encourage biodiversity in plantations,
- diversification of species that are being planted, including natives,
- zero nutrient loss and soil erosion from plantation operations,
- zero use and discharge of toxic chemicals/pollution, and
- independent monitoring and certification of compliance with standards.

It is acknowledged that the industry is already making progress towards these, in particular the recognition that better planning is needed, along with the development of standards. Adopting a precautionary approach and planning for the long term is the key to protecting biodiversity. Greenpeace believes the plantation industry has responsibilities to society as a land user, and urges the recognition of the multiple values of land and trees. For the industry to have credibility with environmental organisations, the consumer and society, a genuine openness to address the issues and independent monitoring and certification will be needed.

Note:
The Greenpeace review *The Plantation Effect* is available for $18 (incl. GST and P&P), from Greenpeace New Zealand, Private Bag 92507, Auckland.

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Some thoughts on the indigenous forest management crossroad and the paths of opportunity

R.K. Gover*

Introduction

This paper suggests firstly that the maintenance of ecological viability of the forests is the umbrella under which all management should be judged and permitted and, secondly, that the two divergent concepts of indigenous timber harvest and forest conservation are not necessarily incompatible: that is to say that indigenous timber production is a legitimate use, but only if it is strongly based on the maintenance of the basic forest ecological system.

It is time for both conservation and forest managers to recognise this principle and to frame management regimes that do allow compatibility on selected forest types in specific areas set aside for production.

Working within Environmental Constraints

The vision of sustained yield indigenous forestry must "embrace the sustained ecological systems" philosophy (Findley 1990). Sustainable forest management can only be considered within the constraints of the need to maintain ecological viability and integrity. Managers should know the constraint levels, or "bench marks" at which ecological viability can no longer be maintained. Not just tree flora but in terms of all aspects of fauna and flora.

These bench mark indicators are not easy to assess or understand, although I believe that some significant work is being done in selected forest types to understand change and, more importantly, the effects of change (R. Allen pers comm).

In effect this is the build up of forest fragility ratings and, when it is done in conjunction with other environmental factors such as inherent soil fertility, erosivity, erodibility and others, it becomes a strong decision-making and management tool. It can answer the questions such as "to harvest or not to harvest?" It can also assist in matching forest management techniques to identified environmental constraints.

It should also be said that general forest harvest, if harvest in the interim is restricted only to the more robust forest types, can afford to be conservative. It does not need to test the extremes of ecological breakdown. A cautious approach to the setting of forest management and harvesting practice will go a long way towards maintaining forest viability until the complex relationships of forest ecology are further unravelled by research.

The Use of Geographic Information Systems

In Papua New Guinea, where I currently work for the CSIRO Division of Wildlife and Ecology, we have just finished putting together the Papua New Guinea Resource Information System (PNGRIS). It is a geographic information system; that is, a database and associated mapping package that covers the whole country. It pulls together all the basic natural resource data that have been collected by CSIRO survey since the early 1950s and matches them against population statistics, conservation needs ranking and other administrative and spatially linked information.

It is used by agriculturists, environmentalists and foresters alike for develop-

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ment planning, and allows things like fragile environments to be linked with crop evaluation, with populations, with rainfall deficits, with potential forestry areas, with specific conservation needs and so on.

One of the real benefits from the system is that foresters can go back to their roots as such. They need no longer work in the tunnel vision syndrome of diameters and merchantable height. They can now look at a whole raft of natural environment and resource issues as part of forest development planning. They can also do this quickly and easily and produce computer-generated maps to illustrate the spacial links of different values. They can check soil fragility of potential development areas and frame management regimes to alleviate any potential problems or to enhance follow-up development. They can now look at steepness, associated relief and lithology and, in association with species occurrence, get some idea of machinery requirement and working methods. They do this because their whole planning system is strengthened and broadened with a solid factual base on which to monitor the effects of change and the performance of operators.

I have given this example because indigenous forest managers in New Zealand must also widen their outlook; to take off the blinkers, to pay more than lip service to a wide host of environmental factors and issues, to look at such things as soil fertility, erodibility, ecological relationships and to frame acceptable management practices that accommodate the constraints of these factors.

The Need for an Inter-Disciplinary Approach

Times are changing and New Zealand rightly abides by, and has been a major force in forming, international codes of conduct with regard to environmental issues and development. However, there is still internationally a difficulty in accepting the practicality of joint use. There is still a perceived need by various natural resource sectors to work independently. To isolate their activities from others. Hence foresters are isolated from the soil and land evaluation skills of agriculturists.

Some environmental organisations still wish to isolate all their activities from development issues. Agriculturists are not always benefiting from the knowledge of indigenous grassland management. This inherent compartmentalisation of natural resource issues belies the fact that maintenance of ecological viability and integrity of an environment is fundamental to long-term effective management.

Beech management showing size class distribution. Photo: Ian Platt, Ministry of Forestry.

The New Zealand Beech (*Nothofagus*) Example

Bodkin and Talbot (1992) have explained that in the past the concept of "conservation of biological diversity" simply means "protection from use", whereas today the purpose should be "to ensure future capacity for use".

Gover *et al* (1992) have argued that good sustained yield management practice is low-impact, high-tech and highly controlled, and all based on a sound knowledge of basic forest ecology with long-term planning horizons.

In the New Zealand context my company, Western Beech Ltd, have put to Government over the last few years a number of proposals for the management of the Southland beech (*Nothofagus*) forest based on the principles espoused above.

Planning for this has been done on a step-by-step basis with a series of checks and balances on the way.

I have illustrated a part of the process below to try to show how planning needs to be linked to a broader philosophy at one end of the scale and to operational aspects at the other.

In this process the rules of "maintenance of ecological viability" are paramount and are consistent referral bench marks at which to test subsequent levels of planning.

Selected beech forests in New Zealand have always offered excellent prospects for sustained yield management. They have high growth volume rates, large lowland tracts of predominantly one or two commercial species, ready establishment, rapid seedling growth rates and timber properties highly suited to high-value end uses.

In the silver beech (*Nothofagus menziesii*) forests of Southland these prospects are even better if the special features of Southland silver beech are considered – its shade tolerance, its highly concentrated locations and the highly developed infrastructure of Southland. If ever a New Zealand beech management operation is to succeed, then it will succeed in the south.

However, factors limiting its past success are still apparent and must be considered as potential constraints of management in any future operations. These traditional constraints are listed as follows:

- low end prices in the domestic market;
- relative smallness of the resource in relation to international markets;
- inherent pathogen problems;
- distance from markets and associated high freight rates;
- the expense of harvesting in low-volume forest;
- the "traditional methods" syndrome of

foresters and loggers alike;
- the apparent need to have machinery dictate harvest and silviculture practice;
- the lack of understanding of ecological relationships by loggers and forest managers.

All of the above constraints can, with a bit of vision and a change of attitude, be overcome.

Silver Beech Silviculture

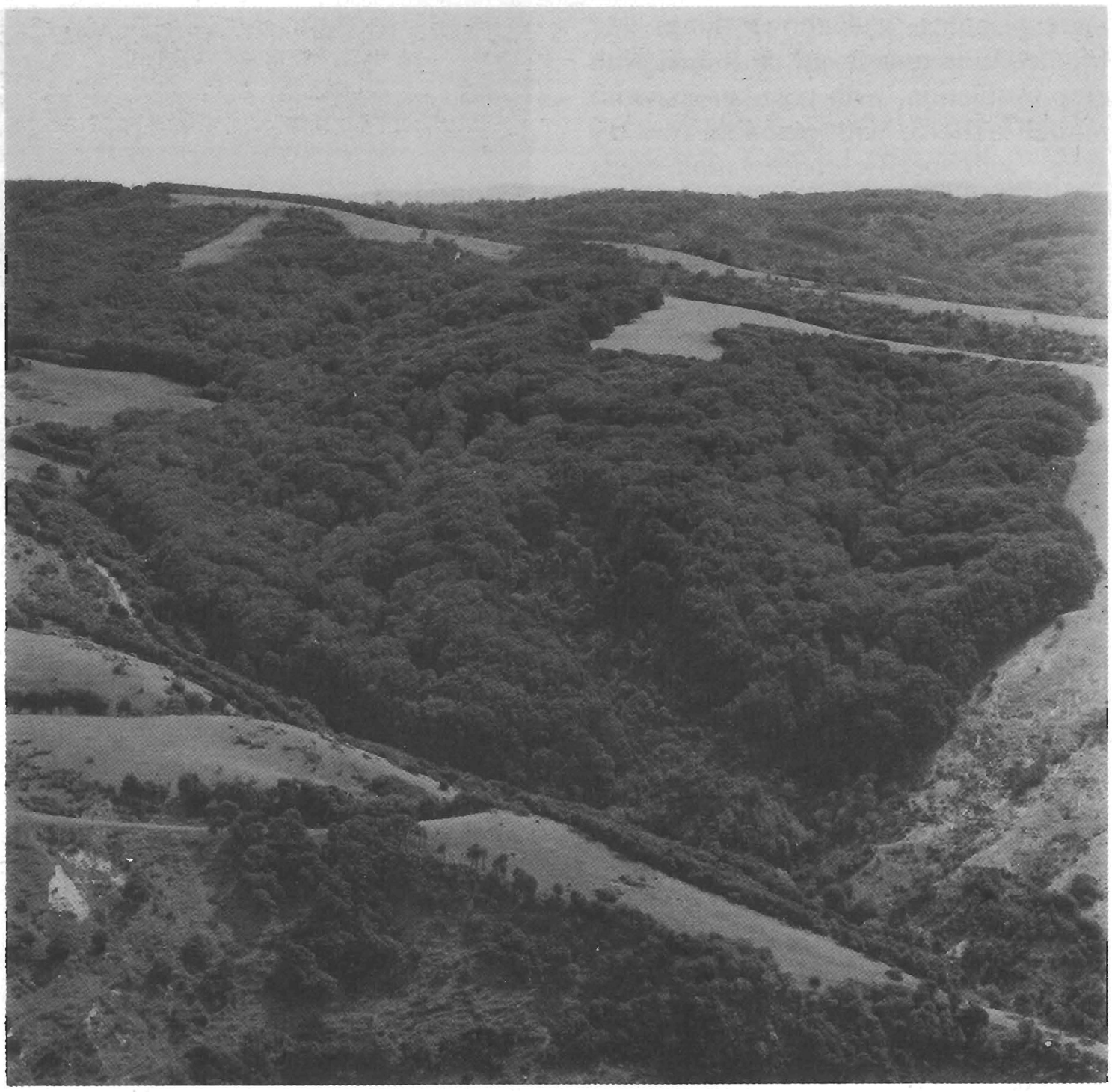
On the positive side is the technical suitability of beech for ecological management. Silver beech is eminently suitable for single-tree and small-coupe-size harvesting techniques under the right market conditions. In its seedling and sapling stages it is a reasonably shade-tolerant species and, as such, well established advance growth is usually present in natural forests.

This advance growth is persistent and there is a steady recruitment into the larger-diameter classes to maintain the forest in a mixed-age condition. At the same time the advance growth responds well to the opening of the forest canopy and reduced root competition, providing that excessive exposure does not occur. Growth in the younger stems is strongly apical, given some overhead shade. Once the whips achieve the height of the surrounding canopy stem, diameters increase rapidly and the diameter growth rate remains generally constant through to maturity.

The prime aim of management under a sustained yield system of management is, in simple terms, the identification and protection of the second and subsequent crops and, through this, the maintenance of the forest as an ecological entity. To harvest and yet protect the considerable volume of advance growth is expensive but operationally possible. Under the right market conditions such an operation can be technically feasible and economically viable.

The "cropping or cutting cycle" system is the system that best meets the ecological needs of beech and the maintenance of ecological viability. In brief, it means maintaining forest structure, harvesting an identified first crop, identifying a second merchantable crop and subsequent crops from the advance growth, and calculating the time required for this second crop to grow through to merchantable size. The latter is the cutting cycle period.

The questions that forest managers must answer as a part of the planning process are:
- Can the second and subsequent crops be recognised in the forest structure?
- Can harvesting of the first crop be done without destroying the second and subsequent crops?
- Will the second crop put on sufficient diameter growth to be of merchantable size at the end of the first cutting cycle?
- Is there sufficient volume available in the first crop to allow economic harvesting?
- Will the harvesting of the first crop allow sufficient opening of the canopy to allow the second and subsequent crops to grow?
- Can the build up of pin hole borer (*Platypus*) be prevented?
- Will the canopy opening be ecologically acceptable with regard to the maintenance of ecological viability of the forest?



Private beech forest suitable for ecological sustained yield management. Photo: Ian Platt, Ministry of Forestry

Conclusion

This paper just touches on some of the fundamental issues that affect management of Southland's beech forests and in a broader sense the management of the whole of New Zealand's indigenous forest estate.

It does not talk about marketing and project development, which is another of the fundamental keys to successful management, but I hope it does illustrate that management, and the long-term success of indigenous timber production, cannot be considered in isolation from the changing environmental attitudes of the international community.

International markets are already indicating that indigenous timber produced without regard to the concepts of eco-forestry will not have a place in the world market within a few years and, by association, our own domestic markets as well. Moreover, the rapidly increasing international status of eco-based timber production and the marketing opportunities that are opening as a result herald an exciting phase for those with the vision and the skills to promote our green products.

In short, we either treat it properly or we do not get to use it. We have already gone well down the track with legislative controls as set out in the Forests Amendments Act 1993 (amending the Forests Act 1949) and we already have operators with vision. The challenge is now to put it all together and to make it work.

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