

PRODUCTION FORESTRY IN THE 1980s

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I understand that to be a good soothsayer you have to be able to predict from the signs of the times. Foresters need to develop the talents of soothsayers because the broad pattern of what is likely to happen in the near future is moulded by the events of the past and shaped further by what is being done at present. The future in production forestry is moulded by the elements that affect the extent and characteristics of our wood resource — land, man and the weather. The last is the least predictable so need not be considered further. Influences affecting the others — the raw material, land availability, and human elements — can be more readily interpreted so they will form the launching pad for my predictions for the 1980s.

THE RAW MATERIAL SCENE

The quantity of wood which will be available in the 1980s, and its intrinsic characteristics, have already been largely predetermined by past events. By then, the era of the "old crop" radiata pine planted during the 1920s and '30s will have passed. With it will have passed the era of surplus, under-utilization, untended stands, long rotations, high incidence of malformation, high heartwood content and other sundry characteristics to which our industry has become accustomed and accepts as the nature of the beast. Surplus tends to be followed by shortage and our forebears unwittingly set the scene for shortage in the 1980s when, from the mid-'30s to the early '50s, they adopted low planting rates and switched to planting a higher proportion of slower-growing species. They contributed further by dispersing this morsel around the country in what were termed local supply forests. Unfortunately, the textbook forestry principles they were following were not written for plantation forestry. Consequently, today's captains of industry foresee shortage of suitable raw material to be the principal factor limiting their expansion beyond extensions already in hand or programmed.

Some palliatives are already being implemented: the short-rotation sawlog regime that forgoes production thinnings in the interests of bringing forward the final harvest, ensuring market flexibility, and making higher profits; the liquidation

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and conversion of other pines that did not pay off pathologically; rapidly expanding radiata pine planting programmes since the mid-'60s, which could allow even shorter-rotation pulpwood regimes to be considered in some localities; greater utilization of sawmill residues; higher-yielding pulping processes; and wider species acceptance standards. Acceptance of a wider range of species could lead to more intensive utilization of indigenous hardwoods but strong counterpressures can be expected from a newly awakened conservation-minded public. The decline of indigenous softwoods for general building purposes is inevitable, but qualitatively they could continue to provide an important and valuable special-purpose component.

When these influences are projected forward to the '80s, we find that the characteristics of the raw material will be significantly different from what they have been, and are at present. Most of the produce will be coming from stands that have received some tending, and that are substantially younger than those used in the past.

Past thinnings should have eliminated most of the poorer stems so final crop stands should have less malformation. Logs may be marginally straighter. Mean log size will be smaller with fewer large logs. Because much of the thinning has been belated, loggers may still have to contend with a wide range in tree size at clearfelling.

Past pruning, though also mostly belated, will result in enhanced recoveries of factory grade, with some clears, cut from butt logs; if cut for framing, they will yield high proportions of No. 1 Framing. Consequently, value gradients for different log height classes will steepen. The bulk of the sawn out-turn will still be knotty, but the large bark-encased knot will be less frequent as a primary defect. Average knot size in top logs may be significantly larger but will be intergrown.

Heartwood content will become of decreasing significance as rotations shorten, and average basic densities will decline. Mean fibre length may be reduced slightly by the higher proportion of young wood and there could be more compression wood associated with the larger knot size in top logs. It is envisaged that these effects could be ameliorated by technological improvements in processing, resulting in a broadening of present acceptance standards for pulpwood, particularly in respect to knot size and bark content. Developments of this nature would result in recovery of material hitherto wasted, both in the forest and in the mill.

THE LAND SCENE

There is ample land that can grow good productive forest at high incremental rates. The question, therefore, becomes one of availability; of being able to acquire "the right land in the correct place at the right time and at the right price". The era of afforesting large, previously undeveloped blocks of State-owned land is passing. Much of the land required for new planting in the '80s will have had some previous form of land-use, usually under different tenure. Thus, our capacity

to pay current agricultural prices for land could determine the location of much of our future exotic forest estate. In this respect, means of phasing from one form of land-use to another without markedly dislocating the existing infrastructure and social values will be an important consideration.

Forces liable to influence the acquisition of land for new planting in the '80s are:

- The location of large processing plants and their owners' policy in regard to establishing their own forests to safeguard their raw material supplies.

- The dominating influences of site quality and location in respect to markets or ports on the profitability of forestry. Within these constraints, the limitations of topography and soil type on harvesting could become of increasing significance.

- The planners' desire to consolidate resources in priority supply areas or to expand existing resources that are inadequate to sustain viable processing plants that can utilize wood in chip form. Linked to this is the Government's desire to foster regional development and to diversify industry in stagnating localities.

- Increasing public opposition to further large-scale conversion of State-owned indigenous forest, irrespective of whether or not it has been cut over.

- Pressures to combine production forestry with protection plantings to combat soil erosion, often in remote localities on difficult terrain on soils of low productive capacity.

Here I should like to sound a note of caution; it is readily apparent that these forces will often conflict so it will become increasingly incumbent upon foresters to ensure that the significance of each on the viability of production forestry is fully evaluated and correctly weighted. The facts of their case will then need to be presented logically and forcibly in the right quarters. Some foresters seem to live in the euphoric dream world that they can afforest any country, anywhere, at any cost — a state of mind that agriculturists possessed 50 years back. If we are to avoid the agriculturists' pitfalls, foresters must do their sums at the beginning; it should be unnecessary for production forestry to be bailed out by massive injections of taxpayers' cash in the form of concessions, hidden subsidies, or protective tariffs when we reach the stage of harvesting, processing, and marketing what we have grown.

THE HUMAN SCENE

It is foreseen that increasing industrialization, affluence, education, urban drift, and the social stigma against unskilled manual work are likely to make it increasingly difficult to recruit and hold labour for labour-intensive operations. If present trends are not arrested, production forestry

could face severe constraints in obtaining sufficient labour with the requisite skills, motivation, and stability to perform the prescribed range of operations efficiently. Factors that will require particular attention are:

— Less reliance on employing young single men, preferably by drawing on larger, more socially cosmopolitan communities. This may require the provision of employment opportunities for several sectors and age classes of the community, especially for women.

— The creation, by means of appropriate incentives, of a work environment that gives personal satisfaction and motivation. Important aspects in this respect will be better instruction and training at the artisan level, and safer, less physically demanding work methods.

— The adoption of management regimes that circumvent subsequent labour-intensive operations, or the development of alternative techniques — *i.e.*, using guided rollers for crushing scrub on steep country in place of hand-felling.

In the community at large, forestry operations could be subjected to increasing public scrutiny as more and more of their familiar landscape is modified. The constraint of public opinion against the wider utilization or conversion of indigenous forest has already been mentioned. In time, public concern for other values may carry over into the exotic forests — much more pressure will certainly be directed against practices that can be seen to be damaging soil, water, recreational or amenity values. Production foresters run the risk of losing by default unless they educate themselves in these matters so that they in turn can educate the public.

The human-induced energy crisis is giving wood a competitive advantage as a raw material over non-renewable or high energy-consuming substitutes. At the same time, it could react also against wood conversion processes that have a high energy requirement. Energy consumption and the cost of installing stricter pollution control safeguards could become determining considerations in deciding whether we should export our surplus as logs, sawn timber, chemical pulp, or newsprint. In the not too distant future, we may have to give more thought to the prospects of using wood as a renewable source of energy.

IMPLICATIONS FOR MANAGEMENT

Forest management encompasses and integrates the raw material, land, capital and human resources; changed patterns in any one can have repercussions on the others. How are the influences I have discussed likely to impinge on individual management operations and what new developments may stem from them? The characteristics of stands scheduled for felling in the '80s are predictable, so it is convenient to work backwards from harvesting to the establishment of the new forests upon which the long-term future of the industry will depend.

Harvesting

I foresee that the dominating influence on logging during the '80s will be the shortage of readily available wood. It could cause a chain reaction through the industry, the pattern being somewhat as follows:

Increased competition → higher wood cost → more zoning of stands → smaller trees → lighter, more mobile gear → broader acceptance standards → higher utilization standards → stricter controls → cleaner cut-overs → smaller landings → less damage to soil and site values. Superimposed over these will be greater recognition of human values and risk.

I do not foresee novel concepts like helicopter or balloon logging or pipe-lines for chips taking hold. We shall still be using cables and winches on steep broken country and mobile rubber-tired machines wherever practicable. Mobility, flexibility, and versatility should be the keynotes for our approach to mechanization. Our topography is too broken, our stands and soils too variable, and our products too diverse for there to be much scope for large, complicated, costly machines. Our philosophy should be to make the man in the woods more effective and more productive, creating a safer and more congenial environment for him; to mechanize the man with relatively low-cost reliable gear rather than to replace him with complex monstrosities. Our efforts towards improving mechanization would be better directed towards determining the right combination of proven gear when used in the right way in the right circumstances.

There are other developments that could arise within the framework I have outlined. Projected domestic demand forecasts for wood products during the '80s estimate that more than 60% of the total roundwood requirement will be for sawlogs and peelers. It would appear, therefore, that efficient segregation of logs into produce categories will be essential to the independent forest grower if he is to recoup his investment in tending stands for sawlog or veneer production, and to the sawmiller and plywood manufacturer if they are to improve their processing efficiency. Segregation in the forest or at the mill often has the effect that log values for different products become masked by contingencies or expeditencies. Higher value gradients could encourage the development of log segregation yards or primary processing plants at convenient transfer points (akin to an abattoir in the meat industry). Logs would be transported to the yard in maximum lengths, barked, cut to length or grade, segregated, measured, and sold at yard instead of on stump or at skid. Side benefits that should accrue would be long-length logging and transport, smaller landings in the forest, and smaller wood-rooms at the mill.

If acceptance standards for fibre board or pulping processes allowed unbarked chips, whole tree harvesting systems should eventuate based on the principle of reducing the trees to chips closer to the stump. Major benefits for small trees

would be the elimination of trimming and barking, reduced handling costs, higher recovered yields, and reduced residues. Developments of this nature would improve prospects for thinnings in crops being managed for sawlogs, provided the thinnings can be extracted profitably before they impinge on the growth of the main crop component. Lower acceptance standards might also lead to cheaper systems for salvaging slash or stump residues from felled settings. The better approach, however, would be to aim at eliminating the need for salvage by improving clearfelling standards.

Broader pulpwood acceptance standards in regard to species would allow hitherto non-merchantable wood in indigenous forests to be utilized but I foresee that mounting public concern and sentiment for the indigenous forest will restrict the scope for it. In fact, the pattern is likely to be the reverse, with more of the indigenous cover being retained and with much stricter controls on logging. Increased values for indigenous timbers should enable selective logging to be more widely adopted, designed primarily to safeguard other values of the forest and only incidentally to maintain its productive capacity. Regeneration will be sought and encouraged with a view to perpetuating the species rather than to guarantee industry a sustained yield of wood.

Silvicultural Regimes

The silvicultural regimes we shall be prescribing in the 1980s are more difficult to foresee. The cross we have to bear in plantation forestry is that all the really important decisions — what land to acquire, what species to plant, what end product to plan for, what initial spacing to adopt, and what tending regime to apply — have to be made years ahead of the final harvest. With technological advances occurring so rapidly, there is obviously a high marketing risk attached to investment in stand treatments that are designed to enhance future sawn timber and veneer grades. When the future is obscure, the safest option is to settle for a regime that has either:

- (a) Maximum market flexibility even though it requires a substantial investment in tending, or
- (b) Less market flexibility but with a minimum investment in tending.

For radiata pine, the direct multi-purpose sawlog regime would fall in the former category, and the direct pulpwood and the framing sawlog regimes in the latter. I do not intend to argue their pros and cons; all three could have their place in the future, the choice being dependent upon ownership, local circumstances and market opportunities. Each is purposeful, having an end product in view which establishes the specifications for the tree crop, which in turn defines the final crop stocking, the rotation, and the tending the crop should receive during its life span. Ironically, the least certain component of the regime is initial stocking — the number of

trees we need to plant in order to be assured of producing crop trees with the characteristics we want. Because radiata pine grown from unselected seed has been such an ugly duckling, we have in the past operated on a massive safety ratio of up to 10:1, resulting subsequently in endless confusion over pruning and thinning. At present we are down to a ratio of 5:1; with progeny raised from orchard seed, some bold individuals are toying with ratios of 3:1 or even 2:1. By the '80s it is possible we may go so far as to plant only as many trees as we intend to harvest at rotation age, applying the same principles to radiata pine as we apply now without question to poplars; if so it would resolve the thinning argument for the simple reason that there would not be any. However, knowing foresters' addiction to the principle that there is safety in numbers, it is not likely to occur.

Thus, whether or not we should production thin will continue to remain a controversial issue, particularly in view of the foreseen wood shortage. The case for it depends primarily on whether we can extract the extra trees before they impinge markedly on the growth of the crop component. In pruned stands at 750 stems/ha we know this occurs before top height 12 m, so we have very little latitude; there is little point in allowing culls to accrue increment that can be captured by the crop. Where we have not pruned, there may be a case for holding a higher stocking till top height 15 m to control branch size. Even then, this will allow little scope for cheap production thinning. For short rotations, it would seem preferable to adopt the adage: "If in doubt, chop it out". If labour is short, we could ill afford 10 man-days/ha on a low-producing pulpwood operation when, if thinned to waste earlier, 10 men could treat 16 to 20 ha/day. Added to this, of course, is the high management risk that the scheduled production thinning for one reason or another will not be done on time, increasing the physical risk to the crop. All in all, I can foresee that, through the combined influences of short rotations, shortage of labour, and risk to crop values, prescribed production thinning will fade away. Waste thinnings (euphemistically termed restocking, respacing, or stocking control) of necessity will become more universal and be done earlier. The pulpwood production that would have come from thinnings will be met either by higher utilization standards at clear-felling, greater salvage of forest residues, or direct short-rotation pulpwood regimes (adopting whole-tree harvesting concepts where feasible).

Pruning also is liable to remain controversial. However, once low early stockings are adopted in the interests of shortening rotations, pruning will be seen in its correct light as a means of capitalizing on the fast growth of radiata pine without incurring serious degrade. It will be regarded as a necessary preventive measure and so upgraded in priority. Timing of pruning will remain important in order to obtain the best return on the investment. Unfortunately, there seems little prospect that pruning in several short lifts will be mechanized satisfactorily (except where there is good vehicle access between rows) so labour difficulties will remain. Its

solution will require new thinking on how we approach labour-intensive operations like pruning. The best parallel in agriculture is shearing, where labour must be found to do hard physical work at a specific time. The sheep are shorn throughout the country on schedule, so obviously the labour can be found. The answer is self-motivated people, attractive contract rates, good supporting facilities and amenities, and better access and easier ground conditions under-foot. Stands may have to be zoned and priorities for pruning decided according to these criteria.

Other species will continue to fall by the wayside as long as radiata pine remains free of serious bugs and blights. Eucalypts are the only species I foresee gaining ground, planted primarily as a hardwood pulpwood resource. A few farmer and forester enthusiasts will undoubtedly persist in nurturing them as special-purpose sawlogs or veneer logs, but continuity of supply problems will continue to dog their efforts.

Land Acquisition

Acquisition of suitable land in the right place offers to be the principal constraint in maintaining present rates of new planting. By the 1980s it will have become readily apparent to foresters and economists that production forestry should be advancing over farmland towards the markets and ports in place of pushing further back into the mountains and the bush. Initially farmers may not see forestry in such favourable light and, as they own most of the land in question, acquisition at the right time in the right place is going to present difficulties. Land, however, like labour, has its price, so provided forestry can pay more than the ruling agricultural price for land the task will not be impossible; it will have the benefit of ensuring that it is in the right place. Having purchased farms at high prices, forest companies will be obliged to farm them to meet high interest rates and to improve their cash flow situation. Thus, the forest farming concept should gain ground rapidly, the impetus coming from the private companies. Farmers with large holdings may begin to show more interest and eventually, perhaps, we may come full circle and see the Forest Service and Lands Department working in harness again. By turning their attention away from the mountains and bush, production foresters may find themselves on side again with environmentalists, a lobby that will undoubtedly become a power to be reckoned with.

CONCLUSION

A wise prophet avoids being too specific; his predictions for the future are generalized, allowing ample scope for differences in interpretation. So far, I have also avoided the pitfall of being too specific, but I can foresee that practitioners will want more substance. The Forest Research Institute is participating in the Earth Resources Technology Satellite programme so, to obtain a bird's-eye view of the future, I placed an advance order for photographs of Kaingaroa and environs

in 1985. There are some cloudy spots, the scale is miniature, and the images are blurred, but the general scene that emerges has the following outline:

- The forest is almost all dark green, with a few remnant patches of bright green (presumably Douglas fir) and the odd splotch of light green (presumably eucalypts); few old stands of radiata are left.

- The rate of clearfelling has obviously accelerated — most stands being felled have 250 to 300 stems/ha about 30 m in height; some younger denser stands about 24 m high are also being clearfelled.

- Trees are being extracted in tree lengths by rubber-tyred machines; an odd whole-tree chipper is cleaning up the remnants of the minor species; a massive combine harvester is rusting in the yard at Murupara.

- The cut-overs are very clean with few prominent skid tracks, small landings, and little evidence of soil erosion; there is an odd-looking machine working that could be chipping stumps; no windrows or signs of burning are evident.

- There is no sign of any recent production thinning — all landings visible seem to be associated with clearfelling.

- A large plant under construction at Murupara could be for segregating logs; it must have chipping facilities because there are chip vans alongside; a train load of good pruned logs has by-passed Kawerau, presumably heading for the Mount.

- Clearfelling of podocarp-hardwood stands and their conversion to exotics seems to have ceased recently at Minginui; only one mill is working; careful siting of roads and tracks on hill country suggest that some stands are being selectively logged.

- A helicopter is spreading nitrogenous fertilizers over young thinned stands; all stems seem to be pruned and the trees are well spaced at about 300 stems/ha; I cannot see any sign of *Dothistroma* infection anywhere.

- There are some denser unpruned stands growing in what appears to be a sea of gorse; some 15-year-old stands adjacent are being clearfelled — obviously a pulpwood operation.

- Newly-planted areas have been well prepared; the planting machines being used have fertilizer and weed-sprayer attachments.

- Initial spacings are about 4×2.5 m except for recent plantings on the Half Mile Strip spaced at 8×2.5 m; the latter look as though they have been propagated from cuttings; the sheep and cattle amongst the trees look contented; a structure which could be a deer fence is being erected near 60/8.

- An aerial mapping aircraft is photographing all stands that have been recently thinned to their final crop stocking and stands scheduled for clearfelling.

— All the forest villages appear to be half-empty. The number of buses and cars about suggest contractors drawn from Rotorua, Murupara, and Taupo are being employed. Mobile caravans at landings indicate that contractors have workshop facilities on site.

— There is only one runabout parked outside Kaingaroa HQ, but there are lots situated at various points of activity around the forest; another wing has been added to the office.

— Overall, the industry is obviously buoyant and competition keen — perhaps the grower is at last obtaining a fair reward for his efforts and investment.

These forecasts are an admixture of what probably will happen, what might happen, and what I should like to see happen; which is which, I leave the reader to decide.

You may be wondering why the year 1985 was chosen. The answer should be obvious — I shall have retired by then.