Riparian management for hill country farms

Sustainable Land Management Programme 04

TARANAKI REGIONAL COUNCIL

Introduction

Rivers and streams in Taranaki's hill country are different from the ringplain's. Instead of short steep-gradient bouldery channels, they have long low-gradient channels, often with muddy bottoms. In the larger valleys, their banks are cut into flat terraces of alluvium deposited by the rivers. In many smaller valleys, the streambanks are silt or clay weathered from rock where hillslopes abut the channels. In some places the banks are vertical bluffs, where streams have incised bare rock in valley bottoms.

Riparian management - looking after land on streambanks - is just as important and beneficial in the hill country as on the ringplain (see Infosheets 21 and 22). So are the general principles and practices (see Infosheet 23). However, because hill country streambanks aren't the same as the ones on the ringplain - and because hill country farms are large properties grazing drystock rather than small ones grazing dairy cows - the details of implementation differ.

What are the differences?

Retirement-fencing the entire length of banks and revegetating them with native species - management practices the Taranaki Regional Council advocates for ringplain streams - would be a major exercise on most hill country farms. They are large and their terrain is dissected. So length of streambank inside a farm's boundary is much greater than on a typical ringplain dairy farm. Cost of fencing - let alone planting native vegetation inside the fences - would simply be unaffordable. It may also be impractical - valley bottoms are often the best routes for stock movement and vehicle access, sometimes the only routes. Streambank retirement fences would cut off these routes at many points. Close to footslopes and streambanks, the fences would be hard to maintain against erosion and flooding.

Retirement fencing and revegetating banks is usually practical just along main river channels (Figure 1) because:

- Here the channels are bordered by continuous alluvial terraces; elevated and flat with deep alluvial soils; and where well-drained, the most easily managed grazing land on a farm.

Fig 1. A River margin that has recently been fenced and planted.

- The terraces are large enough to be fenced off as individual paddocks, separate from hill faces and river banks.
- The river bank area is a small percentage of the terrace area. Retiring it from grazing, generally entails losing only a few hundred square metres of grazing out of a paddock 1 to 10 hectares in extent.

Retirement and planting of a terrace edge should be avoided if the river has been excessively narrowed by silt or sand temporarily plastered on its banks. This situation is common on rivers that carry high sediment loads. Such a river will attempt to widen its channel during the next flood, scouring the sediment away and undermining the plantings. In this situation, it is better to wait until the bank stabilises, and institute controlled grazing.

Figure 2. Discontinuous terraces are often too small for individual bank retirements. Controlled grazing of a long valley-bottom paddock is an alternative option here.

As well as the situation described above, controlled grazing of streambanks is a practical option along the large streams that flow through valley bottoms in hill country (Figure 2). Here:

- Terraces are discontinuous, low-lying and swampy; and generally too small to be fenced off as individual paddocks.
- A fence either side of a valley bottom can enclose a series of small terraces together with the winding stream that separates them, into a single long narrow paddock several hectares in extent.

In the winter months valley bottoms can become so waterlogged that grass growth is depressed, and the soil pugs badly if grazed. As they dry out in spring, a flush of growth occurs and stock access becomes easier - so the stream banks can be grazed in summer and autumn when feed is in short supply on the hills. Short bursts of intense grazing help suppress weed regrowth in swampy pasture - which would be a problem in the wet hill country climate, if banks are completely retired. At other times, the valley-bottom paddock can be used as a stock race.

Figure 3. Where there is not enough area to fence off a stream paddock, space-planted trees are a third option that will reduce sediment entering watercourses.

Along many small streams in valley bottoms (Figure 3), also on their tributaries running down hill faces, planting soil conservation trees on the banks may be a more practical option than installing controlled-grazing fences. This is because:

- The terraces, where present, are too narrow to be collectively fenced off as a single valley-bottom paddock.
- At many points, hillslopes descend directly into streams. Few farmers would want grazing subdivision across the lower part of a hill face.
- These small streams are often the only source of stock water for a hill paddock.

Option 1 - bank retirement in hill country

The places where this is practical and beneficial include:

- Edges of large alluvial terraces in valley bottoms - here a retirement fence can form one side of a permanently grazed paddock. The area of bank to be planted with native shrubs or trees is a few hundred square metres - small enough to be manageable.
- Edges of incised gullies at the bottoms of hill slopes - here a retirement fence can aid stock mustering and also be a valuable safety measure. Planting inside the gully is rarely needed - it is often already a mix of reverting scrub and bare rock bluff.
- Wetlands - where spots on terraces or floodways are simply too low-lying for drainage to be effective, stock management and safety will be improved if they are fenced off from the better pasture. Their value may be greater as refuges for fish and waterfowl.

For fencing, try one of the permanent fence designs outlined in Infosheet 24. Materials cost can range from $10 down to $1 a metre depending on what design is selected (Figure 4). Remember the tips in Infosheet 24 - collapsible gates or removable rails so that stock can be easily removed if they get inside; simple stock crossings; flood-proofing at points where a fence crosses or is close to water.

Figure 4. At moderate cost, this fence has excluded stock from a retired bank.

Where an alluvial terrace edge is being planted in natives, the species list in Infosheet 26 is as appropriate for the hill country as the ringplain.

Remember to plant the right species in the right places:

- Sedges and rushes, or water-tolerant shrubs at the water's edge,
- Shrubby species that can resist frequent passage of floodwater up the bank,
- Trees suited to damp soil on the terrace edge at the top.

Many places on alluvial riverbanks are at risk of erosion by floodwater. Here the slow-growing native species may be washed away before their roots are deep enough to hold. Where a bank is not presently eroding, consider inter-planting the natives with faster growing soil conservation trees. Suitable species are listed at the end of Infosheet 26. Their foliage is open and deciduous, so the natives can form an under-storey and eventually grow up through them. If a bank is actively eroding or silting, try a controlled-grazing fence, with soil conservation trees planted sufficiently far back from the edge that they have a chance to establish; only attempt permanent retirement and native planting when the bank stabilises.

Option 2 - controlled grazing on hill country riverbanks

The places where this is appropriate include:

- Alluvial terrace edges that are too unstable to attempt retirement-fencing and native planting.
- Discontinuous valley-bottom terraces that are individually too small to fence off as separate paddocks, but can be collectively enclosed by a fence at the break-of-slope either side.
- Poorly drained floodways and wetland margins - too wet to graze in winter, though good feed when they dry out in summer.

Rather than a temporary fence, consider using one of the low-cost permanent fence designs outlined in Infosheet 24 (Figure 5).

Figure 5. This fence, light-weight but permanent, suffices for a lightly-grazed streambank paddock.

Controlled grazing entails a trade-off between:

- Mob-stocking in short bursts - good for feed utilisation and also for suppressing weed regrowth; but entails polluting the stream with dung, urine and soil trampled from banks,
- Lighter rotational grazing for longer periods - can still give good feed utilisation; pasture recovers faster so can be grazed sooner; the impact on water quality is less than mob-stocking..

The utility of control-grazed streambank pastures may be improved by oversowing with the water-tolerant pasture species listed in Infosheet 26.

Option 3 - soil conservation tree-planting on hill country streambanks

The places where this is appropriate are many and diverse. These include:

- Outer bends on river channels: These are the most common sites of scour by floodwater. Here the roots of densely planted poplars or shrub willows can anchor the bank.
- Straight reaches: Here there is little risk of bank scour during floods, but the bank frequently collapses due to hydraulic "draw-down" of groundwater in alluvium as the floodwater recedes. Where trees are planted at a wide spacing, their roots can nevertheless interlock sufficiently to protect scarce valley-bottom flats from collapsing into the channel.
- Hillslope watercourses: Steep-gradient tributaries often cut shallow gullies into hillslopes. Apart from delivering sediment into the main rivers, these shallow gullies make mustering difficult and occasionally cut access tracks. Pair-planted trees up the larger channels, or line-planted trees up the smaller ones, will arrest the gullies by forming an erosion-resistant mattress of roots beneath.
- Foots of erosion-prone slopes: Where earthflows or slumps descend right into hill country streams, the stream keeps them active by undermining and carting away the debris. Similarly where repeated landslides on an upper face have deposited a large quantity of "colluvium" (erosion debris) on its footslope next to a stream. In both situations, close-planting trees on the "toe" of debris where it meets the stream, can stabilise it and greatly reduce sediment entry into the water.

Places to avoid are:

- Point bars and inner bends: Here a dense planting of trees can trap temporarily deposited silt, so that it doesn't move downstream. The planting may force floodwater towards an outer bend, worsening erosion there.
- Banks where silt is repeatedly deposited and re-eroded: Here trees here are likely to be undermined, collapsing into the channel where they divert floodwater farther into the banks.

If planting soil conservation trees on regularly grazed banks, remember it's important to protect trees from stock until they establish (Figure 6). Protection can take several forms:

- Temporary retirement fences e.g. hotwires for the first year - appropriate where seedlings or short stakes are planted,
- Netlon or dynex sleeves - appropriate where poles are planted. Even so, try to keep stock out of the paddock for a month or two,
- Old 44 gallon drums, stacked car tyres and similar - unsightly but effective.

Infosheet 26 lists tree species appropriate for planting in grazed pasture, that do well in Taranaki's climate. If considering other species, consult one of the Council's Land Management Officers first - there may be a reason why it's not on the list e.g. possum damage, invasion of watercourses.

Figure 6. These young poplars are establishing well, because they are protected against browsing by stock on the bank.

Ongoing management of riparian plantings

As regards how to go about planting on streambanks (time of year, planting technique, site preparation, fertilisation), Infosheet 25 gives some useful tips that are as appropriate for planting a tree on a hill country streambank, as on the ringplain. Walking away after planting won't achieve anything - remember that success depends on the standard of post-planting maintenance. Useful tips are contained in Infosheets 27 (stock management on banks), 28 (keeping channels and floodways open), 29 (spraying for weed control), and 30 (trapping and poisoning for pest control).

Where to get more advice

Taranaki Regional Council provides a free advisory service for landowners wishing to manage streambanks. This service includes site visits, preparation of farm plans, and supply of plant stocks at cost. For hill country farms, riparian management may be part of:

- An erosion control plan to solve a specific problem in one paddock,
- Or a riparian plan for managing all the farm's streambanks,
- Or part of an agroforestry plan which includes woodlot establishment on streambanks or gullies,
- Or an element in a Comprehensive Farm Plan or Conservation Plan for sustainable land use.

Help is also available to solve any problems which arise; for instance with plant establishment, stock management, weed and pest control, or channel maintenance.

For further advice on riparian management options in hill country, contact:

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