Barriers and opportunities for planting native trees on farms

The following questions were asked during our live webinar with Peter Edwards and Maksym Polyakov but due to time restrictions, we were unable to answer these in the session.

Please explain where the 'often farmers do not like trees on their farms' comment comes from please.

I may not have completely qualified this in the presentation. From our work looking at landowner attitudes towards planting trees, we found that farmers don't like trees on their farms unless they play a necessary/needed role in the farm business.

How did you find out the information you are sharing. Was it an assumption, from interviews, phone calls etc? I see, from the Survey of Rural Decision Makers - but who are these people - consultants, advisers, landowners, foresters?

We used a number of surveys including the Survey of Rural Decision Makers (SRDM) and a survey of sheep and beef and dairy farmers carried out for the One Billion Trees project. SRDM surveys farmers, growers and foresters - both commercial and lifestyle. You can see a webinar on the 2021 SRDM here https://youtu.be/hl24wpasyLk.

It's hard to imagine no one wanting rimu timber in 200 years from sustainably grown forests planted now. Can you elaborate on what the uncertainty is? Is it economic? If so, have interim ecosystem services been factored in to those economic analyses?

Some of it is economic; farmers are interested in what will be best for their farm. Interim ecosystem services haven't been factored into this analysis.

Why is finance a barrier for Māori and not general?

Finance is a barrier generally, however it is more so for Māori, where it is more difficult to get finance for land with multiple owners

GHG/Sequestration doesn't fit with Te Ao Māori: Can you unpack this/say more on this please?

This was a finding by Motu, out of extensive interviews with Māori landowners. The consensus of the interviewees was that greenhouse gas (GHG) emissions is an abstract and relatively new concept that is not part of Te Ao Māori. (Motu Note #32, 2019)

If carbon farming is 0.6 FTE/1000ha, what is the FTE value for "traditional" hill country farming?

For sheep and beef, it is 5.6 FTE/1000 ha. This figure is from SRDM data.

Where the ETS forest definition considered/informed to farmers for the survey?

We informed the participants that the new forest cannot be cleared for at least 50 years. The afforested or regenerated area needs to be one hectare or more, and that the new forest should be eligible to enrol in the Emissions Trading Scheme (ETS).

Should the focus be on volume or value for native trees?

I expect this might depend on the outcomes sought for the planting. If the tree is only ever thought about in terms of non-productive use, its "value" for timber will not be high but it might be valued in other terms.

Can you describe a bit more on what types of areas are not suitable for native trees?

Survey respondents and the literature reported areas unsuitable for (some) native trees as being too windswept, salty, or prone to drought conditions.

Has the economics of downstream harm been calculated for "traditional" farming systems, exotic forestry, and re-establishing native forest? Could change the balance.

This is beyond the scope of this research project but other work has been done to calculate the impacts of sediment and erosion. This is a difficult impact to monetise and often requires many assumptions.

Is there a requirement on farmers to not clear native forest elsewhere on their farm, or to not log natives?

This depends upon regional planning rules and different rules will apply to different types of land. Covenants such as QEII or Nga Whenua Rahui will also have rules.

Can you elaborate on social/perception of forestry as a barrier - it's surprising that native afforestation would evoke a negative perception?

In our work with the 1BT programme, we found that a general narrative is that trees don't belong on farms; farms are for growing food. There are changing perceptions, but there are many "nostalgic" farmers that still feel this way.

https://pureadvantage.org/carbon-sequestration-by-native-forest-setting-the-record-straight/. MPI is revising the ETS look-up tables for natives, including a table for planted native forest, based on TTT's data, which shows that planted native forest sequesters more carbon than previously thought.

We are aware of work done by Tane's Tree Trust and the details are in our first report (Appendix 2). In brief, native trees sequester carbon more slowly than exotics (at first), but the rate picks up after a number of years. From those figures, the current native rate table overestimates it early on, but underestimates in later years.

The focus here seems to be on planting. Utilising a more natural system for regeneration could be considerably less labour and resource intensive. Regeneration can be supplemented with seed dispersal, weed control and where necessary low density specimen tree/enrichment planting. In many areas regeneration could be low outlay cost and accelerated with a gorse nursery cover.

Transition to manuka/kanuka hat shade out the gorse can occur within a decade. Broadleaved species will emerge and within a further decade can out shade the tea tree. Where there is low natural seed dispersal this can be supplemented. While this may not be quite as quick as planting a forest, it can be low cost, resilient to storm damage and more likely to result in a more natural biodiversity (even where future harvest is planned for enrichment species.

In the choice experiment part of the study we looked at the willingness to participate in both planting and reversion (natural regeneration programmes). We do highlight that supplemental planting is an option in our literature synthesis.

Was the required commitment to long term maintenance of native planting (e.g. weed and pest control) also a barrier to landowners?

We did not look at this in the choice experiment because we can only use a limited number of attributes. From the literature it is known that long term commitment reduces interest in participation. However, a major part of this is that landholders don't actually know how to maintain these trees after planting (they want advice/extension to provide this information). They are also concerned that some outcomes (e.g. pest control) are largely out of their hands as they depend on what the neighbours are doing.

So, were participants less interested in the government providing advice on planning and choosing native species?

Yes.

Did you ask if farms had native forests covenanted through QEII or protected through Nga whenua Rahui? e.g. if farmer actively aware of benefits of native trees…

No, we only asked if they have forest, scrub, wetland.

I am kind of stunned that you have said so little about native forest planting as a vital part of what is needed for biodiversity restoration. Do you include this in 'aesthetic and amenity' perhaps?

"Encourage biodiversity" is the most important reason to establish forest in the choice experiment. The second most important reason is to "improve aesthetic value".

How does the choice experiment results compare to feedback from the regional council staff (or others) who helped implement the 1BT programme?

We did not explicitly ask about the 1BT programme.

Any data available on carbon sequestration rates per specie?

In the survey, we assumed that the landowners will use lookup tables (one table for all native species) and provided a chart with potential return.

Did the survey consider the intended surface for afforestation?

We asked what area landholders will allocate, and in the follow up question we asked where afforestation would be implemented. In the presentation I reported the area, the breakdown by locations that would be afforested is in the report.

Unfortunately none of your Māori staff are co-presenters to answer some of the questions. On your website you have iwi and Māori partners. As a future presentation recommendation - it is a great idea to include them. The inclusion of te ao Māori viewpoints - other than an "issues" slide would be proactive and positive. As a Crown Research Institute /corporatised Crown entity charged with conducting scientific research and in - keeping with the Crowns Treaty of Waitangi responsibilities - there is an opportunity for movement beyond what barriers exist to what scientific matauranga is already available/piloted/tested and innovative contemporary knowledges are available - to add to the pool of knowledge.

Thanks for your observations. In an ideal world we would have our Kairangahau Maori work in every project and play a part in the presentation. As this particular research focussed on a spectrum of landowners we were not able to collect enough data to undertake meaningful analysis relevant to Māori land. The commitment to Te Tiriti is front and centre of MWLR's strategy Te Apopotanga (https://www.landcareresearch.co.nz/publications/te-apopotanga/). You might be interested in this webinar which outlines some of our work with Māori landowners https://youtu.be/PqDapRrfTmw.

What made the 600 survey results unusable?

We had a total of 641 responses. 609 responses were usable. 26 responses were excluded because they were "protest" responses (respondents that always selected to not participate, but for the reasons not related to their willingness to plant trees). Another 6 responses provided inconsistent answers (about areas) and were also excluded.

NZ economy, environment and people would benefit a lot from less pine forestry and more native forests as evident by the current state and damage of the east coast following Cyclone Gabrielle. I know the focus of the carbon programme is to sequester the max carbon BUT what good is that when it causes such damage to the whenua. I think this should be factored into the cost and benefit analysis.

This research was done in 2022 before the recent weather events and was focussed on exploring the incentives and barriers to afforestation rather than undertaking a cost-benefit analysis. You might find this report of interest https://mpi.govt.nz/dmsdocument/26302-valuing-the-benefits-of-forests-technical-paper.

Is that $4200 per 377ha farm, or per hectare?

Average grant per hectare (we had a range of values from 0 to 12,000).

My feeling is a single focus on trees is environmentally too narrow a focus. Trees naturally grow in harmony with a range of other plants, shrubs and grasses for instance. Is there going to be a follow up study looking at this relationship?

Trees are the only vegetation recognised for carbon sequestration - thus the focus for this project. We are not aware of follow-up projects.

What are the mātauranga opportunities?

While not addressed in this project, other work at MWLR is exploring the opportunities for Māori to harness mātauranga in indigenous forestry and other land use options. https://www.landcareresearch.co.nz/news/giving-whakamana-back-to-maori-landowners-through-land-science-tools/

How did you determine this was the best way to conduct this experiment?

We (1) used literature; (2) consulted experts in MPI and DoC regarding the attributes; (3) got feedback from farmers; (4) conducted pilot survey and rectified design.

Mind Blown. This has missed all of the great things happening in the farm biodiversity space. Catchment group courses, seed collecting days, seed libraries, on farm nurseries, trees for survival, trees that count, Tane's tree trust, pest control on farm bush blocks, David Norton's great work, fieldays and monitoring, plant ID education opportunities.

We certainly recognise all these great things happening on the ground - and some of our other research looks at these activities. The brief for this project was specifically around four categories of barriers to planting native trees for carbon sequestration.

What is the next step for these findings? E.g. recommendations to Councils or Government to establish programmes and grants?

This work is published on MPI's website to enable other agencies and councils to consider the advice when establishing programmes and grants.

I have spoken to landowners who are worried that as soon as they have any native vegetation on their land they then won't be able to do anything with the land because it will be considered a significant natural area or for some other reason e.g. regional planning rules they will have restrictions of what they can do on their own land. Is this considered one of the possible restraints?

Yes it was one of the constraints, however it didn't figure as strongly as one might have expected. It was minimally present in the literature and came through in some of the written comments in the survey.

I'm always interested in RELATIVE UTILITY; so the issue is not just what are the barriers to planting natives but also why is the practice of pine forestry so much better at recruiting practitioners. Is pine too easy?

1) when considering timber and/or carbon, pine outperform natives by a large margin; 2) seedlings are cheaper, planting is easier.

What if shelterbelts could be included in the carbon farming model? would that help break down some barriers?

Farmers are interested in possibility of earning credits for vegetation that is not currently eligible (such as shelterbelts). So it would likely break some barriers

We received a number of questions that were beyond the scope of this research. We have talked to other science teams at MWLR to help us with these responses.

Is there a possible issue caused by low genetic diversity in native plants bought from nurseries? I would expect they would only source seeds from a very limited number of trees?

Genetic diversity per se probably isn't an issue as at very broad scales genetic diversity is low for many species. If nurseries are supplying plants for ecosourcing they should be sampling from large and/or several populations. Inbreeding depression could be a problem. This is often cryptic and difficult to identify with any certainty. Watch this space for a webinar on this topic later this year.

Harvesting seedlings from an established native forest is a good idea as I understand these can only stay in the region they have been harvested from.

Scientists at MWLR recommend very broad scale / large regions for ecosourcing. For example, we have a paper in review recommending 9 such regions for NZ.

Is there a possibility to sustainably "harvest" seedlings from established native forests to transplant?

This would be impractical, time consuming and would often result in low quality plants and is not advised. Nursery raised plants are far superior and can be grown in controlled nursery conditions in large numbers. Harvesting large numbers of seedling would impact on natural regeneration and succession.

In addition to carbon storage, planting trees have many environmental benefits such as biodiversity and reducing erosion, and have different financial implications for landowners. Is there any work exploring the trade-off between these outcomes from planting different species, and identifying an optimum option?

This is a topic of wide interest at MWLR and we hope to present more webinars on this topic later in the year. In the meantime you might find this article of interest. https://www.landcareresearch.co.nz/news/can-mosaics-of-trees-help-to-reach-aotearoas-carbon-targets/. However, an "optimum" option depends on the landowner's values and trade-offs will be necessary. There are models or tools available to explore this but they all have assumptions and require more input data.

I agree, carbon income is a one-eyed big agenda item, what about the ecosystem services to farmers and downstream residents and infrastructure - small natives washing down in recent times may not have destroyed so many bridges and livelihoods. We need permanent native vegetation in sensitive areas to prevent erosion long term

Research increasingly covers multiple outcomes and benefits for forestry and other land use options. The Smarter Targeting of Erosion Control programme looked into some of these issues and there is a wealth of information available here https://www.landcareresearch.co.nz/discover-our-research/land/erosion-and-sediment/smarter-targeting-of-erosion-control/.

This would be interesting from a wetland perspective. Similar issues I assume but there would be differences as well. Wetlands could offer good long-term carbon storage.

We are undertaking some initial research on peatlands/wetlands as carbon sinks and hope to establish a large programme which explores the unique opportunities for peatland and wetland restoration in NZ.

Has there been any parallel or similar research into barriers and opportunities for wetland development on farms (imagining there are some cross-over barriers and opportunities)?

We are working on one similar for wetland restoration, it is in its early stages.

The implementation of the Forests (Regulation of Log Traders and Forestry Advisors) Amendment Act 2020 is going to create a significant additional barrier to native afforestation, impacting land owners, NGO's and local government. Has MWLR done any work to understand and quantify the impacts the implementation of these regs will have?

We are not aware of any policy analysis in this area at MWLR. However many regional council staff have expressed concerns about having to register as advisors. Scientists who assist anyone making decisions on future forestry are potentially caught by these regulations as well.

What is the cost of NOT planting natives on marginal land? In terms of erosion control, downstream negative effects of not having native vegetation?

We expect there are back of the envelope calculations in terms of benefits and costs but many assumptions are likely in those. Planting is not the only way to achieve the benefits of indigenous forests in future - planned or assisted reversion is preferable in many areas over planting. However, pest control is a key major on-going cost.

What if any work has been done native regeneration on crown pastoral lease and stewardship land?

We have considerable research and modelling on natural regeneration in the high country - particularly looking at where it will occur spontaneously. Maps of predicted tree occurrence probability in non-forest vegetation have been provided https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0075219.

What work has been done on the water capture and retention properties native sward verse exotic plantings?

The paired Glendhu catchments (one planted in pines 1982) is the best NZ study that rigorously compares water yield from planting pines vs unplanted. There are many papers from the study - you might find this one of interest https://onlinelibrary.wiley.com/doi/10.1002/hyp.11234.

Many of you have shared useful suggestions and links. It's great to hear your ideas and experience - thanks for sharing.

1. A local irrigation scheme is using local schools to set up small nurseries to grow natives with the kids looking after the plants. Quite a cool idea!

2. Getting schools involved in setting up small nurseries - and building this into the science curriculum - sounds amazing.
3. Tane's Tree Trust has a lot of useful information on establishing native forests: https://toolkit.tanestrees.org.nz/
4. Tane's Tree Trust's work on carbon sequestration in planted forest - Carbon Sequestration by Native Forest – Setting the Record Straight.
5. Info on non-timber values can be found here - https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf
6. Here's a model for urban folks to grow trees for rural restoration: https://trilliontrees.org.au/
7. There are school programmes such as Trees for Survival where schools have small nurseries and grow seedlings for planting on private farms.
8. Local biodiversity trusts may be better vehicles for providing assistance for planting native forests than government or local/regional authorities.
9. Plant and Food Research are currently undertaking studies on plant species that encourage beneficial insects for crops and biodiversity. This could be another benefit to encourage landowners to establishing trees