

Soil erosion solutions

Helping North Coast landholders reduce soil erosion

Fact sheet 5: Gully erosion

Gully erosion occurs when running water erodes soil to form channels deeper than 30cm.

Gullies start when fast flowing runoff hits a 'nick' point such as a rabbit burrow, root hole, stock/vehicle track, or bare soil. The energy of the water scours away the soil, undermining the vegetation. Once the vegetation and topsoil are removed, gullies spread rapidly up and down drainage lines until there is insufficient runoff to continue the erosion.

New gullies can spread quickly, but once they stabilise they lose very little soil, despite their often dramatic appearance.

Gully erosion occurs on most cleared soils, but the most vulnerable soils are poorly structured dispersive soils, where the soil structure disperses or collapses when wet. In such soils gullies often start as tunnel erosion underneath the soil surface. The roof of the tunnel eventually collapses and the tunnel becomes a gully. Other vulnerable soils are those developed from granitic or sandstone rocks where there are low levels of groundcover in dry seasons.

On the north coast gully erosion is relatively common, particularly in the Upper Clarence, the Copmanhurst area, Upper Nambucca, and Rappville area in the Richmond catchment. Around the Lismore area there are old gullies in basalt soils, but most of these have now stabilised and grassed over.

Fixing gully erosion

1. Check whether the erosion is active

Gully erosion can look dramatic, but if the gully has stabilised it may be better to leave it alone. Disturbing dispersive soils may reactivate the gully and cause more erosion. To check whether the erosion is active, look at the gully head, walls and floor.



Above: An active gully head in the Clarence Valley

Gully head

If the gully head is active you will see it cutting into the drainage line above the gully, moving back up the slope. If you are not sure whether there is movement, take regular photographs of the site and compare them.

Gully sides

Active gullies tend to have vertical sides. Once they stabilise, gully walls slump to a natural batter and grass over.

Gully floor

In active gullies the floor lowers over time as more soil is scoured out. Regularly measure the distance from the floor to natural land level and compare the measurements to check floor movement.

2. Check water source

If the gully is active find out if the erosion is caused by surface water or groundwater. If it is surface water, you may be able to divert it away from the gully by earthworks, or slow it down using vegetation. If it is groundwater you will not be able to divert it, but you may be able to revegetate surrounding areas to take up some of the groundwater.

3. Improve groundcover

Vegetation is vital for soil protection. Plants break the force of raindrops hitting the ground and slow the speed of surface runoff. Plant roots hold the

soil together and take up groundwater that may otherwise cause subsurface erosion.

As a general rule of thumb 70% groundcover is needed to protect soil, but in areas of high water flow this needs to be thicker, up to 100% cover. Where possible increase groundcover where the rain is most likely to fall above the gully to reduce runoff.

If vegetation above the gully is sparse, look at removing stock from the area and fencing it off so that plants can regenerate. Keeping stock out of gullies will encourage faster stabilisation and natural revegetation.

Plant deep-rooted perennial grasses in and on the sides of gullies and ephemeral waterways that have the potential to become gullies. Plant trees further away from the gully to take up groundwater.

4. Review land management

All gully erosion indicates that the soil is beyond its capacity to cope with the land use. You may need to review your current land management and look at other options for the affected land.

5. Install earthworks

Sometimes gulying is so severe that earthworks are needed. **It is important to seek advice before undertaking any earthworks as some activities may worsen the erosion.** For general advice, talk to your local CMA community support officer. For specific technical advice you may need to consult private soils experts.

Useful earthworks can include

- structural works to stabilise gully heads so that they no longer erode
- gully reshaping, battering and revegetating to prevent further erosion
- diversion banks to divert runoff and prevent it building up energy
- drop structures to control water flow.

In small catchments under 1ha small dams can help intercept runoff and sediment. However, these need to be permanently half full to be effective, and you need Department of Natural Resources approval to construct dams.

6. Prevent erosion occurring

Regular inspection of your land will help you detect early signs of gully erosion. It is much cheaper to prevent erosion than repair gullies.

Bare soil tracks made by stock provide drainage lines for runoff and 'nick points' where gullies can start easily. Overgrazing can also reduce groundcover and encourage soil erosion.

Drainage lines and ephemeral waterways may have areas that could be 'erosion starters'. Remove such erosion risks by removing stock, fencing off the area, or planting grasses.

More information

NSW DPI's website has information on soil erosion at:

<http://www.dpi.nsw.gov.au/agriculture/resources/oils/erosion>

To discuss your specific soil erosion issues, contact NSW DPI soils advisory officer Abigail Jenkins, Wollongbar, on 6626 1357 or abigail.jenkins@dpi.nsw.gov.au.

Below: Severe gully erosion in the Upper Mann catchment, photo courtesy P Roberts



Produced by NSW DPI Wollongbar for Northern Rivers CMA project 'Revegetation/improved management of areas with high erosion risk'.



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