

# One Billion Trees Programme

Helping New Zealanders plant the right trees, in the right place, at the right time

## Plantation forestry on erodible land



### Why plant trees on erodible land?

Plantation forestry can potentially reduce soil erosion by up to 95 percent.

Benefits of planting trees on vulnerable and unstable landscapes include:

- reductions in soil erosion
- storing carbon dioxide from the atmosphere (carbon sequestration)

- environmental benefits, like cleaner water and increased biodiversity
- reduced damage to downstream land and infrastructure. Trees protect landscapes from erosion, especially during severe storms, by:
  - providing a canopy that intercepts rainfall and reduces the amount of water in the soil
  - having roots that bind the soil together, making it less likely to wash away.

### Types of erosion you might see on your land

**Rill erosion** – happens when water from rainfall doesn't soak into the soil, but runs across it instead.

Image: Environment Canterbury



**Gully erosion** – caused by flowing surface water.

Image: Bay of Plenty Regional Council Toi Moana



**Sheet erosion** – happens when rain falls on bare or sparsely covered soil, loosening fine particles that are carried downhill in surface runoff.



**Soil slip** – shallow landslides after heavy rain.

Image: Peter Scott  
[www.abovehawkesbay.co.nz](http://www.abovehawkesbay.co.nz)



**Earthflow** – large slow-moving slips.

Image: Taranaki Regional Council



## Land type and forestry

As land gets steeper it tends to have:

- decreasing versatility
- increasing vulnerability to erosion
- declining soil quality
- fewer ways to help prevent erosion.

Climate conditions at higher altitudes become harsher and less suitable for growing grass or trees.



## Types of erodible land and options for use

### Land suitable for a wide range of uses, including plantation forestry

Types of erodible land	Potential for forestry
Alluvial valleys or terraces (where loose clay, silt, sand or gravel has been deposited by running water), fertile, lower altitude.	Erosion and sedimentation are relatively low. Likely possible to protect or improve water quality through modifications to existing land use practices, with or without the support of small-scale plantings of a range of species. Larger scales of planting would come down to cost and landowner objectives.
Generally rolling to steep land on hard geology, fertile & lower altitude.	
Rolling to steep land, prone to some forms of sheet erosion, rill or gully erosion.	
Land with various features which has some climate, altitude and erosion limitations.	Increasingly limited by: <ul style="list-style-type: none"> <li>• steepness</li> <li>• climate</li> <li>• lower soil fertility</li> <li>• increased vulnerability to erosion.</li> </ul> Fewer species options (commercial and semi-commercial) as the site gets steeper. Need to match species to conditions like soil depth. Some commercial forestry feasible but limited by constraints of land.
Moderate to steep landforms that are prone to soil slip or sheet and gully erosion under pasture.	
Limited productivity under grazing on steeper parts, and prone to gully erosion.	
Generally steep uplands subject to high rates of natural or induced erosion.	Land highly likely to erode away, especially under grass cover. Soils are deeper, and erosion is slow moving, so depending on other land constraints, wide scale tree planting options can work in these areas.

### Land not suitable for intensive forestry

Types of erodible land	Potential for forestry
Limited productivity under grazing, with skeletal (thin) soils on steep land. Vulnerable to debris flow/debris avalanche.	Generally unsuited to large scale conversion for timber harvesting: <ul style="list-style-type: none"> <li>• highly likely to fail</li> <li>• highly vulnerable to debris flow (where water-laden masses of soil and bits of rock rush down mountainsides and funnel into stream channels) and generation of debris floods (water carrying debris like rocks, soil and trees)</li> <li>• these may happen more often with climate change.</li> </ul> Reversion, honey or native vegetation enhancement should be seriously considered in much of this group, except outwash slopes (left over from glaciers).
Generally moderate to rolling hill country subject to deep seated mass earthflow erosion (slow moving landslides).	Broadly non-productive, high altitude and highly eroding landscapes. Good to consider adding native vegetation cover where practical.

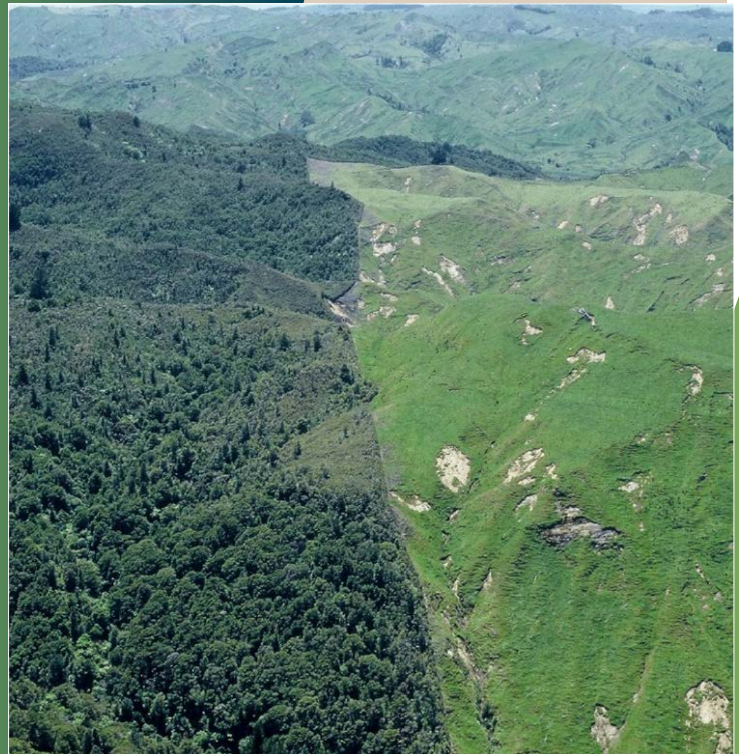


## Limitations of planting erodible land

After harvest, there's a 6–8 year timeframe where land is vulnerable to erosion. This happens until a planted crop grows up and the canopy (the branches and leaves you see when you look up in a forest) closes.

Some vulnerable landscapes at risk from extreme and/or frequent storms will always struggle to maintain commercial plantations. This is because of:

- rainfall intensity and runoff
- the amount of moisture already in the ground
- slope and slope length
- soil type and geology
- vegetation cover (how many plants and trees are already on the land)
- previous extreme storms
- whether the land faces the direction of frequent intense storms.



## Want more information?

Read the Summary report – **Planting eroding hill country in the Hawke's Bay region**

See p34 in the Technical report – **Planting eroding hill country in the Hawke's Bay Region: Right tree, right place, right purpose**

Tirohanga Ngahere | Canopy: [www.canopy.govt.nz](http://www.canopy.govt.nz)

One Billion Trees: [www.mpi.govt.nz/1BT](http://www.mpi.govt.nz/1BT)

## Acknowledgements

This fact sheet is based on research from Scion supported by funding awarded to the Hawke's Bay Regional Investment Company by the One Billion Trees Partnership Fund, Te Uru Rākau – New Zealand Forest Service/Ministry for Primary Industries.

## Disclaimer

While every effort has been made to ensure the information in this publication is accurate, Te Uru Rākau/Ministry for Primary Industries does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information.