indigenous forest, only to be interrupted by plantations and agriculture. It may be that pine trees facilitated an increase in biodiversity but "good biodiversity" is not measured by the number of species. Biodiversity, which refers to the indigenous component, is about the gene pool, species, ecosystems and landscapes naturally occurring. "Good" biodiversity has nothing to do with a greater number of species. There are more exotic plant species in New Zealand than native. It is about recognising and protecting that which is unique to New Zealand.

This means protecting and restoring ecosystems that have been modified or degraded through past use, including in the case of the pumice lands, shrubland ecosystems and successionary phases. We have a responsibility, in particular to future generations, to ensure nature's successionary and evolutionary processes take their course at least in representative areas in the land. It may be that the pine plantations are now a valuable resource and that we all need wood. However, the market is coming to view the plantations as more of an asset if they incorporated native protected ecosystems. Furthermore, I would question the amount of wood that we need, considering the huge amount of paper and packaging wastage. Recent reports by Friends of the Earth (UK) and Rainforest Action Network (USA) re-commended that sustainable consumption levels will require cuts in wood consumption of 65% in the UK and 75% in the USA.

Grant Rosoman
Forests Campaigner
Greenpeace

Barr responds – a pertinent answer?

Sir,

The editorial in the last issue of the NZ Forestry (August 1995) journal leads with this quotation, " ... ask an impertinent question and you are on the way to a pertinent answer".

It is a stimulating piece of writing which moves me to so many pertinent answers that I scarcely know which to select. But it also could stimulate some that could be classed as impertinent, coming from one who has spent 60 odd years in farming and only 50 interesting years in forestry.

Yes, I think there is an ever-growing trend to growing timber on faster rotations – good fat pruned logs at 30 years. But do these regimes need to be of higher capital input? I think not. Nor do they have to be of higher volume at the expense of quality, pruned pine, cypress or eucalypt.

When farm foresters became interested in forestry as a diversity in land use, regimes suggested to us were to plant six feet by six (2500 sph) with mandatory blanking up. Then came the killer, a working plan as long as your arm; thin and prune, thin and prune down to 400 sph: far too many. It was a work-heavy and expensive job imposed on busy people. Were these the "robust forests" of the past of which the editor writes? I hope not. I would expect the "robust forests" to be the Fenton board regimes, or some that Sutton advocated for clearwood production.

Agroforestry – Low Input and Simple

Later in his article, the editor writes of a low-input system with its "organic" or "permaculture" connotations and its "hippy" undertones.

Let me set out one of several low-input farm-forestry regimes. Yes, we do have hippies in our ranks; very welcome they are too, and often stimulating.

This is a common agroforestry regime:

1. Plant 450 s/ha pines in groups of three at 8 metre centres, or in pairs if of aged cuttings.
2. Sail or stability prune any bushy top heavy trees at 18 months – a few hours work per hectare.
3. At three years of age or height 3-4 metres, form prune the selected trees. This is the start of the pre-emptive pruning (as first proposed by Franklin). The method involves removing any ramicorns, correcting the leader if necessary, removing any coarse rogue branches and lightening any basket whorls. If aged cuttings are used, the form will be good and little work is needed. This operation takes less than a minute. A tree selection can be made at this stage and surplus trees removed.
4. A clear lift is made at DBH 12-14 cm and continued up to 10-11 cm, which usually leaves a green crown of three metres or half total height. Under the pre-emptive pruning regime the correction of the residual green crown is then done, tidying up basket whorls (the big trouble), leaders and so on. Epicormics are rubbed off, even in the lower whorls of the green crown.
5. This pruning procedure is repeated to a height of either 6.3 or 8.5 metres.

Is this high technology? I think not. But it is certainly low-input as to work and capital. After working on this method of silviculture even in my late eighties, I found pruning to be a pleasure. My teenage grandsons could be taught the rudiments in a few hours. Forestry can be a simple procedure compared to farming.

Foresters' Attitude to Change

Foresters have a name for being very suspicious of change. Why else would they have stuck to those fundamentalist regimes of 60 years ago until the recent past? A train trip from Hamilton to Rotorua through the back end of the Mamuku Forest can be typical of what one sees around the back roads of the Pumice Plateau, masses of dead and dying trees. I think timber regimes of the present should be simplified, keeping basic ends in view. Perhaps a look across the fence to observe what the farm foresters are doing would help.

Farm foresters have adopted other work-easy regimes: the one-shot silviculture over gorse (as proposed by Bunn); the group plantings of one eucalypt at 10-metre spacings surrounded by four close-planted pines (Terlesk); close-spaced, in-row planted pines and eucalypts wide-spaced between rows (MacKay, Barr, Tombleson and Moore); eclectic thinning of close-planted double rows of pines through gorse: I could go on. All of these regimes are low-input and efficient methods of growing early pruned fat trees.

This is not intensive silviculture, it is "Timely Tending" (Barr and Colley). As Mick O'Reilly, one of our Farm Forestry members, said at a seminar: "We do our thinning before we plant our trees".

I could go on but I will restrain myself, except to point out to foresters on the Pumice Plateau that they are growing pulp on some of the most sought-after dairy land in New Zealand. Large herds of 600-700 cows are being run on that potentially rich no-mud land. The largest cheese factory in the world has been built at Lichfield within sight and smell of Tokoroa. Watch it you lot!

Neil Barr

The Editor replies to Neil Barr

I seem to have netted some by-catch; certainly the targeted fish aren't biting. My arguments are not with farm foresters, who I think largely display the integrated decision-making to which I was referring.

Though in saying that, only considering agroforestry is also a mistake. Regime choice must relate to individual farmers' objectives, resources, and particularly to their constraints and options. Not everyone has the expertise, time, land or inclination to pursue agroforestry management, nor should they.

I think, more and more, that one of the most important considerations for forest growers, and especially for farm foresters, is having options. It means having some other "less commercially viable" species, or managing for a so-called "non-profitable" production thinning contingency –

so be it!

A mad focusing on the bottom line of a spreadsheet doesn't always allow such considerations. Most often the value of the options are not quantified (some probably can't be), and many may not even be identified during the analysis. But that is another story.

Time to throw the line back into the water; I'll add a bit of berley this time.

Ed.

CONFERENCE PAPERS

Mechanisation of logging operations in New Zealand

Alastair Riddle*

Introduction

There has recently been a flurry of activity in New Zealand forests as contractors and forest owners look to mechanising parts of their logging operations. The 1994 Forest Industries expo at Rotorua provided some of the impetus for this push, as many of the machines imported for this show were subsequently trialed in forest operations. The Health and Safety in Employment Act (1992) has also provided motivation for the industry to seek safer alternatives to people with chainsaws. By the end of the decade it is possible that a large proportion of the delimbing operations in our forests will be undertaken by machines, with a smaller proportion (because of slope limitations) of the harvest being mechanically felled. It is likely that most logmaking decisions will be made by machine/computer as the cost of poor decision making climbs with increasing log values. There is also a renewed interest in undertaking this logmaking at processing yards rather than on skids. For mechanisation to be achieved at acceptable economic levels however, both contractor and forest owners' operations must be run efficiently. Any poor tactical or operational planning pushes the unit rates of a mechanised operation to unacceptable levels.

Background

Mechanisation of logging is not a new trend, but has been a spasmodic process over the last 15 to 20 years. In the late 70s and early 80s there were several tractor, rubber-tyred loader and excavator-based feller bunchers being used in minor species. Chain flail delimbers, both static and mobile, had also been used with varying degrees of success. Waratah Engineering had three machines working in radiata thinning operations. Gleason at the 1982 NZ Logging Industry Research Association's (LIRA) Logging Machinery Seminar reported that of all the different machines and approaches that had been tried, just four felling machines and no delimbing machines were being used. At the 1986 LIRA 'Ground Based Logging' seminar Gordon reported the lull continuing, with a few feller bunchers and a locally built delimber, the Hunt processor, being the only machines replacing men with chainsaws falling and delimbing in our forests. In contrast, an Australian speaker, O.H. Raymond, reported the widespread mechanisation of falling and processing in their pine forests by a range of systems. The New Zealand speakers put the slow rate of change down to our extensive use of small contractors, controls on the volumes produced, conservative forest owners and the high cost of imported machinery, although in hindsight it is obvious that low-priced and readily available labour gives forest owners little incentive to change.

LIRO has kept a watching brief on the new machines and systems and has been able to help the industry with evaluating these. A large number of different machines and systems have been tried and reported and these are summarised in a review of mechanisation in New Zealand which will soon be published by LIRO. This will contain summaries of 220 published and unpublished reports and papers on mechanisation in our forests.

Analysis of these reports shows a gradual increase in the mechanisation of thinning and minor species operations, although by LIRO's 1991 'Machinery Developments in Logging' seminar only seven of the 78 Waratah units sold were being used in New Zealand. Just 15 mechanical harvesting machines had been introduced in the five years since the 1986 seminar (Cochrane 1991). In the last three years to February 1995 there has been a considerable change, as can be seen in Table 1.

Machine Type	Thinning	Clearfell
Feller Director	1	2
Feller buncher	1	7
Delimber/feller/buncher	3	
Harvester – shear		2
Harvester – saw	4	6
Grapple processor	2	6
Stroke delimber		3
Hahn harvester		5
Static delimber	1	38
Forwarder	13	1

Table 1. Logging machines for felling or delimbing in use in New Zealand – Feb. 1995 (LIRO, unpublished)

* *Senior Researcher – logging systems Logging Industry Research Organisation.*