

Revegetating watercourses

This introductory guide has been prepared to help individual landholders and the community develop a plan for revegetation activities within riparian lands. Riparian land can be defined in a number of ways, but put simply it is "any land which adjoins, directly influences, or is influenced by a body of water" (Land & Water Australia, 2007). This guide describes the main principles and practices of revegetation, including stock management, site assessment, site preparation, planting techniques, species selection, maintenance and monitoring.

Riparian land and revegetation

The Northern & Yorke Region contains four priority catchments: Willochra, Broughton, Wakefield and Light. These catchments cover an area of 1,460,000 hectares and contain native riparian vegetation corridors within a largely cleared agricultural landscape. Grazing has been identified as the most extensive threatening process in recent biodiversity values assessments of the riparian zone in Australia (Sattler & Creighton 2002).

Since European settlement, river landscapes and wetlands have been used by Australian farmers as watering points for stock, as well as valuable sources of feed. Today, the impact of domestic and feral grazing on riparian habitats is often greater than within dryland habitats. Livestock in particular have negative impacts on watercourse geomorphology and hydrology; riparian soils; in-stream water quality; and aquatic and riparian vegetation. Some watercourses within riparian lands are still in good condition despite the impacts of grazing, but sustaining this ecosystem requires active management.

Revegetation of riparian lands is considered to be the most important part of a wider catchment rehabilitation

approach that takes into account hydrological, geomorphologic, social and economic factors.

Why should we manage and revegetate watercourses?

Clearing of vegetation to increase the amount of land available for grazing and cultivation has been the major cause of change in riparian areas. Unrestricted stock access to watercourses can cause negative impacts in riparian areas including:

- erosion
- reduced bank stability
- reduced water quality
- reduced regeneration of native vegetation
- soil compaction and pugging
- increased exposed bare ground.

Riparian vegetation plays a key role in protecting the watercourse from damage by adjacent land use.

Revegetating or managing native vegetation on the riparian areas can:

- improve water quality
- reduce erosion, loss of bank vegetation and siltation of pools
- provide habitat for both aquatic and terrestrial plants and animals
- improve stock health through provided better quality drinking water quality and shelter
- provide vegetated corridors between patches of remnant vegetation
- reduce weed infestations and the risk of weeds spreading
- increased property values.



Revegetation in practice

There are five main areas to consider when you're planning revegetation activities:

1. site preparation
2. species selection
3. planting techniques
4. maintenance
5. monitoring.

1. Site preparation

Site assessment

The first step in a successful revegetation program is an accurate site assessment. We recommend that this is undertaken by a person skilled in plant identification as it is important to accurately identify the vegetation associations in place. Additional factors such as erosion, drainage issues, weed species and existing native vegetation also need to be considered at the site.

It is important that remnant vegetation (e.g. grasses, sedges, rushes and understorey plants) remains relatively undisturbed during the revegetation process.

Riparian buffer zones

Planting and maintaining a buffer of native vegetation between a watercourse and adjoining cultivated or grazed land will have a range benefits including, minimising soil loss and slowing runoff; reducing the risk of water contamination; and providing a greater diversity of aquatic life.

The recommended distance of the fence from the top of the banks will depend on a number of factors, including:

- likelihood of flooding
- funding source requirements
- level of bank erosion
- requirements for providing habitat
- level of sediment run-off.

Stock control

Fencing

Fencing is the most vital part of riparian land management. Excluding stock entirely is recommended in some situations although short periods of controlled grazing may help in other situations. Controlled grazing may reduce the amount of perennial grassy weeds and:

- reduce fire fuel loads
- reduce regrowth of weeds
- increase access for other weed control activities such as woody weed control.

Sheep rather than cattle are preferred for riparian grazing as they tend to favour drier ground, which has a lesser effect on the watercourse.

Stock watering points

Unrestricted stock access can cause stream banks to destabilise and increase erosion, so stock watering facilities should be located well away from watercourses. This may require the installation of a pump, header tank and pipes. Pumping from a watercourse may require a Water Affecting Activity permit from the Northern & Yorke Natural Resources Management (NY NRM) Board.

Alternatively, stock access can be restricted to certain locations along the watercourse. The watering area should be carefully chosen to reduce damage to aquatic flora and fauna and minimise the risk of erosion. Stock should only be allowed access to watercourses in gently sloping areas or where erosion controls have been installed.

Crossings

Stock access to water points must be controlled to successfully revegetate and maintain a watercourse. The crossing point should be seriously considered along with riparian land fencing. Crossing points should be located on straight sections of the watercourse with low, gently sloping banks. These crossing points should be carefully designed and constructed to take into account:

- frequency of use
- stock or vehicle type
- water flow during peak flood events.

Construction of quality crossing points may be expensive but installation of poorly constructed crossings can negatively impact watercourses and potentially stock. Construction of crossing points may require a Water Affecting Activity permit from the NY NRM Board.

Weed control

Developing a weed management plan is an important part of any riparian revegetation program. This will provide some structure for weed control actions, help schedule follow-up efforts and help to monitor project success.

There is a high risk of erosion within riparian land and great care should be taken to avoid soil disturbance and leaving large areas without cover when weeds are removed. It is recommended to organise weed control programs at least 18 months prior to planting, especially for areas where perennial weed species are dominant. In areas where weeds are the only habitat for native fauna, carefully staged removal in conjunction with planting will be required.

There are different techniques for controlling different weed species, including:

- hand-pulling
- cutting
- grazing
- biological control
- chemicals/herbicides use.



Chemicals/herbicides

Many herbicides are toxic to aquatic ecosystems and there is a very high risk of off-target damage when they are used around watercourses. It is crucial to choose the right herbicides for each site and professional advice in this area is recommended. Various techniques have been developed to apply herbicides to different types of weeds near watercourses, such as spraying, cut and swab, stem injection, and stem and leaf swabbing. Where weed control activities are planned near a watercourse it is recommended to spray away from the water and make sure the herbicide doesn't run into the water, and only use herbicides approved for use near a watercourse.

Exotic tree and woody weed removal

Exotic trees such as willows, ash and poplar as well as woody weeds such as blackberry, briar rose and gorse are a problem along many watercourses in the Northern & Yorke Region.

These weeds impact on the watercourse environment in many negative ways. They restrict light, prevent regeneration, increase organic matter and provide limited food and habitat resources for native fauna.

The removal of exotic trees and woody weeds is likely to be required as part of revegetation programs. To achieve effective weed control:

- start in the least infested areas first
- gradually replace weeds with native vegetation
- 'drill and fill' methods may be used for control of exotic trees
- remove woody weeds by cutting the stems and swabbing with appropriate herbicides.

Pest control

Vertebrate pest control should be run in conjunction with weed control activities. Vertebrate pest control is essential in the establishment phase of revegetation but it should continue throughout the entire program. Browsing herbivores such as kangaroos, rabbits and hares may need to be controlled up to two years in advance of planting and control efforts should be ongoing. Control methods can include non-destructive options, such as fencing, planting prickly plants and distraction.

2. Species selection

Selecting the right species to plant is an important part of a revegetation project and only species that are native to the local riparian area should be used. Seek advice from NRM officers or revegetation consultants to develop a specific species list for a particular site as this can vary between properties, depending on what existing native vegetation remains on the site.

It is important to record where each species naturally occurs on the property, as there are sub-zones of differing moisture levels within the riparian zone. As different species grow within each sub-zone, this will help to select the appropriate species for each area.

Use seed collected from locally existing native species. Local species are adapted to the climatic and physical conditions of the particular site (local provenance). Planting local species also favours successful plant establishment because of the increased potential for interaction with animals in the area for pollination and seed dispersal. Seeds need to be collected from the nearest possible native or remnant vegetation to make sure that they are from a similar soil type.



3. Planting techniques

There are several techniques for riparian revegetation, although tube-stock planting, machine direct seeding and hand seeding are the most common. The choice of planting technique will depend upon the species planted, the target sub-zones being planted, and the available resources (including budget). Tube stock (nursery seedlings) planting is often the most appropriate revegetation technique within waterways and eroding areas, as it can be difficult for direct seeders and other machinery to access these areas. The recommended number of plants per hectare can vary depending on site features, such as the existing flora, cost, time, climatic variables (e.g. rainfall) and the type of vegetation association.

Tube-stock planting

A wider range of species can be established using tube-stock planting compared to machine direct seeding and hand seeding. Tube-stock planting is the most costly and labour intensive revegetation technique but it is the most reliable. It can be used in combination with other techniques and it has a number of advantages, as it:

- can be used in areas where machinery access is limited
- enables planting of slow growing species, e.g. yackas and banksias
- allows planting of cutting-grown species
- increases the establishment rate for species with little available seed
- produces reliable results using a well-developed technique.

Machine direct seeding

A specialised machine can be used to sow a mixture of native seed directly into the ground. This technique is cost effective and easier than planting tube stock or hand seeding. However, machine direct seeding is not suited to

sites with native trees and understorey species, like native grasses.

Machine direct seeding should only be used for pastured flats that are adjacent to the watercourse and it is not recommended to seed canopy species beneath an existing tree canopy.

Hand seeding

Hand seeding is a considerably cheaper technique and, if done properly, can be very successful. However, hand seeding is not preferred in high moisture areas with high levels of grass competition. If hand seeding is the chosen technique in pasture-dominated riparian sites, special attention needs to be given to weed control as a part of the site preparation. The most common reasons for failure of hand seeding are: poor weed control; sowing at the wrong time of the year; lack of rainfall; and grazing within revegetated sites.

4. Maintenance

Maintenance is a vital part of riparian land revegetation projects as watercourse areas are continually subject to a range of pressures such as weeds, flooding, erosion and grazing. Incorporating grazing management activities, weed management, feral animal control and fire management into your revegetation plan will provide the base for a good maintenance strategy.

This strategy will include:

- inspecting sites to record successful species
- checking for signs of pest animals regularly
- applying weed control as necessary
- replacing dead plants if losses are >20%
- checking and straightening/replacing tree guards as necessary
- watering plants during extended dry periods
- checking fence lines regularly.



5. Monitoring

Monitoring provides the opportunity to collect detailed records of the progress and outcomes at each step of a revegetation project. Monitoring may consist of qualitative (e.g. photopoints) and quantitative (measurable) methods. Photopoints give an overview of vegetation change over time, while survey transects provide specific information related to species presence.

Upstream and downstream water quality monitoring may also provide vital information on the effectiveness of the revegetation project.

Observational records of fauna, such as birds, reptiles or mammals, may also indicate whether the planting is providing habitat.

Monitoring can also provide useful information for future projects in the area. There are numerous monitoring techniques and databases which can be found by contacting local NRM officers or conducting an internet search.

Calendar of revegetation activities

It is important to have clear calendar entries of all revegetation activities to help manage the potential impacts on the revegetation project, such as environmental conditions.

- Start planning two or more years prior to commencing seeding and planting.
- Implement weed control activities at least 12 months prior to planting.
- Order seeds two years prior planting.
- Order plants at least 12 months prior to planting.

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For more information

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