful in terms of growth are the eucalypts and She-oaks. The growth rate of the tea trees and bottlebrush has been slower.

The trees were watered once a month using polypipe and drippers for almost two years after planting. The expansion and contraction of the line meant that the polypipe often had to be realigned and drippers repositioned to water the trees sufficiently.

Weeds were controlled both mechanically and chemically with Fusilade® for grass control. Because Fusilade® is grass selective it can be sprayed over the top of trees. The loss of all grasses, however, resulted in a proliferation of weeds, which had to be chipped out and burnt.

In future plantings the Van Der Est's plan to move away from chemicals for safety concerns and they would also like to move towards being accredited as organic producers.

Generally the fenced off riparian area is not grazed, but during the extended dry months the Van Der Est's utilised the thick grasses present at the site for feed. Older cattle only are let in for about an hour a day. The cattle tend to concentrate on grazing when they first enter rather than rubbing on trees or breaking branches.

A good feature of the Van Der Est's fencing is that the two bottom wires are plain wire which reduces the problem of debris catching on the wires so readily.

In retrospect, the Van Der Ests realised that the riparian planting was too dense (about 1000 to 1200 trees per hectare). This has resulted in early competition between young trees and a higher maintenance workload, with all trees needing to be watered and the surrounding area cleared of weeds. The presence of polypipe and the high density of trees did not facilitate tractor slashing. Future plantings will be in groups of approximately thirty trees near key weak points along the creek bank to reduce competition.

The use of resources in the future will focus on strategic areas of their creek frontage, such as outside bends, where the pressure of flows can cause slumping and erosion on stream banks.

No catch – having 2 plain wires at the bottom of the fence reduces debris buildup.

Case study 3

Fast flowing gravel bedded creeks a challenge –

Tenthill Creek

Land Owner:	Revegetation area:
Jim and June McDonald	200m of Creek frontage

Tenthill resident Jim McDonald with she-oak (Casuarina cunninghamiana) and lomandra, two important species for stabilizing creeks.

Starting a program of planting back in 2000, Jim and June McDonald have learned the need to respect the power of the fast flowing Upper Tenthill Creek. Their experiences highlight the fact that planting gets more difficult an with increase in gravel content, but can still be successful.

Their first revegetation project was the development of a wildlife corridor stretching from a nearby hill to the creek. As the soils at the site are alluvial, the revegetation project was expected to be successful.

Plantings in 2001 were undertaken down the bank slope right to the toe at the creek bed. However, soon after planting, the creek rose and washed away the bank and the unestablished plants. The strength of the flow within the creek was such that boulders the size of fridges were moved downstream.

In fast headwater streams, such as Upper Tenthill Creek, the gravelly substrate can be very coarse and fine soil non-existent, making it difficult for plants to establish quickly. To overcome this problem, additional soil was introduced in some areas. Establishment is easier for plantings at the top of the bank, with problems increasing as plantings are undertaken closer to the streambed.

To reduce erosion on the bend adjacent to some sheds the Department of Natural Resources advised the construction of groynes. Although built with very large boulders the power of the stream has been such that even these engineering works have suffered some erosion, without yet having seen a major flood.

Species used in the plantings have been local species such as Black Tea Tree (*Melaleuca bracteata*) and River She-oak (*Casuarina cunninghamiana*).

Many of the trees were supplied water through a polypipe and drip irrigation watering system until they were established. Unfortunately the prolonged drought has put some of the plantings under stress as the gravel substrate dries out.

As in any creek, the waterway has many weeds; lantana, twining glycine, Noogoora burr, castor oil plant, cats claw.

There has been no natural regeneration of trees on the banks in these dry years, except for some in the middle of the creek.

For the McDonalds the big question is whether the tree plantings that have been established along the 200 metres of creek will be able to handle a big flood.

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