



## Objectives and Strategies for Planting

### WHY PLANT NATIVE TREES?

Establishment of native trees and shrubs for the restoration and enhancement of native forest is occurring throughout New Zealand usually to meet multiple objectives. The aims for establishing native plants can be broadly listed under environmental and production-orientated objectives.

For environmental objectives, most revegetation programmes use a wide range of natives to fulfil one or more of the following aims:

- extend forest remnants on farms and restore high forest;
- provide shelter on farms, around residential and horticultural blocks;
- provide aesthetic or landscape benefits;
- provide cultural and spiritual benefits;
- provide amenity and recreational facilities;
- enhance wildlife values and biodiversity;
- control soil erosion both of hill country and along riparian areas; and
- improve water quality.

Many natives can also be planted and managed for a range of productive purposes including many direct and indirect benefits such as:

- supply of wood;
- production of raw materials, e.g., bark, leaves, and oils used as medicines, herbs, food, and fibre;
- honey production;
- production of seed and cuttings used by the horticultural industry;
- provision of shade required for stream fisheries;
- provision of screens around buildings and unsightly areas;
- provision of shade and shelter on farms;
- enhancement of tourist areas; and
- carbon sequestration.

It is possible to achieve both environmental and production objectives on the same site by establishing a wood resource of native trees. Through careful choice of species, plant communities can be established and enhanced to provide a sustainable resource of high-quality timber which can be integrated with many conservation-based objectives. Once native forest is established, the adoption of Continuous Cover Forestry (CCF) practices, whereby harvesting is undertaken as single tree or small group felling, will ensure the conservation benefits of the high forest including biodiversity, soil and water values and the landscape are not compromised (Barton 2008).



*Where is the indigenous biodiversity in many New Zealand productive landscapes?*

## Indigenous biodiversity in our productive landscapes

New Zealand's productive landscapes are invariably dominated by agricultural, horticultural, and exotic forestry landuses which cover up to three-quarters of our landmass. Much of this human-induced change of landuse has been to the detriment of indigenous biodiversity. Concern is increasing about the ongoing decline in New Zealand's indigenous biodiversity and for the ecological sustainability of landuses that support our primary industries (Parliamentary Commissioner for the Environment 2002). While the Commissioner strongly supports ongoing preservation initiatives to restore our threatened ecosystems, there has not been adequate exploration of the potential beneficial roles that native plants can play

in our productive landscapes dominated by exotic pastoral, horticultural, and forestry landuses.

As part of a broad range of management opportunities for native plants on our working lands, there is excellent scope for the planting and management of native trees. In addition to the potential productive value of native tree plantations, the establishment of native forest in these productive landscapes will likely improve productivity of the existing primary sector. Significant areas of the New Zealand landscape, both urban and rural, are being revegetated by planted native species. It is estimated that over 10 million native plants are produced annually in native plant nurseries throughout the country. Significant proportions of these native plants are major timber species.

## STRATEGIES TO MEET OBJECTIVES OF PLANTING

*Should those landowners wanting to establish a native woodlot match species to site based on natural regeneration patterns, or should they plant on the best sites to achieve optimum growth?*

### Mimicking natural regeneration and forest succession

Locating species on sites matching their ecological requirements that mimic natural patterns of regeneration is likely to be the most appropriate approach where revegetation is the primary objective. Such sites will contain native timber species and, although growth rates are likely to be compromised by competition or other site factors, landowners still have the option of removing semi-mature or mature trees for timber in the future.

An understanding of the regeneration strategies of each native tree species including their role in forest succession patterns will influence appropriate methods of establishment. Planting strategies that mimic natural regeneration and species successions are most likely to succeed.

For instance, recognition that natural succession of a previously forested site is most likely to require establishment of a range of early successional species. For many sites, these early species, sometime referred to as 'nurse species' will include shrub hardwoods such as manuka (*Leptospermum scoparium*), kohuhu (*Pittosporum tenuifolium*), karamu (*Coprosma robusta*) and koromiko (*Hebe stricta*). These hardy shrub species create sheltered conditions for the inter-planting of later successional native tree species such as many of the conifers like kauri (*Agathis australis*) and rimu (*Dacrydium cupressinum*) and hardwoods like kohekohe (*Dysoxylum spectabile*) and puriri (*Vitex lucens*). Planting strategies that mimic natural succession pathways are more likely to result in good survival and growth rates for most species, provided weed control and releasing are to a high standard.



## Optimum Sites for Native Tree Plantations

For those landowners whose major objective is to establish plantations of native trees for high-value timber production, using natural patterns of regeneration may play a lesser role in determining planting sites and patterns. For native tree species, best plantation growth will occur on sheltered sites where soils are deep and fertile and there is adequate moisture. To ensure optimum growth rates of native tree plantations targeting the best planting sites, in combination with good site management and silviculture practices, is the best strategy.

## Planting patterns

Rigid planting layouts of sites (e.g., line-planting) that comprise a range of microsites may result in a less natural appearance and sub-optimal survival and growth. Such planting patterns do not account for specific site preferences of each species.

Equally, random planting of species will result in mismatching of species to appropriate microsites.



*Native trees don't have to be planted in rows! Rather, a flexible planting pattern will allow matching of species to preferred sites for optimal survival and growth.*

Rather than a rigid or totally random planting pattern, a flexible pattern that allows matching species to sites will ensure greater success of planting programmes.

## Native Trees Can be Grown for Wood

Current research being undertaken at Scion evaluating the growth and wood quality of selected native trees indicates that the timber from fast-growing planted trees can be as attractive as, and has many of the wood characteristics of, timber from old-growth indigenous forest or locally grown and imported exotic species. With growth rates in excess of 50 cm in height and up to 1 cm in diameter per year on favourable sites, logs approaching 40 cm in diameter are achievable within 50 years of planting for kauri and totara (*Podocarpus totara*).

While development of heartwood is slow, particularly in native conifers, the sapwood of planted kauri and totara trees less than 50 years of age contains a range of colours and textures. A range of knot sizes in totara enhances its decorative potential. Basic density of the sapwood from kauri in a 66-year-old plantation was lower than kauri heartwood but higher than that of radiata pine (*Pinus radiata*) (Bergin and Steward 2004). Wood shrinkage and stiffness testing showed plantation kauri was superior to that reported for old-growth kauri and commonly used exotic forestry species. Similar preliminary results are found with fast-grown planted totara.

The results suggest that relatively young plantation-grown native conifers have good potential as a solid wood resource. Preliminary investigations of some of the hardwood tree species in early plantations also indicate fast growth rates but probably faster development of heartwood than in young plantations of native conifers. Such research is providing encouragement to landowners planting native trees on good quality sites not only for environmental and social objectives but also for the option of timber production for future generations



*Given favourable sites, many of our native trees, including kauri, have good potential to be managed as a solid wood resource.*



## CONCLUSIONS

Establishing and managing native trees as a long term supply of timber need not be a single objective. Indeed, greater utilisation of native trees for sustainable timber production is likely to have significant biodiversity benefits in our production landscapes.

Unwittingly, or by design, those planting native trees are establishing a resource which future generations will have the option, on some sites at least, to manage for extraction of high-quality, high-value wood. However, acknowledgement of non-market benefits of established native forest will reward landowners and foresters in many ways long before timber removal is contemplated.

### Carbon Farming and Natives

In 2002 New Zealand ratified the Kyoto Protocol, an international initiative aimed at reducing greenhouse gas emissions and thereby controlling or mitigating the adverse effects of anthropogenic (human) interference with the climate system. An aspect of the Protocol is the recognition of the ability of trees to remove carbon dioxide (significant greenhouse gas) from the atmosphere (Tāne's Tree Trust 2008).

As part of measures designed to assist New Zealand meet these commitments, the Government has several packages in varying stages of development and/or implementation that are of interest to the production forestry sector including relevance to those with native forest. These schemes have the potential to encourage the establishment of native forests on an operational scale (Tāne's Tree Trust 2008).

In addition to long-standing benefits of established native forest such as biodiversity and soil and water values, the planting of trees on bare land for carbon storage as part of the Kyoto Protocol is likely to provide further economic opportunities on many sites and lead to increased interest in the planting of natives.

Latest information on carbon schemes is provided on the Ministry of Agriculture and Forestry's website [www.maf.govt.nz](http://www.maf.govt.nz). An independent website, developed by the Carbon Farming Group, [www.carbonfarming.org.nz](http://www.carbonfarming.org.nz), also provides information including a carbon calculator to allow landowners to assess individual carbon liabilities.



*Matching species to site - harakeke (Phormium tenax) planted along wetter margins with a range of shrub hardwoods on slopes, as a first step to establishing native forest.*

### References:

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- Tāne's Tree Trust 2008: Forestry and Sequestrian: A review of the options for planted and regenerating indigenous forest. *Tāne's Tree Trust Newsletter No. 15*. 10 p.

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Tāne's Tree Trust promotes the successful planting and sustainable management of New Zealand native trees and shrubs for multiple uses.