SEQ Catchments
Healthy Land – Healthy Water

Tunnelling

Muddying Lockyer Valley waterways

Overgrazing, drought and fires have all contributed to widespread tunnel erosion and consequently gully erosion in susceptible parts of the Lockyer catchment.

Tunneling and associated gullying can be a major contributor of sediment entering waterways. A feature of the sediment generated by tunneling is that the clay fraction of the eroded soil readily turns into solution and can remain suspended for long periods of time, causing waterway turbidity.

Tunnel erosion

Lethal hole: Tunnelling is common in a number of areas of the Lockyer and nearby Marburg and Bremer catchments. Subsoil dissolves and is washed away, causing the surface to collapse, forming gullies. These sediments can stay in suspension reaching waterways.

Tunnel erosion is the erosion of the subsoil by water while the surface soil remains relatively intact. Later the surface can collapse causing gully erosion. It occurs in areas where the subsoil, or B-horizon, rests on an impermeable C-horizon and erodes more easily than the topsoil (A-horizon). Water passes through cracks or holes in the topsoil, caused by drought, tree stumps and adverse vegetation management (including overgrazing and fire).

A tunnel forms below the topsoil as rainwater disperses the subsoil. Very often one can see dispersed subsoil deposited further downhill. These 'tunnels' then collapse and form open gullies.

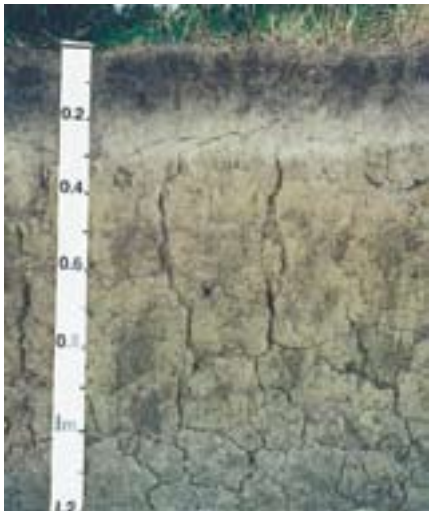
Tunneling in the Lockyer catchment occurs on sodic duplex soil, and is found in areas like Minden and Ropeley amongst others. Sodic duplex soils are highly susceptible to tunneling when vegetation is removed, the pasture is overgrazed or the topsoil layer is broken.

Australian Government
Department of the Environment, Water, Heritage and the Arts

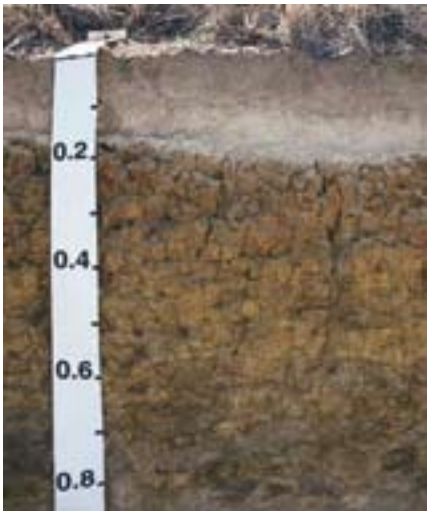
HEALTHY WATERWAYS
Because we're all in the same boat

Control and Reclamation Guidelines

Soil groups susceptible to tunnel erosion in the Moreton region are:



Loamy Solodics or open forest soils that carry narrow/silver leaved ironbark (*Eucalyptus crebra/E.melanophloia*) and Moreton Bay ash (*Corymbia tessellaris*). These soils have texture contrast profiles with clear division between the loamy brown/dark grey surface and heavy clay subsoil (brown/yellow).



Sandy Solodics – are open forest soils that support spotted gum (*Corymbia citriodora*) narrow/silver leaved ironbark, Moreton Bay ash and bull oak (*Allocasuarina luehmannii*). The soil has a texture contrast profile. Plant growth is restricted by the impermeable clay subsoil and hard setting surface.

Soloths – vegetation on these soils is open woodland and open forest. Restricted plant growth due to poorly structured subsoil and the hard setting surface is also a contributing factor. The third layer (C-horizon) forms hard and saline subsoil. Generally, these soils are not suitable for agricultural land.

Soils particularly susceptible to tunnelling in the Lockyer catchment are those derived from the Kaukandowie formation.

Best Management Practices

If these susceptible soil types are being utilised, then a good grass cover should be maintained at all times. Conservative stocking rates in the order of less than one Animal Equivalent per eight hectares may be needed. Certainly cultivation is not an option on these soil types.

Reclamation of Tunnelled Land

Tunnelled land can be reclaimed using a range of techniques. Some suggestions are:

Mechanical: Deep rip with a bulldozer across the slope in order to 'shatter' the tunnels and improve permeability.

Chemical: Apply gypsum, starting with two to three tonnes per hectare, and repeat annually until six tonnes per hectare has been reached. This will improve the depth of topsoil layer and assist reclamation. Check pH and apply lime to increase calcium levels and availability of manganese. Lime will also assist in legume nodulation.

Revegetation: revegetating an area affected by tunnelling can improve soil fertility, increase the evenness of infiltration, stabilise soil structure and avoid drying effects on soil during summer. Species that can be used to revegetate areas being treated are:

- legumes siratro (*Macroptilium atropurpureum*)
- clovers (the lime also improves nodulation)
- Pioneer Rhodes grass (*Chloris gayana*).

The area can be further stabilised by using suitable deep rooting trees, which if planted widely spaced, can allow cattle grazing to provide an agro-forestry system.

Restoration can be successful

The experience of two Lockyer landowners illustrates that restoration can work.

Grazing control and grass

Case study 1

Land Owner:	Location:	Property Size:	Landuse:
Bob and Narelle Hampson	Marburg Range, 60km west Brisbane	24ha	Grazing

Repaired: An area of tunneling at Marburg has collapsed, and been stabilized with pastures.

On the northern end of Bob Hampson's Marburg property is the Kakandowie formation, which locals and others familiar with the landscape know for its susceptibility to tunnel erosion.

When Bob and Narelle Hampson finished eradicating lantana from their block, they found that they had a small area that continued to tunnel and slump.

After fencing the area and sowing pangola grass (*Digitaria erianthus subspp. Pentzii*) the area has estabilised.

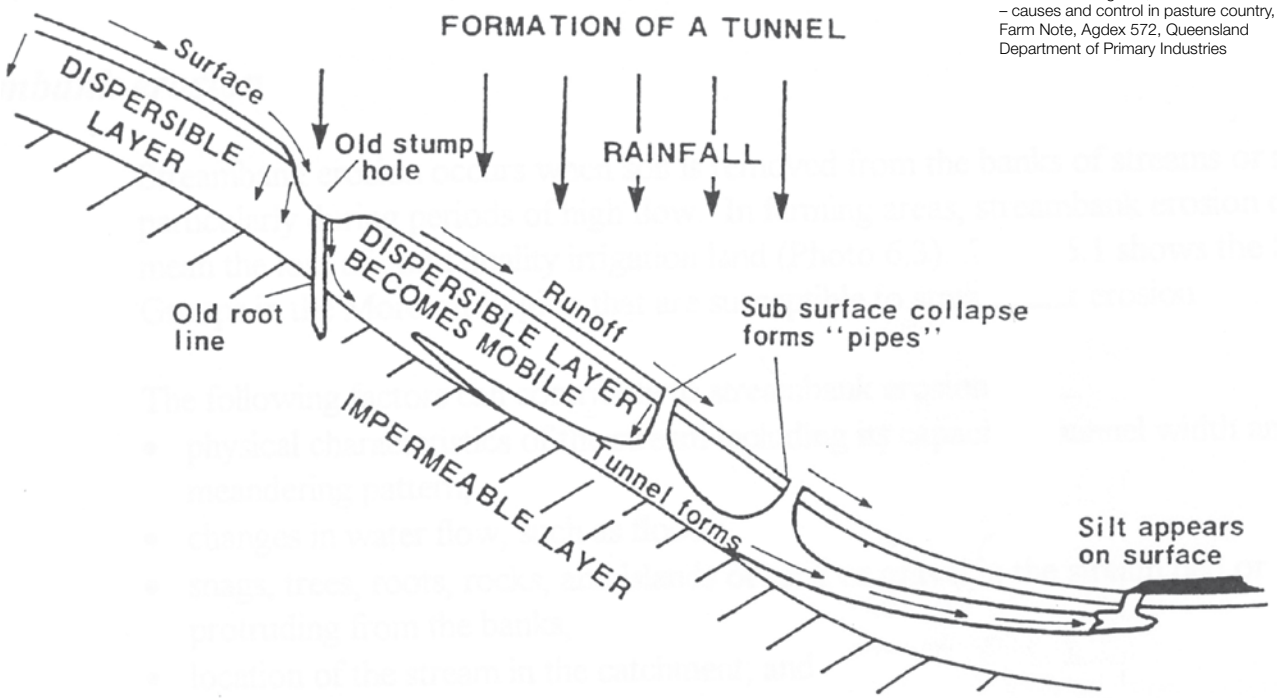
With a good cover of grass, the sides of the small gullies have smoothed and there has been little further erosion.

A pasture that has proven particularly useful in stabilising the area is Pangola (*Digitaria erianthus subspp. pentzii*).

Contour ripping

Case study 2

Land Owner:	Location:	Property Size:	Landuse:
Bruce and June Young	Minden	50ha	Grazing Charolais cattle



Source: D. Houghton, Tunnel erosion – causes and control in pasture country, Farm Note, Agdex 572, Queensland Department of Primary Industries

A small part of the eastern boundary of the Belhaven property of Bruce and June Young at Minden is prone to tunnelling and slippage.

In 2005 they commenced a program to address the tunnels in the subsoil. The area affected measures about 50 metres by 100 meters.

Initially the area was fenced to allow it to be managed separately. The site was then ripped across the contours in order to collapse the tunnels. Pasture has been allowed to regrow and trees have been planted, principally the fast growing white cedar (*Melia azderach*).

A bag of millet seed was spread over the site but conditions did not favour its establishment. The panic grasses (*Panicum* species) were the main grasses established.

The pasture has established well and the trees are also successful, in spite of increased grazing pressures during the dry winter.

Indications to date are that the measures undertaken appear to have solved the problem of tunnelling, although the real test will come with substantial rain.

Brisbane
Level 2, 183 North Quay, Brisbane
PO Box 13204, George St QLD 4003
Ph: +61 7 3211 4404
Fax: +61 7 3211 4405

Ipswich
52a Tiger Street
PO Box 731, Ipswich Q 4305
Phone: + 61 7 3816 9700
Fax: + 61 7 3812 8685

Email: admin@seqcatchments.com.au
www.seqcatchments.com.au