

# Managing watercourses



This introductory guide has been prepared to help individual landholders and the community understand the value and importance of sustainable riparian land management. This guide provides an introduction to the riparian lands in Northern & Yorke Region, their importance and benefits as well as the key aspects of protecting riparian lands.

## Riparian lands within the Northern & Yorke Region

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).

Within this definition, riparian land includes:

- wetlands on river floodplains which interact with the river in times of flood
- gullies that run with surface water that finds its way into a nearby watercourse
- land alongside major rivers, small creeks and watercourses (even if they flow only occasionally), including the banks
- areas surrounding lakes, reservoirs, and large farm dams.

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 of the riparian

zone in Australia in recent assessments of biodiversity values, (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 habitat is often greater than within dry land habitats. Livestock have a particularly negative impact on watercourse geomorphology and hydrology, riparian soils; in-stream water quality; and aquatic and riparian vegetation.

Despite these impacts, some watercourses within riparian lands are still in good condition and active management is required to support these ecosystems.

While there are costs associated with managing riparian land, the many benefits it offers and the problems that are avoided with good management, easily outweigh the cost in the medium to long term.

In recent years, community groups and individual landholders in the Northern & Yorke Region have become actively involved in improving the management of their riparian lands, in such a way that fits into their particular farming practices.

There are many specific measures which can be used to protect and rehabilitate riparian land within the Northern & Yorke Region, but there are three key measures to consider:

- retention of existing natural riparian vegetation and sustainable management of pest species
- sustainable management of stock
- revegetation of degraded riparian areas.



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## The importance of riparian land

Riparian land is often the most productive part of the landscape, in terms of both agricultural production and natural ecosystems. Riparian land supports a higher diversity of plants and animals than the surrounding areas. Sustainable management of riparian lands can:

- limit watercourse bank and bed erosion
- trap sediment, nutrients and other contaminants before they reach the waterway
- contribute to healthy terrestrial and aquatic ecosystems
- help to control algal growth
- enhance recreational and aesthetic values
- increase capital values.

### Limit watercourse bank and bed erosion

Well-vegetated watercourse banks are more resistant to flood-outs, stripping of topsoil from the floodplain, and erosion – all of which can lead to the extensive loss of valuable agricultural land. Replanting of native species on riparian land can help to stabilise watercourse banks and beds, and protect them in times of flood. Well-vegetated riparian areas are also more resistant to undercutting and slumping. Overclearing and intensive use of riparian lands results in high levels of run off during heavy rain. This leads to floodouts and topsoil stripping which increases bank erosion and leads to the loss of agricultural lands.

### Trap sediment, nutrients and other contaminants before they reach the waterway

Sustainable management of riparian land can decrease the amount of soil and nutrients moving from land up slope of the riparian land to the waterway. Water quality will improve as soil and nutrients are trapped and less in-stream habitat will be lost through siltation.

### Contribute to healthy terrestrial and aquatic ecosystems

Sustainable management of riparian land may prevent and minimise damage which can upset important biological balances and lead to the deterioration of environmental systems. Healthy riparian vegetation helps to sustain good habitat for aquatic animals, including macro-invertebrates and fish communities.

### Help to control the growth of algae

Riparian vegetation helps to reduce light and temperature levels in the in-stream ecosystem. This can help to control the growth of nuisance plants and algae, even when nutrient levels in the water increase.

### Enhance recreational and aesthetic values

Riparian areas provide people with access to watercourses, which are an important recreational resource for fishing, swimming and relaxing. Ecotourism is also a major source of income for rural regions, as demonstrated by the resources used to establish good bird watching habitat, walking trails and other activities within riparian lands.

### Increase capital values

There is also good evidence that well managed riparian frontage can increase rural property capital values by up to 10 per cent.

## Key aspects of protecting riparian lands

### 1. Weed management

Weed invasion of riparian areas is a serious threat to local landowners and ecological communities. Riparian land that has become degraded by past land use or affected by flood or wildfire is at increased risk of weed invasion. Weed introduction can often be instigated through wind dispersal of seeds, seed deposition in the droppings of animals and birds, or the transport of seeds or vegetative material from upstream during flows.

Throughout the Northern & Yorke Region, many weeds are now common in riparian areas, including the Weeds of National Significance: African boxthorn, bridal creeper, blackberry, boneseed and gorse. These weeds are highly-invasive, high-impact weeds that are difficult to manage without a coordinated weed management program.

Other declared weeds commonly occurring within riparian areas in the region include wild artichoke, horehound, dog rose, wild olive and broom. Managing these weeds requires addressing the areas of degradation which encourage their establishment, as well as a systematic control program and follow up monitoring.

#### Prevention

Prevention is the first and most important part of weed management and represents good land management. This is true whether we are dealing with environmental or agricultural weeds. Most properties in the Northern & Yorke Region have agricultural or environmental weeds that need to be controlled to some degree. It is far more cost effective to prevent weed infestation than to treat weeds, as the total cost of control is high. If weeds are neglected and become dominant, then the productivity and diversity of native riparian vegetation can seriously decline.





### **Weed management plans**

Developing a weed management plan is a vital step to a successful weed control program for landholders. This plan should be developed based on the nature of the weed and level of invasion at a particular site. The most effective weed control is achieved when a variety of methods are used to target susceptible aspects of a weed, such as its lifecycle or its environment. There are four steps involved in developing a sustainable weed management plan.

#### *Step 1 Site assessment*

Land managers should be familiar with the vegetation of their local area so they can react to new weed infestations before they become difficult or costly to control. Monitor and map the weeds on the property and determine their density. This will help to prioritise weed control efforts and assess how well they have worked. Identify weed-free areas and keep them free of weeds.

#### *Step 2 Setting objectives*

Determine which weeds are the highest management priority, taking into account the impact level of each weed onsite and the viability of their control. Set realistic timeframes for control and prepare a financial plan to allocate funds to weed control.

#### *Step 3 Selecting weed control options*

- Always work from the least weed infested areas to worst.
- Treatment options include chemical, mechanical, biological and hand weeding.

#### *Step 4 Monitoring and recording*

Recording information helps us to understand how a site changes over time. Monitoring changes in the density and area of weed cover and recording any new weed species will help you to understand how a site changes over time.

### **Weed control options**

There are four main treatment options that can be used alone or together to provide effective weed management.

#### *Chemical*

There is a very high risk of off-target damage from herbicides within riparian areas as many herbicides are toxic to aquatic ecosystems. Additional care needs to be taken in riparian areas: avoid spraying near watercourses and select minimal use, direct application methods such as cut and swab in these situations.

#### *Mechanical*

Mechanised weeding with large earthmoving equipment may be necessary where large infestations occur, although this isn't common. Scalping, or the removal of all plants and surface soil with a bulldozer, can be undertaken to ensure crowns and the majority of roots are dug out.

#### *Biological*

Biological control uses the natural enemies of a weed to reduce its population to below an economic or environmental threshold. Biological control will not provide instant control, but will reduce weed populations over many years.

#### *Hand weeding*

Hand weeding is only effective under very limited circumstances. Even seedlings and small plants can be difficult to pull out by hand.

## **2. Stock management**

Riparian land is often a very diverse part of the landscape and usually contains various tree and shrub species as well as ground cover plants such as grasses, sedges and herbs. The presence of different plant species in the landscape influences the nature of the root zone and the depth to which roots penetrate. This affects the water table within the banks and bank stability.

The major pressure on riparian lands is the direct grazing and trampling of ground covers, shrubs and saplings. Plant parts are removed from ground cover vegetation during grazing and damaged by trampling. This results in a loss of cover and vegetation biomass; loss of grazing-sensitive species; and a decline in native plant species.

The loss of significant species within riparian vegetation affects plant diversity and can result in microclimate, nutrient cycling and soil structure changes. This disruption and degeneration of ecosystem function in riparian zones cannot be easily reversed.

Water quality is also affected by intensive grazing. Livestock can impact on aquatic invertebrates and fish and poor water quality can have major effects on in-stream fauna. These effects can be particularly severe during



periods of low flow, such as during the dry season or when animals congregate at the few remaining waterholes in the landscape.

Several studies from Western Australia have also shown that stock productivity can be increased by up to 25%, just by providing clean and uncontaminated water. Wethers that drank from polluted dam water lost 1.7 kilograms more body weight and consumed 33% less water than those that drank solely from fresh water (Parlevient 1983).

Areas that are constantly grazed and trampled by livestock are usually open sites that provide the perfect opportunity for a weed species to become established. Weeds are also spread by the movement of stock: either in their faeces or by attachment to the animal.

Livestock impact riparian vegetation by:

- degrading riparian habitat through the loss of riparian-dependent fauna, including aquatic organisms
- reducing the number of native plant species
- compacting soil
- promoting weed invasion.

### **Managing stock access**

Rapid results can be seen when livestock are managed and sustainable grazing practices are implemented. This is particularly true for the recovery of physical functions, like restoring native vegetation, preventing erosion and improving water quality. The most effective way to manage uncontrolled livestock in riparian land is to remove or

control stock access by fencing the area. At sites with a long history of grazing, riparian vegetation may have adapted to this form of disturbance. In these cases livestock exclusion can lead to changes in the vegetation and invasion by woody plants and reduced species diversity (Milchunas & Lauenroth 1993). Sustainable grazing that does not affect vegetation cover should be the long term aim of riparian land management.

There are two main methods to control stock access and grazing pressure within riparian lands which include fencing and designating watering points.

### *Fencing*

Fencing is the most practical way of regulating animal access and grazing pressure on riparian land.

Fencing can be used by landholders to manage stock access according to need and available feed. The fencing type and location will depend on type of stock; when and how landholders want to use riparian area; the size and shape of the channel; flood frequency; and the size of flood peak.

Fences should not be located too close to the watercourse due to possible flood damage, widening or incising of the channel. It is generally suggested to place the fence at least 10–20 m from the top of the bank.

There are several types of fences available:

- hanging fences
- electric fences
- drop fences
- electronic fences.



### Watering points

Creating an alternate watering point for livestock is another option to protect riparian areas. Carefully located, shaded watering points and supplementary feeding stations can be used as an alternative to fencing. These alternatives can significantly reduce the amount of time stock spend in riparian areas without the need for fences.

Watering systems that could provide clean water to livestock include:

- **formed access point**  
Carefully selected formed water points can be a relatively cheap option that can significantly reduce stock impact on riparian areas. It is important to select a graded slope into the watercourse as the site for a formed access point. Consider using concrete, compacted gravel and rock, logs or similar material to protect the surface and form the walkway for livestock. Cross-channel fencing may be required to prevent animals wandering along the banks.
- **alternative water supply**  
Providing water from a dam upslope or a reticulated water scheme is often the most effective water supply option. This encourages stock to maximise the use of available feed in the area.
- **pumping groundwater or watercourse water**  
Riparian lands overlie old river channels with beds of sand and gravel. These formed aquifers may provide good quality water for a large number of animals. This water can be accessed by range of different pumps or windmills. A range of pumps have been developed that use the flow of the watercourse to pump a small volume of water to tanks and troughs for stock.



### 3. Revegetation of riparian lands

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.

For successful revegetation programs it is important to consider:

- site preparation and assessment
- stock impact
- weed control
- pest control
- planting techniques
- plant species selection
- ongoing maintenance
- monitoring.

#### Site assessment and preparation

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.

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.



### *Manage stock impact*

Excluding stock by fencing riparian areas is a fundamental step towards improving habitat value for wildlife and agricultural lands. Case studies have shown that the effectiveness and health of narrow riparian buffers may be increased simply by excluding stock or using short periods of controlled grazing.

Fencing is a vital part of riparian land management but exclusion of stock is not always the best solution within agricultural lands. Controlled grazing may be a more suitable way to manage stock, and this includes developing stock watering points, constructing crossing points for stock and installing off-creek watering points.

### *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.

### *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, distraction and disturbance.

### **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 watercourses and eroding areas as access for direct seeders and other machinery can be difficult. 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.

### **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.

### **4. Ongoing 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 greater than 20 per cent
- checking and straightening/replacing tree guards as necessary
- watering plants during extended dry periods
- checking fence lines regularly.

### **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.



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.

Developing a calendar of revegetation activities is also a good way to have clear records of all revegetation activities and help manage the potential impacts on the revegetation project, such as environmental conditions.

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Water and Rivers Commission Water Note WN12, "The values of the riparian zone"

Water and Rivers Commission Water Note WN19, "Flood proof fencing for waterways"

## For more information

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