

THE STRUCTURE OF FORESTRY

When will we be big enough to think small?

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ABSTRACT

Current forest ownership and wood industry conglomeration are placing New Zealand forestry in a corporate oligopoly structure. There is a case for resisting such development and seeking to maintain some diversity in size amongst the forestry sector. The substantive argument for smaller-scale independent forest units includes improved political representation and public image, more flexible wood supply, sharper management effectiveness, greater opportunities for reduced growing costs, maintaining a wider scope for innovation, and general social values. Achieving a wider diversity in forest-growing units could arise through co-operatives, deliberate policy insofar as disposal of State forest plantations is concerned or more imaginative organization management within the present large growers.

A CASE FOR THE SMALLER FOREST UNIT

This paper focuses on the social organization of New Zealand forestry, and more particularly forest growing. In a largely qualitative manner I hope to persuade you to the view that an imbalance has developed in forest ownership, and that the current position warrants change.

Do we need more small growers in New Zealand and what role should they have?

Over the years foresters have taken an interest in the small grower and expended a good deal of effort in the farm forestry arena. The prime purposes for such forestry interest have been multiple use encompassing shelter, diversification of farm income or simply better land use; only recently has forestry been advocated as a financially superior activity to agriculture.

This interest in the small grower quickened appreciably in the wake of the 1981 Forestry Development Conference where sectoral tar-

gets for afforestation were compared against actual and probable regional landbanks. Achievement of new land planting targets clearly required additional lands outside existing forest gates and pastoral lands were seen as the logical source. The potential was there as surveys of agricultural holdings indicated extensive vacant or poorly productive areas. Launching innovative legislation (Forestry Rights Registration Act 1983) to facilitate planting of areas by 'farmer's choice' seemed certain to result in an increased rural woodlot estate and assist afforestation goals.

But times change and economic circumstances today challenge the confident planting targets of the 1970s and early 1980s. Loss of the Forestry Encouragement Grant Scheme and declining farm incomes make it clear that small growers are in a poor position to finance forestry activity. Government attitudes to forestry taxation continue to vacillate and do not encourage investor confidence. Afforestation now for timber harvest 20-30 years ahead offers little real income diversification for individual farmers or anyone else operating in an ailing business activity.

The second planting boom has run its course for some 15 years, but it has not generated a significant subsector of independent growers. Independent forest growers are typically very small-scale and associated with pastoral agriculture with a predominant income for the individuals concerned derived from outside forestry (Trotman and Lewis, 1984). There are few examples of sustained independent income through forestry — a 'forest-farm' if you like with regular annual income and expenditure through management of a normal or nearly normal forest.

The concept of forest-farms is not new and farm forestry folk especially have described and enthused over integration of forest and farm personal incomes as demonstrated by much of Scandinavia and to a lesser extent Europe. The evidence from New Zealand farm forestry either documented (Meister and Smaller, 1983) or generally acknowledged is that farmers have established forests principally for multiple uses and not as a predominant source of income. Viable small forest units do not seem likely to emerge from traditional farm forestry forests because:

- stands are typically fragmented and poorly accessible;
- most stands are young and the age-class distribution is clumped;
- woodlot size is small to the point of being limiting;
- harvesting often compromises farm management;
- owners are frequently ignorant of real values and the benefit/cost relationships of silviculture;
- farm labour is committed to agriculture and unfamiliar with forestry work;
- management is not forestry-oriented.

In any event current ownership of forest land seems hardly conducive to independent growers, judging by gross statistics. At March 31, 1985, New Zealand's plantation forests totalled 1,097,000 hectares (NZFS, Planning Division); present forest ownership is estimated to be:

State Forest	52%
Public and Private Companies	37%
Private Individuals	5%
Trusts/Societies, etc.	2%
Local Authorities	3%
Other Government Departments	0.8%
Unknown	0.2%

With the New Zealand Forest Service soon to become a State-owned corporation and given the small group of companies concerned with forest management, the position effectively is that 80% of our plantation estate is owned amongst five commercial entities. This oligopoly of forest ownership approaches a monopoly position in wood supplies for some regions. The stage is set for corporate forest-growing and corporate utilization and there appears to be little scope for the independent smaller grower and probably smaller industry. I view this situation with scepticism and concern.

There is increasing recognition that the much more competitive future facing the forestry sector will require improved cost-effectiveness in all operations and greater attention to efficient utilization and marketing. It appears to be widespread belief that such progress implies maximum aggregation of the forest resource into large, preferably contiguous blocks in order that resultant wood supply may be exactly matched

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to the optimum conversion process. Utilization efficiency relative to throughput is very arguable on current evidence. If we are to draw valid conclusions on forest size and efficiency, good comparative data on growing costs should be available but aren't.

In any case, to hear citizens of such a small insignificant nation as New Zealand give unquestioning support to 'economies of scale' and the necessity for 'big blocks' is disquieting. Small is not invariably beautiful but if this country is to succeed in an internationally competitive arena like forestry we need to sharpen and develop all our skills, not rely on supposed economies of scale. The discussion vacuum on what might be an optimal basic structure for forestry enterprise stimulated me to offer some support to the smaller grower.

The substantive case for smaller-scale forestry includes many facets:

(1) Representation and Image

Forest-growing, and to a lesser extent the forestry industry, seems likely to continue as a regional rural activity. Our country's population is not well represented in rural activities with only 16% of New Zealanders living in country areas or towns of less than one thousand people. Government policies for New Zealand and 'democratic' decisions taken by Government directly mirror urban concerns and offer 'politically acceptable' urban solutions. Nowhere is this more apparent than in Government and public attitudes towards forestry, particularly forestry and the environment.

It is awkward for forestry to escape the poor press accorded a juggernaut image (corporate or departmental) with production forests owned by so few organizations and the forestry industry moving towards multinational status. Economies of scale may be real enough within the wood processing industry and large capital investment may demand some security of supply; nonetheless I believe our sector could improve its public image greatly by encouraging smaller family concerns and companies and emphasizing their importance within forestry. The remarkable public acceptance of the pastoral farm unit illustrates the scope for improvement.

Government's stance to forestry taxation in both basic principles and mechanics, let alone the demise of forestry incentives, reveals an underlying public ignorance of forest management and an indifference, even hostility, towards those whom the public perceive to be directing the sector. Taxation issues are political and will continue to be determined through interactions of Treasury, Government and the forestry sector where lobbying power is based directly on the assumed media presentation of the issue and public response to such presentation. In this game it is very important to have supportive numbers. The ordinary rank and file of forestry are unaware of the significance behind say taxation policy or

even general economic policy and typically leave representation of their interests to national unions or bodies. This does not help advance New Zealand forestry.

(2) Wood Availability

Economic theories have difficulty in adjusting from assumptions of perfect competition to the realities of monopolies, oligopolies and non-market price-setting. Like others, I believe a more elastic supply-demand curve in wood availability to be healthy.

In some ways greatest competition would arise from many processors bidding for the supplies of a few growers. Present circumstances for wool processing favour sizeable plants and this seems likely to continue for the bulk of the annual cut. If timber supply continues to be by negotiated short to medium terms sales, then an increased number of independent forest units could generate uncommitted parcels of wood on to the market, introducing greater competition and improved returns to growers. However, I regard assumed increased returns as exaggerated. Far more valuable to the forestry sector are the improved prospects for entrepreneurs to enter the wood processing field either via acquiring rights to small wood parcels or simply having the confidence that wood can be procured by competitive tendering. In most industries entry into the marketplace is straightforward — if New Zealand wood conversion is to reach its maximum, wood availability systems is a vital aspect of sector planning.

(3) Management Effectiveness

The vigour of a large organization as judged by its ability to formulate intentions and objectives, instil direction and achieve physical results is never easily determined. It is obvious enough that as size increases group agreement on objectives becomes more difficult and specialization may even seed conflict. Resource allocation may be viewed as unfair and unjust to activity managers and impersonal quantitative results assessments can raise doubts about overall organization purpose. Problems I have experienced related to organization size will be familiar to many others too:

- confusion over objectives;
- confusion over resolution of work activities that stem from the objectives;
- difficulties in allocating resources;
- concealed personal prejudice by managers towards objectives;
- expenditure of undue effort by managers in establishing their spheres of responsibility;
- erratic or inconsistent delegation;
- confusion about specific control of people;
- pervading stress through difficulty of maintaining co-ordination and communication between widely spread people;
- inconsistent reference to policies or guidelines and poor 'maintenance' of such documents;

- difficulties in incorporating servicing sections that operate on manager request;
- undue concentration upon approval procedures;
- confusion over differentiation between urgent requests or tasks that come from higher levels as opposed to achieving basic routine tasks vital to longer-term organization survival;
- difficulties in assessing individual performance.

Production forestry exists now and will continue in landscapes and localities where non-production values are important, maybe even predominant. Even the most straightforward plantation will differ from another forest in terms of age-classes, establishment problems, legacy of regimes, sale commitments and so on. Integration of forests and forestry's diverse and irreplaceable individuality within a few large organizations facing the inherent problems listed above will be difficult.

(4) Improved Opportunities for Reduced Growing Costs

If forest growing is concentrated in a few commercial entities, these entities will be very large. The Forestry Corporation in particular spans an extensive disjointed geographical area. Those responsible for organization design should consider optimum sizes for forest management tiers as well as total corporate size.

Bureaucratic procedures that do little but add costs to production activities may develop within any institution or organization not just public agencies. The larger the size and geographical spread of an organization the greater the risk that inconsistent delegation and autonomy to various tiers will result in bureaucracy. Furthermore, most people are aware of the incentive in Government departments and agencies to simply enlarge; in-house concern for management efficiency rarely tackles size as a problem or constraint (Morris 1985).

My observation is that the potential advantages of centralization and specialization in forest-growing and to some extent harvesting are often illusory because inevitably the quality and efficiency of forest operations is set by the workers and work supervisors at the forest face. Planning and budgeting for work and the motivation and supervision of forest workers is acknowledged by top forest administration as the key to productivity though appropriate recognition to individual forest managers may be awkward to assign; paradoxically recognition and promotion invariably brings less involvement with direct work supervision.

As more labour is employed and as labour operations become more frequent insidious dilution-by-distance comes to bear on managers. This encourages use of substitute 'eyes-and-ears' and larger forests have squads of quality control and mensuration staff monitoring and measuring

operations at significant cost basically to ensure operations do not derail. Similarly highly-trained specialists will toil with computers and digitisers in forest mapping, inventory and harvest planning systems simply because command levels are increasingly removed from direct wood supply and accountability.

I would argue that we are approaching the point in some larger forests where the cost per m³ of MARVL inventories, cutting plans, yield control, supervision and payment procedures are greater than the comparable expenditure of a small grower who may walk-out a ten hectare felling block, mark the skid tracks, tally the 2929 trees to be felled, estimate mean tree size with the 'Ready Forest Reckoner' then supervise the contract gang daily for the five weeks it takes to harvest the year's cut.

The point is: What constitutes a reasonable and efficient level of indirect costs and overheads? Forest managers are confident to set work and cost quantities over a range of silvicultural and logging operations based on work study, but how do we feel about the work content in managing and administering a plantation forest? New Zealand's plantation forestry is recognized internationally for the sophistication of our technical understanding. We can simulate our forests from seedling to finished products using complex computer systems. The challenge now is how to arrange forest management so as to capitalize on the comparative advantage of our knowledge whilst costing an affordable few dollars per hectare per annum.

When economic evaluations of afforestation and/or restocking are calculated using realistic indirect costs and overheads (at levels incurred by many forests) these costs emerge as far more significant than the direct costs of planting and silviculture. Reducing overheads by a few dollars per hectare alters considerably internal rates of return and/or net present values equivalent to major savings in tending operations. Such a comparison does not prove indirect costs and overheads to be excessive but it illustrates the need to research and study this aspect of forest-growing.

(5) Maintaining Scope for Innovation

Effective application of applied forest science research relies upon a cadre of forest managers willing to prescribe for and implement change. Forest managers (including farm foresters) and the Forest Research Institute have combined well in the past two decades to develop and introduce major improvements to nursery practice, establishment, tending treatments and design of silvicultural regimes. Can we rely upon the Forest Research Institute to continue its contribution to efficient plantation management under a user-pays philosophy? Forest Service departmental structure gave

considerable autonomy to Forests/Districts/Conservancies and the independent free-thinking spirit of many forest managers was advantageous to innovation and introduction of change. One wonders if centralization of decision-making may accompany Forest Service corporatization at the expense of innovation. It is difficult for me to judge the innovation present in existing companies but it seems no less than that of the State. However, my observations of agriculturists and horticulturists lead me to suggest forest managers overall are inclined to be conservative if not staid.

Forestry needs to retain a human-scale dimension to forest-growing. Owner-operators in close working contact with forest operations could become a key factor in maintaining technical innovation and 'smart' practice in forest-growing and harvesting. It is important that operation efficiency and profitability be closely linked to individuals who have sufficient hands-on responsibility to perceive the scope for improvements if not also benefit personally from any gains in efficiency. Fostering such an atmosphere in a large organization is difficult.

(6) General Social Values.

Predominant agricultural and horticultural land uses inevitably contain areas of underutilized and/or unutilized land, frequently suitable for forestry but individually small though significant in total. If attitudes to small-scale forestry are condescending incorporation of such sites into a system of effective and efficient land use will be limited. It seems only common sense to maximize output from the settled areas of New Zealand with their well-developed infrastructure and support services. Note too that the much-vaunted export log trade was established on a foundation of small woodlots and shelterbelts, not from the more extensive large-grower plantations.

Good land use, including very intensive single land use, is attractive to most people if only in the sense of being reassuring. Trees and forests enrich many landscapes especially pastoral localities generating a feeling of permanence and husbandry that is real and valid albeit awkward to price. Similarly the general social well-being of us all arises in no small measure from our perceptions of the physical environment about us. Are we at ease with it all? In the end pursuit of a target rate of return on assets employed is no more than an attempt to increase our overall standard of living — we amass funds quantitatively even insensitively and then expend them qualitatively often on intangibles. This approach has performed satisfactorily at times though it does not necessarily foster quality of life. For many self-expression through business or vocation requires individual identity — such people can be expected to secure more fulfilment through smaller-scale forestry oper-

ations rather than in corporate entities.

If my thesis that smaller-scale forestry could be efficient and worth pursuing is correct, where and how might such forest units arise? As mentioned earlier, independent units have not arisen from traditional farm forestry afforestation. New joint venture measures may generate an increased area of manageable forest blocks but the terms and conditions for joint ventures protect the interests of the partner financing the project and consequently they do not engender smaller growers with real independence or managerial accountability.

The extension of joint venture principles to management of a working circle of immature and mature forests could stimulate independent small-grower organizations. Forest co-operatives are provided with legislation but have not formed as vigorous business units. Involvement with processing industry by co-operative members along the lines of the dairy industry would initiate greater progress though unfortunately one needs to have a reasonably advanced age-class series to contemplate investment in utilization.

To a large extent the thrust of departmental forestry has been towards active achievement of extensive establishment and tending programmes. Nonetheless calls for diversity of forest ownership in more recent times including straight-forward privatization are a sign of maturity. The 1981 Forest Service Review considered submissions to this effect but "did not favour outright sale of State forest lands to private interests" nor did it endorse alternative arrangements such as leases, etc. Clearly the greatest potential for establishing viable independent growers lies principally in the current State holdings through identification of appropriate working circles and assistance in financing. Given present Government attitudes to either privatization or financial incentives it is hard to imagine independent growers arising from the Forest Service ashes. However, if the Forestry Corporation seeks to exclude the less clearcut production forests or areas of lesser predicted economic return then independent forest units could arise though reasonably large and by definition not principally commercial. The possibility of multiple use exotic forests being managed through ad hoc boards or authorities encompassing major production operations will hopefully be evaluated by those dismembering the Forest Service.

Lastly, I expect to see within the large-grower organizations themselves a move towards more efficient forest growing through different management systems. An effective large forestry organization must recognize at some stage that its activities embrace competing objectives — there are those that relate to output (planting, pruning, logging) and there are those that make possible the means for output to continue (sales and marketing, public image, investor confidence, yield regulation). Efficiency

advantages that I have suggested for owner-operator forestry can also be integrated within corporate forest ownership and its concomitant financial and servicing resources. Large manufacturing organizations contract out production of components and ingredients vital to the finished product; the food processing industry commonly purchases inputs from numerous small suppliers and/or contract growers. It seems reasonable to foresee independent farm forestry growers arranging forward wood supply contracts with processors for all or part of their annual harvestable increment. Given initiative and a willingness to experiment, the large companies/corporations

may consider financing forest managers into established forests with current or oncoming yield that is regulated or predetermined by contracts from the management specialists. Contract logging and transport would function much as it does now in forestry. Additional harvest volumes or value through good practice could be treated as a bonus to efficient forest management. Restocking and tending treatments could also be handled by such management contracts. The "profit motive" would operate strongly in such situations and incentive would be far closer to the work face than in current company or corporation balance sheets.

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Economics of fire prevention in New Zealand plantations

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ABSTRACT

The history of expenditure and other data on NZ Forest Service fire prevention confirms that fire prevention expenditure per hectare is greater in the high-risk districts compared with the moderate and low-risk districts. However, there has been considerable variation in expenditure over time. In the past, these expenditure levels have been based on management's experience, intuition, and local assessments. Such practices do not necessarily provide an optimal economic solution. This requires expenditure to be such that expected costs and losses are minimized. Managers are then required to trade-off between efficiency and risk associated with their fire prevention programme.

When exotic plantations were first established in New Zealand in the late 1800s fire prevention measures were very quickly found to be essential. Ideas on equipment strategies and legislation were gleaned from North America and as a result fire prevention costs became part and parcel of the plantation management (Cooper 1981).

Over the intervening years serious fires have occurred in both State and private plantations. They range up to 13,000 ha in the Tahorakuri Block during the 1946 Tau-po fires (Fenton 1951, Church and Stanley

- Harris 1967). Fires in the recent dry seasons of 1981-83 have kept forest managers on their toes and fire prevention costs are therefore still an essential item of expenditure in the management of exotic plantations today, especially as young forests planted in the 1960s increase in value with the approach of harvesting.

Historic Costs 1900-1966

Data are difficult to obtain. A study of early annual reports of the Lands and Survey Department (which was responsible for State forests until 1918) from 1896 onwards reveal some crumbs, one being that the costs of plantation fire prevention was "6 pence per 100 acres" in the early 1900s.

In the 1912/13 annual report H.A. Goudie, superintending nurseryman, North Island, stated that "the present system of firebreaks is, on the whole, satisfactory, but as it entails an annual expenditure of 10 pence for every acre planted . . .". He went on to say that this sum compounded at four and a half percent amounted to 12 pounds in 60 years; it was better therefore to sow pasture and graze to bring in a "profit at the rate of seven and a half percent on the outlay".

A few more details are available from the State Forest Service annual report to the Commissioner of State Forests.

In the 1923 report the costs of protection, prevention, detection, and control amounted to 2297 pounds 4 shillings and sixpence and the plantations totalled 44,646 acres. Costs were therefore 12 pence or 1 shilling per acre. The value of timber destroyed totalled 6080 pounds but some of this was indigenous forest and an accurate costing

is impossible to obtain. At that time wages for patrols amounted to 84 percent of costs with equipment and transport taking up the remainder. Cost analysis in annual reports ceased after 1928 and have not been continued to the present day.

Fire protection cost data appear to have been poorly recorded because managers had to rely on time-consuming handwritten, typewritten or the Hollerith commercial accounting systems. The advent of the first electronic commercial accounting systems in 1967 changed this situation.

Costs - 1967 to 1982

It is useful to consider these data together as a consistent system was employed over this time period. Examination of average costs/ha in 1983 dollars, by NZ Forest Service Conservancies, show changes from a low to a higher expenditure, or vice versa, from year to year which cannot always be accounted for by either wet seasons or high fire danger (Table 1). Improved salaries or wage awards such as occurred in 1977 translated into increased 1978 costs. In the case of Canterbury, windthrow, log salvage and the need for extreme care in the years 1975-1979 also reflected increased costs per hectare. In 1980-81 the onset of a dry spell with an increased number of days in high and extreme fire hazards resulted in some increase in prevention costs, particularly in Nelson, Westland and Canterbury.

The data confirm generally what we would expect. Expenditure per hectare is greater in high-risk than moderate or low-risk areas — for example, in Canterbury compared to Auckland and Southland, respectively. It is difficult to pinpoint why fire prevention expenditure moves unevenly

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