

THE ROLE OF ECONOMICS IN FORESTRY: THE CASE FOR AN INDEPENDENT VIEW

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ABSTRACT

At the current rate of expansion the forestry sector is becoming a significant user of the country's resources. When utilisation of the current planting commences it is likely that, as a nation, we will have insufficient resources to allow some processing options to proceed. As a nation we must insist that the forestry sector, like all other sectors, uses the rigour of economic analysis to aid in the choice of processing options and to ensure the efficient use of the resources required.

For economics to fulfil this role there needs to be less emphasis on economics as a device for measuring the exact impact of a course of action, and much greater emphasis given to its function as an interpretive tool. This requires a much closer liaison between forester and economist than there has been previously, but paradoxically requires some economists at least to be seen as independent voices rather than as advocates of the forestry sector.

INTRODUCTION

The aim of this paper is to promote discussion about the nature and role of economics in forestry, in the hope that this will improve understanding between economists and forest managers.

Although our economy is essentially a market economy rather than a centrally planned one, the way our resources are allocated is not decided by the market as much as by the institutions which undertake development. In this respect the institutions in the forestry sector have assumed an important role—not only in relation to the resources which they are presently committing to afforestation, but also in the further resources—roads, ports, energy, water, and labour—that will be required before the forests can be used.

Partly because of the size of individual firms involved and partly because of a history of government involvement through both ownership and licensing, the forest industries have managed to isolate themselves from many competitive market forces (Anderson, 1975). Their demand for the

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country's resources is therefore not always the result of competitive bidding or rational economic planning. Further, there have already been some warnings that the economy may have insufficient resources to allow some forest processing options to proceed (O'Neill, 1974; Grant, 1976a, 1977b; Sutton, 1978). It is important that the institutions of the forestry sector should not be allowed to assume a dominating role in our economy merely by undertaking afforestation. In the country's interest some economic evaluation and guidance is necessary in both the development and management of our forest resources.

Yet in a recent survey of members of the Institute of Foresters one-third of the respondents indicated that economists frustrate their efforts to practise good forestry, and another third were neutral or had no opinion when asked this question (Kennedy and Sutton, 1978). There has also been some opposition to the introduction of silvicultural regimes designed to increase economic efficiency, and to the corollary that general resource forestry should be avoided in favour of single-purpose crops (Grant, 1976a; Levack and Hargreaves, 1976).

At the same time there is such considerable public dissatisfaction with the analyses provided by the Forest Service in support of claims for continuing the logging of indigenous forests that parliamentary petitions and public demonstrations have resulted. There is also discussion in technical journals about the validity of some of the general economic arguments the Forest Service has advanced in favour of using the exotic forest resource as a base for further industrialisation (Donnelly, 1974; Grant, 1976b, 1977a), and the economic arguments of the Forest Service in favour of specific forest processing proposals have caused concern (Searle, 1975; Salmon, 1977; Grant, 1977b; Fraser and Horgan, 1978).

In these circumstances the role of economics and economists within the forestry sector surely deserves urgent and frank review.

ECONOMICS IN NEW ZEALAND FORESTRY

There is of course no such thing as a purely economic problem which can be settled by purely economic logic: a number of factors, including political interests and prejudice, enter into every discussion of actual questions. As the economist Joan Robinson observes:

The participants in every controversy divide into schools—conservative or radical—and ideology is apt to seep into logic. In economics, arguments are largely devoted, as in theology, to supporting doctrines rather than testing hypotheses. (Robinson, 1977.)

In New Zealand forestry this is certainly so. The New Zealand tradition that good manners should prevail (McNeish, 1978) is evident in the hierarchical structures responsible for forestry. This tradition of genteelism reinforces attitudes found in bureaucracies elsewhere, where the professionals are very much the staff of an established order and the initiatives they pursue conform to these patterns (Henderson, 1977).

These constraints have had a considerable impact on the way in which economics has been used within New Zealand forestry organisations. It is readily possible for the inputs to economic analysis to be limited in a way that ensures acceptable answers. Thus, an organisation which is intent on expanding the forest estate can advance the concept of (*e.g.*) farm forestry with no satisfactory published analysis of its profitability. In areas where the senior staff favour Douglas fir (which has a substantially lower profitability than radiata pine), a complicated economic analysis can be used to show that stumpage income from Douglas fir is maximised by planting it on the best sites (with no value being assigned to the loss in income from radiata pine which would also perform best on these sites). In an organisation which heavily favours industrialisation, the export log regime tested in one analysis of forest management proposals was a combination of silvicultural proposals and growth models which does not produce the export logs the regime was originally designed for. And in an organisation which is judged in terms of the return on its assets, the value placed on its forest asset is its depreciated cost, although the trees will be increasing in value as the forest matures.

These examples, which are deliberately not referenced, are not intended as an indictment of the organisations involved, but are an attempt to illustrate how the constraints of the established order of an organisation can lead to a doctrinaire attitude in both forest management and research. The pressures are no less severe because the rewards of accepting the constraints are likely to far exceed that accorded to any radicals (Robinson, 1977; Henderson, 1977).

In part at least, the present nature of forest management can be attributed to historical accident. In State forestry the economics of forest management has traditionally been unimportant on the grounds that State forests produce a number of public goods (erosion control, preservation of a domestic wood supply, etc.) which the private sector cannot be relied upon to supply (Leslie, 1964). Thus, quite properly, neither the original justification for State forests, nor their rules of management, included a comment about economics

or profitability. All that was envisaged was the need to create a domestic wood resource.

In private forests the economics of forest management have been made unimportant by a series of takeovers and mergers which have led to most mature forests being owned by companies with utilisation plants. Since the capital invested in the utilisation plant is often considerably greater than the investment in the forest, and since company philosophy generally includes perpetual existence, the forest is again quite properly regarded as subservient to the economics of the enterprise as a whole.

In more recent times, however, the situation has changed radically. By 1965 there was already sufficient forest established to satisfy the predicted domestic demand until the year 2000. Further afforestation had to be justified by earning foreign exchange through exports (Familton, 1969; Hosking, 1972). In obtaining government funds for such afforestation (either directly for State forests or by subsidies for private afforestation), the forestry sector was required to show that it could meet the government's guidelines for investment in export earning industries—guidelines which included a minimum return on investment of 10%. The ability of the forest-growing sector to satisfy the government criteria, including the profitability criterion, was demonstrated in a series of papers prepared by Forest Research Institute economists for the 1969 Forestry Development Conference and subsequently published in the *Journal of Forestry Science* (Fenton, 1972; 10 papers). In these papers Fenton concluded that to achieve the required high returns it was necessary to adopt new silvicultural practices which sacrifice volume yields to achieve shorter rotations.

However, a recent survey of the Institute of Foresters shows that nearly two-thirds of the respondents over 54 years of age thought that the major objective of exotic forestry should be to produce the maximum wood volume possible (J. J. Kennedy, pers. comm.). Thus, while economics, including profitability, was established as a legitimate concern for forest management, some members of the forest organisations have been slow to respond to these changed circumstances. While happy to accept the expansion of the forest estate, justified on economic grounds, they appear to cling to the notion that their objective is still to create a general resource. They apparently fail to appreciate that public money was invested in forestry because of the promised high returns. Unless there is some indication that these high returns can be realised, the money currently being invested in afforestation

tion may be better invested in other foreign exchange earning activities.

In these circumstances it is not surprising that some foresters and forestry organisations feel under attack from economics.

One response of forest economists to the changed circumstances has been to concentrate their attention on a series of extensive economic analyses of particular projects—called cost-benefit studies. Both Dupuit, the intellectual father of cost-benefit analysis, and the United States Bureau of the Budget, the organisation which popularised the technique, saw cost-benefit analysis as a project justification device (Marglin, 1967: 18). The cost-benefit studies of afforestation certainly fall into this category, for, whatever their faults, they have been isolated events and cannot pretend to be a planning device. As a medium for project justification they may have been successful, but without a framework for planned growth of the economy they must inevitably suffer the fate of similar analyses in the United States, where they “serve as window dressing for projects whose plans have already been formulated” (Marglin, 1967: 18), and in Australia, where they give “plausible but often pseudo-factual backing for predetermined political decisions” (Leslie, 1964).

Unfortunately, a doctrinaire attitude may also have invaded the interpretation being applied to some aspects of forest economic research, including research into the selection of silvicultural management schedules. While a number of different criteria were used in the profitability studies of different silvicultural treatments (Fenton, 1972), the studies had a model forest as their basis. The model was establishing a new forest on a fixed area of land known as the Maraetai block, which had been the subject of earlier economic analyses (Ward *et al.*, 1966). Other factors of production such as labour and capital were assumed to be in unrestricted supply. This qualification is an important one, and in fact there is no special reason to believe that results derived from the analysis of such a model forest apply to situations where there is a restriction on the amount of capital available, where there is no restriction on the amount of land available, or where an existing forest is expanded. These “exceptional” circumstances include most of the conditions likely to apply to forestry. Accordingly, the conclusions following from Fenton’s work are not necessarily directly relevant to many State and private forests and Maori incorporations. Unfortunately, in the interpretation of Fenton’s work these qualifications are often forgotten and the results are sometimes advanced as being universally applicable.

The consequences of any doctrinaire approach to both forest management and research are severe, and are likely to increasingly jeopardise the contribution of the forestry sector to the economy as a whole. The forestry sector could become one of the sectors the New Zealand Planning Council is talking about when it says:

. . . individuals and groups can become preoccupied with the goal of maintaining their own positions rather than coming to terms with the issues facing the country. These problems permeate society and represent the Achilles heel of any strategy to solve our external problems by increasing exports. (N.Z. Planning Council, 1978: 52.)

Further, there is a danger that ideology may become so mixed into the analysis of forest economics that unorthodox ideas appear unscientific and are not treated on their merits. This may already be happening in the conflict that has surfaced in the newspapers between forestry establishments with different points of view (Reynolds, 1977; Tustin, 1977), and may be the reason why foresters are regarded with suspicion by conservationists and others (Searle, 1975; Devonshire, 1976). In the circumstances, perhaps the present guarded and suspicious attitude of some forest managers to economists is justified, and may be attributed to both those in charge of forestry operations and those practising economics.

What Can Economics Do?

It is clearly evident that the present circumstances (unemployment, foreign exchange problems, and inflation) call for better management of all sectors of the economy, including the forestry sector. However, any attempt at better management of either the economy as a whole or the forestry sector requires an appreciation of the impact of the resources invested in the forestry sector—both those currently being invested directly in afforestation and those which will subsequently be required before utilisation can commence. Economists in the public sector may help to provide this assessment by using the techniques of economic analysis to contribute an unbiased evaluation of the consequences of alternative courses of action.

In these circumstances the most important feature of economic analysis is its role as an educational device in increasing understanding and enabling better communication. In this role economic analysis is almost a subversive activity for its purpose must be to provide the means to question both the mores and the goals of the organisation concerned. This

must particularly be so for economic analysis of management. If the investigation is conducted by outsiders (consultants), of course, the conclusions cannot be regarded as treasonable although the results may offend conventional wisdom. Consultants also have the advantage that the problem generally has official recognition, while the task of internal investigations is often to convince the hierarchy that there is a problem. Nevertheless, management must accept that economic analysis includes evaluation of new, and therefore unaccepted, methods.

At the same time economists should appreciate that where politics are involved, ambiguity may be preferred to a rational analysis. For, since most situations involve competing interest groups, the politicians may hope that in being ambiguous they can appear all things to all men. While forest managers should be offering technical advice on management, rather than indulging in politics, it is inevitable that any preference for ambiguity in their masters will lead to badly defined or even contradictory objectives. In turn, this will lead to actions which may appear irrational and even profligate when viewed from outside the pressures which created them. The danger is that establishing a precedent for apparent irrational and profligate behaviour will encourage it or even allow its emulation throughout the hierarchical structure.

Where economists are forced (whether overtly or covertly) to allegiance to organisational politics, either by doctrinaire attitudes in State forestry or by the goals of private forestry, the conflict between interest groups will almost certainly remain. In these circumstances the protection of the public interest requires an "economic audit" of the organisation's proposals in much the same way as proposals are presently submitted to environmental auditing procedures. Any economic auditing of forestry proposals would require another independent organisation to acquire some skills in forest management analysis. Such an organisation must represent a duplication of effort which can be avoided as long as economists within the organisation can maintain an independent viewpoint.

Avoiding an economic auditing procedure places a great deal of responsibility both on the hierarchy of employing organisations and on economists. It requires them to engage in almost continuous dialogue, which will not always be a pleasant experience. But it also offers significant advantages to forest managers in better fitting them to answer the political pressures, and to economists by ensuring that they will play a useful part in the processes leading to a decision.

How Can Economics Help?

The economics appropriate to a forestry organisation which requires political allegiance from its economists is the economics of advocacy.

Where economics takes an independent viewpoint, either within the forestry organisation or in an institution undertaking economic audits, there must be qualifications placed on its use. Clearly the most important qualification is that economics is merely modelling. Just as surely as sandcastles are models of houses, so is economics a representation of the real world. For this reason alone considerably less emphasis should be given to the numerical answers, such as the calculated internal rate of return or the present value, and much more emphasis given to the relationships the analysis reveals, and the insight it provides into the operations of the organisation.

The recent cost-benefit analysis of afforestation proposals in Otago and the King Country (New Zealand Forest Service, 1975; Anon., 1977) are examples of considerable emphasis being given to the financial result. Yet in deriving the estimates of financial return for these studies it was necessary to assume that a number of circumstances would remain unchanged for the next 20 years. These circumstances include the level of unemployment, the scarcity of capital, the relative returns to capital and labour, the exchange rate and the scarcity of foreign exchange, and the real cost of energy. These are all items which have fluctuated considerably in the past 10 years, and to place emphasis on a calculated financial return based on the assumption that they will remain constant is akin to keeping the score in the Red Queen's croquet game in *Alice in Wonderland* (see Carroll, 1954: ch. 7).

What the studies do reveal, however, is the relative importance of financial and social benefits, both within and between the various land-use alternatives investigated. For example, the economic analysis of the King Country (Anon., 1977) clearly demonstrates the overwhelming influence of pulpmill capital on the estimates of project profitability, and the critical nature of the assumptions about employment multipliers and migration patterns in estimating the social benefits.

Similarly, considerable emphasis has been given to the high internal rates of return generated by silvicultural regimes with low final crop stockings (Fenton, 1972). Yet in calculating these returns it was necessary to make the same sort of assumptions as the cost-benefit analysis, and the confidence limits to the calculated levels of profitability must be very wide. In my opinion this work has a number of much more

important implications, although they are dependent on the accuracy of the estimates of stand growth: firstly it defines the relative economic importance of the operations necessary in producing a forest crop; secondly it shows the economic importance of the response of stand production to changes in final crop stocking and rotation length (Grant and Walter, 1978); thirdly it illustrates the economic advantages of defining the end use of the crop well before utilisation commences (Grant, 1976a); and finally it demonstrates the economic significance of the prices received for both clearwood and other grades (Sutton, 1978).

These examples demonstrate the fundamental insight that economic analysis can provide by directing attention at a number of points which are not intuitively obvious. Inevitably such analysis raises new questions for consideration and redirects the emphasis of the enquiries. But the important point is that the issues raised are not solely of concern to economists. Thus Fenton's profitability studies, which revealed the relative importance of various forestry operations, have important implications for those directing the research effort; and the new emphasis Fenton's studies give to the change in productivity with stocking should be of considerable concern to mensurationists.

The second qualification that must be placed on the use of economics is the need for the economist to find common behavioural values so that common premises may be found for resolving problems between conflicting interest groups (Speir, 1971). Two examples may illustrate the point. In many parts of India a cow is held to be a sacred animal; yet an economist who did not hold this view could consider the animal for desperately needed material consumption, without realising that it would generate more problems in the ideological sector than it would solve in the economic one. Certainly his analysis, though technically correct, would be rejected by the people. The second example involves differences in attitudes to change. A typical American attitude is to regard change as a way of life, with cars, homes, jobs, and even marriage partners, all open for replacement. This is in marked contrast with the attitudes of most Japanese people, for whom change is something to be painstakingly avoided. Consequently, when American economists advised Japan to increase labour mobility as an important step in raising productivity after the 1941-45 war, it was unacceptable.

As agencies heavily involved in the utilisation of Maori land, forestry organisations have an obligation to find common premises about the land with the Maoris. This requires them to ensure that economists evaluating Maori land-use know,

and appreciate, the spiritual and ideological role of land in Maori society. This should make the Maori concept of "turangawaewae", and the concept of the continuity of the people and the land embodied in the proverb "Whatungarongaro he tangata, toitu te whenua", no less important to understand than is the role of the interest rate. As recent disputes over urban Maori land have shown, no organisation can expect to permanently overcome Maori landowners with bureaucratic weapons and an appeal to a national desire to use idle land. Eventually Maori landowners can be expected to question and renegotiate land-use arrangements, unless they are based on a common understanding of the role of land. Arrangements where forestry organisations treat land as just another commodity while the Maori owners treat it almost as part of the family, seem to have a shaky foundation.

In a similar way, the values held by conservationists and others in the anti-forestry lobby also deserve investigation and appreciation; for, as we have seen, no number of well presented and logical forest management plans will be mutually satisfactory unless they can find some common value to start with.

The third major qualification to the use of economics is the way in which money is often viewed as a measure instead of a measurement tool (Speir, 1971). Further, the desire for quantification which techniques such as cost-benefit analysis have encouraged has led to a desire to obtain a measure of the total utility of the project by combining the money profit from a project with the money value placed on the social benefits such as travelling time and congestion.

In fact, deriving a measure of social utility (alternatively called a social welfare function) has been the subject of extensive commentary in the literature of both economics and operations research, but there appears to be a wide gap between this theory and the practical assessment of the benefits in cost-benefit analysis. While this journal is not an appropriate place to discuss the reasons why this is so, it is appropriate to consider some important limitations which the theory places on some practices of techniques such as cost-benefit analysis.

Important causes for concern are the assumptions that the social utility function is linear (that is, that the benefits are additive and that a dollar gain is exactly the same as a dollar loss); that the project is independent of all other projects and the benefits are independent of each other (that is, the value of a given benefit is not influenced by the level of any other benefit arising from this project or any other project); and that the present price system adequately reflects the real

cost of resources. There are many examples in present forest economic analysis where these assumptions are invalid. In afforesting farm land, for example, the dollar loss in farm income is subtracted from the profits of the forest. Yet the individual farmer whose land was taken for afforestation may feel quite differently about the risks involved in a new venture elsewhere and may argue that he should be compensated for taking the risk. This is introducing a distinction between a dollar lost and a dollar gained.

There has been considerable discussion of the likelihood that resource constraints may limit forest utilisation proposals (O'Neill, 1974; Grant, 1976a; Sutton, 1978), thereby linking all schemes under a common constraint. The Forest Service has also recognised that indigenous forest plans are not independent, by jointly considering the utilisation plans for the indigenous forests of the central North Island and the west coast of the South Island. Finally, the analysis of afforestation in the King Country (Anon., 1977) acknowledges the failure of the market price to set the real cost of resources, when it uses a 1969 Treasury directive to put a 10% loading on foreign exchange. The inadequacy of the market mechanism is particularly noticeable when used to estimate future prices, especially for resources such as energy whose real price is expected to rise in future (Meirnyk, 1976).

These comments do not mean that cost-benefit analysis is not a worthwhile technique. Rather it is an example of one of a number of techniques which are used to present a simple monetary answer to a question when the economic analysis involved is largely unintelligible to the layman. The real danger of such techniques lies in situations where the economist advances the analyses as proven estimates of the money value of a project, when at the very best this value will be surrounded with considerable uncertainty. Further, any value arrived at must largely incorporate the analysts' views about the weights to be attached to the various costs and benefits, and in this respect economists are in danger of usurping the functions of politicians, whose role in making their decisions is to assess the weight society accords to differing impacts. The problem can be overcome by resisting the temptation to simplify and, in presenting the results of the analysis, to use money as a measure of profit along with other measures such as employment, foreign exchange earnings, and social impact.

CONCLUSIONS

The differences within the members of the forestry profession as to whether the Institute of Foresters should be

an advocate for forestry or should offer an unbiased or independent view probably reflect different conceptions of members' own roles (Kennedy and Sutton, 1978). It is not surprising, therefore, that there is some division within the forestry sector as to the role that is appropriate for forest economists.

It is, however, essential to the national interest that, where economists adopt the role of advocate, the assumptions of their analysis are clearly evident, and that favourable conclusions are not reached merely by restricting the costs and benefits considered. Even when these conditions are satisfied, where public money is involved the normal democratic practice of checks and balances will require that the work of forest economists whose primary function is to promote forestry will be independently reviewed. If the cases advanced in favour of afforestation are to succeed, it is necessary for economists working within the forestry sector to indicate where the arguments advanced may be deficient or unduly biased.

Thus for the efficient working of the forestry sector some economists at least must be encouraged to maintain an independent viewpoint. Since this may often require economists to advance what may be regarded as negative criticism, they may find themselves in conflict with the hierarchy of forestry organisations. This is the conflict that can be avoided if the forest manager and the economist can appreciate each other's role.

These arguments lead inevitably to the conclusion that economics has a much more important role to play as an interpretive tool than as a technique for defining the exact impact of a course of action. This requires a much closer liaison between forest managers and economists than there has previously been. For if the greatest use is to be made of economics in its didactic role it must be used in the process of making the decision rather than as an addendum to it.

Where the techniques of economics continue to be used to suggest specific forest management practices, both foresters and economists must closely examine the assumptions inherent in the analysis. Neither economist nor forester should be overcome by the techniques of analysis; for no matter whether it comes from a computer or not, whether it is the result of complex economic argument (as in cost-benefit analysis) or is the result of sophisticated manipulation as in linear-programming analysis, the results are entirely dependent on the initial assumptions, as they must be in all modelling exercises.

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