



Waikura Valley Land Restoration Project



“This project provides the opportunity for all parties to jointly determine their sustainable future, potentially securing the future of the natural environment and biodiversity of Waikura Valley as well as its culture and economy. Working collaboratively to develop a practical vision to achieve long term economic, environmental, cultural and social sustainability across the entire region”

Karen Te Kani, Whangaparaoa 2L Trustee

Planting trees to control erosion

Radiata pine as a good option for erosion control on steep eroding country in the East Coast. It survives well in the harsh environment and the economic and environmental benefits associated with it outweigh the costs of planting.

Other planting options for controlling erosion are also worth considering. If tree survival can be increased, growing redwoods and eucalypts are good options.

Mānuka is a further option if both survival rate and the benefits associated with it can be increased.

The environmental and social values boosted the overall benefits provided by reforestation and, in most cases, were greater than the economic benefits. This highlights the importance of forests beyond economic value.

Land owners and the local community will be able to use this information on the possible revenue and environmental and social benefits of reforestation to make decisions on the best erosion control options for them in the Waikura Valley.

Erosion in the Waikura Valley

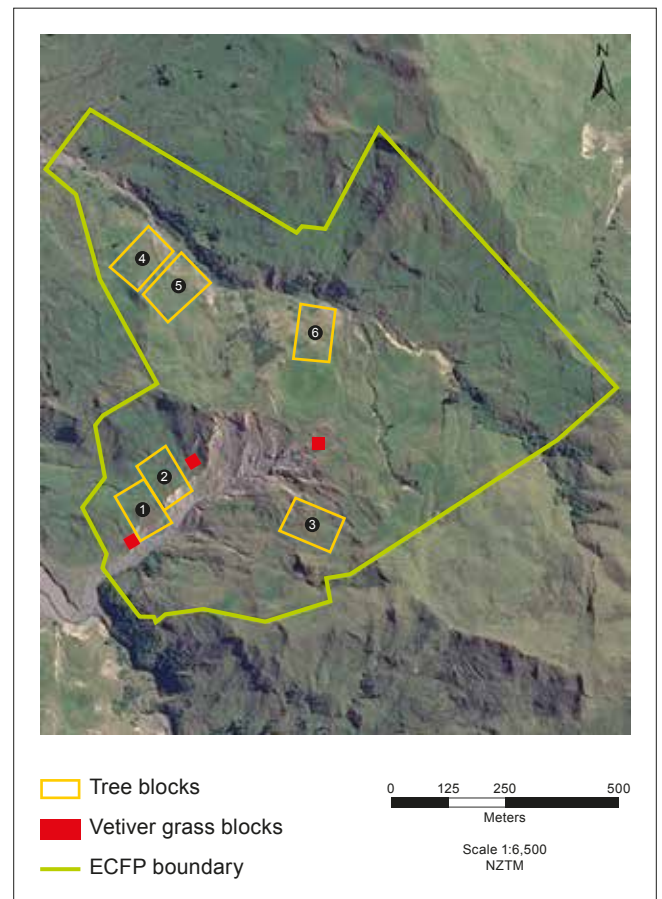
Severe gully erosion in the Waikura Valley has affected the land and the quality of life of the community. The erosion is largely due to the effects of historical deforestation and extreme rainfall on vulnerable soils and geology. Similar problems affect the wider East Coast region.

The Waikura Valley community is made up of iwi Ngāti Porou and Te Whānau-ā-Apanui and non-iwi land owners. The community is looking for new ways to manage erosion and threats to environment, and to build a strong, prosperous community. The ability to sustainably manage the land is critical to tangata whenua and other locals as kaitiaki (long-term guardians of the land).

Continued farming in the valley depends on finding successful solutions for erosion on some of the more vulnerable land. Restoring vegetation is seen as the best solution to the problem.

Erosion control on Mataraoa Station

Mataraoa Station is farmed by the Whangaparaoa 2L Trust. Severe and active gully erosion is taking place on the farm. The trust has received an Erosion Control Funding Programme (ECFP) grant to reforest 64 ha around two large active gullies. The trust sub-contracted Scion to test the suitability of a range of native and exotic species, including radiata pine, to stabilise gully erosion.



The trial. Six trial blocks, which included each of the six treatments, were planted. Vetiver grass was planted outside main trial blocks in three smaller blocks on the most active gully only.

Planting was done in September 2015. Plant survival was checked in December 2015 and November 2016.

Plant survival. Radiata pine had the highest survival rate (83%). The survival rates of the other trees and vetiver grass were around 60-70%, with the exception of the native tree mix (50%)¹.

The radiata pine planted in the larger ECFP area around the trial plots had a survival rate of 85%, the minimum survival rate that is required by the ECFP for full payment of the grant.

¹ The originally requested native tree mix could not be supplied. Some of the substitute species were not well suited to the site.

Maximising survival and benefit to cost ratio

Benefits and costs were estimated out over a 120-year time frame. Different rotation lengths were used for different species or the planting was considered permanent.

The benefits include economic (timber and honey sales), environmental (carbon capture, avoided sedimentation and flood regulation) and social benefits (habitats for native species). Environmental benefits outweigh economic benefits in most cases.

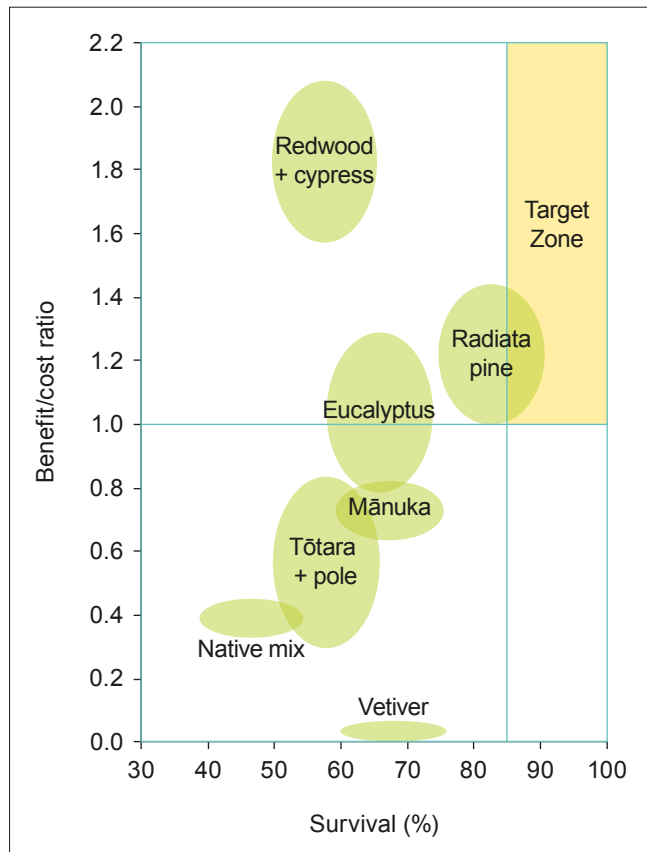
All benefits and costs were valued to 2015 NZ dollar values and to work out the benefit:cost ratio for each planting option. Where benefits outweigh costs the ratio is greater than 1, where costs outweigh benefits the ratio is less than 1.

Setting targets. With the targets of 85% of plants surviving and having a benefit:cost ratio of one or more, the planting options can be compared.

Radiata nearly falls into the target zone. The mānuka, eucalypts, and redwood/cypress mix are all close to the target zone. Increasing tree survival would move all three treatments closer to the target; for mānuka, benefits also need to be increased.

Benefits could be increased by considering other social and environmental factors that have not had monetary values assigned in this project.

The major cost in all cases was fencing to keep farm animals away from the establishing trees. This could be reduced for all options by planting larger areas and taking advantage of existing farm fencing.



Treatment survival by an indication of the benefit to cost ratio over 120 years vs survival rate after 14 months.

Common name	Species traits				Comments
	Roots	Growth rate	Drought tolerance	Wind tolerance	
Mānuka	Good	Good	Good	Low	Permanent - replant every 30 years
Tōtara + Willow pole	Moderate	Good	Good	Low	60 year rotation
Native mix	No data	No data	No data	No data	Permanent
Coast redwood (71%) + Cypress (29%)	Very good	Good	Moderate	Low	40 year rotation
Eucalyptus	Good	Good	Good	Low	40 year rotation
Radiata pine	Good	Good	Good	Low	30 year rotation
Vetiver grass	Very good	Very good	Very good	Low	Permanent

Species trait guide

No data
 Very good
 Good
 Moderate
 Low

Both native and exotic plants are preferred for reforestation

A survey of the Whangaparaoa 2L found mānuka was the most popular species, followed by tōtara. Using a mix of species for erosion control was also preferred, and planting eucalypt and redwood plus cypress was seen to be of value.

Combining the survey results with erosion control traits, e.g. rooting depth, root structure, root tensile strength, and growth rate, led to the selection of six different plant combinations to be compared with radiata pine.

Vetiver grass, with its deep root system and reputation for stabilising unstable and eroded slopes, was identified as a seventh option. Vetiver grass was not part of the ECFP grant application.





Community engagement

The journey of the Waikura Valley restoration project over a three year period has helped to strengthen the relationship between the community, research institutions and government agencies. A key part of the project's success was contributions and in-kind support, from Mataraoa Station, Monte Farms and Forests Ltd, and other trusts in the valley.

Knowledge sharing, providing skills training and the opportunity to work collaboratively with science providers is a key outcome for Whangaparaoa 2L owners from this project. This has been achieved with project-specific hui, a written summary of project findings and this pamphlet.

Acknowledgements

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Further information

Scion

Email enquiries@scionresearch.com
Telephone +64 7 343 5899

Garrett, L, Heaphy, M, Te Kani, K, Yao, R, Steward, G & Stovold, T (2017). *Waikura Valley land restoration project*. Scion, Rotorua, New Zealand.



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