LAND MANAGEMENT

SUSTAINABLE LAND
Protecting infilled valley bottoms from gullying

Main Points

- Valley bottoms in soft rock hill country are important for grazing and access but are often divided by gullies.
- It is better to prevent gullies forming than trying to fix them afterwards.
- Gully erosion can be controlled by controlling the gully head, stopping bank erosion and stopping the gully deepening.

What is the problem?

Valley bottoms in soft rock hill country are very important because they provide grazing in droughts as they are naturally moist. They are also fertile and have the potential for quality pastures, and they often provide main access routes.

But often gullies divide the valley floors, breaking access routes and requiring expensive bridges or culverts. Gullies can also drop watertables and dry flats out earlier, and sediment from gullies can fill dams or lower waterways.

A series of small gullies in a typical valley system. Gullies enlarge to make access difficult.

There are two main types of gully:

- a continuous gully up the valley which bottom enlarges as the gully head moves up the valley. It often continues to cut down and widen, causing continuing problems and pasture loss.
- a series of small gullies with each having a gully head moving up the valley.

A gully cutting up a typical valley bottom.

What's the best way to prevent this problem?

Prevention is better than cure. Gullies can be prevented from forming:

- Check often for any little nick points or gully heads. Stock tracks running up the valley are very sensitive points.
- Nick points need to be fenced out in a block, with Matsudana willow poles planted at 2m by 2m spacings with six zig-zagged rows, and then thinned to 5m spacings.

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- Ensure drains, which are cut to reduce swampiness, do not gully. Ensure the grade is less than 1:100.
- Pair plant the proposed drain two or three seasons before construction. Plant each pair about two metres wider than the anticipated width of the drain and leave 4-5m between pairs.

How can gully erosion be controlled?
Controlling the gully head, stopping bank erosion and stopping the gully deepening are the three ways to control gully erosion.

Controlling the Gully Head
The rate of headward movement determines the control measures. A gully head moving slowly at 1-2m a year can be controlled by planting a block of willows. Blocks need to go from side to side of the valley, with six rows of zig-zagged plantings at 2m by 2m. Plant upslope of the gully head sufficiently far back that it will take three years for the gully head to move to it.

A gully head moving more quickly may have to be controlled mechanically. The quality of the structure depends on the value of the asset to be protected, but the most common form is a wooden box flume designed to carry the maximum flood flow. See your Land Management Officer for advice before building a box flume.

Stopping Bank Erosion
Careful planting of vegetation along the banks is necessary. Matsudana willow poles are the most common tree used. Where there is a lot of bank erosion, plant the poles in pairs 4m apart. Where there is only a small amount of erosion, plant the poles alternately along the bank.

It is essential to plant above the flood level. Trunks of trees planted below this level can deflect floods and cause banks to scour.

A block planting preventing the gully heads from cutting up the valley bottom.

Pair planting of poplars along a stream provides effective bank protection. Silviculture would result in quality timber.

Plant the pairs wide enough apart that debris doesn't get caught between them. If they are too close they can deflect floods and cause more bank erosion.

Bank edges dry out rapidly, so poles need to be planted far enough away from the edge so they don't dry out.

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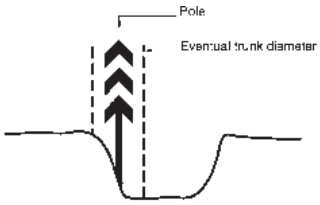
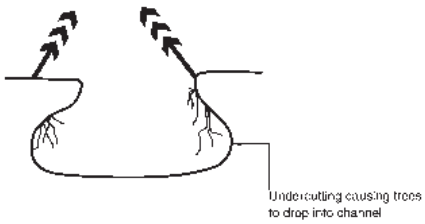


DO NOT plant in the channel



DO NOT plant too close to channel edge

DO plant above the edge of normal flood level.

Stopping the Gully Deepening
If the gully deepens, the side walls will collapse, widening the gully and losing more pasture. This can be prevented by pair planting willows along the bank.

Two 15 year old rail & netting dams effectively stopping any gully deepening.

Willow roots will grow under the stream and form a protective mat on the floor to stop downcutting. This is important to protect a crossing. Debris dams can be built, and will lift the floor 150 to 400mm, and give a stable control point.

Other Measures to Control Gullies
Retire the gully by fencing it out and planting approved species. When planting, it is essential to maintain a good cover. However, do not plant so many trees that the ground is shaded permanently, as this will result in bare ground and more erosion.

Plant Kawa poplars to give protection, shade and timber. This is the ideal growing environment for Kawa. Pasture will be maintained, especially if the trees are pruned.

For further information
For information on sustainable land management, ask for the other titles in this series, or contact Land Management staff at Hawke's Bay Regional Council for advice.

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