



Managing erosion before and after floods

Flooding can cause significant riverbank erosion, particularly if there is limited vegetation in place to bind the soil together. There are a range of measures land managers can undertake to repair erosion damage, that will also ensure riverbanks, floodplains and gullies are better protected against future flooding events.

Healthy riparian zones (the land alongside creeks, streams, gullies, rivers and wetlands) can support clean water by filtering and trapping sediment and nutrients, stabilise banks and provide habitat for plants and animals. They also provide shade that helps to moderate water temperature so aquatic animals can survive.

Key Points

- Erosion is accelerated when little or no vegetation exists on or near the streambank to bind soil together. Pasture grass alone does very little to protect riverbank soil from flood events.
- The bigger the waterway, the wider the riparian zone needs to be to withstand the impacts of flood events. For major rivers (stream orders 3 and 4), the riparian zone should be greater than 50 metres wide on both sides of the bank. For minor creeks and gullies (stream orders 1 and 2), riparian zones should be at least 10-20 metres wide on both sides of the banks. Wide, healthy and continuous riparian zones offer the greatest protection from erosion damage.
- Riverbanks/riparian zones require a mixture of reeds, grasses, shrubs and trees that have different root types (e.g. fibrous, tap, creeping or tuberous) to help bind and hold the soil in place, and keep it from washing away during floods.
- Livestock can cause erosion by compacting soil, creating ruts, trampling vegetation, spreading weeds and browsing native vegetation.
- Landholders can reduce erosion on their properties, by:
 - Restricting and managing the length of time livestock graze in the riparian zone/riverbank edge
 - Installing off-stream water
 - Establishing or maintaining a wide, vegetated riparian zone
 - Controlling weeds

- Talking to their neighbours about how to better manage their shared waterway.

- Local Land Services, and local groups such as Landcare, can offer advice to help rehabilitate eroded banks, reduce future erosion risk, and better manage the riparian zone.

Erosion damage

Damage from erosion can include:

- Removal of riverbank material and associated vegetation
- Deepening and widening of gullies
- Stripping floodplain soil and vegetation
- Silting of downstream waterholes
- Poor water quality

Riverbanks can quickly lose their integrity once soil is eroded and washed away. Once soil is removed and the banks begin to steepen, soil not held in place by a variety of roots will erode quickly during a flood event.



Image: Erosion is accelerated without vegetation to hold the soil together.

Recovery from erosion

Recovery options will vary depending on the size of the riverbanks and gullies, the amount of damage, and previous management of the riverbank and riparian zone. Effective erosion recovery and ongoing management ensures beds and banks are better protected against future floods, which should result in less damage.



Image: A narrow riparian zone should be widened to properly protect the riverbank from erosion.

Options to reduce the risk of future erosion include:

1. **Fencing to better manage stock access** – In flood prone areas, fencing can be difficult to manage. However, there are inexpensive electric fence options that can protect considerably large areas and be retrieved quickly prior to or after flood events.
2. **Widening your riverbank vegetation** – Native vegetation (trees, shrubs and grasses) are the best bank protectors we have. Trees like watergums and shrubs like Lomandra and river bottlebrush can play a major role in slowing flows and binding soils together on a riverbank. Purchased as tubestock, these plants are often less than a few dollars each and easy to plant. Revegetation should be undertaken using 'local stock' and aim to mimic what would naturally grow in your area. You should aim to have a mixture of native trees and shrubs that have a variety of root depths to hold soil in place.
3. **Controlling weeds in riparian zones** – Weeds can outcompete native vegetation and dominate the riparian zone. With their shallow roots, they leave riverbanks more susceptible to erosion. Vine weeds should be aggressively managed as they are known to pull trees over during flood events creating large voids in the riverbank.
4. **Let sleeping logs lay** - Any native tree that has fallen into a waterway is a 'snag' protected under the Fisheries Management Act 1994. Snags play an important role in the river system by creating fish habitat and slowing flows to reduce erosion. With permission from DPI Fisheries, snags can be repositioned to ensure they benefit bank stability.

Managing erosion through structural works

It is your responsibility to determine what approvals are required and obtain permission from the relevant authorities for any proposed works before any structural riverbank work commences. The best way to do this is to talk to relevant State agencies listed below, and your local council.

- Local Council (For land zoning and to determine if development applications is required)
 - Contact your local office
- The Natural Resource Access Regulator (For approval of controlled activities on waterfront land including the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary and/or to report suspicious activity):
 - P: 02 9338 6600 W: www.industry.nsw.gov.au/nrar
- Department of Primary Industries (Fisheries & Marine Parks):
 - P: 1300 550 474 W: www.dpi.nsw.gov.au
- Transport for NSW (if the works are associated with boating activities or may affect navigation):
 - P: 13 12 56 W: www.transport.nsw.gov.au
- Crown Lands (For approval of works including Land Owners Consent and Crown Lands License):
 - P: 1300 886 235 W: www.industry.nsw.gov.au/lands
- Local Land Services (Native vegetation on rural land):
 - P: 1300 795 299 W: www.lls.nsw.gov.au

Engaging a suitably qualified River Practitioner to assist in both the permitting and planning process can be the key to success. River Practitioners have the experience and knowledge required to both navigate the permitting pathway on your behalf and apply best practice construction techniques to deliver a low risk erosion control outcome.

The Soil Conservation Service is a unit of Local Land Services with a long history in providing practical natural resource management solutions. The Soil Conservation Service can provide services including design, costing and approvals, through to managing project construction and engaging local contractors. For more information on its services, head to the Soil Conservation Service website www.scs.nsw.gov.au



Image: Remediation ideally includes additional features like snags to promote aquatic habitat.

Best Practice Erosion Control

Best practice erosion control includes utilising environmentally safe materials that both protect the bank from fast flows and provide habitat for fish and other aquatic organisms.

Materials such as tyres and concrete waste are not preferred as they can leach contaminants into the water and fail to lock together into one resistant mass.

Additionally, the design should incorporate elements of the River Styles Framework to identify the appropriate target condition of the site, ensure the design suits the behaviours and characters of your river and aligns with the future trajectory of the reach.

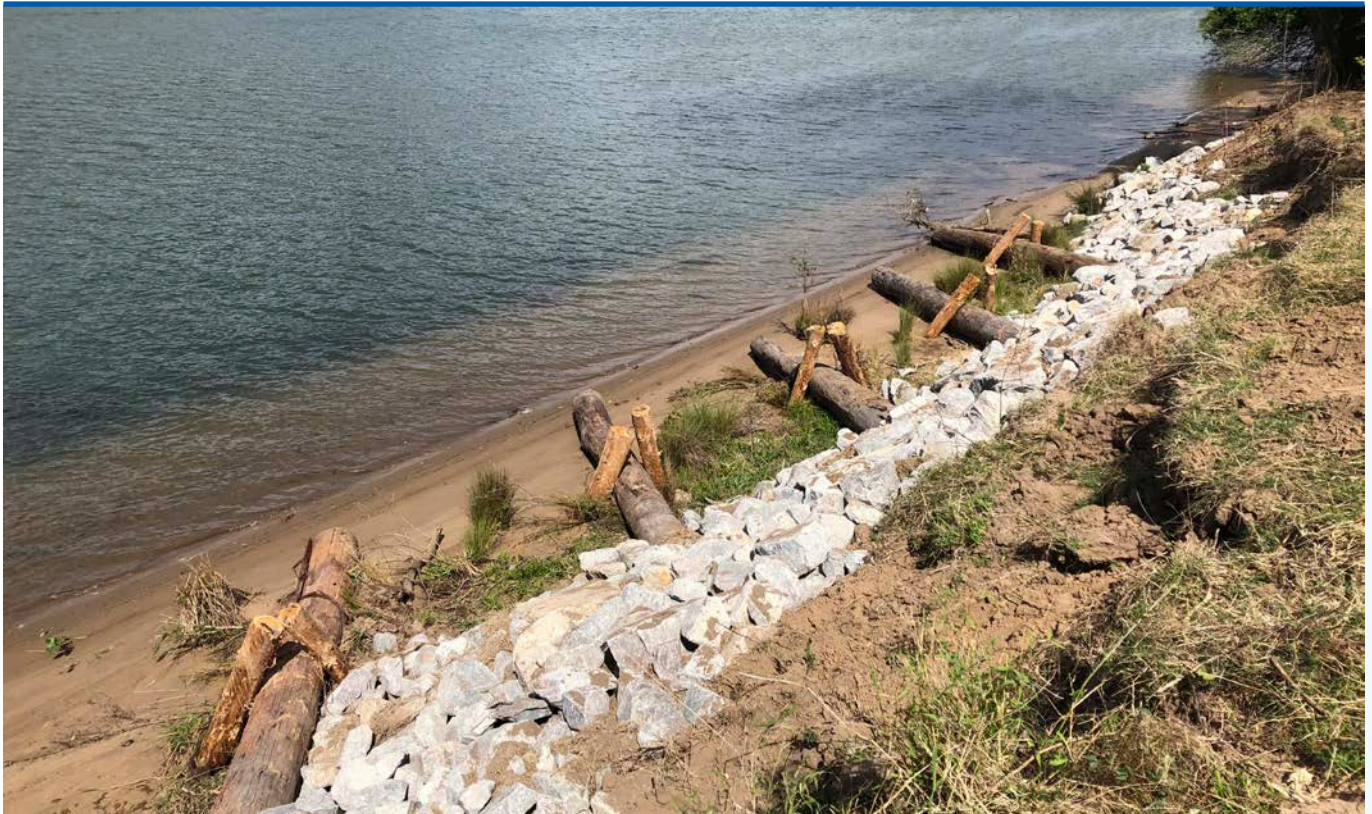


Image: Protecting the toe of the riverbank is the highest priority.

More information

Talk to Local Land Services staff about your situation, or contact your closest office on 1300 795 299. The information below is a starting point to understand the variety of options available.

- Saving soil – A landholder's guide to preventing and repairing soil erosion, NSW DPI
www.dpi.nsw.gov.au/agriculture/soils/erosion/saving-soil
- Stock and Waterways: A NSW Manager's Guide
www.stockandwaterways.com.au/contents
- NSW DPI Soil Erosion Factsheets
www.dpi.nsw.gov.au/agriculture/soils/erosion/soil-erosion-factsheets
- NSW DPI Fisheries Factsheet on large woody debris
www.dpi.nsw.gov.au/_data/assets/pdf_file/0011/634529/Primefact_Removal_of_large_woody_debris.pdf
- River Styles Framework
www.riverstyles.com/river-styles-framework
- River Landscapes - Land and Water Fact Sheets
www.water.vic.gov.au/waterways-and-catchments/riparian-land/riparian-land/technical-information-and-reports/landholder-engagement-toolkit/resources