A treasure-trove in the pines

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New Zealanders tend to have a love-hate relationship with Pinus radiata.

This exotic pine provides jobs and wealth, is a home-grown source of construction timber, stabilises eroding hillsides, protects our water supplies, and is a highly productive crop for land which is of marginal value for farming. That's all well understood.

But on the other side of the coin, pine forestry is often seen by the public as a drab monoculture — something of an ecological desert.

Those who work in forests know this is not true. They see things the driving public does not see from the road — the profusion of hardwood shrubs in the understory and flocks of native and introduced birds.

But even forest managers did not know the extent to which their exotic plantations are havens of biodiversity. Only in the last decade, as researchers have begun looking for indigenous species has the true picture started to emerge.

It's a picture which is really quite extraordinary.

"Even in the clear-fells, which we have often had to defend, we are finding that invertebrates have recolonised within a matter of weeks," says Timberlands environmental manager Colin Maunder.

"My theory is that clear-felling replicates what happens in nature — the sort of catastrophic destruction which occurs as result of severe winds, volcanic activity or fire. These events provide opportunities for colonising species, as well as for species which like feeding along the margins of forests, like bats and falcons.

"The more we look at exotic forestry, the better it gets."

The search for biodiversity in exotic forests is a result of a drive among forest owners to get their forests certified by the international Forest Stewardship Council (FSC) — a process which requires biodiversity to be identified and given protective management.

Some of the most important biodiversity research has been carried out by Ecki Brockeroff, a scientist with Scion/Ensis, who found a total of 202 native and 70 introduced plant species in 60 small study plots in Rotoehu and Kaingaroa Forests (near Rotorua), Hochstetter Forest (on the West Coast) and Eyrewell Forest (in North Canterbury).

The canopies of these forests may have been made up of only one species — but the small plots were also home to 10 per cent of New Zealand's native plant species.

Graham West, Ensis, says 65 indigenous plant species were found by Chris Ecroyd, herbarium curator at Scion/Ensis, and Ecki Brockerhoff in six plots in the Puruki catchment in the central North Island, seven years after clear-felling a stand originally planted into pasture containing few native plants.

While this level of indigenous species richness is not as high as native forest, which boasts epiphytes and longer-lived climax species, it is much higher than pasture where native plants are normally found at very low levels, if at all.

Plantations as young as six years may have healthy fern populations and these often reach levels of diversity similar to adjacent native forest. John Ogden, Auckland University, found tree ferns reached densities of up to 2500/ha in mature central North Island pine plantations.

In a report last year, Ecroyd said pine forests are also home to a number of endangered or threatened plant species.

"The native woodrose, Dactylanthus taylorii, grows in a pine forest in north Taranaki. Pomaderris, a genus of indigenous shrub uncommon in the South Island, is found in relative abundance in Canterbury's Eyrewell Forest," he says.

"Iwitahi Orchid Reserve, a few hectare corner of the Kaingaroa Forest, is a paradise for orchid lovers. This old-growth Pinus nigra forest supports 36 species of native orchid, including the only known North Island population of Chiloglottis valida. A larch and Corsican and Austrian pine forest near Hanmer Springs is also rich in native orchids.

Steve Pawson, a University of Canterbury PhD student working with Scion/Ensis, who has been investigating invertebrate biodiversity, has found more than 350 species of native beetle alone, a number that keeps climbing, with greatest species richness in clear-fell areas.

Lorna Douglas, Northern Polytechnic, says the good shelter and high water quality in gullies in plantation forest are ideal habitat for Hochstetter's frogs. Monitoring in Carter Holt Harvey forests has show that some frogs survive both wind-throw and harvesting and have been found in regenerating stands after logging.

Good pest control in plantations, as well as in the native forest remnants within the forest, is highly beneficial to native and introduced birds. Researchers working in Kaingaroa Forest in the 1960s found the highest densities of birds ever recorded on the New Zealand mainland, with 1203 pairs per 100 ha, of which 652 were native.

The North Island kiwi is common in some plantations, with 800 –1000 estimated to live in Waitangi Forest, near Kerikeri, despite normal forestry activities.

Streams running though plantation forests make good habitat for many native fish. Trees can improve bank stability, help to absorb nutrients from runoff before they reach the stream, and provide shade that controls stream temperature and the growth of nuisance plants — all of which helps improve stream health.

Several endangered species such as giant kokopu and short-jawed kokopu have been found in streams running through plantation forest.

Aquatic invertebrates upon which native fish feed, also benefit from forestry. S. M. Parkyn and M. J. Winterbourn of the Canterbury University School of Zoology found in 1997 that invertebrates did not show any pattern of preference for leaf litter of native trees over exotic trees.

Discovering that such a treasure trove exists in pine plantations raises a number of issues for forest managers — not the least of them being how to manage the forests to protect and enhance this biodiversity.

So far, research has shown that invertebrates and most bird species are not threatened by most forest management practices. Care, however, does need to be taken when ground-nesting birds are incubating eggs. Forest managers in kiwi country now routinely use kiwi-sniffing dogs to detect birds before raking, windrowing or burning clear-fell areas.

Bats are now known to be present in many old-growth pine and Douglas-fir forests (see panel), despite their declining populations elsewhere. More research will tell managers what practices they should adopt to maximise bat survival when they are most vulnerable — at harvest.

In Planted Forests and Biodiversity, a paper delivered by Ecki Brockerhoff and co-authors at a UNFF Experts Meeting on the Role of Planted Forests in Sustainable Forest Management in 2003, the authors said plantations play particularly important roles in buffering native forest remnants and enhancing connectivity between areas of native ecosystems.

"In doing so, these plantation forests may help foster the overall sustainability of agriculture and other land uses across these landscapes."

However, to sustain health and productivity of the forests themselves, the authors said managers needed use of a greater variety of planted species (exotic and native). The use of alternative forest management regimes, such as the extension of rotation lengths in some stands, and adoption of a variety of harvesting approaches was also advised.

This approach may well prove to be the next step in the evolution of the New Zealand forest industry.

While there are economic advantages in growing trees of a single species in forests grown for wood fibre production, this may no longer be the case in forests grown to provide other services such as carbon sequestration.

Diverse forests also tend to be healthier than monocultures and much less vulnerable to damage from species-specific exotic pests. Fruiting species, like some eucalpts, also provide a valuable food source for native birds like kereru.

In the meantime the forest industry can feel proud that its Pinus radiata and other forests protect such a wealth of native species. Protecting and enhancing habitats for these plants and animals is an important part of managing an FSC-certified forest.

It also makes the lives of those who work in our plantation forests that much more rewarding.

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