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Natural Heritage Trust

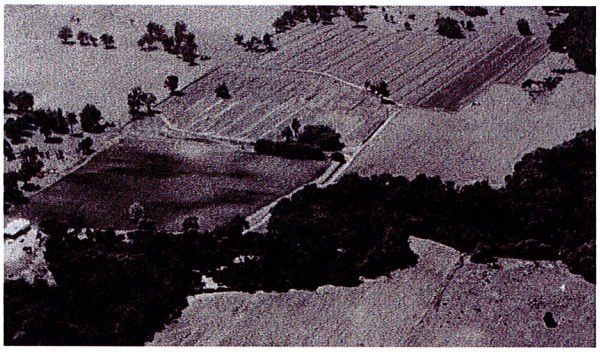
Water notes

GOVERNMENT OF WESTERN AUSTRALIA

ADVISORY NOTES FOR LAND MANAGERS ON RIVER AND WETLAND RESTORATION

The values of the riparian zone

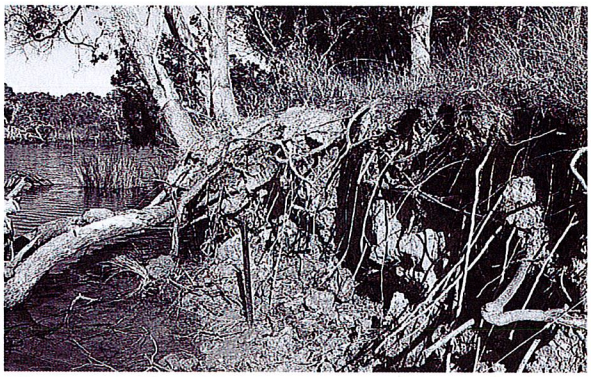
Due to the presence of water and nutrients, riparian land often supports significant plant communities that are generally denser, faster growing and have a greater number of layers or strata, than adjacent plant communities. They also perform a variety of valuable functions, many of which are discussed below.



Clearing has left many rivers with little or no vegetative buffer of the riparian zone. D. Burt

Pollution, sediment and nutrient trapping

Most pollutants (e.g: heavy metals, pesticides etc) and nutrients are attached to sediment particles (usually clay) and riparian vegetation can play an important role in trapping this sediment and its attached pollutants and nutrients before they reach the channel. This process is also called *biofiltration.* Grasses and understorey plants are most effective in achieving this 'buffer zone'effect, with most research indicating that a buffer zone of at least 20 metres from the top of the bank is required to achieve effective pollutant and nutrient stripping, and the wider the buffer zone is the more effective it is. Buffer zones are also more effective when the flow is shallow and steady (i.e. they are probably not effective in large floods). Instream or aquatic vegetation is also effective at water purification by further removing nutrients.



The roots reinforce banks to reduce erosion. L. Pen

Channel stability

Streambank vegetation reduces the risk of erosion. Firstly, root systems of shrubs and trees protect stream banks from erosion by reinforcing and increasing cohesion of the soil, and by providing a protective surface matting. Trees use water in the banks and increase the drainage of the soils which reduces the risk of bank failure due to heavy saturated soils.

Secondly, riparian zone vegetation and the associated layer of litter and debris increases channel roughness, slowing the flow and reducing the capacity of the flowing water to erode and transport sediment. Rather, sediment is deposited amongst the vegetation. This helps to buffer downstream sections of waterways, such as river pools, from large inputs of material

Fencing and revegetating riparian zones reduces erosion and increases biofiltration. L. Pen

Riparian ecosystems

Riparian zones are an interface between terrestrial and aquatic ecosystems and also play a critical role in supporting biota and therefore biodiversity. Healthy, native riparian vegetation reduces the water temperature of aquatic habitats by shading. It also produces tannin which gives the water a distinctive amber colour, which further reduces light penetration of the water column. When water temperature increases dissolved oxygen levels decrease, creating conditions which are difficult to endure for cold-blooded animals whose metabolic rates may exceed available oxygen in the rising temperatures. More sunlight in the riparian zone also increases the growth of soft leaved vigorous weeds and algae that can choke the stream channel. Because the leaf material of these plants is soft, it breaks down rapidly, depleting the water of oxygen completely. This situation is one cause of fish kills.

Riparian vegetation supplies energy in the form of leaf litter and other organic debris, which affects the aquatic food webs. The relative importance of the riparian zone on the instream ecosystems varies as you move from small, narrow upland streams where the riparian vegetation has a significant influence, to larger, wider lowland rivers, where many of the aquatic ecological processes occur independently of the immediate riparian vegetation, but instead rely heavily on inputs from upstream. It is therefore vitally important to view our streams as continuums — and recognise that upstream riparian communities play a critical role in the functioning of the entire river system.

L. Pen

Riparian vegetation has a significant influence on aquatic ecological processes in narrow streams.

Habitat provision and corridors

With the reduction in native vegetation and the increasingly large distances between remnant habitats, riparian corridors serve a vital function in allowing the movement of flora and fauna between remnants as well as being habitat areas in their own right. The high productivity and diversity of plant communities found within the riparian zone provides valuable habitat for a variety of fauna and can support diverse and abundant communities. Some animals may spend their entire life cycle within the riparian zone while others use the riparian zone as a source of food, shelter, nesting and nursery sites. Large woody debris and living vegetation within the stream provides shelter, feeding and spawning habitat for many native birds, fish and invertebrates.

Recent research indicates that for a riparian buffer zone to effectively act as a habitat corridor, a minimum width of 30 metres, and up to 100 metres in some cases, is desirable, in order to achieve the full range of plant communities needed for a range of species and to link effectively with adjacent terrestrial ecosystems.

Woody debris provide important habitat for birds, fish and invertebrates. *I. McCarthy*

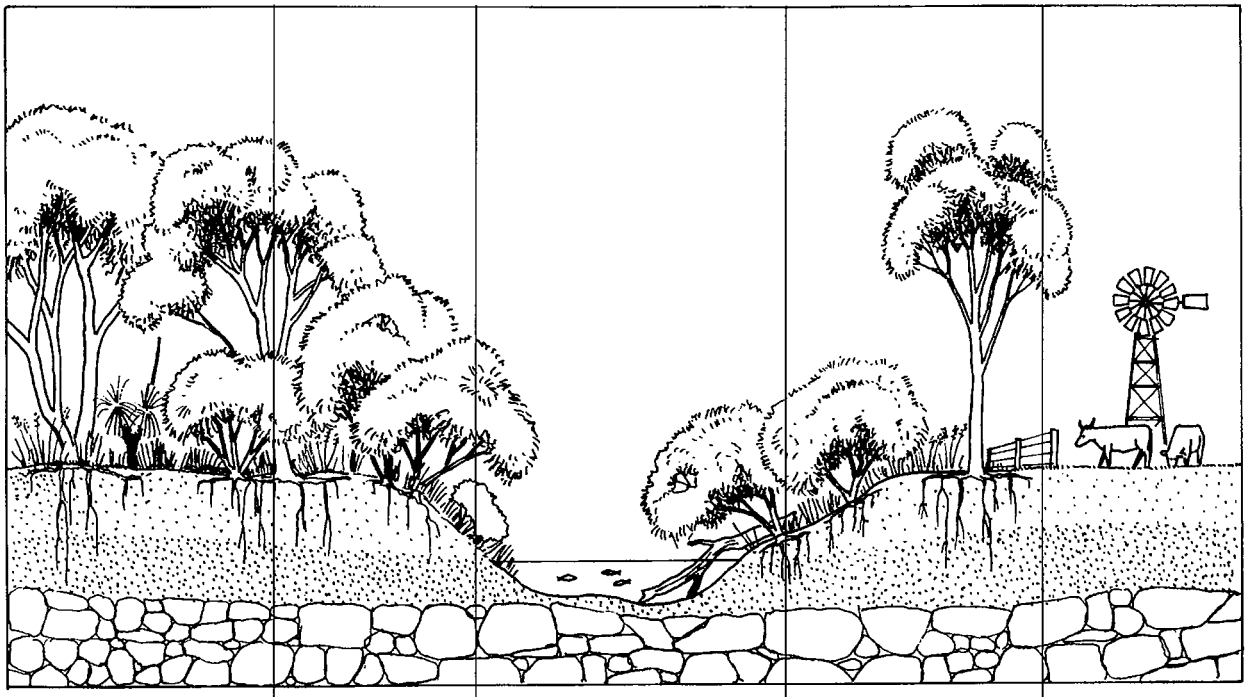
Flood control

Naturally vegetated riparian areas can reduce the force, height and volume of floodwaters at a particular point along a stream by allowing water to spread out horizontally along the floodway and across the floodplain. However, vegetation can also slow and hence raise water levels in other areas, so flood management using vegetation must be carefully planned.

Economic values

Increasingly, researchers are discovering that a well managed riparian zone is an asset to landholders, rather than a net burden. Some of the benefits of a healthy riparian ecosystem include improved water quality with an associated increase in stock health, a decrease in insect and bird pests that damage pastures and crops, opportunities for diversification such as agroforestry or firewood, provision of windbreaks and shelter which can lead to improved stock growth and productivity through reduction of heat or cold stress, decreased bank erosion and topsoil stripping, and even an increase in capital value of land and the potential for eco-tourism.

Some values of the riparian zone.



1. Biofiltration prevents sediments and nutrients from entering the stream. Vegetation and leaf litter increase infiltration and slow overland flows preventing erosion. The zone provides flora and fauna habitat and corridors between remnants.

2. Vegetation provides organic matter to the stream. Trees shade the stream and reduce light and water temperature.

3. LWD* and living vegetation provide shelter, feeding and spawning habitat for birds, fish and invertebrates. Riffles, LWD and aquatic and emergent vegetation help to increase O_2 levels in the water.

4. Root systems reinforce soils, provide protective surface matting, increase soil cohesion and drainage to reduce bank collapse and erosion.

5. Floodplains are commonly used in agriculture and for recreation and need to be carefully managed.

**Large Woody Debris*

Recreational and aesthetic values

A healthy riparian zone not only has ecological value but also provides pleasant surroundings that are popular recreational areas near which people often choose to live. Rivers and the riparian zone are an important recreational resource, with fishing, swimming, boating, walking, picnicking and bird watching all being common riparian zone activities. The river and riparian zone tend to dominate the local landscape and may also contribute significantly to the regional landscape and so are important to the aesthetic value of an area[i].

Eco-tourism is one of the potential economic benefits of healthy riparian zones. *L. Pen*

Spiritual values

Foreshores are places of spiritual importance. Traditional landowners have strong spiritual attachments to watercourses. Creeks, streams, rivers and estuaries are all connected to the Dreaming. The path of watercourses is often attributed to the actions of the Waugyl (rainbow serpent) who is believed to have carved out river valleys and streamlines from the landscape.

Foreshores also have strong spiritual values for non-Aboriginal people. The soothing and life giving properties of water may evoke powerful emotional responses from people who recognise spiritual qualities of water. Spiritual connections are different to recreational values as they are generally more passive and may have religious qualities. Meditation, prayer, visualisation, and healing activities often rely on foreshores as a context in which to express a spiritual connection between humans and nature.

Healthy riparian zones make rivers popular recreational areas. *L. Pen*

Further reading

Available from the Water and Rivers Commission

Byrne, J (1999) *State-wide Foreshore Policy.* Water and Rivers Commission Policy Update 1. April 1998.

Byrne, J (1999) *Foreshore Policy.* Water and Rivers Commission Policy Update 2. August 1999.

[i] Water and Rivers Commission (1999) *Planning and Management: Foreshore condition assessment in urban and semi-rural areas of south-west Western Australia.* Water and Rivers Commission River Restoration Report No. RR 2.

Water and Rivers Commission (1999) *Planning and Management: Foreshore condition assessment in farming areas of south-west Western Australia.* Water and Rivers Commission River Restoration Report No. RR 3.

Waterways Commission (1994) *Guidelines for determining a protection precinct.* Waterways guidelines (3) June 1994.

Water note WN6 *Livestock management: Construction of livestock crossings.*

Water note WN7 *Livestock management: Watering points and pumps.*

Water note WN8 *Habitat of rivers and creeks.*

Water note WN9 *The value of Large Woody Debris (Snags).*

Water note WN10 *Protecting riparian vegetation.*

Water note WN11 *Identifying the riparian zone.*

Water note WN13 *The management and replacement of Large Woody Debris in waterways.*

Water note WN15 *Weeds in waterways.*

Available from other sources

Land and Water Resources Research and Development Corporation (1996) *Managing riparian land.* Riparian Management Series (1) September 1996.

Land and Water Resources Research and Development Corporation (1996) *River ecosystems.* Riparian Management Series (4) November 1996.

Woodfull, J. Finlayson, B. and McMahon, T. (1992) *The role of buffer strips in the management of water pollution from diffuse urban and rural sources.* Proceedings of a workshop held at International House, University of Melbourne, October 1992.

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This Water Note is intended to be a general guide only and is not a comprehensive document. For further information on any particular issue please contact the Restoration & Management Section at the Water and Rivers Commission.