

# What to plant on erodible land



## Why it's good to plant on erodible land

By planting on erodible land:

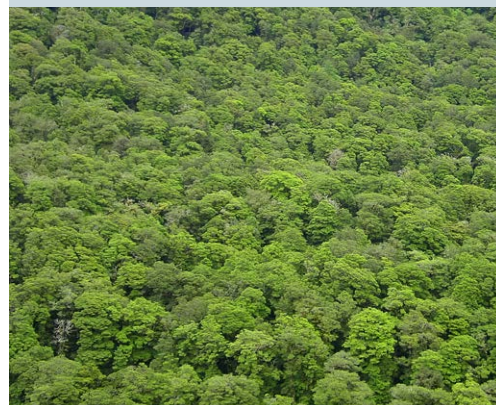
- land will be more resilient to climate change and severe storms
- you'll see an increase in land productivity and value, with benefits from:
  - avoided erosion
  - avoided investment in marginal land
  - avoided damage to infrastructure (for example, fencing, downstream land).
- there'll be environmental benefits like:
  - avoided sediment, phosphorus and nitrogen entering waterways
  - carbon storage
  - new habitat for species like kiwi and karearea (bush falcon).
- forests help regenerate headwater streams and the areas around them, and those benefits flow on to downstream waterways
- plantation forestry helps strengthen communities and create jobs.

## Choosing what to plant

To make sure you get the most value when you're planting trees, it's important to know which tree species are suited to which environmental conditions. Make sure you plant the right tree in the right place for what you're trying to achieve.

Talk to an expert who can advise you which trees might be best suited to your site based on the landscape, its climate and soil types. You can also look at similar sites in your area and see what's growing well.

If you want to establish plantation forestry on eroding hilly land, there are a few different options to consider.





## Which trees to plant where

### Native species

Native species, which originally covered the land, are suitable for planting around New Zealand. Management options for forestry include permanent forests on steep land and land at higher altitudes, or growing plantation trees.

Species	Growing regimes	Which sites	Benefits	Risks/drawbacks
Native species like tōtara offer a diverse range of options for management.	<ul style="list-style-type: none"> <li>• Could be very low-cost reversion to permanent forest.</li> <li>• Intensively managed forest restoration.</li> <li>• Planting for eventual harvest.</li> <li>• Using exotic species to provide canopy, then planting native species.</li> <li>• Permanent forests.</li> <li>• Permanent forests with small area harvesting.</li> </ul>	<ul style="list-style-type: none"> <li>• New Zealand was originally covered in native forest so lots of options to fit different sites.</li> <li>• Species mix and forest type will vary from site to site.</li> <li>• Commercial timber options will be limited to land where soil and slope can sustain large tree species.</li> </ul>	<ul style="list-style-type: none"> <li>• Very high community and cultural values.</li> <li>• Potential ability to secure funding to support native forest planting.</li> <li>• The economics of native species varies. The best potential option is podocarps like tōtara and rimu for timber and carbon.</li> <li>• Ecosystem benefits like water filtration and carbon storage.</li> </ul>	<ul style="list-style-type: none"> <li>• High costs to promote survival and even then, survival rates may be unreliable.</li> <li>• Growth rates are not certain.</li> <li>• Long rotation length (length of time between planting and harvesting) has a significant effect on financial returns.</li> </ul>

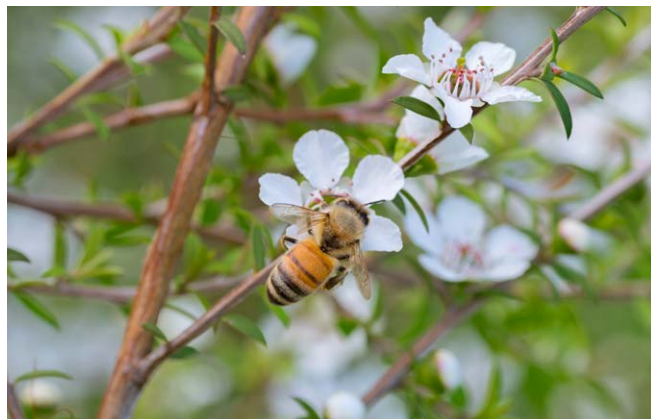
### Mānuka

Mānuka is a potential protective nurse crop for species like tōtara, kauri, or beech when planted on exposed or steep eroding hillsides. It can be grown for honey production when planted on warm, sunny slopes.

Mānuka is a foundation species, commonly found growing on land that has been disturbed by erosion. It's widespread throughout New Zealand, but only a small amount of plantation mānuka is being grown for honey production.	<ul style="list-style-type: none"> <li>• The most common regime is initially planting mānuka for honey. Once the mānuka crop reaches floral maturity, land is either reverted to native forest or re-establishing mānuka.</li> <li>• Could be a nurse crop to support a plantation of native tall trees (like tōtara) for timber.</li> </ul>	<ul style="list-style-type: none"> <li>• For honey production, warm, sheltered sites with free draining soils are preferred.</li> <li>• Honey production is much better on north facing slopes with low rainfall and wind during the summer months when the mānuka is flowering.</li> <li>• Can be used to control erosion on relatively shallow and unstable sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Diversity of revenue.</li> <li>• Can be used for erosion control on relatively shallow and unstable sites as mānuka trees are smaller and lighter than exotic species.</li> <li>• Good public perception.</li> <li>• Potential for honey and/or oil production.</li> <li>• Potential for reversion to native cover.</li> </ul>	<ul style="list-style-type: none"> <li>• Sensitivity to weather conditions.</li> <li>• Variability of annual returns from honey.</li> <li>• Myrtle rust (a fungal disease) is a future risk.</li> </ul>
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Tōtara

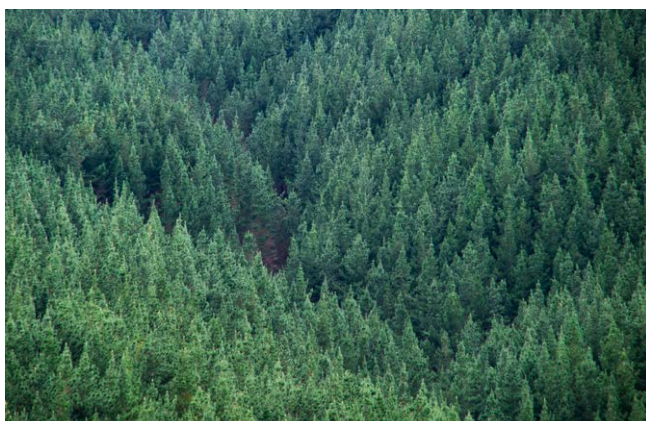


Mānuka

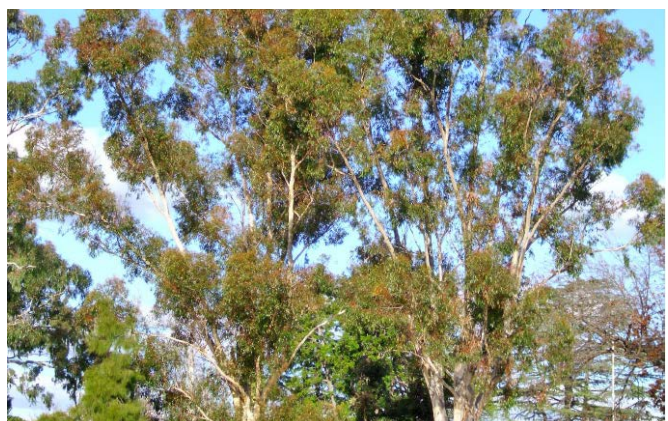
## Exotic species

Exotic species like radiata pine can make money where access for harvesting and transport is possible. Coast redwood and eucalyptus are good options for planting at lower elevations if sites suit.

Species	Growing regimes	Which sites	Benefits	Risks/drawbacks
<b>Radiata pine</b> Radiata pine is the dominant commercial species in New Zealand (90% of total).	<ul style="list-style-type: none"> <li>• Clearwood (pruned, thinned) – provides the highest returns per hectare, but requires lots of investment in pruning.</li> <li>• Framing (unpruned, thinned) – needs higher stocking rates but avoids costs of pruning.</li> <li>• Permanent forest.</li> </ul>	Suited to a wide range of sites and climates, but don't plant on waterlogged soils or where it snows.  Be aware that planting commercial forestry on steep slopes is limiting, mainly for health and safety and environmental reasons.  Slope also affects: <ul style="list-style-type: none"> <li>• how hard it is to harvest</li> <li>• how much it costs to harvest</li> <li>• how susceptible the land is to erosion, especially right after harvesting.</li> </ul>	<ul style="list-style-type: none"> <li>• Proven reliability.</li> <li>• Fast growth.</li> <li>• Well-developed supply chain.</li> <li>• Established markets.</li> <li>• Generally low risk of wilding spread (self-sewn trees).</li> <li>• Relatively tolerant to pests and diseases.</li> </ul>	<ul style="list-style-type: none"> <li>• Negative public perception of pine forestry.</li> </ul>
<b>Coast redwood</b> The area of redwood in New Zealand is estimated to be around 10,000 hectares (2018) and is steadily increasing. You can get very good prices for clearwood grades and heartwood.	<ul style="list-style-type: none"> <li>• Clearwood – pruned regimes need a longer rotation length to get enough clearwood (35–50 years).</li> <li>• Low stocking (500 stems per hectare) can be established with elite clones.</li> <li>• Non-clearwood regimes will need higher stocking to control branch size.</li> <li>• Permanent forests.</li> </ul>	Be careful where you plant redwoods.  They: <ul style="list-style-type: none"> <li>• don't like strong prevailing winds</li> <li>• need reasonably high, well-distributed rainfall</li> <li>• need good soil depth with reasonable moisture retention.</li> </ul>	<ul style="list-style-type: none"> <li>• Good early growth rates.</li> <li>• Redwoods will regrow after being cut down, sending up shoots from stumps. This is called coppicing.</li> <li>• These two things make coast redwoods potentially an important erosion control species.</li> <li>• People pay a lot of money for clearwood grades and hardwood.</li> </ul>	<ul style="list-style-type: none"> <li>• There is a lack of market for pulp and smaller grades that may lead to more residue on site after harvest.</li> <li>• You need to wait longer for larger diameter logs.</li> </ul>
<b>Eucalyptus</b> The number of plantation eucalypt forests is growing.	<ul style="list-style-type: none"> <li>• Production thinning – removing thinned trees for sale or use.</li> <li>• Continuous cover – maintaining forest canopy to protect the site.</li> <li>• Permanent forests.</li> </ul>	<ul style="list-style-type: none"> <li>• There are many species of eucalyptus, each of which prefers different sites.</li> <li>• It's important to match the right species to the right planting site.</li> <li>• Some species are relatively tolerant to dry conditions and may be better suited to cope with the potential future effects of climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Relatively fast growing.</li> <li>• Eucalypts also coppice, regrowing after being cut down.</li> <li>• Potential for relatively short time between planting and harvesting.</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially severe damage from exotic insect pests and fungus.</li> <li>• Under-developed markets due to current scale.</li> </ul>



Radiata pine



Eucalyptus

Species	Growing regimes	Which sites	Benefits	Risks/drawbacks
<p><b>Douglas-fir</b></p> <p>This is the second-most widely planted exotic species in New Zealand, with an estimated 104,000 hectares (6% of production forest area). 80% of this area is in the south of the South Island.</p>	<ul style="list-style-type: none"> <li>• Framing (unpruned, thinned).</li> <li>• Permanent forests as it is a long-lived species.</li> </ul>	<ul style="list-style-type: none"> <li>• Suited to cooler sites.</li> <li>• Has historically been used on higher altitude sites.</li> <li>• Highly vulnerable to out of season frosts.</li> <li>• Will struggle in warmer and wetter areas.</li> <li>• Will struggle in very dry areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Well established markets.</li> <li>• Sawlogs with small knots command good prices.</li> <li>• Long-lived species so could be an option for a permanent forest, especially at higher altitudes.</li> </ul>	<ul style="list-style-type: none"> <li>• Slow growth in the first 10–15 years.</li> <li>• Time from planting to harvest is longer than radiata pine (35–50 years).</li> <li>• Generally high risk of wilding spread.</li> </ul>
<p><b>Cypress</b></p> <p>There is about 10,000ha of plantation cypress in New Zealand.</p>	<ul style="list-style-type: none"> <li>• Pruned and permanent regimes are options.</li> <li>• Pruned regimes will require a longer rotation length to get enough clearwood (35–50 years)</li> </ul>	<ul style="list-style-type: none"> <li>• Will do best on sheltered sites with moderate to high rainfall and free draining soils.</li> <li>• Do not do well more than 400m above sea level.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant premiums have been paid for clearwood.</li> <li>• Suits portable milling and small-scale lots with likely significant premiums for high quality pruned logs.</li> </ul>	<ul style="list-style-type: none"> <li>• Susceptible to drought.</li> </ul>



Douglas-fir



Cypress

## Want more information?

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

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

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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

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