

# SOME COMMENTS ON FOREST PLANNING AND THE FORESTRY DEVELOPMENT PLAN FOR OTAGO

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## *Abstract*

*Both capital and electricity are likely to place constraints on the development of New Zealand's forest-processing industry. In such circumstances forest planning for individual regions viewed in isolation gives an incomplete picture which may give rise to misleading conclusions.*

*In the Forestry Development Plan for the Otago Planning District, the estimates of the cost of supporting domestic industry do not include the necessary adjustments in the exchange rate or the cost of export incentives. Within the framework of the analysis presented in the plan, adjusted figures support a log export proposal rather than the major wood-processing plant envisaged.*

## INTRODUCTION

The Forestry Development Plan for the Otago Planning District (N.Z. Forest Service, 1975) is the first major regional development plan published by the Forest Service. It is expected that the analysis in this plan will be repeated in the planning for other regions where major afforestation is either being undertaken or is expected to take place. For this reason the techniques and assumptions of the Otago report are of special interest to all those responsible for forest management in New Zealand.

The Otago forest planning report demonstrates that an afforestation programme of 3240 ha/yr would provide sufficient wood to support a major forest industry, such as an integrated sawmilling-refiner groundwood complex, in the Balclutha district by 1986. It also demonstrates that 1986 is the earliest that any pulp and paper plant of economic size could be established, although it is shown that variations in the planting rate and in the silvicultural schedules applied can alter the scale of operations after that time.

The development of such a complex is shown to give an internal rate of return of 7 to 10% for forest growing for domestic industry compared with an internal rate of return

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of about 11% for a log export scheme. However, the wood-processing complex is preferred because of the impact it has on regional and national development. For all the alternatives investigated, and for both optimistic and pessimistic cost and price assumptions, the value of the processing industry to both the national and regional economies is shown to be sufficient to offset the difference in forest profit between the log export regime and the other regimes.

There are a number of assumptions implicit and explicit in the valuation of the developmental effects. The principal ones are:

- (1) For every person employed in forestry and the dependent forest industries, one additional job is created outside these industries.
- (2) For every 25 jobs not created in the Balclutha area, the local population will decline by 100, with 80 people going to Auckland and 20 going to the Hamilton/Bay of Plenty /Hawke's Bay areas.
- (3) People shifting to Auckland would bear a share of the cost of the Auckland rapid rail scheme and a share of the cost of the Auckland district roading scheme.
- (4) People moving from Balclutha would suffer increased social costs because they would have to travel further to work than if they had remained in Otago.
- (5) People moving north to work would work in domestic manufacturing industries which require more protection from imports than pulp manufacture.

### THE ASSUMPTIONS

There can be considerable discussion about the validity of these assumptions and their presentation in the report.

For example, the employment multiplier\* evident in forest-processing plants has been found to be 1.45 in Scotland (Greig, 1971), 1.55 in Australia (Reilly, 1974), and between 1.1 and 1.4 in New Zealand (Grant, 1976). The multiplier used in the Otago plan (2.0) is consequently much higher than could be justified on past experience. This is an important difference since most (80 to 90%) of the social benefits of the Otago scheme are attributed on a "per person employed" basis. In fact, using an employment multiplier of 1.5 instead of

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\*The ratio of employment created within the forest-processing plant to the total employment created inside and outside it.

the 2.0 used in the study would reduce the social benefits by 20 to 22.5% and would be sufficient to make the total net benefits of some of the afforestation and processing proposals negative for the more pessimistic cost and price assumptions examined. Unfortunately, the use of such a high employment ratio is not discussed nor is any analysis presented to show the sensitivity of the conclusions to changes in this ratio.

In addition, no evidence is presented in support of the migratory process to Auckland and the Bay of Plenty described in the report. This assumption must be treated as merely an assertion, with many other migratory patterns equally plausible. For example, the advent of major wood-processing plants in the King Country, nickel smelting in Westland, fish processing in Southland, or petrochemical industries in the Taranaki region could encourage a migratory movement to those areas at the expense of the Bay of Plenty and Auckland regions. In such circumstances, workers would incur no greater travel costs than if they had stayed in Otago. Unfortunately, 50% of the social benefits of the afforestation and manufacturing proposals are savings in the social costs of travel associated with keeping people in Otago rather than Auckland. Since other migratory patterns appear equally plausible, these social benefits can at best be regarded as "in doubt". If they did not eventuate, the Otago scheme proposals would again fail to make a positive contribution for the more pessimistic cost and price assumptions examined.

However, the greatest single social benefit attributed to the development of a wood-processing plant in Balclutha is the cost of protecting domestic industry in Auckland. This is calculated to be between .48 and 54% of the total social benefits of the scheme. Again, there is no discussion of why the only alternative to a wood-processing complex in Balclutha is a protected industry in Auckland. This is only one of the possibilities, and perhaps the least likely. There will probably, for example, be sufficient wood resources in New Zealand for more wood-processing plants than the country will have the resources to establish. Any of these industries could be regarded as alternatives to wood processing in Otago.

Notwithstanding these objections, the actual calculation of the cost of protecting domestic industry in Auckland is in error. While it is possible to estimate effective rates of protection accorded various industries at current exchange rates, it is essential to include the exchange rate adjustment (necessary for the economy to maintain balance of payment equilibrium under free trade) in estimating the true monetary cost of protection (Corden, 1966; Balassa and Schydrowsky, 1968; Balassa, 1971, p. 24). No correction for the exchange rate adjustment has been made in the calculations for the Otago plan

and for this reason the inclusion of the cost of protecting Auckland's domestic industry in the social benefits of the scheme is invalid. In fact, at the free trade equilibrium exchange rate estimated by Scobie and Johnson (1974) it is unlikely that New Zealand industry would require protection. Consequently, the best estimate of the cost of protecting domestic industry in Auckland is zero. For this reason the cost of protection should be subtracted from the social benefits given in the Otago plan.

TABLE 1: PRESENT VALUE OF SOCIAL BENEFITS OF PROCESSING — REVISED ESTIMATES  
(million dollars — interest rate 10%)

COST AND PRICE ASSUMPTIONS	UNFAVOURABLE TO PROCESSING <i>Alternatives*</i>		
	I	II	III
Total social benefits given in Otago plan .....	7.720	8.419	8.471
<i>Less</i>			
Value of protection† .....	3.463	3.417	3.454
Export incentives‡ .....	2.1	2.6	2.7
Net social benefits .....	2.157	2.402	2.317
<i>Less</i>			
Opportunity cost of log exports .....	5.372	6.852	7.207
<i>Net benefits of processing</i> .....	-3.215	-4.450	-4.890
COST AND PRICE ASSUMPTIONS FAVOURING PROCESSING	<i>Alternatives*</i>		
	I	II	III
Total social benefits given in the Otago plan .....	15.133	16.680	16.595
<i>Less</i>			
Value of protection† .....	6.925	7.034	6.908
Export incentives‡ .....	2.1	2.6	2.7
Net social benefits .....	6.108	7.046	6.987
<i>Less</i>			
Opportunity cost of log exports .....	1.212	1.960	2.235
<i>Net benefits of processing</i> .....	4.896	5.086	4.752

\*Alternatives I-III represent different management regimes in the Otago plan.

†The value of protection given in the Otago plan. This valuation is in error because no allowance was made for the exchange rate adjustment necessary to ensure foreign exchange equilibrium under free trade.

‡Export incentives were calculated from the value of exports given in the table on p. 61 in the original report, and the 1974 rates of export incentive (20%).

Further, the analysis in the Otago plan does not include the export incentive allowance which is available for exported manufactured products but not for the export of logs. Table 1 shows the impact of these last two errors on the estimates of the net social benefits of processing given in Table 19 (p. 58) of the Otago plan.

Their impact is dramatic. The afforestation and manufacturing scheme described in the report fails to make a positive net contribution except under the most favourable cost and price assumptions.

Moreover, in addition to the considerable uncertainty surrounding the major assumptions behind the social benefits given in the Otago plan, their presentation gives the impression that the social benefits are attributable to the processing. In fact, an average of 65%\* of the employment generated by the scheme is in forestry and logging. These jobs would also be provided by an export log scheme. Thus, while not all of the social benefits apply equally to both mill and forest workers, a considerable part of the social benefits of the scheme would also apply for a log export proposal.

There are also some relevant costs which have been omitted from the analysis. One important one is the social cost of the electricity the processing plant uses. If the cost of electricity to the processing plant is to be the average unit price of all New Zealand's electricity sales, as the report suggests, the nation will have to bear considerable social costs since the replacement cost of this electricity will be several times the current average sale price (Shirtcliffe and Johnson, 1975). This difference in costs should be charged as a social cost against processing.

These factors all tend to further reduce the net benefits given in Table 1. But in the Otago plan the processing plant was assumed to be profitable and therefore made a positive contribution to the total benefits of the scheme. This profit would partly offset any negative social benefits attributed to the scheme.

However, when the errors in the estimates of the benefits associated with the protective structure are corrected, the total net benefits of the scheme are positive only for the more optimistic cost and price assumptions, which favour processing. With the considerable uncertainty about both the valuation and the appropriateness of many of the major social benefits, the profitability of processing is not likely to be sufficient to make the scheme provide a positive total net benefit.

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\*Total discounted percentage of the workforce employed in forestry and logging.

For all these reasons the case presented in the Forestry Development Plan for Otago fails. It cannot be said to have shown that a wood-processing plant in Otago is in the national interest. In terms of the case presented in the report, a log export scheme is likely to have greater economic merit than an energy-intensive scheme of the kind the report envisages.

### IMPLICATIONS FOR FOREST PLANNING

Two important implications for forest planning arise from this examination of the Otago plan.

Any valuation of the social impact of a wood-processing project cannot be considered in isolation. Because both electricity and capital are likely to be constraints on the development of wood-processing plants by 1990, it is necessary to co-ordinate the development of projects in different parts of the country. The 1969 National Forestry Planning Model (Familton, 1969) did spread the development of major wood-processing projects over time and in 1992, the only period when two projects were planned, one was in Otago-Southland and one was in Hawke's Bay. No similar exercise is available for the expanded afforestation programme of 55 000 ha/yr.

Furthermore, over the last 5 years private planting has risen considerably in importance and it is possible that within the next 15 to 25 years there will be sufficient wood for major wood-processing plants based on private forest resources. The development of such processing needs to be co-ordinated with processing based on state resources. A comprehensive national review of forest and forest industries development to consider these points should be a prerequisite to the development of regional plans. Within this framework a national cost-benefit analysis of alternative forest-based industries\* in a region would include the comparison, between regions, of the opportunity cost to the forest of not exporting logs, an economic assessment of the differences in the regional effects and export incomes, and a comparison of the use of scarce resources.

The second major point to emerge from the analysis of the Otago plan is the importance of the differences in forest profitability in growing different crop types. For if economic criteria are to be used it is apparent from analysing the Otago plan that, where regional employment effects are similar, wood-processing projects will be allocated to regions with the lowest opportunity cost of not exporting logs.

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\*Export logs is an industry in this context.

For management by economic criteria to be a feasible proposition it is necessary to know the growing, logging, and transport costs of the different crop types at each major project area in New Zealand. In turn this requires at least an assessment of the site quality in each area. Since wood density also plays an important part in the cost of wood per tonne of pulp, each area should also be rated in terms of the basic density of wood produced there. When forest profitability studies are extended to include the evaluation of pulpwood rotations, it should be possible to evaluate the cost of growing each crop type in each location.

### CONCLUSIONS

Within the framework presented in the report, the economic value of the net national social benefit would most probably be greatest for an export log scheme, a finding that is contrary to the conclusions presented in the plan. This does not mean that a wood-processing complex for Otago is inappropriate. All that is implied is that, on the social benefits of regional development presented in the Otago plan, the case has failed.

More important is the fact that, even had the Otago plan succeeded in making a case for a major wood-processing complex in Otago on regional development grounds, the conclusion would have been invalid because it had failed to consider the way in which this project would interact with projects in other areas.

When projects are competing for scarce resources, a co-ordinating national plan is a prerequisite to valid regional planning. The features that the national plan should be most intimately concerned with are (1) assessing the impact of scarce resources on forest utilisation, (2) comparing the costs of production of the different crop types in the major project areas, and (3) measuring the differences in the national and regional impacts of the different proposals. Within this national framework regional development plans will provide an invaluable guide to forest management.

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