



BRING IN THE BIRDS - NATIVE FOREST RESTORATION UNDER EXOTIC CANOPIES

Written by Ian Brown, November 2020

The Cost Problem

A major impediment to planting native forest is the establishment cost. The costs of seed collection from natural forests, specialised nursery procedures, labour costs in planting, and up to 3 years of weed control, can add up to \$10 per plant. Tane's Tree Trust has been active in the search for low-cost solutions to native forest restoration – including bare-rooted seedlings and exploring the possibilities of direct seeding. However, most of the work will continue with containerised planting stock and teams of planters making their way across open hillsides.

Pit-Stop Forest Establishment

An alternative approach is to engage a readily available workforce, which costs nothing and is willing to collect and deliver the seeds, neatly packaged in pellets of organic fertiliser. Of course, these are the birds. They have a good track record, establishing forests in Aotearoa for millions of years. Their demands are simple. All they need is a nearby seed source and a convenient perch for a pit-stop. We could take it further by creating a plantation system that will generate cash flow, while the birds help the transition to native forest. Some purists may balk at a mixed exotic-native system but bear with me, it has become highly topical as described below. Examples below - note, **there is nearby native forest** in all instances.



Figure 1: Australian blackwoods, near Mt Pirongia, Waikato, with an emerging native understory

The large trees (above) are 28-year-old Australian blackwoods (*Acacia melanoxylon*) which produce stunning decorative timber with export potential to the Chinese market. These trees were planted in open pasture near Mt Pirongia, Waikato, but are now embedded within an emerging native forest of karamu, mahoe, pigeonwood, *Pseudopanax* species, and a variety of ferns. They form the nucleus of what will be transformed over time, with some supplementary planting, into a mature native forest. Note that regenerating native forest is 500 m away. Thanks to the birds, this native forest will be delivered at minimal cost. Meantime, at about 40 years, the blackwoods will be milled.

Another example of native revegetation under wattles is found near Kawakawa in the Far North. The 15-year-old block of *Acacia mearnsii* (initially planted for pulp) has an understory already well-stocked with tōtara seedlings all other natives including puriri – all thanks to the birds. The wattles are short-lived. In another 20 years, they will likely have done their dash and will start falling apart, no match for the up and coming tōtara. Most likely the owners will not need to do anything but wait to become the recipients of a splendid tōtara forest. There will be no shortage of firewood in the meantime. The large trees in the photo below are white stringybark (*Eucalyptus globoidea*) in a plantation near Mt Pirongia, Waikato. This is another Australian species, with a big future in laminated veneer lumber. Their flowers provide nectar to complement the birds' toilet break, resulting in an emerging native understory dominated by red matipo.



Figure 2: Vigorous regeneration of native species under *Eucalyptus globoidea*, Mt Pirongia, Waikato

In the photo below, strong kahikatea and tōtara regeneration is evident under a canopy of maritime pine (*Pinus pinaster*) in Kaeo, Northland. Maritime pine and kanuka naturally regenerated after a fire burnt the hillside. Tōtara and kahikatea subsequently squeezed out most of the kanuka. The pines are now over 70-years-old and starting to fall over. Now that grazing is excluded, ferns are common in the understory along with hangehange, makamaka, mahoe, and matipo. The future of this forest is now set. It will be a tōtara and kahikatea dominant forest with some tanekaha and hardwoods.



Figure 3: Strong kahikatea and tōtara regeneration under senescent maritime pine, Kaeo, Northland

Continuous Cover Forestry

With a little planning, these associations of exotic and native species could be developed into continuous cover forestry (CCF) regimes. The long-term objective is a transition to native forest, but with an opportunity for some profit along the way. This is one recipe for how it might be done (in this case, with blackwoods):

- First ensure there is a seed source of natives within bird range.
- Plant and manage blackwoods at 8 to 9 m spacing for a final crop at 40 years.
- Add to the mix a selection of native aristocrats, including kauri and totara, that might be suitable for selective milling from 80 years. (Ian Barton considers Kauri and blackwood the two best species for CCF from a wide range of contestants.

Surprisingly, he found that as a nurse for kauri, blackwood performed better than native species such as kanuka).

- Let the birds fill in the gaps.
- Generate income from carbon credits, with additional income from milling the blackwoods at age 40.
- Blackwoods will germinate in the gaps and can be easily managed for a second crop.
- Begin selective harvesting in the natives at 80 years (if sustainable production of native timber is desired) together with the second crop of blackwoods.
- Continue selective harvesting, as part of a CCF regime, or allow a transition to undisturbed native forest.

Transitioning from Exotic Plantation Species

There is a lack of information on the transition of exotic plantation species to native forest. This is a knowledge gap that Tane's Tree Trust hopes to help fill. Some of our common plantation species will support native regeneration, and some will not. The eucalypts and acacias from eastern Australia attract birds, and their open canopies transmit sufficient light to support a healthy understory and an opportunity for transition to native forest. In contrast, the narrow-crowned conifer forests derived from the Western USA provide heavier shade, and their understory is often relatively barren, particularly with Douglas-fir. Cypress species and redwoods have great potential and are popular alternative species, but not much of interest can be found growing under them.

What about the big guy, the elephant in the room, radiata pine?

Transitioning from Radiata Pine

Despite our advocacy for native forests, the [one-billion-trees programme](#) will likely result in extensive increases in radiata-pine forest. No other species in New Zealand has the same capacity for rapid carbon storage in the short term over a wide range of sites, although native forests are better at carbon sequestration in the long term. (Redwoods are a good alternative but are much more site-specific than radiata pine). There is strong advocacy for 'plant and leave' regimes from parts of the forestry industry, ie, radiata-pine planted at high density and left unthinned and unharvested.

We should bear in mind some aspects of radiata-pine ecology. Radiata pine is a relatively short-lived species. Its natural populations normally begin to fall apart at about 80 to 90 years and are mostly gone by 120 years. During that final period, light gaps will become available for competing pioneer species. The limited information currently available indicates significant difficulties, with costly interventions required over long timespans to remove radiata pine regenerating in light gaps, to allow transition to native forest.

In nature, this sequence is commonly interrupted by fire. Like the eucalypts, radiata pine is a fire-adapted species, it is highly flammable, and its natural populations expand and contract in response to fire frequency. With climate change, [fire is likely to become an increasing threat](#) to pine forests in New Zealand, especially in our eastern areas.

In addition to this, [radiata-pine plantations have little to offer fruit- and nectar-eaters](#), other than a place to perch.

So two issues need to be considered: (i) a strategy to reduce the risk of fire, and (ii) a strategy to ensure that when the pines are replaced, it is our native species that do so, rather than an invading army of exotic weeds. There is no point in hoping for the best. We should prepare well in advance. The disintegrating pine forests are likely to be inaccessible, and dangerous to work in. Again, we will need to recruit the birds, provide them with a seed source, and give our native species a head start.

Tane's Tree Trust has promoted two strategies that address the issues of wildfire and forest succession. These are green firebreaks and seed islands. If pine forests are established on a 'plant and leave' regime, there could be a case for requiring both these concepts to be incorporated into the plantation design.

Green Firebreaks and Seed Islands

[Green firebreaks](#) are a proven technology widely used offshore, particularly in China. Their primary purpose is to contain fires, but they could have a secondary function providing networks of native species that encircle and infiltrate plantation forests. These would be available to the birds as a seed source for forest succession and serve as corridors for birds (and other wildlife) to move about in. Fire and Emergency New Zealand provides lists of highly-flammable through to low-flammable species.

Similarly, strategically located 'seed islands' can provide a seed source allowing for bird- and wind-dispersed species. The [seed island approach](#) is currently being evaluated by Tāne's Tree Trust at Waikereru Ecosanctuary, near Gisborne (and other sites) and is proving to be a cost-effective method for large-scale forest restoration. The aim is to cost-effectively enhance indigenous biodiversity by working with (and supplementing) natural processes of regeneration and accelerating succession to high forest. Tane's Tree Trust has compiled a fact sheet on seed islands, which will soon be published.

Summary

There is a tendency to regard our native and exotic species as mutually exclusive. However, with a little planning, they can be harnessed into systems that meet the short-term objectives of reducing establishment costs, sequestering carbon and meeting our climate change commitments, while generating income from carbon and timber, and achieving the long-term objective of conversion to native forest.

The biggest concern is the knowledge gap on the transition of exotic plantations to native forest, which Tāne's Tree Trust hopes to help fill. There is strong advocacy for 'plant and leave' radiata-pine regimes. However, the limited available information indicates the transition from radiata pine to native forest is likely to be difficult, although other exotic species may be more amenable in this regard, particularly the eucalypts and acacias. Furthermore, the requirement of nearby native seed sources is often overlooked. Meanwhile, we can be usefully engaged with new plantings and in maintaining our existing forests - native and exotic.

References

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November 2020*