

CRITERIA FOR PRODUCTION FORESTRY

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SYNOPSIS

The standard nominative labour, land and capital requirements of production forestry are listed, with their respective returns. The highly capitalistic nature of production forestry argues that profitability should be the main criterion for other than State investors. The State should attempt and publish cost/benefit type analyses for major projects. To reduce subjectivity, analyses should be preceded by a statement declaring the interest of the investigator.

1. INTRODUCTION

"Production forestry" in this paper refers to forests managed primarily for production of logs or other goods; these may be subject to further processing. Logs and their derivatives are priceable, are capable of substitution, so are included in the normal precepts of economics. The conventional criteria used to justify production forestry would require several volumes for their comprehensive expression, hence only outline headings are given here. A recent British publication includes a summary of the main factors (Johnston *et al.*, 1967). Fundamentally the question to be answered is: Why have production forestry?; the nominative (theoretical) answer should depend on the relative levels of labour, land, capital and returns.

2. THEORETICAL CONSIDERATIONS — FACTORS OF PRODUCTION

(a) *Labour*

Three main direct components of production — labour, land and capital (including time) — are required to produce eventual returns, and the definition and measurement of "labour", "land", "capital" and "returns" as usually understood in theory are briefly discussed in sections 2 to 4 of the paper. Practice, in contrast to theory, is straightforward, being based largely on human actions and is considered in part 5.

Labour differs from land and capital to the extent that, on occasions, it can be readily available and on today's political and economic thinking, must be employed. Like capital, labour is relatively mobile and can be employed elsewhere — both geographically and in different industries. Afforestation or forest tending, on Keynesian theory, is superficially a good way of employing surplus labour, as the labour investment's contribution to supply is relatively distant in the future, while the immediate generation of demand, caused by the workers'

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wages (and the capital spending — such as roads — incurred) aids recovery from depression. As is well known, New Zealand's exotic forests were to a great degree established because abundant labour was available at minimal cost. The pattern of the late 1920s has been repeated on a much smaller scale in the 1959 and 1967 recessions. In practice, the use of otherwise unemployed labour for afforestation may have marked repercussions; while only 4 to 5 men per 10,000 acres are required per annum for all establishment and tending, over 20 are needed for logging (excluding truck drivers) in a simple operation as for Japanese log production. Over the last thirty years, however, labour has generally been in keen demand and forestry's (over-simplified) role as a potential large-scale employer has been a real cost. The labour required for any project should be specified, over time, by:

(i) *Total required.*

(ii) *Skills required* — whether these are costs or returns depends on the education levels, intelligence and desires of the potential labour force. So far in New Zealand State forestry a proportion of labour is prepared to accept lower pay with increased responsibility in return for security, status (presumably) and ultimate prospects: "... few Maori workers aspire to join the permanent staff on a lower fixed salary; thus the curious relations already existing between management and labour may be complicated, in due course, by the fact that an entirely pakeha management will have to deal with a predominantly Maori work force." (Groves, 1962.) This situation, if unrectified, can only lead to poor morale and/or standards of the supervising staff.

The qualities and calibre necessary for the ultimate decision-makers in forestry should be high, as there are few of them; the capital resources used are costly; and the long time-scale involved obscures results.

(iii) *Population distribution (geographical).* The arguments for and against greater dispersal of the population are twofold. The relative quality and attractiveness of rural, compared with urban life is shown by the migration figures, and will vary at different times. There are problems with single-industry towns or villages (Fenton, 1969a).

(iv) *Demands on the work force.* Plantation work in New Zealand has hitherto required a relatively high proportion of young male workers and so, as these are presumably the sector in greatest demand, should have weighted labour costs.

(v) *Acceptability by the labour force.* This can be measured by ease of recruitment, turnover, strike rate, and accident rate in the given industry and its derivatives. These have been enumerated (Fenton, *op. cit.*). The pay in relation to skill and training should be specified.

(b) *Land*

Forestry belongs to one of the few industries which needs relatively extensive areas of land. Its availability for any use depends largely on history; in New Zealand, as in the United Kingdom, an hereditary latifundia is of considerable importance in land acquisition for forestry. Multiple ownership increases the New Zealand problem. With negligible exceptions, land for forestry here has been unwanted — at the time — for the major alternative uses of National Parks or agriculture (Fenton, 1965). It is not difficult to demonstrate that site quality, location, scale, topography and ground vegetation can greatly affect the level of costs and returns from plantations, but there are few examples of any local afforestation based on such arguments. Special reasons, notably protection, have enabled afforestation of a few favourable, and some unfavourable, sand dune sites. The gross and net areas of given land productivity classes for any total volume production can be calculated, and should be enumerated in forest planning.

Originating in continental Europe when wood was indispensable and expensive to transport, the conservationist movement was codified in the U.S.A. at the beginning of the century. It has had a continuous and profound influence on forestry and land use policies and is strongly represented in New Zealand. (How appropriate is the name "Conservator" for a man endeavouring to launch exotic forest utilization? What of the implications behind choice of a name such as "Perpetual Forests Ltd.") One of its fundamentals is that "idle" land resources should be utilized. Since Keynes, this has been economically acceptable for labour, but can only be justified economically for land development if no more profitable alternative uses exist for the labour and capital required. To utilize land as such "because it is there" is akin to mining low-grade or technologically difficult ores "because they are there" — whether it is worth while or not depends on other criteria; gold and uranium production may be maintained for strategic purposes. Currently there is plenty of land potentially available for the proposed afforestation of one million acres.

(c) *Capital*

This is usually the scarcest of resources, particularly in young countries, and in periods of rapid development characteristic of the post-war years. Investments in long-term development projects such as forestry are characterized by low degrees of liquidity, unlike, for example, some transport or educational investments. Further, forestry requires a long time period before returns are obtained and "... as consumption per head increases, each absolute addition to it will yield successively smaller increases in economic welfare" (Henderson, 1965). The effects of different timing of the costs and returns have been accommodated for over a century by valid discounting techniques in forest economics.

Capital is required from two sources — domestic and overseas; their relative availability depends in part on the market accuracy of the exchange-rate valuation. Locally a narrow range of resources, combined with a relative absence of accumulated capital, coupled with demands for high current living standards, results in keen demand for capital and a necessity to trade overseas to obtain the goods or materials which cannot be procured locally. Overseas trade comprises more than 40% of the annual gross national product in New Zealand. Hence the overseas-exchange costs and returns should be specified in local investment analyses.

Production forests, in comparison with other industries, are exceptionally highly capitalized. Table 1 shows ratios of capital invested per employee as given for the 100 U.S.A. firms with the largest sales in 1958 (Fedkiw, 1960).

TABLE 1: CAPITAL PER EMPLOYEE, BY TYPES OF COMPANY

	\$NZ
U.S.A.*	
Aircraft	6,300
Railways	34,000
Retail and wholesale	7,200
Integrated pulp and paper	16 to 25,000
Douglas fir forest†	480,000
Average, 100 largest firms	19,000
New Zealand	
Rotorua conservancy schedules‡ (at 5% interest)	109,000

*Fedkiw, 1960

†Excluding logging

‡Including logging (Fenton and Grainger, 1965)

The New Zealand figure is based on the capitalized net income at normality and contrasts with the higher figure for the U.S.A.; the latter, however, excludes logging personnel. Ratios of declared capital to gross annual sales of the local pulp and paper companies are around 1:1, as in the U.S.A. (Fedkiw, 1960), whereas the supporting forests would have a ratio of over 8:1 if the Rotorua management schedules are used.

Estimates of \$NZ38,000 per man in forestry (interest rate not given) and \$27,000 per man in pulp and paper making are given for the United Kingdom (Johnston *et al.*, 1967), with capital:annual output ratios of 11:1 for forestry and 5:1 for pulp and paper. Yet, in comparison with other industries, pulp and paper is considered, correctly, to be highly capitalized. The high capital costs of forests in New Zealand have been obscured owing to the historical accidents of afforestation in the 1920s and 1930s, the low stumpage from major State sales, and the absence of financial criteria. Elsewhere,

analysis led to the conclusion: "The capitalistic nature of timber production makes the earning rate of forest assets and the cost of capital paramount economic considerations in forest management planning" (Fedkiw, *op. cit.*). There is no evidence that this view is taken here, although artificial plantations are as highly capitalized as the modified natural forests discussed by Fedkiw. The relative biological, managerial and marketing risks should be considered — usually a formidable task.

3. RETURNS

The literature on the measurement of returns of long-term projects, with their concomitant "external" costs and benefits is now turgid, and has been summarized as "... ordinarily more conceptual than useful" (Enke, 1969). A review has been prepared for local forestry (Fenton, 1969a, b, c), and one of the more readable summaries is also available here (Jensen, 1968). (The most serious practical omissions in the literature are the treatment of depreciation accounts, allowance for working capital, and the effects of fluctuating interest rates.) In brief, returns to capital (profitability) can continue to be expressed in land expectation values for given interest rates; it is still useful to know the rate of return earned; and usually necessary to specify the investments required through time. The outputs per acre and per year are also useful for comparisons within and outside forestry, together with returns per unit of domestic and overseas capital. Outputs can be given in both physical and money units.

There has recently been considerable emphasis on the further processing of forest products to return the highest value per unit of raw material; this is also argued to support, for example, additional aluminium and iron processing in Australia. Any such processing should also be assessed in terms of profitability, coupling forest and processing units. Calculations show total rates of return of less than 10% for pulp forests and newsprint mills where profit margins are \$26 per ton — 22% of sales price f.o.b. (Fenton, 1967). (In the long run, commonsense should imply that in relation to states such as Japan which lack a raw material base commensurate with their population and which can only remain prosperous by efficient processing, it is better to maintain a trade in raw materials than drive them back to imperialist nationalism.) Values added in local forest processing are available up to 1964-5, both absolutely and in relation to utilization capital (Yska, 1967; Fenton, 1969a); they show that the planing and joinery industry then had the highest values of output.

If the value-added concept is to be taken seriously, the value of the final output should be expressed against each constituent of the input — *e.g.*, it is no more logical to maximize value added per unit of wood than, say, per unit of labour, of electric power, of water used, of worker training time, or any other major input.

4. INDIRECT EFFECTS

Other factors such as recreational, scenic, strategic or hydrological effects have long been stressed as advantages for forestry; they have been summarized together with the indirect "costs" for local forestry (Fenton, 1969a). Most other forms of economic activity have similar costs and returns. Indirect and financial-multiplier effects should logically end up in a Hegelian unity as all economic activity is interconnected, but empiricism demands reasonable shutoff points which would depend on the circumstances of the analysis: that is, for individual growers, a price at stump or on truck; for a utilization company, at the end of primary processing; for a vertically integrated company, at final sales point (usually a retail outlet); for a country, at f.o.b. prices, and so on.

To recapitulate, nominatively (viz. in theory) production forestry should be evaluated by specifying:

- (a) Land needed — by location, concentration and quality;
- (b) Labour — by category and number over time;
- (c) Capital — by overseas and domestic sources over time;
- (d) Returns — by discounted cost and return elements to solve for the main profitability criteria.

5. CRITERIA IN PRACTICE

In theoretical expositions "... economists reveal themselves as esteeming ... such principles as:

- 1. A comprehensive view of factors relevant to a decision.
- 2. Clarity of definition of social objectives.
- 3. A means-end approach to policy.
- 4. Deliberate and explicit choice among policies.
- 5. A calculation and minimization of costs.
- 6. Reason and co-operation rather than arbitrariness, coercion and conflict.
- 7. A unified decision-making process for decisions that are highly interdependent." (Lindblom, 1961.)

In actuality, this does not happen. "What is remarkable is that [in Canadian land-use] none of this kind of analysis is ever carried out" (Scott, 1963); and "... very real difficulties in 'goal identification' [are] imposed by political processes. . . . In the absence of precisely stated goals and agreements on criteria of accomplishment, meaningful statements about the efficiency of resource allocation are hard to come by" (Rathbun, 1969). Another, perhaps extreme, opinion in a discussion of public development programmes is — "The truth is that officials of development agencies can do little more than lend and grant on judgement, experience or hunch, and each

will have a somewhat personalized view of what is necessary for other people's welfare" (Enke, 1969). There are other warnings that, if economic analyses are carried out, there is a chance of bias in the result (Henderson, 1965; Stoevener and Castle, 1965). Against this, although "... one can view cost/benefit analysis as anything from an infallible means of reaching the new Utopia to a waste of resources in attempting to measure the unmeasurable" (Prest and Turvey, 1965), they concluded "... it seems some estimate however rough is better than none at all. . . . Insistence on a cost/benefit analysis forces those responsible to quantify costs and benefits as far as possible rather than rest content with vague qualitative judgments on personal hunches . . . in much the same way insistence on cost/benefit analysis can help in the rejection of inferior projects which are nevertheless promoted for empire-building or pork-barrel reasons."

The effects of most of the theoretical criteria are largely irrelevant for many classes of production forestry owners. As long as gross anti-social activity is avoided, the dominant criterion for individuals, small and medium-sized firms should be profit, as the capital investment in production forests is so high. For the largest private organizations more complex arguments may apply, but inefficient use of capital, and the concomitant reduction of shareholders' profits sooner or later attracts abler financiers who, in a genuine capitalist society, may take over the firm. Those engaged in forestry can be misled by accounting systems into undervaluing forest assets. The State should carry out and publish justification for all major afforestation schemes (and a lot of little forests equals a major scheme) as, although the initial investment is often small, the compounded growth of capital and the labour force required are finally on a much larger scale. The State rarely lacks alternative uses for its funds and forestry should justify its claims (so, of course, should even more sacred cows). Once the profit motive is dropped, much of the justification for production forestry becomes on the level of "the finding of bad reasons for what [is] believed upon instinct" (said of metaphysics by F. H. Bradley).

The extent of subjectivity may be reduced, not only if more analyses are made in various sectors of the economy, but that each should be preceded by a statement of the author's interests. Excessive parochialism could be reduced by having proposals made by specialists from other districts. Where possible, the analyst should be independent not only of the executing agency, but preferably of the industry; engineers should avoid analyses which, *inter alia*, call for more engineers; agricultural economists should not decide between agriculture and other uses. International agencies may be less inviolable than assumed, self-perpetuation is a powerful driving force; it would be interesting to know the proportion of projects which are (a) rejected and (b) accepted and prove successful. Conservationists are not exempt; although the Erewhonian satires on the rights of animals, and of vegetables, are almost a century old, they appear at times startlingly

topical; the costs of conservation proposals should be given. Sample, fictional introductory statements may well be the subject of correspondence to the *N.Z. Journal of Forestry*; the interest of the writer, practising forest economics, is self-evident.

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