

plantation forestry and the environment



Logging of kauri for land clearance and lumber in Mercury Bay, Coromandel in the late 19th century.

PEOPLE AND THE LAND

When people first set foot on the isolated shores of New Zealand more than 1000 years ago, they found a densely forested landscape rich in bird-life. However, the arrival of these new migrants from Polynesia signalled an end to the protection afforded this unique environment by its sheer physical remoteness.

Succeeding generations of Maori settlers gradually cleared large areas of the indigenous forests — a process that was to accelerate after the first Europeans started arriving in the 1800s. When Maori chiefs and European settlers gathered in Northland to sign the historic Treaty of Waitangi in 1840, forest cover had already been reduced to 53 percent. Over the next century New Zealand's many-faceted landscape was to undergo a major transition — from woodland to pastureland.

Introduction of refrigerated shipping for butter and lamb in 1882 made farming for export possible and profitable. Indigenous forests increasingly made way for sheep. With comparatively little commercial value at that time, many logs were simply burnt where they fell. Forestry areas not directly affected by land clearance faced other threats, as introduced weeds and pests — gorse, deer and the Australian possum — all flourished in the temperate climate.

It has become traditional for Evergreen's annual reports to include in-depth discussions on topics related to advantages of wood as a material and plantation forestry as a resource.

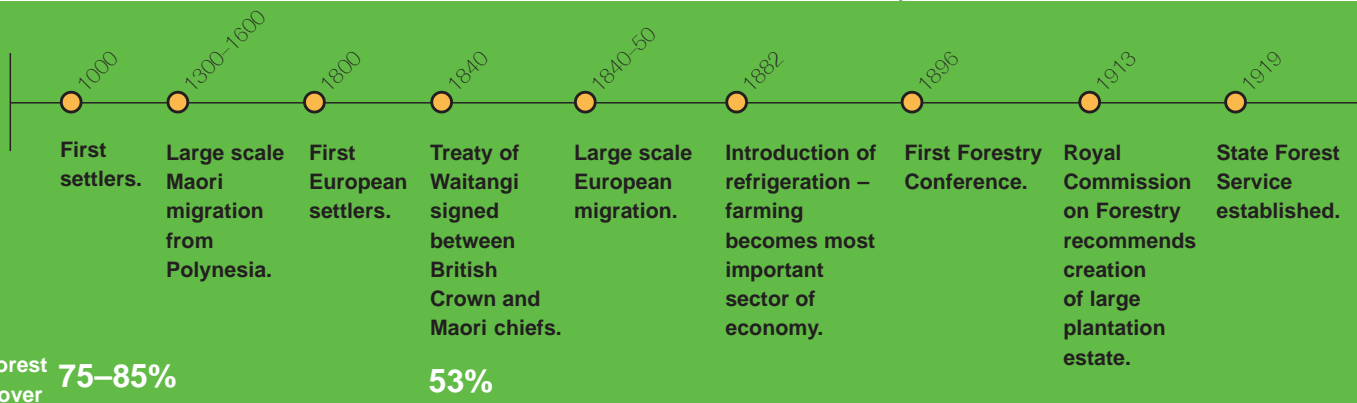
This year, we look at the role of plantation forestry in the environment.

At the start of a new millennium, it seems appropriate to look back at our history of land use in New Zealand in the light of worldwide recognition that future wellbeing depends on our being able to work with nature, not against it.

It has taken centuries for people to recognise that wholesale forest clearance has major environmental consequences that threaten the viability of the ecosystem in which we all live.

Nature has perfected processes such as photosynthesis to maintain the complex balance within ecosystems. We are only just learning how to gain that sort of balance by managing the natural resources on which we depend in a sustainable manner.

In New Zealand, after nearly a thousand years of decline, the area of land under forest cover is now expanding. Thanks to the foresight of early foresters, this country has been a world leader in both the creation and the efficient management of forest farms. The country's thriving forest industry is now firmly based on extensive plantations, mainly consisting of radiata pine. This has not only proved a commercially beneficial investment but an environmentally sound one.

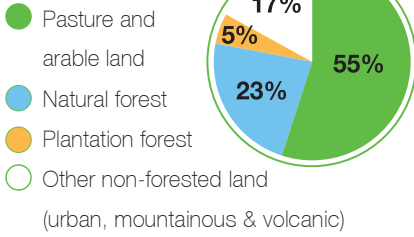


Forest Cover **75–85%**

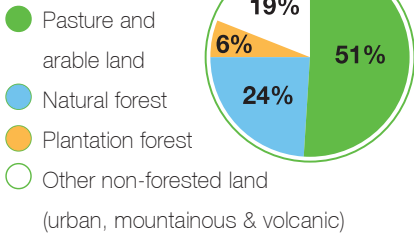
53%

NEW ZEALAND LAND USE

1990



1999



Source: NZ Forest Industry Facts & Figures

Today, the trend of laying bare the landscape has been reversed. The closing decade of the past century saw a small but significant lift in the country's forest cover — from 28 percent in 1990 to 30 percent in 1999. At the same time, the land area in pasture and crops has dropped from 55 percent to 51 percent. This trend looks set to continue. With remaining natural forest now largely protected, plantations of pine and other species are gradually re-wooding the land once cleared for farming.

RE-COVERING THE LANDSCAPE

Even while New Zealand's indigenous forests were being cleared, a few local visionaries realised that the country's wood resource would have to be replaced. A Forest Conference as early as 1896 first identified the need for an alternative wood supply. And by 1913, a Royal Commission on Forestry estimated the indigenous forest supply would most likely be exhausted by 1945. It recommended the creation of a large plantation estate.

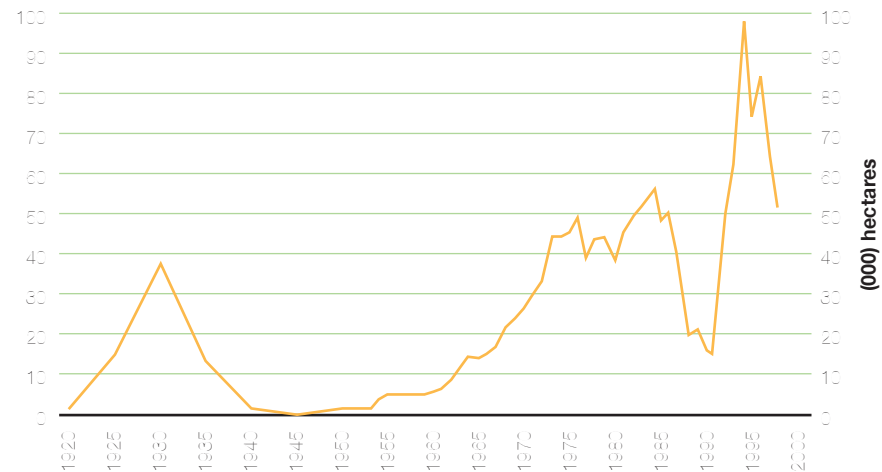
Six years later, in 1919, the State Forest Service was established. Its initial aim — to create a plantation resource of 300,000 hectares (750,000 acres). This was to be financed half by the state and half by private sector interests, and was expected

to satisfy the estimated future domestic demand for wood. Large-scale planting by the state and private investors began in 1925 and continued through the Great Depression until the start of the Second World War. Unfortunately the State Forest Service's vision of expanding plantation areas lost its impetus as the country turned its attention to war operations.

Planting activity languished until the late 1960s when Britain's imminent entry into the European Economic Community (now the European Union) threatened to undermine traditional export earners: dairy, meat and wool. Suddenly, plantation wood was seen not just as a domestic commodity, but a potential export earner.

NEW LAND PLANTED IN PRODUCTION FOREST IN NEW ZEALAND

Years ended 31 December



Source: Ministry of Agriculture and Forestry

1925	1929-32	1973	late 1970s, early 1980s	1984	1990	1991	mid 1990s	1997-99
State Forest Service begins large scale planting.	Great Depression – annual new plantings reach a peak.	United Kingdom joins EEC; across-the-board decline in agricultural commodity prices.	Annual new plantings exceed Great Depression levels.	Adverse taxation regime enacted on forestry; agricultural subsidies eliminated.	Removal of adverse taxation regime on forestry.	New Zealand Forest Accord signed.	Annual new plantings at record highs.	Asian downturn and recovery.
						28%		30%

THE NEW ZEALAND FOREST ACCORD OBJECTIVES:

To:

- define those areas where it is inappropriate to establish plantation forestry
- recognise the important heritage values of New Zealand's remaining natural indigenous forests and the need for their protection and conservation
- acknowledge that the existing area of natural indigenous forest in New Zealand should be maintained and enhanced
- recognise that commercial plantation forests of either introduced or indigenous species are an essential source of perpetually renewable fibre and energy offering an alternative to the depletion of natural forests
- acknowledge the mutual benefits emanating from an accord between New Zealand commercial forestry enterprises and conservation groups, and the example that this unique accord can provide for the international community.

From 1965 to 1984, taxation benefits, grants and other incentives for plantation forestry contributed to large-scale new plantings by both the state and private investors. These exceeded planting rates of the '20s and '30s. Then, in 1984, a political change saw all grants and incentives abolished and forestry investments were subjected to an adverse taxation regime. New planting rates immediately suffered a sharp decline.

In the agricultural sector, farming returns declined in the 1970s and, together with the abolition of agricultural subsidies in 1984, the economic viability of marginal pastureland was diminished. Putting this land into forest became an attractive option.

As well, rapid privatisation of the largely state-owned plantation estate during the late '80s and '90s had a major impact on the sector. Together with the removal of the adverse taxation regime in 1990, these factors contributed to record levels of new plantings – nearly all by private interests – during the 1990s. Even during the Asian crisis of 1997-1998, the rate of new plantings was comparable to the highest levels over the period 1965 to 1984.

Another factor impacting the forest industry was the growing awareness of environmental issues. The concept of sustainable land management — balancing present and future claims on finite resources — became a significant force within the forestry sector. One outcome of this was the New Zealand Forest Accord — an historic agreement balancing forest conservation desires with forestry production needs. Negotiated in 1991, it gained support from both environmentalists and foresters. Signatories included the NZ Forest Owners Association, the NZ Timber

Industry Federation, the NZ Farm Forestry Association, the NZ Wood Panel Manufacturers Association and the Royal Forest and Bird Society, together with a number of environmental and recreational organisations that collectively made up the New Zealand Rainforest Coalition.

In essence, the Forest Accord was an agreement whereby the forest industry undertook to use little or none of the remaining indigenous forest in return for environmental organisations agreeing to support, and in some cases promote, responsible plantation management. Its key effect was to separate the forest production function from the forest protection function in the minds of both private investors and environmentalists. This was reinforced when the government transferred Crown-owned plantations into a State Owned Enterprise, and most of the indigenous forests to the Department of Conservation in the late 1980s.

The result is that New Zealand's forest industry has not faced as many environmental controversies as those in northern hemisphere countries where forest industries are based on the extraction of indigenous trees.

The 1990s saw the introduction of several more initiatives to better manage New Zealand's indigenous forests. These included rigorous policies banning the wholesale felling of indigenous forest, the introduction of selective logging to achieve sustainable management objectives, and a ban on the export of most indigenous wood. Pioneering legislation in the form of the Resource Management Act subjected all land use to environmental criteria.

With 21st century hindsight, it's easier to recognise the remarkable vision of those early foresters and policy makers.

The initiatives they took in the early part of the last century have helped create a substantial plantation estate. It is this resource that has not only allowed the preservation of the local indigenous forests but, through export, helps to reduce the pressure on indigenous forests in other countries.

THE NEW FOREST FARMS

The task of finding the optimum commercial species for tree cropping has exercised the minds of New Zealand forestry professionals and researchers since the time of European settlement. Ideally, plantation wood has to be grown fairly quickly and cost effectively while yielding timber that is both versatile in terms of use and marketable in terms of quality. The tree identified as best meeting all these criteria was radiata pine and it



State Forest Service workers planting seedlings in 1925.

products trade) from just 0.2 percent of the world's forestry area highlights not only this country's fertile climate, but the efficiencies inherent in sustainably managed forest farms.

Although it's been suggested that single species forests are more likely to be

contribution to global wood supply by forest farms. And possession of a proven forest farm plantation resource is, as Dr. Sutton notes, the "best means" of protecting indigenous forest biodiversity.

As a land use, tree farming also has other environmental benefits.

In one year, an average tree consumes 11.8 kg of carbon dioxide – the amount emitted by an automobile during an 18,333 km trip – and exhales enough oxygen to keep a family of four breathing for one year.

Source: National Association of Home Builders Research Foundation, Inc.

now dominates the plantation forests of New Zealand, Australia, and Chile. More than 90 percent of New Zealand's plantation estate is in radiata pine. Because these "forest farms" now provide much of this country's needs, there is little pressure to harvest indigenous trees. In the words of forestry expert Dr. Wink Sutton – a recognised authority on global plantations – : *"Plantation forestry is saving and enhancing New Zealand's indigenous biodiversity."*

Our export trade also helps relieve pressure on indigenous forests in other countries. The fact that New Zealand is able to supply 1.1 percent of the world wood products trade (and 8.8 percent of Asia-Pacific wood

affected by introduced pests or diseases than multi-species forests, there's little evidence to back this. New Zealand is also advantaged by its geographic isolation which, backed by strict quarantine regulations, offers the best protection for both our exotic and indigenous species. Furthermore, vigorous, healthy forests (such as radiata plantations) are inherently less prone to pathogens and diseases.

Radiata pine now has a proven record in terms of growth, marketability and, ultimately, return on investment. As such, it is effective in attracting the sort of investment that is so vital to increasing the

SAVING OUR SOILS

Sadly, it tends to be only in hindsight that the value of forest cover in New Zealand's diverse landscape is recognised. Early settlers set a pattern of forest felling and swamp drainage to extend areas available for the profitable farming of sheep and beef. The result, particularly where hillsides were steep and the soil inherently unstable, was a visible scarring as surface soil washed into nearby water courses. While some degree of erosion is a consequence of geological forces, long-term land clearance was a prime contributor to its acceleration.



Young radiata pines starting to heal East Coast slip scars caused by Cyclone Bola in 1988.

PUTTING RIGHT PAST MISTAKES

In 1988 the East Coast region around Gisborne was ravaged by a cyclone fiercer than any other in local memory. Cyclone "Bola" not only wiped out local crops but deposited a two-metre deep blanket of mud on the nearby sea shelf. In the words of a local landowner, Joan Pollock, "it changed our region for ever".

That's because its catastrophic impact prompted locals to accept responsibility for the volatile environment in which they lived, says Pollock, who now chairs the eco2000 Charitable Trust (www.eco2000.co.nz). Set up to foster sustainable land management, its goal is to re-forest land that should never have been turned into pasture. "We needed to put right the mistakes of the past."

The instrument for doing this was radiata pine, as Pollock explained in a recent address to the Stockholm Environmental Institute Global Dialogue.

"Pinus radiata provides the answer to erosion control... Its quick growth, versatility, root strength, fast canopy cover and disease resistance make it the best tree for the situation."

Forest development also affords a way out of farming for those not farming economically, or sustainably, says Pollock. She notes that new wealth is being generated by forest development in the region at the same time as erosion is decreasing.

"At present, 77 million tonnes of sediment per year – one percent of the world's total erosion – is delivered to the ocean from this region. The landslide rate under forest is about 10 times less than under pasture. Current rates of planting will contribute a 10–20 percent reduction in sediment generated over the next few years."

One way to prevent such soil loss, as a large number of studies have shown, is to re-establish forest cover. Trees not only absorb excess moisture from the soil but also intercept rainfall and significantly reduce the intensity of water run-off from rain storm events. Just as importantly, trees help to bind the soil with root systems that extend deep into the ground.

Most radiata plantations are also established at densities that allow significant amounts of sunlight to reach the forest floor. This encourages the growth of grasses and shrubs that provide soil stability during and after harvesting of the tree crop.

As well as providing valuable land stabilisation, afforestation of land previously in pasture has provided an additional benefit — a reduction in pollution.

Maintaining pasture cover in marginal country requires the use of agrichemicals and fertilisers. The former are needed to halt the growth of both introduced weeds and indigenous regrowth, while the latter boosts the productive capacity of poor, thin soils. One of the major advantages of a robust crop such as radiata pine is that it needs minimal chemical assistance. Thus the polluting effects of chemical or nutrient run-off into nearby waterways is less of an issue where plantation pine has replaced pastureland. This favours recovery of both indigenous and introduced fish stocks — such as trout.

Worldwide, forest planting is being carried out to convert land use away from crops requiring intensive use of agrichemicals and fertilisers — as well as for soil stabilisation purposes, the provision of fuelwood, prevention of sand encroachment, or to mitigate the damaging effects of excessive soil salinity.

In China, for example, flood damage helped prompt the Government to reduce production from its state-owned forests by 45 percent. China is committed to tripling its wood imports until its own plantations are old enough to be harvested to help offset this gap. India partially banned logging of indigenous forests in 1996 and reduced import duties in order to encourage imports of wood products. International organisations, such as the Food & Agricultural Organisation of the United Nations, are looking at the possibility of assisting small farm holdings to grow small-scale industrial wood plantations.

Back in New Zealand, plantation forests with well-defined public access have created an additional recreational resource for tourists, hikers, trail bikers and fresh-water fishing. Access to high country indigenous forests is often made easier by tracks and roads developed for plantations. In the central North Island, radiata forests harbour some of the best rainbow trout fly-fishing rivers and streams in the world.

CARBON CREDITS – A POTENTIAL NEW INCOME GENERATOR FROM FORESTRY

Scientific discussion on climate change and the relationship between global warming theories and so-called “greenhouse gases” has prompted international measures to both reduce carbon emissions and increase carbon absorption. Trees play a major role in the latter as they take in carbon dioxide through their foliage. This, in turn, is locked into wood, and only released through decay or burning. Approximately half of the dry weight of a forest's biomass is carbon — hence the characterisation of forests as “carbon sinks”.

The ability of plantation forests to absorb carbon has provided them with a new source of potential income. The principle of allocating carbon credits based on the amount of carbon taken into forests as “carbon sinks” has been widely promoted as one method of encouraging companies burning fossil fuels to offset these emissions.

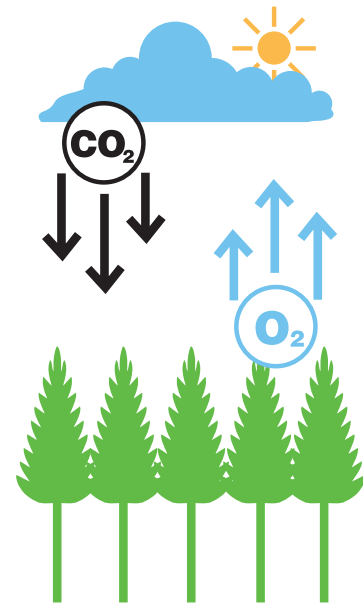
When averaged over time, a hectare of New Zealand radiata forest in a perpetual cycle of harvesting and replanting would contain about 100 tonnes more carbon than an equivalent hectare of pasture. In addition, if farmland is planted for forestry rather than used for rearing livestock, there are substantial reductions in emission of greenhouse gases such as methane or nitrous oxide from animals.

A global “carbon” market could give industries a choice of methods to reduce or compensate for their emissions and would potentially involve both the trading of emissions permits and the trading of carbon credits. The establishment of an international carbon and emissions trading system would allow forest owners to earn additional valuable export income and increase the overall value of their forests.

Progress is already being made in this area. Recently, the Sydney Futures Exchange (SFE) and the New Zealand Futures and Options Exchange (NZFOE) signed a Memorandum of Understanding with State Forests of New South Wales to develop the world's first exchange-traded market for carbon sequestration credits. Trading of these carbon credits is expected to have started at the SFE and NZFOE by the end of 2001.

For companies purchasing carbon credits, a trading system would provide a source of credits that would ultimately reduce the

Average Global Warming Potential (GWP) impact of the annual change in biomass in all forests available for wood supply:



GWP IMPACT:	-3116.1kg CO ₂ /ha, year
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A negative number **lowers** the potential for global warming

On average the net sequestration in the forests available for wood supply each year is 3.1 tonnes carbon dioxide per hectare. The GWP impact is negative, meaning greenhouse gas emission effects are reduced. This represented over 310 million tonnes of carbon dioxide in 1997, almost six times the amount of carbon dioxide emitted from the production of pulp and paper in all CEPI member countries.

Forest-based industries should be encouraged in their key role as contributor to the sustainable management of forests and to the carbon sequestration in growing forests.

Source: CEPI (Confederation of European Paper Industries), 1999.

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costs to companies of meeting their commitments under the 'Kyoto Protocol'. For countries like New Zealand which have the land, climate and expertise to grow

trees to sequester Northern Hemisphere industrial emissions, carbon trading has the potential to become a substantial, profitable business.

system establishes the environmental credentials of this country's forest industry in global markets.

The United Nations Framework Convention on Climate Change was adopted in 1992 as a result of climate change concerns, and a Conference of Parties was established to promote the effective implementation of the Convention. In 1997 the third Conference of Parties held in Japan adopted a consensus agreement, the so-called 'Kyoto Protocol'. Under this agreement involving 174 nations, industrialised countries undertook to reduce greenhouse gas emissions to 1990 benchmark levels by 2008–2012.

COMBINING COMMERCIAL AND ENVIRONMENTAL BENEFITS

Looking to the future, it seems inevitable that the environmental benefits of plantation forestry will become an increasingly important commercial advantage. The integrity of all "environmental" impacts will in part depend on transparent accounting, agreed standards, ongoing verification and independent certification processes.

In that light, New Zealand's plantation-based forest industry is developing a robust reporting system called the Verification of Environmental Performance (VEP). The proposed VEP certification

Plantation forestry offers solutions to some key global environmental issues. For instance, it consumes far less energy than competing and substitute industries. Further, the industry is proving its credentials as an energy-recycler. Timber waste is increasingly providing the energy needed to process logs into high value, kiln-dried timber. Meanwhile, the trees themselves are helping to offset the potentially damaging impact of carbon-emitting industries on global environmental health by serving as "carbon sinks".

With its ability to serve both commercial and environmental needs on a sustainable basis, plantation forestry is increasingly being recognised as an attractive and socially beneficial use of land.

