

Self-supporting strategy to improve climate resilience and biodiversity

Richard Thompson

As a former Chair and founding trustee of the NZ Landcare Trust and co-owner of MacBlack Timber, I have been working on the environment for over 30 years. That background, coupled with governance experience, saw me invited to help establish New Zealand Carbon Farming's Regeneration Independent Advisory Group.

Over the last five years, the group has helped guide the multi-million dollar investment in the development of a nationwide regeneration programme. This focuses on using established science and careful management to support the transition of exotic tree nurse crops into biodiverse native forests. The model established will help New Zealand meet its climate targets, provide long-term earnings for forest owners, and support the resilience and biodiversity of the environment.

As we started the year, the UK Meteorological Office highlighted that human activity would see the atmospheric carbon dioxide concentration in 2022 reach a level 50 per cent higher than the pre-industrial age. At over 420 parts per million, carbon dioxide levels are currently the highest in recorded human history. A lot of the land use debate, and even the global approach to climate change, focuses on what will happen in the latter half of this century. However, with carbon dioxide levels already close to 20 per cent above agreed safe levels, it is clear that we have an urgent need to get carbon out of the atmosphere very quickly and do it in the most cost-effective way possible. When New Zealand Carbon Farming approached me in 2017, the opportunity to tackle this urgent problem on a scale that would make a difference is what attracted me.

A significant advantage

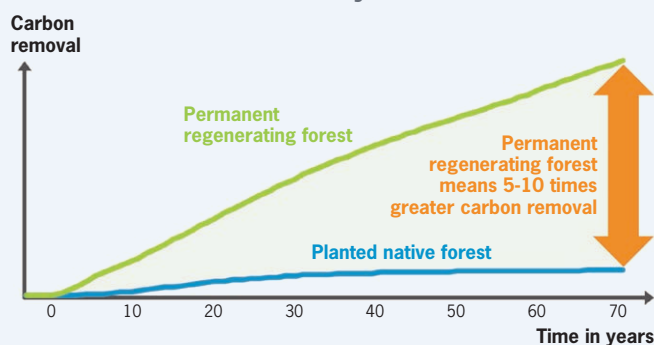
What made being part of this advisory group extremely attractive was that the proposed regime would produce a 'double whammy' of rapid carbon sequestration and a large biodiversity increase. The concept of establishing a nurse crop to support the regeneration of native species is not new. In New Zealand, dozens of academic papers

have been produced on the subject in the last 50 years.

In my own experience, if you want to establish native forests, going out and planting trees in long grass is one of the slowest and most expensive ways to do it. The quickest way is to develop a cover crop and let nature do the work for you. One of the most effective cover crops we have in New Zealand is radiata pine. This means we can draw on significant technology and experience around pine trees, which grow almost anywhere around the country. Radiata pine has incredible properties in terms of sequestration, generating enough revenue to cover the cost of establishment and continuing management.

The ability to be self-funding is significant – especially when native-alone planting projects will cost at least three times as much to establish and potentially use twice or three times the amount of land to achieve the same levels of sequestration. There is also a marked difference in rates of sequestration, particularly over the short-term when carbon must be removed from the atmosphere to help us meet our internationally agreed targets.

Carbon removal over 70 years



Action at scale

When we began our work, the focus for our group of mainly independent scientists and ecologists was to achieve regeneration at a scale not previously attempted in this country.

We identified quite early that pest and weed control were going to be extremely important. But we also recognised that success would hinge on the ability to design the method for each site. That meant tailoring the regime to a particular site, considering the geography and weather as well as how much native forest there was in the neighbouring area to allow seeds to be imported by wind or birds.

We are now providing input into extensive trials across a range of sites to identify the optimum environment for establishing native growth. Along with weed and pest control, one of the main determining factors of success in a transitioning forest is light. Targeted thinning and the creation of light wells at a range of sizes to establish the most productive size, shape and orientation is part of the optimisation process.

Active management

The trick here is to time the intervention, predominately poisoning of selected trees. Too early risks weed and grass suppression of seedlings, too late and it is too dark for establishment. Active management requires monitoring the regeneration progress and tailoring future intervention so that the best microclimate and native forest development takes place.

For owners of permanent regenerating forests, the thinning process could also provide an additional income stream. By undertaking low impact felling, using small machines to minimise disruption to the canopy and undergrowth, wood and fibre created in the thinning process can be recovered from appropriate sites. This can be used to supply the developing local biofuels and existing wood fibre industries, while supporting local employment and supplementing timber supply.

On the other hand, as the non-native plantation trees are progressively removed, there may be a short term reduction in the net quantity of carbon sequestered. This may require the land owner to consider and manage the financial implications. The main fact to remember is that the carbon revenue stream from the early years of rapid exotic tree growth provides enough funds to

cover active management of the forest and fluctuations in stored carbon in later years as the forest transitions to native trees.

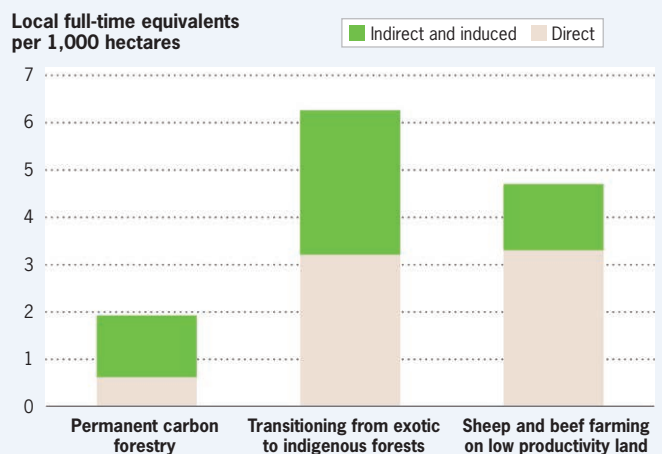
Most of New Zealand Carbon Farming's forest sites are selected for their proximity to native seed sources. As well as a predator control programme to help the bird population, which is vital to seed dispersal, the organisation is also looking at a range of options to introduce more seed sources. This will be with the establishment of native seed islands and supplementary planting.

Economic development

While a lot of the noise from the farming lobby has focused on the potential to reduce jobs in the rural sector, recent updates to Te Uru Rakau research have highlighted the opposite is true. The report *Employment impact of different rural land uses*, produced by PricewaterhouseCoopers Consulting, found that the process of actively managed carbon forestry creates 25 per cent more local jobs than sheep and beef farming on low productivity land.

The report found that of the three land uses considered, transitioning from exotic plantation to indigenous forests creates the most local jobs. An estimated 6.3 local full time equivalent jobs for every 1,000 hectares, compared to 4.7 for sheep and beef farming on low productivity land and two for permanent carbon forestry. The larger number of jobs created by transitioning from exotic to indigenous

Estimated local full time equivalent jobs per 1,000 hectares



New Zealand Carbon Farming

Established and owned by Matt Walsh and Bruce Miller, the business is one of the largest contributors to New Zealand's climate change efforts, sequestering more than 25 million tonnes of carbon dioxide over the last decade.

To put that into context, according to the Ministry for the Environment, the government's five highest-performing projects in its newly released Emissions Reductions Plan will reduce emissions by between four and nine million tonnes of carbon dioxide over the next three years, at a cost of over \$1 billion. Over the same period, 90,000 hectares of New Zealand Carbon

Farming owned and leased forest land will sequester 7.5 million tonnes of carbon dioxide – at no cost to the taxpayer.

The organisation targets only marginal land, with 95 per cent of the property it owns in land use class 6, 7 and 8. The company will subdivide off any better land from the marginal block, re-selling productive farmland and buildings back to the local community.

The company runs the largest private pest control programme in the country, which has removed more than 30,000 pest animals over the last two years at a cost of more than \$1 million each year.

forests was as a result of the additional management activities required to achieve the regeneration.

The report updates employment analysis prepared in 2020, using more up-to-date information and focusing on the specific set of land uses considered, as well as local employment rather than that created elsewhere. In addition to focusing on local employment, not carried out in the 2020 report, the report also provides a 'like-for-like' comparison of the relative effects for a given piece of land. This means sheep and beef farming is only considered on low productivity land, compared to the 2020 report which used an average over all farming land 'because that is the type of farming land which would typically be converted into permanent forests both permanent carbon forests and transitioning from exotic to indigenous forests.' According to the July 2021 Baker Ag report, over 90 per cent of land purchased for carbon farming since 2017 was within these land use classes.

The opportunity to create a complementary income stream on otherwise marginal land is also one that should be attractive to farmers and forest owners. There is plenty of research highlighting that such land can be a drain on farm finances. Introducing a well-managed transitional forest in areas which are steep, erosion prone or hard to access can turn them into a net positive by providing carbon credits and additional income. There is also a long-term benefit of establishing a native forest as an intergenerational legacy that will continue to generate a carbon income over the longer term.

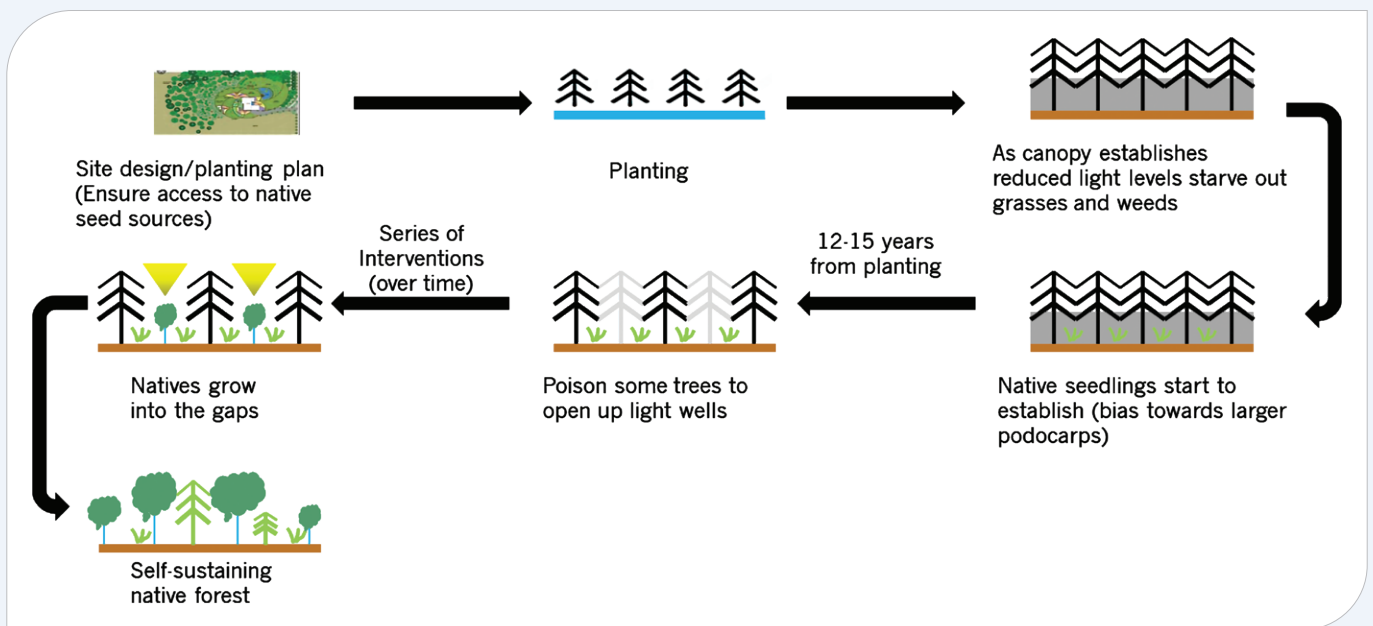
The climate emergency

I am convinced this process has myriad benefits for the environment and the rural economy, but what has become obscured in the heated debate about land use is climate change. There can be little doubt that the rural community is on the front line of climate change. Effects such as drought, flooding and extreme weather already cost rural New Zealand significantly. Anyone who owns vulnerable hill country needs to think about what the future looks like and find ways to improve the resilience of their land while also improving the financial resilience of their business. The farming community has also been on short notice that if they do not act now, they are going to have a carbon price imposed on them.

This makes what we are promoting incredibly important. By establishing a model to sequester carbon and build biodiversity which is essentially self-funding, at the scale required to make a material difference to the problem, the investment required is covered for the long-term. The alternative is a large cost to the taxpayer where billions of dollars could be spent offshore to make up the shortfall in our local carbon targets.

Viable alternative

When there is a clear alternative which relies on established local science and the abundance of marginal land we have available, it makes much more sense to make that investment here and fund it with private



investment rather than the taxpayer. I have spent 30 years working in the environment movement, looking at hill country in particular. I have seen more of our hillsides falling away and very little done to prevent it.

Much of my time has been spent working with regional councils and other organisations to identify ways of turning this round. In all that time, the process of actively managing the transition of exotic trees to native is by far the most viable and successful way of solving some of the urgent problems we are facing.

The transition process

Some of the basic steps to establish and transition an exotic forest to native trees.

- Survey and understand the site. This includes soil, orientation, moisture, existing ground cover, presence of native vegetation, proximity to seed sources and presence of pests. It is especially important to identify and protect native plants of all ages.

- Develop a canopy planting plan. This will be mainly the nurse crop selected for cost of establishment, growth rates, ability to create a canopy and carbon sequestration characteristics. The plan should include stocking rate and set-backs for riparian areas and native vegetation. Stocking rate should be fairly high to quickly establish the light-eliminating canopy.
- Maximise access to seed sources by creating corridors and using gullies and riparian zones.
- Consider the need for enrichment planting which will depend on what is there or nearby. Enrichment planting should have a bias towards podocarps.
- Develop and rigorously implement a pest management plan.
- Create a microclimate to enable regeneration. Carry out a series of thinning intervention to progressively open up light wells. Timing of these is dependent on conditions at the site.
- Commit to continuing management and monitoring of the forest. 🌲

