Forest, Foresters and Forest Policy

Sir,

The Minister of Forests at a meeting of a section of the Institute last December admitted that the Forest Act is "hopelessly inadequate" and that "it has no philosophy at all", never mind an overriding philosophy.

New Zealand was a naturally forested country. Although the Maori first settlers may have destroyed rather more forest than was strictly necessary to provide for their system of agriculture, they did come to understand and identify with the forested environment of their new homeland. They realised its importance for their welfare and their aim was to conserve it. The book "Forest Lore of the Maori", by Elsdon Best, clearly attests to this.

The advent of European colonisation by settlers from the British Isles brought a new and different philosophy. These were people who knew little about forests and had no national tradition of forestry. They were farmers. They understood about sheep, dairy cattle and arable land. Forests were an alien and frightening phenomenon which had to be removed so that they could farm as practised in the Old Country.

One can only speculate now how different the forest history of New Zealand might have been if these European colonists had come from Germany or France, where the importance of forests had long been recognised and there was a history of sustained-yield multiple-use management of their own native forests, or even from Scandinavia where the farmers were usually foresters as well.

It is only in recent years that many Pakeha New Zealanders have begun to identify with the forests as the Maori did of old. West Coaster Peter Hooper's essay, "Our Forests, Ourselves", appeared in 1981. By now, however, a vast indigenous forest heritage and resource, along with the possibility of worthwhile management on a sustained-yield, multiple-use basis, had been destroyed, much of it wantonly and wastefully.

A correspondent in the May 1989 issue of NZ Forestry identified schizophrenic foresters, with particular reference to those in the Forestry Corporation having to put into effect Government policy regarding sale of the nation's exotic plantation forests. There should be other foresters, employees now of the Department of Conservation, feeling equally schizophrenic in view of their former responsibilities for carrying out government policy requiring clearance of indigenous forest for conversion to pines.

Inevitably, in a nation where the Forest Act itself does not even boast a philosophy of forestry, schizophrenia in foresters surely goes back for many years. For a long time New Zealand foresters used to obtain all or part of their professional training overseas, where multiple use and sustained yield were generally entrenched as fundamental concepts. On returning to New Zealand to pursue their careers, foresters had to adapt to a society which had a very limited and one-sided understanding of the potential and purpose of forestry.

Forestry requires planned management in the national interest over the long term. The creation of the exotic plantation resource has proved the validity of this fact, although the cost of such a narrow single-species programme to a broader and more comprehensive practice of forestry is too often overlooked.

One of the great merits of government involvement in forestry is that the State can take the long-term view, where private investment would be discouraged by the time factor and delay in obtaining profit and the uncertainty of the eventual return. The Treasury dogma, that government investment should only occur in those activities which can make a specified rate of return, is as irrelevant to forestry as is the "either preservation or single-purpose profit" attitude to land use which formed the basis for the demise of the Forest Service.

Until the politicians acquire an understanding of forestry philosophy, there is unlikely to be a coherent forest policy. In the absence of such a policy, the nation's 70-year investment in the plantation forests is being sold off, probably even without management conditions, to the highest bidder for a once-only, short-term gain; reafforestation of our most degraded and eroding lands, following misguided clearance for farming, is apparently being abandoned (only a quarter of the East Coast project had been completed by the time the Forest Service was axed); there are still no national guidelines for preservation, or sustained or wise use of indigenous forest on private land; the export of indigenous woodchips, the least processed form of the timber, is still permitted after a decade of continuing forest clearance; there seems to be no certainty that the covenants for the North Westland beech production forests on Crown land will be such as to ensure a properly monitored sustainable operation. One could go on . . .

Jack Westoby in his book "The Purpose of Forests", reviewed in the May 1989 issue of New Zealand Forestry, recognises failure in the attempt to bring forestry into respectability in the eyes of many national Governments. New Zealand must surely rank high up the list of such countries. It seems possibly fortuitous that the 13th Commonwealth Forestry Conference, with its theme "Forestry – A Multiple-use Enterprise", should be taking place in New Zealand at the present time.

Eric Bennett,
Rothesay, Isle of Bute, Scotland

Efficiency of fire protection

Sir,

A methodology purporting to determine the efficiency of anybody's methods of dealing with any particular problem is obviously invalid if it doesn't include a definition of the nature and extent of the problem. On this ground, the article by Peter Robertson in the May 1989 issue proves absolutely nothing about the subject in question and I take issue with its methodology as a means of determining forest fire protection efficiency.

Forest fire risks and protection requirements are affected by a number of factors, all highly dynamic, such as: size of forests, locality of forests, bounding land use, climatology, land preparation methods, weed and vegetation spectrums, silvicultural methods, logging practices, access, population densities and related social climate, public access/highways etc., recreational uses, and others. This makes accurate numerical evaluation of forest fire risk and protection requirements very difficult. Furthermore, arriving at an accurate assessment that includes all the variables would still be analogous with shooting at a moving target.

In a commercial forestry environment, forest fire protection expenditures require justification along commercial lines, and although it does not answer all the questions, there is a rationale for this:

A basic formula relating to risk is:

Risk = hazard × exposure

where

Hazard = the chances of an event happening

Exposure = the amount of loss or damage that would ensue.

For example, risk in relation to a car consists of high hazard and low exposure compared with risk in relation to an earthquake in Wellington, low hazard but extremely high exposure.

The components of forest fire risk are low hazard, but especially in large forests, extremely high exposure along the following lines.

Hazard: weather is the most influential component relating to the chances of a forest catching fire. New Zealand has a maritime climate that generally

keeps forests too moist to burn readily. There are exceptions to this when dry windy periods occur in most parts of New Zealand for periods of maybe 2-6 weeks once or twice per decade.

During these periods, the hazard is extreme but the periods occupy a low percentage of total time. The Fire Weather Index applied to forest fire risk in New Zealand gives a numerical value to likely fire intensity if fire should occur. This index has been transferred from Canada. There, the figure is valid for "Upland Jack Pine Fuel Type – 0% Ground Slope". (1) I understand from New Zealand foresters who have been there that the New Zealand equivalent would be roughly 18-year *Pinus radiata* containing debris from an extraction thinning. The FWI figure would therefore be an understatement of likely fire intensities in forests containing higher fuel loadings, and that is certainly a high percentage of New Zealand forests. Fire intensity is subject to measurement. A 1m wide cross-section of a fire front is assessed as having an energy output in kilowatts per metre:

Fire intensity = kW/m

Worldwide, it is generally reckoned that a vegetation fire with an intensity of 4-8000kW/m will require major suppression efforts and with intensities of > 10,000kW/m is beyond control.

In New Zealand we regard the FWI figure of >31 as extreme. At the standard fuel levels, estimated fire intensities would be 5000 kW/m and it would be certain that in *Pinus radiata* stands with waste thinning debris and/or gorse or bracken understories, a fire would be difficult or impossible to control except on some occasions during early morning hours. We can therefore assume that days with FWI figures of >31 represent days when there are high probabilities of disastrous forest fires. It would be nice and tidy, therefore, to go through annual FWI figures and mean them to obtain a percentage of hazard. In reality it doesn't happen that way. In most parts of New Zealand the pattern is to have no, or few, extreme FWI days for a number of years and then a period of possibly six weeks of them. If the extreme FWI days occurred in a series of a few days each, we could suppose that any fire that did occur would shortly be subject to control by an amelioration of conditions. That this is not so indicates that the real hazard is greater than that represented by the mean of annual FWI >31 days.

There are human elements of forest fire hazards that are subject to some control in response to high hazard days. These elements are subject to a lot of changes including social changes, and defy numerical evaluation.

However, it is plain that New Zealand forests are subject to a hazard that overall is low, but nevertheless is very real indeed.

Exposure: It is generally recognised that something like 95% of forest fire losses are sustained in 5% or less of fires. This reflects the facts that most fires occur in less than extreme conditions, or are subject to quick initial suppression efforts. Further, that should a fire become established in suitable forest fuels, during an >FWI 31 period, it will expand with extreme rapidity, and defy suppression efforts. In this circumstance, a major component of exposure is the area of forest available containing suitable fuel and the total loss able to be sustained is limited by the size of forest. A history of New Zealand forest fires in the order of 100s of hectares each, rather than 1000s of hectares each shows that forest size was a major restriction on the possible losses in the majority of cases. Where fires have been able to make runs in large areas of suitable forest fuel in extreme conditions, the losses have been counted in 1000s of hectares.

Forest managers who are fire experienced are well aware that major forest areas at certain relatively short periods are open to the risk of fire in the order of many 1000s of hectares per incident. Taking P.E. Robertson's $6000/ha loss figure, we assume $6,000,000 per 1000 hectares.

Additionally, supply constraints on timber processing plants would greatly amplify the costs. Exposures for the larger forests are in the order of 100s of millions of dollars. The insurance industry is well aware of this, and forest managers find it hard to get satisfactory forest insurance covers for large contiguous areas of forest.

In summary, the forest fire risk in large forests = a low but real hazard × a high exposure.

Forest managers cannot ignore this and expenditure to reduce the risk is certainly required. The rate per hectare can only be somewhat arbitrarily determined. There has to be a law of diminishing return applying at some level of expenditure. Graphically this does not occur in a nice curve but drops quite sharply in exotic forests after the major expenditure of training and equipping the forest workforce – staff, labour and contractors for forest fire-fighting.

Training the forest workforce has the following advantages over training anyone else:

- Maintenance of fire awareness of the major population within the forests, thus reducing fire ignitions.
- High level of trainees' fitness.
- Familiarity with the forest environment.
- Familiarity with forest-related equipment.
- High motivation – forest fire threatens their livelihood.
- Already divided into work teams equipped with suitable transport and connected with the forest R/T system.
- Are in the forest during times of high hazard, and easily contacted at other times.
- Are readily available during working hours for fire training.
- Are equipped with suitable protective clothing and basic fire equipment.
- Have an established working relationship with the forest supervisors and other crews with whom they would be working at any fire.

A few exceptions to this occur where relatively small and/or isolated forests require a low workforce between silvicultural treatments that only occur at intervals several years apart. Forest owners may obtain good value from assisting in equipping and training rural fire-fighting parties where well-motivated groups have been formed.

Capital fire equipment inventories give good value up to the point where there is sufficient equipment to equip about one-third of the trained forest fire-fighters. As forest fires can last for a long time, it is best practice to commit approximately one-third of the available forest fire-fighters to a fire at a time. This enables the fire-fighting to continue round the clock on a shift basis. For example, to justify expenditure on an expensive item like a forest fire engine, there must first be an ability to provide five fire-trained men per eight-hour shift for three shifts = 15 men, and so on for other equipment.

In practice, recognition that there is a rapidly diminishing return on fire-protection expenditure on training and equipment beyond these criteria becomes the basis for budget considerations.

Other forest fire-protection expenses such as fire-breaks, water supplies, weather stations, patrols, public relations etc. each require justification by the same methodology, i.e. a pragmatical assessment of the risk and the point at which there is a rapid fall-off in return per dollar spent.

To return to the past performance of the NZFS in relation to fire protection: to obtain the historical data from which to analyse the fire protection problems they were coping with would involve a lot of research without which it could be as easily said that they underspent or overspent, and it seems a pointless exercise anyway.

Reference

(1) Martin E. Alexander. Report to the 1986 Annual Meeting of the Canadian Committee on Forest Fire Management.

D.J. Geddes,
Senior Protection Officer,
Tasman Forestry Ltd