



Tāne's Tree Trust

NATIVE FORESTS FOR OUR FUTURE

Hereherea te Wao-nui-a-Tāne

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Submission in response to

Te hau mārohi ki anamata

Transitioning to a low-emissions and climate-resilient future

Details of Tāne's Tree Trust relevant to this submission:

- **Tāne's Tree Trust (TTT) was established in 2000**, with the following aims:
 - Promote best practice establishment of native forests for multiple benefits.
 - Reduce impediments to planting and management of natives.
 - Identify information gaps and priorities for applied research.
 - Increase funding into applied research and information transfer.

<https://www.tanestrees.org.nz/>
- We believe we are amongst those who are best informed and most experienced at native forestry in New Zealand.
- **We are a nation-wide** organisation with currently 10 trustees who have expertise in forest science, forest management, ecology and ecological restoration, nursery systems, forest economics and policy analysis, carbon sequestration, tree physiology, farm forestry, landscape architecture, kaupapa Maori including kaitiakitanga and rongoa, Wai 262, conservation and natural resource management, sustainable land use and water quality.
- **We are committed to scientific research** as a base for best practice guidelines.
- **We are highly qualified** – seven trustees have postgraduate qualifications, including three doctorates. Between us, we have 42 years in government organisations (such as DOC and MPI), 55 years in university academia, 68 years in CRI research positions, and over 70 years of professional forestry management experience. Four of our trustees have experience in forestry with exotic as well as native species, while others are native forest specialists.
- **We have field trials and demonstration sites throughout NZ**, including Permanent Sampling Plots - measuring growth of key native forest species for over 40 years. (Data collected initially through Forest Research/Scion).
- **Our publications** and research results are freely available to all via our website:

<https://www.tanestrees.org.nz/resource-centre/>
- TTT has published a comprehensive treatise on non-timber values in native forests, which includes carbon sequestration, plus an overview of ecosystems services assessment:

https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf
- **We compete for and receive funding** from a variety of central and local government sources, Trusts, NGOs, etc.

- **We collaborate** with like-minded organisations, where there are good synergies, and have close associations with Project Crimson and Trees That Count, the Tindall Foundation, the Coastal Restoration Trust, NZ Farm Forestry Association, and Pure Advantage, among others.
- **Our Annual Report details our comprehensive work programme**, including project updates, as well as our R&D programme going forward - https://www.tanestrees.org.nz/site/assets/files/1037/ttt_annual_report_2021.pdf
- We **support landowners** with integrating native forest back into rural working lands – for ecosystem services including carbon sequestration, biodiversity, adaption to climate change, erosion control, catchment protection, nutrient regulation and water quality, cultural values, and provisioning services, including high-value timber and non-timber forest products.
- We also promote the planting of native trees in urban areas for the myriad of benefits they provide, including carbon sequestration, climate amelioration, water quality, green infrastructure and adaptation to climate change.
- **We promote the planting of permanent native forests**, or forests managed under continuous cover forestry (CCF) regimes as opposed to clear-fell harvest regimes – as high-forest values are retained, including carbon sequestration.
- **We have expertise in and are proponents of continuous cover forestry:** https://www.tanestrees.org.nz/site/assets/files/1069/continous_cover_forestry_-_web.pdf
- **We hold workshops throughout NZ**, covering all topics associated with the establishment and sustainable management of native forests.
- TTT trustee Paul Quinlan has had a lead role in the **Northland Totara Industry Project (TIP)**: <https://www.totaraindustry.co.nz/>, and coordinates the Northland Tōtara Working Group: <https://www.tanestrees.org.nz/about-us/northland-totara-working-group/>
- We are currently **researching methods to reduce the cost of establishing natives**; including managing natural reversion, which is a much more cost-effective way of establishing native forest in NZ, eg, the Northland totara example with over 200,000 ha of reverting country may well be representative of many other marginal hill country areas in NZ.
- **TTT manages NZ's only national database** on planted natives with over 60 different native tree and shrub species measured throughout NZ from over 100 stands ranging in age from 5 to over 100 years old and is used for growth and yield modelling.
- TTT recently launched an on-line **Carbon Calculator**: <https://www.tanestrees.org.nz/resource-centre/carbon-calculator/?highlight=carbon+calculator>. This project was driven by Dr David Bergin (forestry scientist) and Mark Kimberley (biometrician) and uses growth models developed from the TTT Plantation Database: <https://www.tanestrees.org.nz/resource-centre/carbon-calculator/carbon-models-for-planted-natives/>.
- TTT data shows that Look-up tables significantly underestimate carbon sequestration in planted, managed native forest, as described in a paper on carbon sequestration summarised below.
- Further calculators are about to be launched including a Planting and Budgeting Calculator, Growth and Yield Calculator, and a Costs and Benefits Calculator for planted native forest.

In summary, Tāne's Tree Trust is highly committed to increasing the amount of native forest cover in our rural working lands and urban areas, and the promotion of all the benefits associated with native forests, including carbon sequestration and adaptation to climate change.

There are myths about native forestry promulgated by individuals who have little or no expertise in native species. We request that policymakers' proposals are evidence based, obtaining information from those with expertise in native forestry and grounded in scientifically collected data.

Thank you for the opportunity to submit. We are happy to provide further information or clarification and can present in person. We are best contacted via office@tanestrees.org.nz

Tāne's Tree Trust's response to *Te hau mārohi ki anamata*

General Comments

Tāne's Tree Trust's focus for this submission is on native forestry, which is our *raison d'être*, although we support the overall advice given for the balanced approach of emissions reduction, as well as carbon sequestration from exotic and native forests. We purport that there are roles for different types of forestry with different species in Aotearoa, New Zealand - as part of wise, sustainable land use. (Four of our trustees have experience in forestry with exotic as well as native species).

We strongly support the Climate Change Commission's advice for native forests to be a vital part of New Zealand's integrated response to the climate change crisis - in terms of carbon sequestration and climate change adaptation. This will simultaneously help address the biodiversity and freshwater crises, and provide important cultural and socioeconomic benefits.

We particularly support the Climate Change Commission's Recommendations 4, 5, 11, and 25 from *Ināia tonu nei* as listed in Appendix 1, and do not want to see these recommendations watered down. Offshore carbon forest credits should only be "a last resort in exceptional circumstances beyond the Government's control, such as force majeure events, where domestic measures cannot compensate for emissions impacts" (Recommendation 4). There is substantial potential for the government to invest in native forests, for their myriad of benefits, as described below.

There is misinformation circulating on native forests, some of which is promulgated by the forestry industry (by individuals who have little or no expertise in native species), which is further promulgated by government organisations. This includes the ability of native forest species to sequester carbon and the cost of native forest establishment.

We request that policymakers focus on scientific evidence provided by those with expertise.

We have responded to the questions relevant to the forestry sector – see pages 10 - 15. We have also provided supplementary evidence in Appendices. Directly below, we have responded to statements within the discussion document.

Our responses (*in black*) to statements (*in blue*) from the discussion document

- Sequestration from exotic forests is a low-cost way to meet our 2050 net zero target, which can be delivered at scale.

Our response – *The MPI Look-up tables significantly under-estimate the carbon sequestration of several of our native species grown in planted and sustainably-managed native forest, as described in Appendix 2. And there is considerable potential to expand our native forest resources on private land in cost effective ways, as described in Appendix 3.*

- There is also potential to extend our native forests to deliver a slower growing, long-term carbon sink that provides many other environmental benefits.

Our response – *Native species are not necessarily slower growing. While they do not have the initial very fast growth of radiata pine, once established, there are native tree species that grow at rates closer to that of a number of commercially planted exotic species and will continue to do so for many decades.*

Unfortunately, the Look-up tables are often quoted by people wanting to dismiss the potential carbon sequestration by native trees and undermine the call for planting more indigenous forest. The

MPI data for native species is based on unmanaged regenerating shrubland on relatively unproductive land, which is routinely compared with data from managed radiata-pine plantations. It is not an equitable comparison.

TTT's data is far more extensive, based on several decades of permanent sampling plots - the database represents the most comprehensive set of planted native tree and shrub measurements available. Data is collected across the full gamut of poorly managed through to well-managed stands. Most are on relatively unproductive land.

Newly published research on carbon sequestration, based on TTT's databases, demonstrates that well-managed planted indigenous forest is better at sequestering carbon and faster growing than commonly considered (Appendix 2).

The widely held view that New Zealand's native forests are slower growing and accordingly slower to sequester carbon, as indicated by the MPI Look-up tables, may be discouraging landowners from planting native trees, even where it is their preference to do so. Worse, it may be leading to planting advice that is incorrect and not helpful at a time when any form of tree planting by landowners is a bonus.

- We are carefully considering how to encourage greater afforestation with native trees, particularly on land where there are few alternative uses due to economic and environmental limitations. Afforestation, including regeneration, will mainly be on private land (including Māori land), and we need to understand the support and incentives that could encourage land-owners and others to undertake afforestation.

Our response – TTT gratefully acknowledges the focus on incentivising land-use change on marginal, erodible hill country – this would have multiple environmental benefits and help with climate change adaptation. However, ***we are concerned that there is a lack of focus on the restoration of lowland and coastal native forest.***

Much of NZ's remaining native forest is restricted to upland regions, with intact lowland podocarp-hardwood forest, wetland-forest complexes, and natural coastal ecosystems now scarce in most regions, and largely confined to private land. There is a recognised need to increase indigenous biodiversity conservation on our productive rural lands. There is also increased awareness of water quality issues in waterways in intensively developed urban and agricultural land.

Riparian plantings are currently not recognised under the ETS for their carbon sequestration, which cumulatively could be substantial, especially farm-wide plantings – this should be rectified. Riparian zones are often highly fertile sites with the fastest growth and hence carbon sequestration for planted and regenerating native forest compared to marginal steep hill country with skeletal soils and greater exposure. Moreover, the collective cumulative effect and scale of riparian plantings and pockets of native bush on farms is potentially significant. (See article by Dr David Norton, on 'The importance of native trees in agroecosystems': <https://pureadvantage.org/the-conservation-estate-copy/>).

For instance, restoration of kahikatea forest in riparian areas throughout our lowland rural areas would significantly contribute to carbon sequestration and a myriad of other ecosystem services including climate adaptation. Kahikatea is our tallest native tree species; it is a long-lived pioneer species (a rare thing), and is a relatively fast-growing native tree species, therefore, ideal for carbon sequestration!

Please do not limit incentives for planting native forest to marginal hill country, or underestimate the appetite of landowners to plant or manage natural regeneration of native forest on other land classes. This includes dairy farmers. The greatest carbon sequestration in our native species is in our lowland and midland areas and there is strong interest from some landowner groups to restore forest throughout our rural working lands, particularly in riparian areas and in erodible and flood-prone land, i.e., not just marginal land. For example, we have landowners in the Waikato, including dairy farmers, crying out for help with restoration and extension of their kahikatea forests, particularly in riparian zones and flood-prone areas. It is estimated that approximately 100 rural landowners, mostly farmers, would be willing to participate, with some already actively engaged and asking for help with restoring and managing their forest remnants.

Our concern is that focusing forestation efforts on marginal hill country will result in the preclusion of funding for restoration forest in lowland and midland areas. **Weaving native forest back into our intensively farmed lowlands and midlands should also be a priority – this is where carbon sequestration is highest.**

TTT advocates for promoting integration of native forest within our working lands that will enhance existing productive land uses, not compete with them and will result in environmental gains to existing land uses.

We have well-organised catchment groups in Waikato (and elsewhere) requesting help with restoration of native forest ecosystems – funding is urgently needed to help them. This includes environmentally minded dairy farmers. We have a draft proposal on kahikatea restoration in collaboration with the Waikato Regional Council and several other NGOs, and estimate that about 100 farmers would likely come on board, based on previous engagement through Project Kahikatea. Some are already actively engaged and have been involved in kahikatea restoration efforts for over a decade.

We are in regular contact with motivated, capable landowners who are already putting considerable time and resources into native forest restoration but sometimes with mixed success. There are issues due to knowledge gaps, limited expertise, and legacy issues created by poor land management decisions in the past - but we (TTT and allied organisations) have very limited resources to help them.

Some flood-prone areas are barely above sea level and likely to become more difficult to farm with rising sea levels and more intense weather events associated with climate change. We need to help farmers with creating forest buffers and wetland complexes to help future-proof their farms (and downstream infrastructures) against more intensive weather events associated with climate change.

- Establishing a long-term carbon sink - A variety of native and exotic species can form a permanent forest cover that delivers long-term sequestration, to offset hard-to-abate gases and sectors.

Our response – We strongly support the policy direction and approaches recommended by the Climate Change Commission (CCC) in *Ināia tonu nei*, to increase the amount of permanent native forest as a long-term carbon sink.

TTT, along with allied stakeholder groups (q.v. submissions to the CCC) **strongly recommend that the permanent forest category in the NZ ETS is limited primarily to native forests.**

- New and regenerating native forests typically sequester carbon at a slower rate than exotic species. However, they provide other benefits such as native biodiversity, erosion control, freshwater quality, and social and cultural value.

Our response – New research from TTT demonstrates that well-managed planted indigenous forest is better at sequestering carbon and faster growing than commonly considered, as described in Appendix 2. This research is a first for planted native forest using methodology comparable to that used for planted radiata pine forest in New Zealand.

This research was led by Mark Kimberley, Dr David Bergin, and Prof Warwick Silvester, who are subject experts. It rightfully questions the reliability of the MPI look-up tables for planted and sustainably-managed native forest, as the MPI data are based on unmanaged, regenerating shrubland. Mark Kimberley is a biometrician who has developed forest growth models for both exotic and native tree species and contributed to the design and analysis of New Zealand's national inventories of exotic and native forests. TTT has the only comprehensive databases on indigenous species. Data is collected across the full gamut of poorly managed through to well-managed stands. Most are on relatively unproductive land.

New Zealand's Carbon Look-up Tables for the Emission Trading Scheme should include the option for planted native forest as well as regenerating native forest. The current Look-up Tables for native forest are fairly accurate when applied to naturally regenerating shrubland. However, to achieve good levels of sequestration over a long timeframe, regenerating forest needs to include climax tree species such as totara.

Investment in research and development would benefit native forestry as it has the radiata-pine industry, i.e., result in increased growth rates and more knowledge around forest management. Indigenous forestry has been extremely under resourced compared with the many millions in funding spent in developing the radiata-pine industry. Just think what is possible with more investment into R&D with indigenous species!

Properly sited and managed native forest is a good alternative where landowners wish to sequester carbon over long time periods, as well as enhance natural landscapes, indigenous biodiversity and cultural values. Native forests define our unique landscapes, link us to our natural world, offer pleasure and solace, cultural values such as tūrangawaewae, and play a major part in protecting our fragile ecosystems, our biodiversity and our water quality.

While many non-timber values (NTVs) can be attributed to forests irrespective of whether they are native or exotic, in most cases the aggregated NTVs of native forests would likely exceed that for exotic plantation regimes – particularly for cultural and spiritual values, conservation of indigenous biodiversity, and protection of erodible land, water quality, and downstream infrastructure and ecosystems. Permanent native forests managed solely for NTVs or sustainably managed under continuous cover regimes, are likely to have the highest aggregated NTVs, which could potentially exceed timber values (<https://pureadvantage.org/valuing-native-forest-on-private-land/>).

- Current rates of native forest regeneration and establishment are low. The costs of establishing and maintaining native forests, particularly on marginal land, are high and there are limited commercial returns. We will investigate how to overcome barriers to planting and regenerating native forest. This will include working with the native nursery sector, and looking at the optimal mix of investment, direct regulation and price. We will decide on shorter term options regarding financial support by the end of 2021.

Our response - This is welcome news. There is considerable potential to expand our native forest resources on private land in cost effective ways, as described in Appendix 3. This is a major focus for our R&D work programme. (A summary of TTT's current R&D programme is provided in Appendix 5). There is also strong interest from landowners throughout NZ to establish native forest.

There are issues with **scaling-up nursery systems and ensuring adequate supplies of quality planting stock**, as described in Appendix 6.

We have hands-on experience, through TTT and allied organisations (such as Tree That Count), in working with landowners in forest establishment and management. We are well aware of the barriers. Economic constraints are a major barrier for landowners, so incentives schemes would greatly expedite native forestation.

Currently, there are barriers to rapidly upscaling native forest cover due to a significant lack of infrastructure and expertise, the complexity and diversity of our ngahere, and knowledge gaps around indigenous forest restoration and management - due to decades of divestment. This is in contrast with the massive investment in R&D and infrastructure around one species – radiata-pine.

TTT is helping to address knowledge gaps through the development of fact sheets, videos, creation of field demonstration sites, and undertaking workshops throughout NZ.

The narrative also needs to be changed, particularly in the forestry industry, local government, and agricultural sector. For example, we are aware of landowners who are being dissuaded by regional council staff from planting native species, although this is the landowners' preference. However, there are some council staff scattered throughout the country who are supporting the planting of native species. So it is patchy.

Currently, charitable organisations, such as TTT, are stretched too thinly trying to fill the gaps, and are only operational due to philanthropic support.

Most importantly, native forest cover needs to become an economically viable land-use option for landowners, otherwise, native reforestation will not occur with significant scale, nor will those forests be managed as well as they could be. This is a repeated message in many of the articles posted on the O Tatou Ngahere platform (e.g., <https://pureadvantage.org/valuing-native-forest-on-private-land/>; <https://pureadvantage.org/interwoven-land-use-values-and-principles/>; <https://pureadvantage.org/native-trees-and-professional-foresters/>). Therefore, we agree that a comprehensive and effective package of ETS and non-ETS incentives is required to encourage native forest cover and ensure their ongoing management.

In 2018, TTT commissioned a report by Motu Economic and Public Policy Research to assist those interested in carbon forestry with native forest plantings. All the native forest species surveyed had higher total carbon stocks in comparison to the default Look-up table, suggesting that participants who use the field management approach could earn significantly more carbon units. However, this is not an easy option, creating barriers for landowners obtaining an equitable return.

- [Footnote 60 at the bottom of page 119] The cost of establishing one hectare of native forest depends on the purpose and type of forest. Initial stocking rates can vary from 750 stems per hectare to 5000+. A native forest established through regeneration or planting may cost from around \$1500 to \$50,000 per hectare, the lower end based on pure mānuka planting rather than mixed native. Species selection, plant size, site preparation, fencing, supplementary planting and maintenance (including pest and weed control) can have significant impact on the costs of a successful forest (native and exotic). In comparison, planting radiata pine may cost from around \$1500 to \$2500 per hectare. Regional variation, including topography and access, can also have a significant impact.]

Our response – TTT have extensive experience in R&D on native forest establishment. Our establishment costs range from \$5k to rarely as high as \$40k per ha. The \$5k relates to what the

manuka honey industry indicate costs to establish manuka at 3m spacing (1100 spha) and the \$40k relates to the cost of planting natives on difficult sites and/or planting PB2 or equivalent stock at high density (e.g., 4444 spha equivalent to 1.5m spacing) with multiple species, often used for riparian planting.

For many situations, we often recommend a medium density of 3:1 or 4:1 mixed shrubs to trees to achieve a total stocking of 2500 spha. This brings the cost down to around \$20,000 per ha on most sites.

Bringing down the cost of native forest establishment is a major focus for our R&D work programme (q.v. Appendix 5).

- By the end of 2023 we will deliver a broader package of changes to bring down the cost of planting native forests, improve economic return, address supply chain barriers, develop sustainable models to incentivise afforestation and improve planting success.

Our response - This is welcome news. Please work with us as we have significant expertise that will help expedite all of the above. Again, this is a major focus for our R&D work programme (q.v. Appendix 5).

There is considerable potential to expand our native forest resources on private land in cost effective ways, as described in Appendix 3. There is also strong interest from landowners throughout NZ to establish native forest.

There are also infrastructure and supply chain issues with nursery systems, and important issues regarding plant quality that need to be considered (q.v. Appendix 6).

It is appropriate and desirable for native forests to play a significant role in our country's future including its strategic response to the climate, biodiversity and freshwater crises. Native forests offer a comprehensive suite of benefits befitting the complexity of the situation we face. Rather than using climate change policy to solely drive tree planting decisions, this broader perspective helps counter adverse outcomes from well intended policy. Focusing on any single-purpose commodity, e.g., rapid carbon sequestration, can have unintended consequences such as what we have seen with the ETS and high carbon prices leading to 'plant and leave' radiata-pine, which is grown for carbon farming purposes only.

However, [our research into non-timber values](#) (NTVs) indicates that biodiversity is a pivotal NTV, which is likely to leverage most other NTVs, i.e., actions to increase biodiversity values are likely to concurrently improve most (possibly all) other NTVs, including carbon sequestration and climate change adaptation.

We request that any policy around incentivising native forestation dovetails with other policies, particularly the recent Freshwater Reforms (especially the 3 m setbacks), and the Biodiversity Strategy (Te Mana O Te Taiao Aotearoa New Zealand Biodiversity Strategy 2020).

It is likely that multiple potential markets and income streams are likely required to sufficiently incentivise and support native forestry as a viable land use option (e.g., a combination of timber, carbon, and payment for ecosystem services etc.). A comprehensive suite of policies and mechanisms to facilitate this outcome is required. Integration with other planning and regulatory systems will be important (e.g., RMA, District Plans, ETS, taxation, etc.).

We recommend government consider the following options to incentivise afforestation:

- Promote the multiple benefits of [continuous cover forestry](#) (CCF), as demonstrated by the Totara Industry Project on Northland farmland (<https://www.totaraindustry.co.nz/>). This involves limited careful harvest of high-value timber in 'near to nature' forestry regimes. Permanent forest cover is maintained, along with all the high-forest ecosystem services, and there is a future revenue stream for landowners.
 - Funding provided by central government for exploring and developing markets and infrastructure in support of production of high-value native timber from CCF regimes (q.v. Appendix 7).
 - Harnessing the power of markets is suggested as an effective way to bring about a shift in land-use towards more natural models of forest management (<https://pureadvantage.org/nature-based-forestry-regenerative-forestry-models-for-aotearoa/>).
 - Creating a credit/payment system for environmental services, such as biodiversity, erosion prevention and water quality - to incentivise establishment of native forest - the flipside of the 'polluter-pays' principle. Our research shows that biodiversity is pivotal, i.e., actions to increase biodiversity values will likely simultaneously increase all or most other non-timber values, particularly environmental and cultural services.
 - We believe this could largely be achieved through the existing ETS provisions by, for example, adding a "premium" credit which returns more value per credit to the owner and enables buyers to meet their emissions goals and also contribute to a better environment.
- Increasingly, non-harvest permanent pine is being planted mainly for carbon. We are aware that some communities are concerned about the potential impacts of large-scale permanent exotic forests on local economies and jobs, particularly if the land is suitable for other uses.

We will investigate the role of different types of permanent exotic forests, and whether and how the Government can influence the type, location or scale of these forests, with the aim of making decisions by the end of 2022. This will include options to ensure exotic plantation forests transitioning to native forests are managed in line with that intent.

Our response - As indicated by the CCC (page 321 of *Ināia tonu nei*) there are legitimate concerns about impacts and risks from large-scale permanent radiata-pine forests. There has been investment in 'plant and leave' radiata-pine carbon forests, with the unfounded premise that these will transition to native forest with minimal intervention.

There is an urgent need for research on exotic to native transitions. TTT and allied collaborators recently submitted a research proposal to MPI, in a bid for the SFF Futures Fund (see Appendix 4).

Please note that we consider radiata pine to be a good plantation species when it is well sited and utilised for timber production. However, it is not a long-lived tree species and adequate regeneration of other species is required for permanent carbon forestry. Assertions that radiata pine will transition to natives are not backed up by research, as there has been only limited research into management practices to facilitate a transition. The existing research has focused on the management of mature stands for biodiversity restoration. There has been no research into how to establish exotic tree stands to support a transition to native forest.

Responses to Forestry Questions in Discussion Document

106. Do you think we should look to forestry to provide a buffer in case other sectors of the economy under-deliver reductions, or to increase the ambition of our future international commitments?

TTT supports the overall advice given by the Climate Change Commission for a balanced approach of emissions reduction, in conjunction with carbon sequestration from exotic and native forests. However, should there be under delivery in emission reductions, underperforming sectors should pay forestry a fair market price for providing a buffer. There may be an appetite for industry to offset emissions via investment in native forest establishment and management.

We have strong anecdotal evidence of a preference in the farming sector for establishing native rather than exotic forest.

Also, because most of our landscapes have a natural tendency to revert to forest and/or grow trees well (compared with many other countries) we should recognise this natural advantage as one of our strengths and as a powerful card to have in hand regarding our climate change strategy. And of course this places us in a much better position longer term in our goal of recovering and restoring natural ecosystems where it is appropriate to be doing so.

This said, a balanced approach is needed to avoid perverse outcomes of expanding the forest estate, in terms of socio-economic and environmental impacts. TTT are about promoting integration of native forest within our working lands that will enhance existing productive land uses, not compete with them and will result in environmental gains to existing land uses.

107. What do you think the Government could do to support new employment and enable employment transitions in rural communities affected by land-use change into forestry?

Promote and support the development of industries based on CCF and nature-based forestry, including sustainable native forestry on private land, and support training initiatives in rural communities. Please see below APPENDIX 8 - Native Forestry and Employment.

108. What's needed to make it more economically viable to establish and maintain native forest through planting or regeneration on private land?

Early cash-flow revenues are needed from developing native forest areas. It is high cost of establishment coupled with the long wait for returns that disadvantage native forestry as a rational business investment. Comparative income with alternative land use is needed to make investment in native forest establishment and management a rational choice.

Potential revenue sources (such as timber, carbon, and payment for ecosystem services) should be complemented by adjustments to regulatory settings to advantage indigenous forestry and CCF practices - and comparatively disadvantage competing land uses that are less desirable. N.B. – at present, the reverse situation is the case.

We also believe that the almost complete lack of support for bringing existing reverting/regenerating natural areas under more positive forms of management misses probably the single-most important contributor to either national carbon sequestration targets or environmental recovery. Estimates are that well over 1 million ha of such cover

exists on privately owned land around NZ, which could very quickly be brought into production. Removal of farm animals, weeds and pest animals could quickly make a huge difference – and secondary forest aged 30-40 years old is just approaching its fastest growth. Bringing these areas into the ETS by amending provisions around native forest could be very beneficial to NZ in so many respects.

Please see APPENDIX 3 - Cost-effective establishment methods for native forests.

109. What kinds of forests and forestry systems, for example long-rotation alternative exotic species, continuous canopy harvest, exotic to native transition, should the Government encourage and why?

Appropriateness always requires consideration of micro-spatial site factors and within the wider local landscape setting (including social, economic, and cultural context). We purport that there are roles for different types of forestry with different species in Aotearoa, New Zealand - as part of wise, sustainable land use. This needs to be determined on a case-by-case basis, depending on the site constraints and opportunities, risks (including those associated with a changing climate), land-owner objectives, and stakeholder values (including mana whenua).

A flexible palette of forestry systems and options should be developed. However, the shortcomings and risks associated with sole reliance on mono-cultural plantations of exotic species should be recognised and development and transitions to more sophisticated forest management systems and outcomes supported in sensitive catchments and erodible steeplands.

TTT promotes the planting of permanent native forests, or forests managed under continuous cover forestry (CCF) regimes as opposed to clear-fell harvest regimes – as high-forest values are retained, including carbon sequestration. We are proponents of continuous cover forestry in NZ: https://www.tanestrees.org.nz/site/assets/files/1069/continuous_cover_forestry_-_web.pdf (Note that this handbook on continuous cover forestry includes the full gamut of native and exotic forestry species commonly grown or have potential in NZ).

However, please note that TTT considers radiata pine to be a good plantation species when it is well sited (i.e., not planted in erodible steeplands) and utilised for timber production. However, it is not a long-lived tree species and adequate regeneration of other species is required for permanent carbon forestry. Assertions that radiata pine will transition to natives are not backed up by research, as there has been only limited research into management practices to facilitate a transition.

There is an urgent need for research on exotic to native transitions. TTT and allied collaborators recently submitted a research proposal to MPI, in a bid for the SFFF Fund (see Appendix 4).

a. Do you think limits are needed, for example, on different permanent exotic forest systems, and their location or management? Why or why not?

We strongly support the policy direction and approaches recommended by the Climate Change Commission, to increase the amount of permanent native forest as a long-term carbon sink. TTT, along with allied stakeholder groups strongly recommend that the permanent forest category in the NZ ETS is limited primarily to native forests.

Please refer to Appendix 4 for a synopsis of issues associated with permanent radiata-pine carbon forests and exotic-to-native transitions. Radiata-pine is not a long-lived tree species and adequate regeneration of other species is required for permanent carbon forestry. Assertions that radiata pine will transition to natives are not backed up by research, as there has been only very limited research into management practices to facilitate a transition.

We regard this as a perverse outcome of well-intended policy (NZ ETS). Particularly, we are concerned that this practice is being inappropriately exploited for short-term commercial gain by parties who do not have a long-term vested interest in ensuring a legacy of permanent forest cover. This presents a significant social-license-to-practice problem, which undermines the ETS and New Zealand's efforts to combat climate change.

b. What policies are needed to seize the opportunities associated with forestry while managing any negative impacts?

We believe there are limited negative impacts for properly sited and sustainably managed native forest where good management practices are utilised starting with species selection, through to forest establishment and ongoing management, including predator, weed and browse control. It is a good land-use option where landowners wish to sequester carbon over long time periods, as well as enhance natural landscapes, indigenous biodiversity and cultural values.

Appropriate incentive schemes are needed, as discussed above. It is appropriate and desirable for native forests to play a significant role in our country's future including its strategic response to the climate, biodiversity and freshwater crises. Native forests offer a comprehensive suite of benefits befitting the complexity of the situation we face. Rather than using climate change policy to solely drive tree planting decisions, this broader perspective helps counter adverse outcomes from well-intended policy. Focusing on any single-purpose commodity, e.g., rapid carbon sequestration, could result in unintended consequences such as what we have seen with the ETS and high carbon prices leading to 'plant and leave' radiata-pine, which is grown for carbon farming purposes only.

However, our research on non-timber values (NTVs) indicates that biodiversity is a pivotal NTV, which is likely to leverage most other NTVs, i.e., actions to increase biodiversity values are likely to concurrently improve most (possibly all) other NTVs, including carbon sequestration and climate change adaptation.

Multiple potential markets and income streams are likely required to sufficiently incentivise and support native forestry as a viable land use option (e.g., a combination of timber, carbon, and payment for ecosystem services etc.). A comprehensive suite of policies and mechanisms to facilitate this outcome is required. Integration with other planning and regulatory systems will be important (e.g., RMA, District Plans, ETS, taxation, etc.).

Also, we request that any policy around incentivising native forestation dovetails with other policies, particularly the recent Freshwater Reforms (especially the 3 m setbacks), and Biodiversity Strategy (Te Mana O Te Taiao Aotearoa New Zealand Biodiversity Strategy 2020).

110. If we used more wood and wood residues from our forests to replace high-emitting products and energy sources, would you support more afforestation? Why or why not?

Yes, if policy is well considered with regulations to limit perverse outcomes, i.e., displacement of more suitable land use options (e.g., loss of high-value horticultural land); and would not result in inappropriate land use, e.g., clear-fell regimes in erodible steeplands, or an unsustainable net depletion of nutrients or habitat from the forest.

111. What role do you think should be played by:

a. central and local governments in influencing the location and scale of afforestation through policies such as the resource management system, ETS and investment?

Clear policy statements from central government that encourage, support and advantage native forestry as a viable land use option are needed. For example, this needs to be explicit in the Draft National Policy Statement for Indigenous Biodiversity - so that subservient regulatory documents (e.g., District Plans making rules about SNAs etc.) give effect to the higher policy statements. This may require:

- Te Uru Rākau to develop a more visionary and leadership role in developing an appropriate forest vision and strategy for forestry in Aotearoa (possible a National Policy Statement on Forestry in Aotearoa).
- The engineering of regulatory settings to influence markets to support the desired land use outcomes.
- Removal of regulatory disincentives and impediments for native forestry.
- Greater investment in research on native forestry, which has been very under resourced.
- Industry development, including training.

Central government needs to get the 'rules' right, ensure that potential players are given correct and accurate information, and 'police' the behaviour of players in the market. This will decrease the risk of perverse outcomes from well-intended policy.

Appropriate incentive schemes are needed, as discussed above, to compensate landowners establishing native forest, because the environmental and cultural benefits accrue to the wider community, but many of these do not currently have a market value.

The Climate Change Commission in its advice to Government, stated that there are currently limited incentives for land-owners to change less productive farmland to native forest – this was highlighted in submissions, particularly from farmers.

It may be possible that the government can create a policy or tax reform situation that encourages private sector investment in native forestation efforts. We would be keen for Fonterra or Dairy NZ to invest in restoration of kahikatea forest in our Waikato lowlands and elsewhere in New Zealand. It would be a good way for dairy farmers to offset their emissions while investing in all the environmental and cultural benefits of increased forest cover, which includes improved animal welfare, better water quality, and future-proofing of their farmland against extreme weather events.

Tax reforms were recommended in a presentient report produced by the Parliamentary Commission for the Environment in 2002 - to support the efforts of landowners in protecting remnant vegetation and increasing the extent of natural ecosystems, this included making "the expenditure incurred by land-owners in conserving indigenous biodiversity tax deductible" (p. 35, PCE 2002 - https://www.pce.parliament.nz/media/pdfs/weaving_pdf.pdf).

Recommendations by the Tax Working Group in 2019 included broadening the tax base and making greater use of environmental taxation, and developing the tax system over time to enhance natural capital (Tax Working Group 2019 - <https://taxworkinggroup.govt.nz/resources/future-tax-final-report-vol-i>).

b. the private sector in influencing the location and scale of afforestation?

The private sector and business investment will be responsive to markets and is adept at exploiting opportunities created. There are excellent examples of the private sector investing in native forestation efforts, such as Trees That Count (TTC) and Air New Zealand's carbon offsetting programme.

Air New Zealand has partnered with New Zealand's Native Forest Restoration Trust (NFRT), a nonprofit, largely volunteer organisation that acquires, protects and regenerates blocks of native forest and wetland. By purchasing carbon offsets when booking flights, Air New Zealand customers directly fund the NFRT's efforts to regenerate and manage native forest reserves.

TTC has created a market place whereby businesses, organisations and individuals can donate funds to provide native planting stock, which are then matched to groups involved in planting programmes, which are designed to counteract climate change, restore biodiversity and enhance the environment. TTC records, maps and monitors the native trees planted.

112. Pests are a risk to carbon sequestration and storage in new, regenerating and existing forest. How could the Government support pest control/management?

See Appendix 3. Cost effective pest control management is vital for natural forest regeneration processes and forest health. Successful large-scale establishment of native forest will depend on working with nature. Encouraging natural regeneration can only be done in tandem with pest animal control to prevent damage of establishing seedlings, working with Predator Free NZ, neighbouring landowners, iwi and local communities to boost bird populations and seed production for diverse forest ecosystems, as well as selective weed control.

We believe landowners will do more if the incentives are appropriate and they see value in the forests they own.

Private land-owners adjacent to DoC land frequently complain of their pest eradication efforts being undermined by re-invasion from conservation land. We are all hearing comments about the degeneration of native forest on conservation land from colleagues across the country who are concerned about the lack of pest control on DoC land, and that the current situation is the worst they have seen. Yes, we know that COVID restrictions are partly to blame for this, but the bigger problem is the under resourcing of DoC and strong anti-1080 sentiment influencing pest control decisions. The latter is apparently a problem particularly where there is co-governance with some iwi groups.

A better solution to pest control than 1080 urgently needs to be developed.

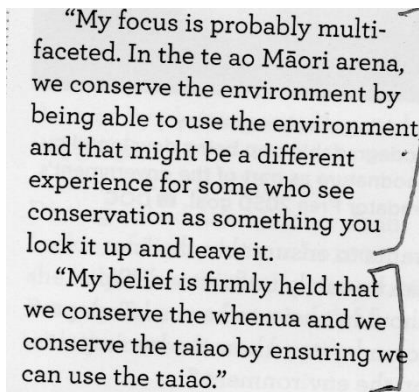
113. From an iwi/Māori perspective, which issues and potential policies are a priority and why, and is anything critical missing?

Iwi need to be consulted on this!

In our experience, iwi groups are often well informed and have well developed thinking on climate change adaptation and mitigation, and stewardship of natural resources in general. Wai 262 must be considered, including the impact of climate change and land use on all our native species, and the access of mana whenua to natural resources.

Regarding native forestry, we have found many iwi groups are interested in developing continuous cover forestry operations with high value native and exotic species. It fits well with their kaupapa. Funding and access to expertise are limiting factors.

See the quote below from Minister Kiri Allan.



“My focus is probably multi-faceted. In the te ao Māori arena, we conserve the environment by being able to use the environment and that might be a different experience for some who see conservation as something you lock it up and leave it.”

“My belief is firmly held that we conserve the whenua and we conserve the taiao by ensuring we can use the taiao.”

114. Are there any other views you wish to share in relation to forestry?

Please see above our responses (in black) to statements (in blue) from the discussion document.

While we agree with most of the suppositions in the discussion document, we are concerned about the promulgation of the myth around slow carbon sequestration in native species, which has come out of the misplaced reliance on the very limited data in the MPI Look-up tables (q.v. APPENDIX 2 – Carbon sequestration in sustainably managed native forest).

Also, we believe that the reported costs for establishment of native forests are on the high side and do not include cost-effective mechanisms for landscape-scale forest establishment (q.v. APPENDIX 3 - Cost-effective establishment methods for native forests).

APPENDIX 1 - Recommendations from Ināia tonu nei, which TTT supports

Recommendation 4 - Limit on offshore mitigation for emissions budgets and circumstances justifying its use

We recommend that, given that emissions budgets must be met as far as possible through domestic action, for the purposes of meeting emissions budgets: a. The limit on offshore mitigation should be zero for the first three emissions budgets. b. The only circumstances that at this stage would justify the use of offshore mitigation is as a last resort in exceptional circumstances beyond the Government's control, such as force majeure events, where domestic measures cannot compensate for emissions impacts.

Recommendation 5 - The rules for measuring progress towards emissions budgets and the 2050 targets

We recommend the following package of rules for measuring progress:

- a. Use of the production-based approach from New Zealand's Greenhouse Gas Inventory as the basis for accounting for emissions budgets and the 2050 targets.
- b. Use of the modified activity-based framework for land emissions accounting, with a 1990 base year and 'averaging' for post-1989 forests, substantially aligning emissions budget accounting with the approach used for accounting for the Nationally Determined Contribution (NDC).
- c. Within the modified activity-based land emissions accounting framework, to:
 - I. Include the land areas and uses corresponding to afforestation, reforestation, and deforestation, as confirmed for the first NDC.
 - II. Exclude forest management, the activity relating to the impact of management practices on pre-1990 forest carbon stocks. This is despite its inclusion in NDC accounting because the forest management reference level has not yet been set for the period through to 2030 and we have been unable to assess how it manages accuracy and uncertainty risks. Improved management of pre-1990 forests nevertheless remains important and should be encouraged through policy.
 - III. Include harvested wood products (HWPs) from post-1989 forests, but not HWPs from pre-1990 forests because they are accounted for as part of forest management which is excluded from emissions budget accounting.
 - IV. Include a natural disturbances provision, aligned with the first NDC and the 2013 IPCC Kyoto Protocol Supplement. The Commission will judge whether to invoke the provision in its reports that monitor progress each year and at the end of an emissions budget period.
- d. From 2021, if the Government allows voluntary offsetting for carbon neutral claims to take place in Aotearoa through cancelling New Zealand Units (NZUs), adjustments corresponding to the amount of NZUs cancelled must be made to the relevant emissions budget, or to the inventory, to avoid the emissions reductions claimed from being negated by increases to the New Zealand Emissions Trading Scheme (NZ ETS) cap.

We also recommend that the Government undertake the following work to improve emissions estimates and broaden the options available for emissions budgets accounting in future:

- e. Continue to produce and improve annual reports on national consumption emissions estimates
- f. Develop an appropriate method to reflect changes in carbon stored in above ground biomass and harvested wood products due to increased use of biomass for energy
- g. Develop methods for tracking emissions and removals by sources and sinks not yet included in the country's domestic or international target accounting. This should include:
 - I. Prioritising development of methods to account for carbon in organic soils (such as peat) and biomass (such as small lots of trees and regenerating vegetation), with a view to allowing them to be included in future target accounting.

II. Examining the feasibility of using the land-based approach in accounting for targets and emissions budgets for sources and sinks other than production forests, while managing the uncertainty and emissions fluctuations from the harvest cycles of production forests.

g. Develop sound and transparent practices for accounting for domestic voluntary mitigation and offsetting claims, in relation to the NZ ETS, emissions budgets and NDCs.

Recommendation 11 - Strengthen market incentives to drive low-emissions choices

We recommend that, in the first emissions reduction plan, the Government commit to:

Amending and continually improving the NZ ETS so that it delivers the incentives needed to achieve emissions budgets. This should include:

1. Amending the NZ ETS to strengthen the incentive for gross emissions reductions and to manage the amount of exotic forest planting the NZ ETS drives, in line with the Commission's advice on the proportion of emissions reductions and removals necessary for meeting emissions budgets (see also Recommendation 25).
2. Updating NZ ETS unit supply and price control settings to:
 - a. Align unit volumes with emissions budgets, taking into account the need to reduce the NZU stockpile.
 - b. Increase the cost containment reserve trigger price to \$70 at the first possible opportunity and then every year by at least 10% plus inflation.
 - c. Maintain continuity with recent prices, by increasing the auction reserve trigger price to \$30 as soon as practical, followed by annual increases of 5% plus inflation per year.
3. Establishing an effective market governance regime for the NZ ETS as soon as possible to mitigate risks to market function, delivered through an interagency team.
4. Continually improving the NZ ETS, including by:
 - a. Developing and implementing a plan for recycling proceeds from NZ ETS unit auctions into emissions reductions, adaptation, climate education, equitable transitions and meeting international climate change obligations. This plan should include mechanisms to ensure that it contributes to equitable outcomes for Iwi/Māori.
 - b. Implementing the legislated process for review and phase-out of industrial free allocation, reviewing other aspects of industrial free allocation policy to ensure they are fit for purpose and exploring other policy instruments that over the longer term could be used to address the risk of emissions leakage.
 - c. Providing more information to reduce uncertainty about adjustments to NZ ETS settings, to support informed decision-making by market participants.
 - d. Urgently clarifying the role and avenues for voluntary mitigation in Aotearoa, so that businesses and other organisations can understand the options available to them for making robust voluntary commitments or claims.

Recommendation 11 - Provisional progress indicators

1. Government to have, by 31 December 2022, developed proposals for strengthening the NZ ETS incentive for gross emissions reductions and managing the amount of exotic forest planting driven by the scheme, with amendments to be effective by 31 December 2024.
2. Government to ensure that, in the next annual update to NZ ETS settings, unit volumes are aligned with emissions budgets and price control settings are increased.
3. Government to develop proposals by 30 June 2022 for establishing an effective market governance regime for the NZ ETS, and to have legislated to address the most significant risks by no later than 30 June 2023.
4. Government to develop and publish a plan for recycling proceeds from NZ ETS unit auctions by 30 June 2022, followed by annual reporting on the implementation of the plan and how the proceeds have been used.

Recommendation 25 - Manage forests to provide a long-term carbon sink

We recommend that, in the first emissions reduction plan, the Government commit to: Developing a framework of actions to deliver a mix of exotic and native forest sinks, and manage these and other carbon stocks, to provide flexibility to meet emissions budgets and targets.

This should include:

1. Establishing a long-term carbon sink through a comprehensive national programme to incentivise the reversion and planting of new native forests to maintain net zero long-lived greenhouse gas emissions beyond 2050.
2. Designing a package of policies to reduce reliance on forestry removals and manage the impacts of afforestation including:
 - a. Amendments to the NZ ETS to manage the amount of exotic forest planting driven by the scheme (see also Recommendation 11 on the NZ ETS).
 - b. A clear position on the role and desirability of different types of permanent exotic forests as carbon sinks, and amending the NZ ETS and other policies accordingly.
 - c. Land-use planning, direction and tools to help local government manage afforestation, mitigate localised impacts of afforestation and to achieve environmental co-benefits.
3. Managing pests in an integrated way, to ensure forests are successfully established and all forests are maintained long term.
4. Considering ways to allow more flexibility for Māori-collectives with pre-1990 forest on their whenua, to give them more scope to manage their whenua in alignment with the intergenerational aspirations of their members. This could include, for example, assisting capital-constrained Māori-collectives to offset deforestation on pre-1990 forest land.
5. Maintaining and increasing other carbon stocks through:
 - a. Improving and enforcing measures to reduce deforestation of pre-1990 native forests.
 - b. Noting that emissions and carbon dioxide removals may not currently be reliably quantifiable or accounted for in targets (see Recommendation 5 on rules for measuring progress), taking steps to:
 - i. Protect and increase the carbon stocks of pre-1990 forests through activities such as pest and fire control, and enrichment planting.
 - ii. Encourage carbon removals by new and additional small blocks of trees and vegetation.
 - iii. Preventing further loss of carbon from organic soils, particularly due to the degradation of drained peatlands and the destruction of wetlands.

Recommendation 25 - Provisional progress indicators

1. Government to have, by 31 December 2022, developed proposals for incentives for native forests and for managing the amount of exotic forest planting driven by the NZ ETS, with amendments to be effective by 31 December 2024.
2. Government to report, from 31 December 2022, on the hectares of exotic and native forest that are afforested and deforested at least annually.
3. Government to report at least annually, from 31 December 2022, on a suite of indicators including information on labour, nurseries, land purchases, pest eradication data (area to which 1080 has been applied or farm management plans).
 - a. Improving and enforcing measures to reduce deforestation of pre-1990 native forests.
 - b. Noting that emissions and carbon dioxide removals may not currently be reliably quantifiable or accounted for in targets (see Recommendation 5 on rules for measuring progress), taking steps to:
 - i. Protect and increase the carbon stocks of pre-1990 forests through activities such as pest and fire control, and enrichment planting.
 - ii. Encourage carbon removals by new and additional small blocks of trees and vegetation.
 - iii. Preventing further loss of carbon from organic soils, particularly due to the degradation of drained peatlands and the destruction of wetlands.

APPENDIX 2 – Carbon sequestration in sustainably managed native forest

Newly published research demonstrates that planted and managed indigenous forest is better at sequestering carbon and faster growing than commonly considered - <https://pureadvantage.org/carbon-sequestration-by-native-forest-setting-the-record-straight/> A paper is currently being prepared for submission to an academic journal.

The widely held view that New Zealand's native forests are slower growing and accordingly slower to sequester carbon, as indicated by the MPI Look-up tables, may be discouraging landowners from planting native trees, even where it is their preference to do so. Worse, it may be leading to planting advice that is incorrect and not helpful at a time when any form of tree planting by landowners is a bonus.

Analysis of Tāne's Tree Trust data from planted native trees still supports the position that radiata pine is initially faster growing and simpler to manage, but the difference between carbon sequestration in radiata pine and well managed planted native forest is much less than is often suggested.

Data from Tāne's Tree Trust Indigenous Plantation Database show that:

- carbon sequestration for planted forests of totara, kauri, kahikatea, rimu, other conifers, puriri, beech, and other broadleaves is in the range:
 - **10.0 to 16.4** tCO₂ ha⁻¹ yr⁻¹ (mean annual increment over 50 years) and
 - **18.2 to 29.9** tCO₂ ha⁻¹ yr⁻¹ (current annual increment at age 50 years)
- growth rates of these native tree species increase steadily over the first 50 years achieving higher productivity as well as carbon sequestration with age.

This research is a first for planted native forest using methodology comparable to that used for planted radiata pine forest in New Zealand (mean annual increment is 21 to 27 tCO₂ ha⁻¹ yr⁻¹ for radiata pine at age 50 years).

Investment in research and development would benefit native forestry as it has the radiata-pine industry, i.e., result in increased growth rates and more knowledge around forest management.

New Zealand's Carbon Look-up Tables for the Emission Trading Scheme should include the option for planted native forest as well as regenerating native forest. The current Look-up Tables for native forest are accurate when applied to naturally regenerating shrubland. However, to achieve good levels of sequestration over a long timeframe, regenerating forest needs to include climax tree species such as totara.

Properly sited and managed planted native tree species are a good alternative where landowners wish to sequester carbon over long time periods, as well as enhancing natural landscapes, indigenous biodiversity and cultural values.

APPENDIX 3 – Cost-effective establishment methods for native forests

We propose assisted natural regeneration augmented by targeted planting:

- We advise a shift in focus from reliance on mostly planted forests to assisted natural regeneration – where planting is part of the mix, along with management to limit factors that inhibit natural regeneration of natives, i.e., control of the most aggressive weeds, elimination of pests including predators of bird populations essential for seed spread.
- We support direct planting, but recommend that it starts on a modest scale, and expands as quickly as capacity permits.
- Concurrent with this is the need to monitor the success or otherwise of planting programmes so that management changes can be made early on to improve performance with subsequent plantings.
- Fixed annual targets should be used with caution, although we understand there is a need to reach carbon sequestration targets.
- Management of natural regeneration coupled with targeted planting must be well planned, adapted to site, supervised, and the outcome monitored and the management input sustained.
- Start with a survey to identify potential sites for natural regeneration.
- Identify any existing native forest within bird range that will encourage spread of seed of key native tree species.
- Our birds have a good track record, having established forests in Aotearoa for millions of years. Strategic planting of berry-producing shrub species provides an incentive for birds to visit sites.
- Implement control of bird and seed predators such as rodents, mustelids and possums – to protect and boost natural regenerative processes.
- There will likely be a need for enrichment planting of species no longer locally present.
- Where there are no native forests within bird range, we can prepare a seed source for them by employing a strategy that has been developed and is being evaluated by TTT, i.e., where there are gaps, establish a network of seed islands.
- TTT has produced fact sheets on assisted natural regeneration and the seed island approach. These will soon be published on our website.
- Assisted natural regeneration could be done at large scale as resources permit, and there should be no need for delay in getting this underway.
- Monitoring systems are vital as practitioners can act promptly to protect their ngahere, and also learn what does, and doesn't work, and adapt accordingly. This is particularly important in an era of climate change.
- This need not be delayed. Some of the human and financial resources available for direct planting should be diverted towards establishing a framework that supports natural regeneration – including sustainable management of the large area of existing natural regeneration, some of which is being routinely sprayed, cut back or burnt to keep marginal farmland in pasture.

Much of this is described in more detail in an article by Dr David Bergin – *The ten golden rules for establishing native forest at scale*, published as part of the O Tatou Ngahere campaign <https://pureadvantage.org/ten-golden-rules-for-large-scale-establishment-of-native-forest/>.

Pros and cons of assisted natural regeneration

Advantages

- Scale - significant areas already exist (hundreds of thousands of hectares), that are in the process of regeneration to forest cover, and much more could be encouraged to regenerate.
- Low cost. Nature and time, assisted by the wind and birds, do the greatest share of the work.

- Less pressure. There are no fixed annual targets to be met.
- Flexibility. It is suited to a range of sites, large and small; and a range of different scenarios can be employed. There is scope here for site-specific and creative solutions.
- Plants that germinate naturally have been, by definition, ecosourced, and are therefore adapted to site.
- Planting can be leveraged for maximum cost/benefit.
- Lower risk of dramatic failure.

Disadvantages

- Forest establishment will take longer. On the other hand, as it is low cost, it can start sooner and at a larger scale (and is already happening over large areas).
- We cannot assume that available open space will be colonised by native species alone. Over time we have introduced too many impediments for that to occur.
- We have introduced a range of weeds, some of which will be better adapted to the changing conditions of a warming climate – these can preclude natural regeneration on some sites, if there is no intervention. And then there are the introduced pests that must be controlled.
- Our remaining forests have been degraded and fragmented, and natural pathways for colonisation have been intercepted by cities, farms and roads.
- Natural regeneration will need our assistance - weed and pest control is vital.
- All forests require ongoing and active management. There is presently insufficient financial incentive or income potential to encourage and support native forest management on private land – especially regarding regenerating native forest cover.

In summary – working with nature for cost-effective, large-scale expansion of our ngahere

Successful large-scale establishment of native forest will depend on working with nature and better integration of those involved. Encouraging natural regeneration can only be done in tandem with pest animal control to prevent damage of establishing seedlings, working with Predator Free NZ, neighbouring landowners, iwi and local communities to boost bird populations and seed production for diverse forest ecosystems, selective weed control to remove or reduce the most aggressive and persistent exotic species, and undertaking targeted supplementary planting to bring back once abundant species now locally extinct or scarce.

Our recommendations:

- Enable naturally regenerated native cover that predates 1990, but that still has significant potential to sequester more carbon, to be eligible and become part of the target area.
- For afforestation by planting alone, start with modest targets and build infrastructure, capability and confidence, and ‘iron out problems’; i.e., start with a smaller yearly target, upscaling gradually as capacity and competence improve.
- Look at the easiest options first - ‘nature-based solutions’ - assisted regeneration, building on the natural regeneration that is already happening in many hill country sites.
- Establishing seed islands amongst shrub pioneers, to help the natural succession to high-forest – let the birds do the work of spreading the seed.
- Ensure that nursery plant quality standards and infrastructure are in place to deliver quality, fit-for-purpose planting stock.
- Monitoring systems are vital and need to be a requirement of any funding for afforestation.
- Planters – are there sufficient well-trained planting gangs who know how to plant native species (as opposed to radiata-pine, which is quite different to plant)?

APPENDIX 4 – Exotic to Native Transitions

Carbon-farming with exotic species, as incentivised by the Emissions Trading Scheme and currently high carbon values, has become a contentious issue. There has been considerable backlash on this, particularly from rural communities and the agricultural sector. Regardless, there are potential opportunities in exotic-to-native forest transitions that could provide multiple benefits to the environment, economy, and society. However, research and guidance on what can or should be done are currently lacking and urgently needed.

Radiata pine is not a long-lived species, and it is assumed by many in the forestry industry that when radiata-pine stands disintegrate they will somehow be automatically replaced by naturally regenerating native forests. We believe that this is unlikely without active intervention, and even then, cannot be assured. Intensive management inputs may be necessary to ensure a successful transition on many sites, but this can be fraught as disintegrating radiata-pine stands are dangerous to work in.

Carbon-farming provides no incentive for the landowner to budget for, or invest in the work required to manage a long-term transition. While TTT does not advocate for 'plant and leave' radiata pine, we are aware that such stands are already being established.

Funding and support for scientific research on exotic-to-native forest transitions are urgently needed. TTT and collaborators have recently submitted a proposal to MPI's SFFF Fund.

One of the drivers for this research is the significant concern about the use of radiata pine for permanent carbon forestry, based on the unrealistic and false premise that those forests will transition to native forest. We regard this as a perverse outcome of well-intended policy (NZ ETS). Particularly, we are concerned that this practice is being inappropriately exploited for short-term commercial gain by parties who do not have a long-term vested interest in ensuring a legacy of permanent forest cover. This presents a significant social-license-to-practice problem, which undermines the ETS and New Zealand's efforts to combat climate change.

Another driver is the opportunity to transition directly from exotic to native forest, avoiding clear-felling on erodible land in regions such as Tairāwhiti where, with correct management, understory regeneration is quite probable. The commercial plantation forestry industry is looking for advice on how to retire radiata-pine stands safely and cost-effectively on remote, erodible steepplands, which are not economical to harvest and/or pose environmental risks and where the best option is a managed transition back to native forest. This is highly pertinent to a requirement of the updated NZ FSC Standards.

We recommend that incentives be created to transition clear-fell regimes of exotic species such as radiata-pine, to permanent native forest in sensitive upland catchments.

Another positive driver is that many Maori landowners are currently actively seeking technical advice in transitioning radiata-pine forest back to native forest.

However, a recent [State of Knowledge review prepared for MPI](#), by Dr Adam Forbes and Dr David Norton, determined significant knowledge gaps and research needs for transitional forestry before it is attempted at scale. In particular, there is a need to establish permanent forestry trials that investigate growth rates, the effect of landscape context, silvicultural interventions, management thresholds, best practice operations and documentation.

With carbon forestry, we think that the 'horse has bolted' concerning the scale at which permanent radiata-pine forests have been established. Therefore, the proposed research is critical and already well overdue.

This research needs to be objective and independent from any commercial or political objectives, and the results made publicly available.

Please note that we consider radiata pine to be a good plantation species when it is well sited and utilised for timber production. However, it is not long-lived and adequate regeneration of other species is required for permanent carbon forestry. Assertions that radiata pine will transition to natives are not backed up by research, as there has been only limited research into management practices to facilitate a transition. The existing research has focused on the management of mature stands for biodiversity restoration. There has been no research into how to establish exotic tree stands to support a transition to native forest.

The proposed research project will establish permanent forestry trials to collect data in existing exotic stands of various ages, on a range of sites representing a gradation of climate zones throughout New Zealand - to determine factors and interventions that are likely to allow a transition to native forest. We will investigate whether this transition can happen without incurring significant carbon liabilities. We will review existing plot data to provide an early indication of the status of regeneration in conventionally managed exotic plantations. We will also look for drivers of regeneration such as levels of canopy cover (light ingress), seed source proximity, climatic variables and site factors - to inform what types and levels of management are required. Importantly, we will examine both the existing and proposed new empirical data to identify situations where a transition is unlikely to be successful/unsuccessful, and provide guidelines and recommendations.

We have a strong team of scientists and foresters within TTT plus two associates who have the most experience in New Zealand in exotics-to-native transitions, i.e., Dr Adam Forbes and Megan Graeme. We are well placed to provide unbiased scientific research.

Tane's Tree Trust and the Coastal Restoration Trust are already involved in a Sustainable Farming Fund research project exploring practical options to transition failing exotic duneland forest buffers to resilient permanent indigenous buffers. Indigenous coastal forest buffers will provide more sustainable and effective protection to the production forests landward, with application to other productive land uses on our coasts and in the face of expected impacts of climate change. This project is led by Megan Graeme and Dr David Bergin.

Dr Adam Forbes is a leading forest ecologist who completed a PhD on management of non-harvest pine stands and has published much of the research on this topic. Adam is a self-employed, independent scientist.

Reference:

Forbes, A., & Norton, D. (2021). Transitioning Exotic Plantations to Native Forest: A Report on the State of Knowledge. Contract report prepared by Forbes Ecology Limited for the Ministry of Primary Industries. <https://www.mpi.govt.nz/dmsdocument/47521-Transitioning-Exotic-Plantations-to-Native-Forest-A-Report-on-the-State-of-Knowledge-2021-22->

APPENDIX 5 – Summary of Tāne's Tree Trust's Current R&D Programme

TTT is undertaking a 3-year research programme funded by The Tindall Foundation to continue developing and providing the urgently needed tools, resources, and advice to support native forestation in Aotearoa. This follows on from the recently completed implementation of Phase 3 of the Our Forests Our Future programme.

Normalising Native Forestry

Each of the six workstreams has a list of project areas with flexibility to include new related work as priorities and funding opportunities arise over the next 3-years.

1. Working with Nature - native forestation at landscape scale

The Climate Change Commission recommended a major upscaling of native forestation efforts, nearly 300,000 ha of new native forests within the next 15 years. With the cost of planting often at \$20,000 per hectare, cost-effective establishment at scale will require working with Nature by encouraging natural regeneration as well as planting.

2. Promoting Nature-based indigenous forestry in Aotearoa

We are well positioned to develop nature-based forestry in NZ, with a good track record already with tōtara (Northland) and beech (Westland). NZ currently imports about \$100 million per year in specialty timbers, some of which could be substituted with sustainably grown native timbers.

3. Making the most of Tāne's Tree Trust's databases

TTT has the most comprehensive national database for planted native forests, which has been used to develop models and calculators. This database and associated tools are providing essential data for policy-makers, investors, and the forestry and farming sectors.

4. Incentivising landowners – an economic case for native forestation

The cost of planting natives remains a limiting factor for landowners. The business case for native forestation, therefore, relies on decreasing the costs, and also compensating landowners for the non-timber values that accrue to the wider community, but do not currently have a market value. The Climate Change Commission's advice to the government includes creation of incentives for establishing native forest.

5. Evaluating novel ecosystems – transitioning exotics to natives

Exotic woody plants that dominate many of our landscapes can potentially be transitioned to native forest. Carbon forestry interests are currently investing in permanent carbon forests, capitalising on the fast early growth of radiata pine, then leaving it as a nurse for permanent native forest. This needs urgent research work.

6. Collaboratively building capability

A holistic, multi-agency approach is required for native forest to be successfully established at scale. Herbivory, bird and seed predation, and vigorous weeds need to be tackled. We must work together and develop more capability in establishing and managing native forests. Contact for this workstream: Michael Bergin michaelbergin.erl@gmail.com

For more information on TTT's Normalising Native Forestry research programme, contact:

- Peter Berg, Chair, Tāne's Tree Trust peter@bergforests.co.nz
- Mel Ruffell, TTT CEO office@tanestrees.org.nz
- David Bergin davidbergin.erl@gmail.com

APPENDIX 6 – Nursery infrastructure, plant quality, and supply chain issues

Planting programmes like The One Billion Trees fund have presented opportunities for the native nursery industry. However, they also present challenges that will need to be carefully considered by all who are involved in the industry, be they producers, specifiers or users of plant material (<https://pureadvantage.org/the-state-of-the-native-plant-nursery-industry-in-2021/>).

Some issues urgently need to be resolved regarding the nursery industry capacity and plant quality standards:

- The Billion Trees programme has put considerable pressure on the native plant industry to produce plants in volumes that have never been done in this country before. NZ has a very small native nursery industry. There are only a handful of large plant producers alongside many small nurseries employing less than 5 people.
- Most native nurseries have been riding a fine line of profitability. They are often undermined by community-based nurseries that can produce plants more cheaply due to local and central government funding and volunteer labour.
- In the decade prior to the Billion Trees programme, the industry was struck hard by the GFC, collapse of the carbon market, and lack of government initiatives supporting ecosystem restoration. Several excellent major native plant nurseries closed, and others retrenched. Surviving nurseries have been reluctant to risk investing in infrastructure to upscale due to the vagaries of funding for native plantings.
- NZ is one of the few countries in the world without a common set of nursery standards. Until there is a required set of standards, particularly for plant quality, ecosourcing and biosecurity measures, there will be wide variations in standards, which will have an impact on planting projects, e.g., biosecurity measures may not be appropriately undertaken, which is critical due to the threats of kauri dieback and myrtle rust.
- Planting ill-adapted species is a recipe for disaster. See Tāne's Tree Trust guidelines on species selection and ecosourcing (<https://www.tanestrees.org.nz/news-events/articles/t-nes-tree-trust-guidelines-to-species-selection-ecosourcing-and-seed-collection/?highlight=ecosourcing>).
- One of our major concerns is the use of large-scale cuttings propagation - as promoted and practised by one CRI and several major native nurseries. This can dramatically decrease genetic diversity and lead to inbreeding in permanent native forest. It is an example of inappropriately applying plantation forestry deployment systems (for short-rotation forests) which is counter to what we need for permanent forests in an era of climate change and increased biosecurity risk (<https://pureadvantage.org/future-proofing-our-ngahere/>).
- Biosecurity measures must be upheld in nursery and planting operations. This is particularly important for myrtle rust (<https://nzppi.co.nz/CURRENT-THREATS/19727-s119533/>) and kauri dieback (https://www.kauridieback.co.nz/media/1864/bpg-kauri-propagation-and-planting_v1_finalpdf.pdf).
- These issues could be addressed by nursery standards being a requirement of government or private funding.

APPENDIX 7 – Creating industry around sustainable production of native timbers

New Zealand currently imports large amounts of specialty timbers each year - e.g., NZ\$99.6 million worth in 2016 and NZ\$107 million worth in 2017 (MPI 2021¹). Some of this is from non-sustainable sources, e.g., kwila. There are multiple published discussions on why we are not producing more of our own specialty timbers, including timber from native species, e.g., sustainably grown tōtara would be an excellent substitute for imported western red cedar in many applications, as well as being a culturally important resource highly valued by Maori.

New Zealand is fortunate in having a spectacular range of world-class native timbers. They are part of our heritage, and we should have an opportunity to make use of them for decorative and practical purposes. By applying the principles of continuous cover forestry (CCF), selected trees can be harvested without compromising the integrity of the forest and the myriad of ecosystem services it provides (https://www.tanestrees.org.nz/site/assets/files/1069/continuous_cover_forestry_web.pdf; and <https://pureadvantage.org/nature-based-forestry-regenerative-forestry-models-for-aotearoa/>).

A good example is the management of totara, which has proliferated in most regions due to clearance of the original forest cover and is recolonising on our less productive land. This is occurring even in the presence of grazing, despite repeated attempts by landowners to control it. Our Northland Totara Working Group (NTWG) is continuing to demonstrate that farmers have a valuable resource of native timber establishing before their eyes.

The NTWG has established over 60 Permanent Sample Plots in Northland demonstrating the benefits of thinning and pruning this resource as a future high-value specialty species that can be managed under CCF harvesting methods to retain high forest values and benefits. The Totara Industry Project (<https://www.totaraindustry.co.nz/>) demonstrates the viability of CCF with naturally regenerating totara on marginal hill country. However, a viable native timber industry is required to encourage sustainable native forestry. Government investment could help expedite this.

Native forests require ongoing management and that requires ongoing income streams. These could come from carbon, timber, and payments for ecosystem services. However, effective mechanisms, industries and incentives need to be created to support this.

¹ Ministry for Primary Industries (MPI) (2021a). Wood product markets. Data on forestry imports and exports and indicative log prices: <https://www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-product-markets/>

APPENDIX 8 – Native Forests and Employment

It is difficult to ascertain figures for employment and training opportunities regarding native forests because the available employment data is not categorised in sufficient detail. However, examples of types of businesses, employment and educational opportunities associated with native forests include:

- Ecotourism, e.g., Canopy Tours, Sanctuary Mountain Maungatautari, ZEALANDIA, Orokonui Ecosanctuary, and Foris Eco-tours, as described above. There are also supporting industries associated with ecotourism ventures, such as local accommodation providers generating revenue for the local economy.
- Industries based on outdoor activities, e.g., hunting, fishing, tramping, mountain biking and horse trekking. Business enterprises involved in hunting of game, management of pests, and trapping possum for fur and pelts have ranged in number from 140 to 170 in recent years. Commercial operators provide guided tours in many wilderness areas, with other enterprises providing provisions and accommodation, generating revenue for the local economy. Native forestation and conservation projects funded by government agencies, local councils, community organisations, and iwi groups. This includes the New Zealand government's 'One Billion Trees Programme', as described below.
- Native plant nurseries are distributed throughout New Zealand. Those that are well-managed can be a significant employer of local people. Commercial and community-based nurseries also provide opportunities for training and skills development. For example, the Minginui Nursery provides employment and training opportunities and contributes to the socioeconomic and cultural values of a local community, as described below.
- The honey industry - the number of registered beekeeping enterprises in New Zealand was 7,814 in 2017 (MPI data). Many of these honey enterprises are solely dependent on native forest species for nectar and pollen, such as mānuka honey production, while other honey industries rely on native forest for part of the season, particularly early season nectar flow.
- Forest-based health products such as nutritional supplements, antibacterial oils and health remedies, e.g., bioactive compounds for pharmaceuticals (e.g., mānuka and kānuka oils). Māori have been significantly involved in businesses and associated research initiatives on these types of products, frequently drawing on customary knowledge.
- Wild food and fibre enterprises are small-scale, but they are important for providing employment and supporting local economic activity, and they are often culturally important. This includes hunting of wild game and trapping for fur, and traditional foraged food for fine dining – as described previously.

Compared with radiata-pine nurseries, native nurseries are generally dealing with multiple species, which often have different propagation requirements, and far less scale and mechanisation. And it takes longer to produce native plants compared with radiata-pine. So it is far more labour-intensive compared with radiata-pine nursery systems.

And there is no 'one size fits all' formula for establishment and management of native forest, as compared with radiata pine, so it is also more labour intensive.

An example of increased employment and an improved socioeconomic situation is demonstrated by the Minginui Nursery, in the Whirinaki region of the central North Island. This nursery specialises in production of native plants and received a significant boost from the billion-trees programme. Ngāti Whare established the nursery in 2016 to supply plants for the Whirinaki regeneration project and other regeneration projects in the North Island. This has created employment in an area where there has been high welfare dependency and socioeconomic deprivation since the closure of the timber mill in 1988. About 40 full-time, part-time, and seasonal staff from the local community are currently

employed in the native plant nursery and planting and maintenance of native forest in logged sites as part of the Whirinaki Regeneration Project.

In terms of employment throughout the rotation of native versus exotic forestry – ‘it depends’. The honey industry in New Zealand is significant and this is underpinned by native species, as they provide the early season nectar flow, as well the huge export industry for manuka honey. There is also a multitude of small industries that could be associated with native forests, such as forest-based health and food products e.g., kawakawa, honey, pikopiko, and medicinal plant oils.

Harvesting of nurse crops to create light gaps may also create employment and income, such as manuka oil, kanuka palings, and manuka and kanuka for firewood and smoking food. And sustainable timber production based on CCF regimes will provide jobs and income, starting with production things. There are also opportunities for ecotourism and recreational industries, e.g., mountain biking, which will create jobs and income.