LAND MANAGEMENT

SUSTAINABLE LAND
Soil erosion in Hawke's Bay hill country

Main Points

- Soil erosion is a continuing process on Hawke's Bay soft rock hill country.
- Most soil erosion happens on slopes steeper than 25 degrees.
- Most erosion happens in storms where more than 250mm of rain falls in only two or three days. Smaller storms tend to clean out the debris left by larger storms.
- Tree cover significantly reduces the amount of soil erosion on steep country.
- Slopes over 25 degrees need some tree cover to increase slope stability. Without tree cover we can expect a severe erosion event at least once every 10 years.
- Sustainable management of steep slopes needs lots of trees or much of the soil will be lost over time.
- More than 50% of the sediment which moves in big storms enters streams and rivers, leading to silting in plains, lakes and coastal waters.

What is happening to our hill country?

It's hard to say what effect the development of pasture has had on soil erosion on Hawke's Bay hill country. But in the last 10 years scientists studying the small catchment which feeds into Lake Tutira have been able to find out how our hill country has responded to changes in land use over time.

Lake Tutira following a storm in the 1980's. (Photo: N Trustrum)

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What did the scientists do?

The scientists looked at the changes in land cover and erosion back to when the lake was formed by a large landslide 6500 years ago. They took cores from the lake bed and the valley bottoms near the lake.

The cores were made up of bands of light grey sediment deposited after erosion, and bands of dark grey sediment or organic material from periods in between storms. The scientists matched up the bands using the 93 years of Tutira Station records for recent storms, and the layers of volcanic ash for older storms. They looked at pollen in the layers to tell them what the surrounding vegetation was at different times.

The scientists found that:

- soil erosion has always occurred in the hill country but it has increased significantly since pastoral development.
- in pre-human settlement times volcanic ashfalls and droughts led to outbreaks of fire which burnt forested areas. These caused significant erosion which healed up over about 100 years.
- after Polynesian settlement, fires led to a change in land cover from forest to fern and scrub with a moderate increase in soil erosion of 0.5-1.2 times.
- after European settlement, conversion of fern and scrub to pasture led to a major increase in erosion. Soil erosion rates under pasture are between 8-16 times that of original forest and between 5-7 times that under fern and scrub.

More information on the Tutira studies can be obtained from Mike Page or Noel Trustrum at Landcare Research, Private Bag 11052, Palmerston North, or from reading the “Stormy History” article in the June 1992 issue of Terra Nova.

What causes erosion?

Almost every year the Tutira area has a rainstorm with more than 150mm of rain. For soil erosion to happen, 150-200mm of rain is needed, but at least 250mm of rain in two to three days is needed for major erosion to occur. Around Tutira these heavy rainfalls occur on average once every 10 years.

Large storms with more than 250mm of rain falling produce much more sediment compared with smaller storms where only 150 to 200mm falls. These smaller storms remove the sediment left on valley floors and in channels on hills during the previous large storm.

Where does erosion occur in the landscape?

Cyclone Bola was one of the largest rainstorms in the area and was fairly typical in its effects. By mapping each scar caused by erosion and its volume, scientists worked out the most susceptible areas.

They found that:

- just under 90% of all soil erosion was from slips.
- 81% of the sediment came from slopes steeper than 25 degrees. These slopes covered nearly a third of the catchment area.
- Most of the sediment was washed off the hills onto the flats.
- 6% of the sediment was washed down the river, and 51% was deposited on the floor of the lake.
- 22% of the sediment was deposited on the valley floor, and 21% of the sediment stayed on the hillsides.

For further information

For further information on control of soil erosion, ask for the other titles in this series or contact Hawke’s Bay Regional Council Land Management staff for advice.

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