



Environmental policy and landscape transformation

New Zealand Farm Forestry Association Conference 2021

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- Thank you for inviting me to speak here today. I will start with a quick recap of *Farms, forests and fossil fuels*, or FFFF for short – a report I released in 2019. I will then share some information about the direction of a new investigation I have embarked upon that follows on from that report. I will conclude by providing some reactions to the Climate Change Commission’s draft advice.

Farms, forests and fossil fuels: A quick recap

- My previous report argued that the next great transformation of New Zealand’s landscapes was about to begin. Unlike previous transformations, environmental policy would be a major driver – particularly freshwater quality regulations and expectations of a rising emissions price under the New Zealand Emissions Trading Scheme (NZ ETS) favouring less emissions-intensive land uses such as forestry.
- In that report, I cautioned that if emitters covered by the NZ ETS continue to be allowed unlimited access to forest sinks to offset their emissions, we could expect to see large areas of mainly sheep and beef land converted to fast-growing pine plantations over the coming decades. This is because the cost of establishing exotic plantation forests is likely to remain lower than the cost of actually reducing gross emissions in the transport, industry and other sectors for many years to come. I illustrated this using the Hurunui catchment in Canterbury as a case study. [Slide 1: Farms, forests and fossil fuels: Hurunui land use change]
- You can see significant areas of sheep and beef land in 2018 (coloured grey) converting to plantation forestry (coloured dark green) by 2075.
- Meeting emissions reduction targets by relying heavily on forestry offsets risks further delaying action to reduce gross emissions. But it also risks exacerbating other environmental pressures such as soil erosion and biodiversity loss, and creating landscapes that are less resilient in a changing climate. This is because the NZ ETS puts a monetary value on carbon sequestration but not the other important ecosystem services provided by forests. To mitigate these risks, in the last chapter of FFFF I called for a “landscape approach” to managing climate and other environmental challenges. Here is how I described the landscape approach in that chapter:
- “This approach would see the landscape as more than just a place for storing carbon. Rather, it would focus on the landscape as a place in which a wide range of interrelated environmental, social and economic services are provided. Making such an approach work would depend on being able to integrate all that we know about environmental processes at the landscape scale with bottom-up, grass roots knowledge. That in turn relies on willing landowners and communities taking ownership of many problems currently associated with land use practices.

- Ideas like this can remain just that – lofty ideas lacking a means of implementation. Fortunately, using emissions pricing as a way to incentivise changes to land use and land management provides an important source of revenue to facilitate the transition. Revenue from the pricing of biological emissions could be, in part, directed back to the landscapes and communities from which they came. That revenue could be used to support tree planting and related activities designed to reduce the risks of climatic and economic disruption.”

New follow-up investigation: What is the problem?

- I have now begun a follow-up investigation to FFFF that aims to explore in greater detail what a landscape approach to climate policy might look like and how it could be implemented. As part of this work I am undertaking two case studies at the catchment or sub-catchment scale, one in Northland and one in Southland.
- My starting point is that climate, freshwater, soil and biodiversity pressures are interconnected symptoms of a larger underlying problem: excessive human modification of carbon and nitrogen cycles and degradation of natural ecosystems. In rural areas, this has been driven by land use change, particularly the expansion of intensive agricultural systems and clear-fell plantation forestry.
- The environmental policy framework that New Zealand has put in place to deal with these multiple pressures is fragmented. A dazzling array of environment-related policies and funding programmes related to agriculture and forestry has been proffered by teams of officials in different ministries. From a quick scan, my team have identified at least 18 distinct funds and programmes in this area, totalling roughly \$200 million annually, excluding Jobs for Nature.¹ [Slide 2: Funds and programmes]. You will no doubt be aware of others.
- This tangled web of policy is not only difficult for landowners and catchment groups to navigate, but a lack of alignment between policies could also lead to negative unintended environmental consequences as I noted in FFFF, along with unintended economic and social impacts such as higher land prices and fragmentation of rural communities.
- Further, many of the environmental regulations issued by the Government have been relatively blunt and have failed to account for spatial variation in environmental outcomes due to landscape attributes that are beyond landowners’ control. Some of the more arcane regulations within the Essential Freshwater package provide a recent example.
- Clearly there is no single ‘right’ land use for each piece of land, since this is subjective and depends on one’s weighting of environmental, social, economic and cultural values. But thanks to advances in our understanding of the biophysical processes operating within land and water systems, we are now able to identify with a high degree of precision the areas within a landscape where changes in land uses or land management practices would yield the greatest benefits.

¹ At-risk catchments project, DOC Community Fund, Drought Recovery Advice Fund, Erosion Control Funding Programme, Freshwater Improvement Fund, Hill Country Erosion Programme, Jobs for Nature, Mātauranga Kura Taiao Fund, MfE Community Environment Fund, Nature Heritage Fund, New Zealand Agricultural Greenhouse Gas Research Centre, Ngā Whenua Rāhui Fund, One Billion Trees, Our Land and Water, Productive and Sustainable Land Use, Smarter Targeting of Erosion Control, Sustainable Food and Fibre Futures, Sustainable Land Management and Climate Change projects.

- There is also much room for improvement in terms of understanding and recognising local knowledge and mātauranga Māori in environmental policymaking. All too often these sources of knowledge are ignored, but they can play a valuable role in finding solutions that fit the local context and circumstances.
- For the new investigation, the overarching question I am interested in is this. [Slide 3: New investigation problem statement].
- How could policies to reduce biogenic greenhouse gas emissions enable rural communities to transition to climate-resilient landscapes that meet multiple environmental objectives? There are a lot of issues to unpack within that question, so let me break it down into three themes.

Climate-resilient landscapes that meet multiple environmental objectives

- The first is “climate-resilient landscapes that meet multiple environmental objectives”. Let me unpack those words. [Slide 4: New investigation problem statement – landscapes].
- *Landscapes* come in all different shapes and sizes and can be thought about in terms of biophysical or social aspects. I do not intend to get too specific when it comes to scale. I would only note that for the landscape approach to work the scale should be large enough that by working together landowners can have a material effect on local greenhouse gas emissions, water quality, soil erosion and biodiversity outcomes; but at the same time small enough to enable effective coordination between landowners. I am envisaging groups of landowners that are small enough to come together and meet in a wool shed or local hall. [Slide 5: New investigation problem statement – climate resilient landscapes].
- What is a *climate-resilient* landscape? We need to start systemically building resilience into every land use decision we take. The impacts of climate change are already manifesting themselves and there will be further shifts in temperature, rainfall patterns and extreme weather events over the coming decades. We therefore need to be considering which species of trees, crops, fruits and vegetables will be best suited to the coming changes in local climate. [Slide 6: New investigation problem statement – multiple environmental objectives].
- Finally, what do I mean by *multiple environmental objectives*? The environmental pressures I am focusing on are greenhouse gas emissions, freshwater quality, soil erosion and biodiversity. I am focusing on these four because new policies have recently been advanced, or are in the process of being advanced, by the Government in these areas. It therefore makes sense to be thinking about what these new policies mean for landowners and how to ensure that they are aligned.
- The relative priorities of these issues will vary from place to place. In Southland, for example, freshwater quality is a high priority. In Northland, there is a strong focus on erosion control. There are of course many other environmental pressures that are also driven by land use change, but for pragmatic reasons I have limited the scope to these four.
- Some progress towards these objectives can be achieved through changes to land management practices. But there is a limit to how far changes to management practices alone can get us. In some places, fewer livestock and land use change away from intensive farming systems to less emissions-intensive land uses are also likely to be part of the solution.

- Some changes can be undertaken at the individual farm scale, but the biggest gains will come when groups of landowners work together to implement solutions that cross property boundaries. Solutions that run with the grain of the land such as rehabilitating native bush and restoring wetlands can be particularly well suited to addressing multiple environmental outcomes and enhancing resilience.

Policies to reduce biogenic greenhouse gas emissions

- The second theme is policies to reduce biogenic greenhouse gas emissions. [Slide 7: New investigation problem statement – policies].
- What policies could drive the changes to the landscape I have outlined? In FFFF I suggested establishing a farm-level levy on biological emissions and recycling the revenue back to the landscapes and communities it came from. This remains the centrepiece of my proposed approach.
- The main reason I would prefer a levy, rather than bringing biological emissions into the NZ ETS or setting up a separate cap-and-trade scheme, is that a levy is simpler to administer. It was also the preferred option of the Interim Climate Change Committee and is the main option being explored by He Waka Eke Noa. The Climate Change Commission has yet to make any recommendation regarding the choice of instrument for pricing biological emissions.
- The prices on fossil carbon dioxide, biogenic methane and nitrous oxide emissions should reflect their physical attributes and the level they need to be reduced to. I remain of the view that reducing gross emissions of fossil carbon dioxide to zero must be our highest priority, due to its extremely long lifetime in the atmosphere. Fossil carbon dioxide emissions should therefore face a high emissions price through the NZ ETS.
- There are several different ways that a levy on biological emissions could work. For my previous report I modelled the application of a single levy rate to biogenic methane and nitrous oxide, using the 100-year Global Warming Potential (GWP) metric to define equivalence between them.
- However, I see no reason why the prices for biogenic methane and nitrous oxide could not be different. The levy for biogenic methane could be lower than the price for fossil carbon dioxide in the NZ ETS, reflecting the fact that biogenic methane emissions are short-lived and must be reduced to a lower level but not to zero. The price for nitrous oxide emissions could be somewhere between the price of biogenic methane and the price of fossil carbon dioxide. I intend to do some work on this issue.
- There is also more than one way that incentives for forest planting could be incorporated into the biological emissions levy policy. One option would be to enable landowners to reduce their levy liability by claiming credit for trees planted on their land. In this case, a greenhouse gas metric would be needed to define equivalence between removals of carbon dioxide by forests and emissions of biogenic methane and nitrous oxide.
- Another, not necessarily mutually exclusive, option would be to make community tree planting projects one of the activities eligible for funding from the recycled levy revenue fund. This would help to ensure that the forest species and harvesting regimes chosen are locally appropriate and bring multiple benefits.

- I have not formed a view on this question – we are still thinking about how incentives for forest planting could be incorporated into such a levy.
- Getting emissions pricing right will be a necessary, but not sufficient, condition for achieving the transition. There are many other drivers and barriers that influence the decisions taken by landowners. Complementary policies such as spatial planning and land use change mechanisms under the Resource Management Act 1991, information and extension services, and investment in research and development could all play a role in addressing non-price barriers to change. The particular barriers faced by owners of Māori land will also require careful consideration.

Enabling rural communities

- The third theme is enabling rural communities. [Slide 8: New investigation problem statement – enable rural communities].
- A key aspect of a landscape approach is greater community participation and responsibility in decision making. I am interested in governance models that can incentivise coordinated action by landowners, support solutions that are tailored to local circumstances and reduce implementation costs. An example of such a model is the cooperative approach that has recently been established as part of the Dutch agri-environment-climate scheme. In this approach, the final beneficiaries of results-based payments for biodiversity are not individual farms but farmer-led cooperatives, which are responsible for planning and coordinating activities based on guidance from local and national government.
- In Southland, a network of over 20 farmer-led catchment groups has already been established to deal with freshwater quality. This network is being supported and coordinated by the Thriving Southland initiative. I am interested in ways the Government can support and further build the capacity of these existing groups to begin exploring locally appropriate ways of tackling greenhouse gas emissions, soil erosion and biodiversity loss while enhancing resilience.
- To achieve this, an approach is needed that enables communities to access and make use of different sources of information. I am particularly interested in how communities can use physiographic science to better understand the relationships between landscape attributes and freshwater quality outcomes with great precision. This is helpful for identifying and prioritising the best locations for on-farm interventions or land use change.
- Alongside this biophysical science lens, options for changing the landscape will also need to be evaluated from a kaupapa Māori perspective. The interconnected nature of land, water and people is at the heart of te ao Māori and as kaitiaki of the land for future generations, some Māori collectives have been at the forefront of exploring alternative land use opportunities.

Reactions to the Climate Change Commission's draft advice

- Let me close with a few comments on the Climate Change Commission's draft advice. The main aspect I am interested in is the extent to which the Commission's recommendations carry us in the direction of a more integrated approach to land use management.
- Obviously, I welcome the proposal to limit the extent to which fossil emissions are offset with forest sinks, even if they do not go as far as I have recommended. As laid out in FFFF, my preferred option would still be to remove forestry from the NZ ETS altogether and only allow forestry to be used to offset emissions of biogenic methane and nitrous oxide. The

Commission did not have the statutory mandate to consider something as radical as that. But it has gone as far as it can in stating that we must focus on decarbonising and reducing emissions at source, and reduce our reliance on forest offsets in meeting our emissions reduction targets.

- All else being equal, any restriction on forest offsetting implies a more costly mitigation pathway for the economy. Ideally, our reliance on forest offsets would steadily shrink, and both emitters and foresters would be provided with a clear idea of the extent of the transitional assistance forestry is expected to provide.
- After reading the Commission's draft advice, I was left with three questions.
- First, how do you leave forestry in the NZ ETS but limit and progressively reduce its availability?
- As I see it there are at least four approaches that could be used to modify the incentives for afforestation through the NZ ETS:

1. Restrict the amount of new forest land eligible to enter the NZ ETS.

This method would tighten eligibility criteria for registering new forest either by spatially designating eligible land based on minimum environmental benchmarks or auctioning rights to register new forest land. For example, forest land could be assessed on suitability of site location, sedimentation control, forest management practices and other environmental factors.

2. Reduce the quantity of New Zealand Units (NZUs) issued for carbon sequestration by post-1989 forests.

At present, owners of post-1989 forest land are entitled to receive one NZU for each tonne of CO₂ sequestered. If an annual cap were placed on the total quantity of forestry units issued, this would restrict the overall supply of NZUs and thereby discount the notional value of CO₂ sequestration allowed by forests. For example, a ten per cent discount would mean you would need to sequester 1.1 tonnes of CO₂ to earn 1 NZU. Another option would be to auction a fixed quantity of forestry NZUs. Foresters would submit bids representing the tonnes of CO₂ they were willing to sequester for each NZU received.

3. Charge fossil emitters a premium or levy for surrendering forestry units.

In this approach, when forestry units are surrendered by a fossil emitter, a levy or premium is charged for those forestry units. This approach would have the effect of making forestry units relatively more expensive for emitters and thus less desirable on the secondary ETS market.

4. Limit the proportion of forestry units that fossil emitters can surrender.

At present there is no limit on the proportion of forestry units that can be surrendered by fossil emitters. Under this approach, the proportion of forestry units that could be surrendered would be limited to a pre-specified value, such as ten per cent. Such a restriction would reduce demand for forestry units leading to a lower price and reduced incentive to plant new forests. This approach could be expected to create two diverging emissions prices – a lower price for forestry NZUs and a higher one for non-forestry NZUs.

- These options are just some of the different mechanisms that are possible. Each approach has strengths and weaknesses and winners and losers associated with it. History shows that even small changes to the NZ ETS can have large and long-lasting effects. It is therefore essential that we understand the full effects of any of these attempts to limit forest offsetting. A government work programme on this issue should be started as soon as possible.
- My second question is: are the high planting rates for permanent native forests in the Commission's proposed pathway feasible?
- The Commission has recommended a very rapid increase in planting rates for permanent native forests. In the Commission's proposed pathway, the annual planting rate for natives increases from 1,300 hectares per year in 2018 to 25,000 hectares per year by 2031. These planting rates for natives would be unprecedented – the highest planting rate achieved to date was less than 4,400 hectares per year in 2007.
- There tends to be a popular view that natives are good and exotics are bad. Given the wanton destruction of so much native forest on land with very limited productive potential, I can understand the intuitive appeal of that. And there is plenty of land that should be allowed to revert. The Commission's reason is a little different. It sees native afforestation as a prudent way of providing a stream of carbon sequestration post-2050 when we may still have some hard-to-abate emissions. They mention nitrous oxide from agriculture and residual industrial process emissions.
- Thought will need to be given to the long-run fate of these forests. It seems to be assumed that native forests are permanent forests on which you close the gate. But it is equally plausible that native forests could be subject to silvicultural management and sustainable harvest. This serves to make the point that even a native forest may not be a permanent forest. As with exotic forests, if it has been used to offset emissions it has to be maintained in perpetuity unless an equivalent amount of carbon is sequestered elsewhere. In planting any forest – exotic or native – attention has to be given to future option values.
- Planting natives is difficult and expensive. Our silvicultural skills in natives are still far, far away from our experience with exotics. Achieving the very rapid ramping up of native planting rates proposed by the Commission will require a concerted effort across all levels of government to incentivise investment in new native forests and bring down their establishment costs. The scale of such a programme would need to be several times larger than the One Billion Trees programme. How realistic this may be remains to be seen.
- Native forests could be given a boost through the NZ ETS, but these changes alone would be insufficient to bring about the level of native afforestation envisaged by Commission. A range of complementary policy tools is therefore likely to be required. Further evidence from the Commission on the costs of planting natives would be helpful for designing such a policy package.
- My third question is what policies could lead to a reduction in stock numbers? The Commission's Current Policy Reference case assumes that strengthened freshwater policy will lead to an 8–10 per cent reduction in stock numbers by 2030. In the Commission's proposed pathway, dairy and sheep and beef animal numbers are each reduced by around 15 per cent by 2030. The Commission does not comment on what policy instruments might drive these additional reductions in stock numbers. It will be important to understand what effect any policies aimed at stock numbers would have on environmental outcomes.

- Let me finish by saying that throughout this challenging time of environmental catch-up and change, we must be wary of isolated policies that generate unintended consequences. The sum total of climate and other environmental pressures presage potentially significant land use change. That will be unsettling for many landowners and many people will be asking just how much assistance there will be available to make the necessary changes.
- From my point of view, we should be investing in production forests or farming businesses because they are commercially robust. Internalising some or all of the environmental costs of these activities changes the parameters of what is “commercially robust”. This will, in future, mean planting the right trees and grazing the right animals on the right land. This is something that has to involve landowners and land managers in a way that leverages their very considerable expertise. What we must avoid is seeing the landscape as a place where we can park the problems of other sectors.
- I have had quite a bit to say about the risks of using plantation forestry as a carbon waste storage industry. But there could be other problems. Does it make sense to encourage new large-scale native planting if we cannot even secure the biodiversity and resilience of the existing vast Department of Conservation (DOC) estate? Later this year I will produce a report on alien invasive plants and the risks they pose to indigenous flora. Massive land use change could raise significant risks on the weediness front.
- It would be interesting to know what sequestration opportunities are available if we chose to focus our offsetting on securing the health, diversity and resilience of public conservation lands instead of trying to add 300,000 hectares of new native forest by 2035.
- In short, we need to be careful that top-down policies do not lose connection with landowners and kaitiaki. There are no quick fixes to problems that have been many decades in the making.