

THE ROLE OF FORESTRY IN THE LAND-USE PATTERN ON THE WEST COAST*

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Introductory

All references in this paper apply to the Westland Conservancy, the boundaries of which coincide with those of the Westland Land District. Briefly described, these boundaries run from the Pororari River and the watershed of the Upper Grey River in the north, to Mt. Aspiring and Big Bay in the south. The east and west boundaries are respectively the main ridge of the Southern Alps and the Tasman Sea.

Area and Ownership

The area of the Westland Conservancy is in round figures, 3,620,000 acres, and a broad classification of the land tenures is as follows:

| | M. ac. |
|-----------------------------------|-----------------|
| Unoccupied Crown Land ---- | 800 |
| State Forest Land ---- | 1,865 |
| Freehold and Leasehold Land ---- | 560 |
| Reserves ---- | 380 |
| Maori and Miscellaneous Land ---- | 15 |
| | <hr/> |
| Total | 3,620,000 acres |

As these figures show, State Forest land overshadows all other tenures, and occupies approximately one half the total land area of the Conservancy and Land District.

Unoccupied Crown Land. This ranks second in area to State Forest land, and it is predominantly high country above the limit of forest growth, occupying the upper western slopes of the Southern Alps and their satellite ranges. Areas of alpine scrub, tussock basins, shingle screes and snowfields form a large part of the total. In terms of land utilization, Westland's unoccupied Crown Land has little to offer; though it is of importance in providing recreational and aesthetic values. The aim in management should be to maintain it in a stable condition and to protect it from all forms of misuse and damage by man and animals in order that it may continue to yield these indirect benefits in perpetuity.

Freehold and Leasehold Land. Occupied land, held in fee simple or under some form of lease from the Crown, fills third place in point of area, and totals more than half a million acres, 15 per cent. of the land area. Most of this land is situated in the main river valleys, and

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perhaps one-fifth of it could be classed as intensively farmed. Dairying and a small amount of fat lamb raising are the main types of farming practised on the more highly improved land.

Most of the occupied land is largely improved and is farmed by the simple expedient of burning off whenever the second growth scrub becomes dense enough to carry fire. In a mild moist climate this system produces a surprising amount of rough grazing for cattle and sheep. As might be expected, light stocking is the rule on farms of this type; they give a very low yield per acre of beef and mutton, although what they do produce is of high quality.

Reserves, etc. Reserves, Maori land and miscellaneous areas total less than 400,000 acres, and most of this area is contained in Scenic Reserves. These were constituted to protect aesthetic and recreational amenities, and their "yield" though considerable will always be indirect. Except for protection from all forms of damage they require little consideration in land-use planning.

State Forest Land. It is a matter for wonderment that ninety years after European settlement first began, one-half of Westland is still in Crown ownership as State Forest land. These State Forests occur throughout the whole length of Westland, occupying much of the coastal plain and lower foothills. On the east they join the high country zone of unoccupied Crown Land, usually at an altitude which coincides with the limit of forest growth. We may well ask why, in a district with a deeply-ingrained pioneering tradition so much of the land should have remained unalienated, much of it still in its primeval condition.

History of Land Settlement

The first European inhabitants of Westland were gold-miners, and the first settlers on the land were undoubtedly miners-turned-farmers. These were quick to realize that the free draining soils of the river-valleys were the areas most likely to repay the trouble and expense of development as farm land; and the great bulk of these areas were alienated by settlers quite early in Westland's history. The totara, matai and kahikatea forests typical of the river valleys were felled and burned; Yorkshire fog and other introduced grasses established quickly in the mild climate and bountiful rainfall, and stock, particularly beef cattle, flourished on this pasture alternated with browsing on the palatable shrubs in the nearby forests on the hill country.

This pattern of farm development was duplicated in all the main river-valleys of Westland before the end of last century. In most cases the holdings were large, boundaries were indefinite, and each occupied area was separated from neighbours by physical barriers such as rivers or large stretches of forest. Many such holdings remain intact in the same family ownership to the present day, the current generation now reaping the rewards of the foresight and industry exhibited by the forebears who first took up the land.

It should not be thought that all those who essayed farming for a livelihood had the good fortune to obtain land in the lightly forested and obviously fertile river valleys. Many took up pakihi land; scrubs or rush-covered semi-swamps often apparently drainable. Others, more courageous still, selected on the high river-terraces, easy of topography and usually carrying dense stands of rimu or silver pine or both. What a farmer's paradise this land must have seemed, once the timber could be got rid of. We know now, through the tribulations and disappointments of many stout-hearted yeomen, just what a snare and a delusion these pakihi and rimu-silver pine terrace lands have proved to be. They have never been successfully farmed, and there are no indications that this will be possible for a long time to come.

Land settlement in Westland reached its peak in the declining years of the gold-mining era, say from 1880 to 1900. The population then was greater than it is today, and was composed largely of the young and virile, attracted by the lure of gold but undoubtedly able to recognize any alternative means of wresting a living from the soil. Official encouragement was being given about that time to land settlement by the "small man," and what are today State Forests were then almost wholly Crown Lands open for selection. The bulk of it could truthfully be described in the land-agent's time honoured phraseology as "easy rolling country, well-watered by permanent streams, and readily accessible from all-weather roads." But despite these attractions to the settler, the greater part of Westland still remained unalienated when areas totalling more than 1½ million acres were proclaimed State Forest in 1919 and 1920. There was an obvious reason for this position. The soils were not suitable for farming: in other words, they were forest soils.

The Soils of State Forest Land

Westland is an example of a community dependent wholly on the soil for all its wealth. It follows, then, that the first step in any development or expansion of resources should be to know our soils; and to recognize the capacity of each particular soil type. We of the present day can be thankful that what our predecessors had to learn by dint of hard work and many disappointments can now be acquired in large measure by study, coupled with intelligent observation in the field. In this respect, all who have to do with the land in Westland can be grateful to Messrs. Gibbs and Collie, Soil Bureau, Department of Scientific and Industrial Research, and Mr. A. D. Mercer, Department of Agriculture, for their Bulletin, "Soils and Agriculture in Westland, N.Z." In this bulletin soil types have been described and broadly mapped, and the whole publication forms an excellent working basis for the forester or farmer. Of the twenty-two soil types recognized, ten are recent soils, or young to semi-mature podzols. Of these ten, eight are found predominantly in the river-valleys and along the coastal strip. The principal characteristics

of these soils are their free drainage and a fair measure of natural fertility. Because of their free-draining properties, these soils can be farmed successfully, and most of the areas in which they occur have in fact long since been alienated from the forest estate. They are thus of little concern to the forester. The two soil-types of this group which are not usually associated with farming are Runanga clay-loam and Arahura sandy loam. More will be mentioned of these later.

Closer study of the soils map, especially if the State Forests are imposed on it in outline, is apt to leave the forester feeling somewhat glum. Although the forest estate is large, a few soil types cover most of the area, and the position is somewhat as follows:

| | M. ac. |
|--|--------|
| Recent soils and young to immature podzols | 65 |
| Immature to semi-mature podzols | 250 |
| Semi-mature to mature podzols | 250 |
| Skeletal soils | 1,300 |

This is admittedly a broad classification with the acreage figures perhaps more indicative than absolute, and it disregards some soil types of restricted incidence and of no present-day importance in forest management. It may even take liberties with the soil map that were never envisaged by the authors; in which case humble apologies are tendered. The aim has been to obtain an estimate of the area occupied by each soil group, which information when correlated with topography, ground-cover, climate and so on, should lead to reasonably valid conclusions on the position that forestry should occupy in the economy of the district.

Skeletal Soils

These occur on an area of 1,300,000 acres, some 70 per cent. of the total forest estate. They are characterized by steep, much dissected, unstable country, much of it at higher altitudes inland from the coastal plain and lower foothills. A substantial area of skeletal soils is also found on the Paparoa Range north-east of Greymouth. Forest or shrub growth is found on a large proportion of the skeletal soils within the State Forests, but comparatively minor areas of commercial species are included. Any harvesting of the forest on these soils will need to be done with caution, because complete removal of the forest cover, whether done in the process of logging, or later by burning off the slash would almost certainly be followed by accelerated earth movement on the area so treated. It is thus impossible to escape the conclusion that the major part of Westland's forests—those on the skeletal soils—are first and foremost protection forests. Their role is obviously to regulate run-off and prevent soil erosion; functions essential for the permanent management of the fertile land of the lower river-valleys. These protection forests can make only a small direct contribution to the economy of the district; their indirect value is incalculable and the primary objective in their

management must always be to maintain their efficiency as stabilizing agents.

Recent Soils and Young to Semi-mature Podzols

These are mainly the free-draining soils, readily maintained in permanent pasture. The exceptions are Karangarua fine sandy loam—usually deep swamp and of no interest to the forester—Runanga clay loam and Arahura sandy loam. As might be expected, the farm soils proper are of restricted incidence within State Forests, the bulk of them having long since been alienated. Small areas, to the order of 65,000 acres, are still included in the forest estate, being found mostly on forest margins. It can be expected that as population grows and pressure for land builds up in Westland, these areas of potential farm land will gradually be alienated. Many of them are now held and used for grazing by farmers, under licence from the forest authority.

Other Soil Types

With 70 per cent. of all State Forest land dedicated permanently to the protection of the lowlands, it becomes obvious that the "inexhaustible forests of Westland" are in fact only legendary. However, we are still left with an area of about half a million acres, occupying a large proportion of the coastal plain and lower foothills, and extending over the whole length of the Province. This is a sizeable estate by any standards, and the way in which it is managed must always have an important bearing on the local economy. Examination of the soil map shows that this half-million acres of lowland forest land falls into two broad soil groups, immature to semi-mature podzols, and mature podzols. These two groups occupy approximately equal areas, say quarter of a million acres each.

Immature to Semi-mature Soils

In this group we have two types, Ahaura stony sandy loam, and Arahura sandy loam. The Ahaura type is restricted in its incidence and confined to the lower terraces of the Grey River valley. Where it occurs in sufficient area and in accessible locations it can be farmed successfully, hence it is not a soil type that the forester can expect to retain for permanent management.

The second soil type, Arahura sandy loam, is quite wide-spread and covers most of the quarter million acres occupied by this group. Arahura sandy loam always occurs on hilly country, often steep and much dissected; and despite its low fertility it has, in the forester's eyes, the virtues of reasonable drainage and general freedom from hard-pan formation. From the farmer's viewpoint, Arahura soil appears to be a hopeless proposition. Its poverty makes it unattractive enough, but its configuration is possibly the critical factor. Most of Westland gets well in excess of 100 inches of rainfall a year, and the climate is mild. Thus steep land, if cleared of forest and grassed, invariably reverts to second growth with gorse, blackberry, bracken and indigenous shrubs all prominent. Economical control of this

aggressive vegetation is impossible except by machinery, and most Arahura soils are on slopes too steep to permit the use of machines. Because of these inherent difficulties, the forester can feel reasonably certain that there will be no clamour from farming interests to deprive him of his Arahura soils; especially if they can be made to give a sustained yield of forest produce.

North of the Arnold River pure forests of red and hard beech, and mixed beech-podocarp forests are widespread. The red and hard beeches, and in restricted areas silver beech, have not only developed into commercially valuable forests, but have exhibited the capacity to regenerate readily and grow with marked vigour. Their natural preference is undoubtedly for the Ahaura and Arahura soil types, thus for the northern portion of Westland the forester is presented with a set of extremely favourable working conditions. On the one hand he has soils under no pressure from farming interests and on the other, indigenous species which are demonstrably capable of regenerating and developing subsequently at a satisfactory rate. Provided we realize that the soils are poor and shallow, and that radiata pine standards of increment cannot be expected from indigenous species, there is every reason to believe that the beech forests of North Westland, already an asset, can be converted by prudent management into a regular and perpetual source of wealth.

Leaving the beech forests of the north, we find Arahura soils widespread throughout all the other lowland forests of Westland as far south as Bruce Bay. This part of the Conservancy is already of some importance as it is now yielding almost two thirds of the annual timber cut. Its future importance is greater still, as part of this zone, say from the Waitaha to the Paringa rivers, carries the bulk of Westland's softwood resources; which in turn are estimated to be about one half of the total indigenous softwoods left in New Zealand. Extensive and heavily stocked rimu/miro forests are found in this zone, with smaller areas of silver pine and kahikatea. Where rimu/miro forests occur on Arahura soil they are typically composed of large trees with rimu predominant on the hillsides, miro on the ridges. Interspersed with the timber trees and matching them in height and diameter, southern rata competes for the available light. Below the crowns of the tallest trees, kamahi, Westland quintinia, hinau, ferns and other broadleaved trees and shrubs form a continuous multi-storied canopy persisting right to ground level. A noticeable feature of these hill-country Arahura soil forests is the apparent even age of the timber trees—they all appear to be mature or over-mature—and the comparative absence of younger age-classes, particularly in the sapling and pole stages.

The management of this type of forest land sets the forester quite a problem. He is confronted by a *fait accompli*; a high-quality forest evolved without the aid of man. The forester would like to believe that by exercising his art he can induce nature to repeat her original feat, in shorter time and more efficiently. Unfortunately,

on the hill-country forests of Westland things have not worked out that way. Harvesting of the mature rimu and miro timber trees, even where sufficient have been left standing to ensure the production of some seed, has not given satisfactory regeneration of the original timber crop on any significant area covered by Arahura soil. There must be reasons for this position, and although we know all too little about our indigenous forests, certain points do emerge with some clarity. Arahura soil, though not fertile, is comparatively free-draining and it is apparently a good if not an optimum site for many of the broadleaved trees and shrubs always found on it in association with rimu. This broadleaved vegetation for the most part seeds freely and regenerates profusely. Its growth rate when originating from seed is probably not significantly faster than that of rimu, and its ultimate height-growth, except in the case of southern rata, is considerably less. Why then when rimu is harvested from Arahura soil, even though seed trees are left, should the land invariably revert to a waste of scrub-species? Part of the answer is undoubtedly to be found in the silvicultural characteristics of rimu; the species is dioecious, a shy seeder, and notoriously slow in germination and subsequent development. Nor does it coppice from cut stumps. Many of the broadleaved associates of rimu, besides seeding and regenerating freely, also coppice readily and this coppice invariably grows much faster than rimu. In the normal course of logging, much of the broadleaved canopy is felled, broken off and uprooted, and a dense stand of coppice takes control of the site in a few years. Any himu that might germinate subsequent to logging have virtually no chance of survival in such conditions. This sequence can be read quite plainly on many thousands of acres of Arahura soil; a good crop of rimu and miro has been logged, and the occasional seedlings that may have been present before logging or have germinated since are completely suppressed by the onrush of broadleaved coppice.

The New Zealand forester has long been the target of criticism for his neglect of indigenous silviculture. He is continually being asked why he does not replant rimu after his stands have been harvested by the sawmiller. It is true that small areas could conceivably be replanted with trees raised in nurseries from the minute, irregular, and predominantly infertile seed crops that are a characteristic of rimu, the main species. Likewise, it would be possible, by oft-repeated and long-continued release cuttings to ensure that such plantings were allowed to develop without undue competition from the ubiquitous second growth that follows logging. The answer is, of course, that such forms of silviculture would be hopelessly uneconomic, and could not possibly be justified as practical forestry.

So it is hard to escape the conclusion that once the existing rimu/miro forests of the Arahura soil are harvested there is no practicable means of replacing them with the same species. This is a matter for some concern. Arahura soil covers about quarter of a million acres in Westland's State forests, roughly one-half the total

area that can be regarded as permanently available for productive forestry. Part of this area is already occupied by beech forests, but some 150,000 acres lie outside the present natural limits of the beeches. It may even be possible to treat the beeches as exotics and extend their range to the Arahura soil in the central portion of Westland, although it could hardly be expected that this interesting departure in exoticism would be a complete solution to the forester's problem.

If all the Arahura soils within State Forests are to be kept in permanent production, and the future welfare of the Conservancy demands that this should be done, it is fairly certain that the next forest crop must be of exotic timber species. It is also certain that the establishment and tending of these later tree crops will tax the ingenuity of the forester, and will demand radical departures from exotic forestry practice as standardized for other parts of New Zealand. On the credit side our Arahura soil is obviously forest land which has proved its ability to grow a high-quality timber crop, although in the case of the podocarps it appears impossible to reproduce the same species on this soil type. On the debit side we have a soil of low fertility, prone to rapid colonization by gorse, blackberry and indigenous shrub growth as soon as the original forest cover is opened up by logging. A large area of Arahura soil has been logged over the past seventy years, much of it devastated repeatedly by fire, all of it occupied by tall second growth and completely unproductive. To get such land back into productive forest can rightly be classed as reclamation rather than forestry. Even without the obstacles resulting from long abandonment after harvesting, there are numerous difficulties in reforesting recently logged areas.

Firstly, very few exotic timber species have so far been introduced that have shown promise of flourishing in the soils and climate of Westland. We lack knowledge about our soils, about the indigenous vegetation they support, and about exotic species likely to succeed on them. But assuming this knowledge is gradually accumulated, and we can proceed to plant exotics with confidence, we are still not out of the wood. The areas to be planted are already partly stocked with non-commercial trees and shrubs that have escaped destruction in logging; and even where there is no canopy some of the ground is covered by stumps and logs. The effect of this cover is to lower the number of trees than can be planted on each acre; and a low initial density is usually the forerunner of a low increment. Exotics planted on logged forest land must cope with the build-up of insects and fungi which results from the accumulation of decaying wood on the ground; and all areas are susceptible to total loss by fire. Westland's flourishing population of opossums, goats and deer show a distinct preference for many exotic timber trees, and selection of species must be governed to some extent by resistance to browsing by these pests. Judged by exotic forest standards accepted in other parts of New Zealand, Westland's opportunities seem unattractive,

and success by no means a foregone conclusion. The forester can take only one view. Arahura soil forms a large part of the forest estate of Westland, and it is one of the more amenable soil types. Podocarps cannot be regenerated on it. It shows some promise for exotics. Unless this land is replanted with exotics, it will, with the liquidation of the present podocarp forests, revert to a virtual desert of worthless scrub and a reproach to one and all.

Mature Soils

Another quarter-million acres of Westland's forest estate are as described in Soils Bulletin No. 2 mature soils. The predominant type is Okarito fine sandy loam with smaller areas of Kumara loam and Waiuta loam. The liberty has been taken, with due apologies to the authors of the Bulletin, of including the last-mentioned type, Waiuta loam, in the mature soils. This is a forester's classification, functional though probably unscientific. The Waiuta loam type is restricted in incidence but is of some local importance in forestry.

These mature soils are widespread throughout the lowland forests, and they are found characteristically on flat or easy-rolling country, the high terrace lands of Westland. In their original state they carried dense stands of medium-sized rimu, with silver pine, either pure or in admixture with rimu, occupying swampy hollows and depressions. Over large areas these forests contain 70 to 100 sizeable trees to the acre, and as could be expected in these conditions, the stocking of other tree species is quite sparse. Shrub-sized kamahi, Westland quintinia, and coprosmas form the bulk of the lower storey. These forests have often been described as the pole rimu stands of Westland, a description which is not particularly apt, because it implies that the forests are even-aged. Close examination of these stands will usually reveal a wide range in size, form and vigour, with all age classes through seedlings, saplings, poles and standards well represented. Far from being even-aged, the rimu forests of the mature soils are in fact an all-aged association, probably capable of replacing themselves indefinitely so long as they are not subjected to interference by man, animals or abnormal climatic influences. Large areas of forest have been logged on the mature soils, but much of Westland's remaining softwood resources are growing on the Waiuta/Kumara/Okarito soil types. Because of their wide distribution, easy contour, and ready accessibility, and because they have demonstrated their ability to produce a high yielding and apparently stable type of forest, the forester would naturally look to his mature soils as the easiest sites on which to carry out his management proposals. But alas for first impressions. The conditions that appear at first glance to be a forester's dream prove on closer acquaintance to be something of a nightmare. The chief characteristics of this soil group could perhaps be summed up as lack of structure, severe leaching of the lower horizons, strong hard-pan formation, undrainability, sourness, extreme poverty. These are the soils that grew the heaviest stands of rimu and silver pine found in Westland. Admittedly the podocarps took

centuries to attain maturity; but it is hard to blame them for inordinately slow growth when the soil conditions are taken into account. When forest is logged from mature soils, and if, as is often the case, slash fires follow logging, there is usually a noticeable increase in surface swampiness. Fire, or even full exposure to light dissipates the spongy duff and humus layer formed during centuries of protection by the forest canopy, and rushes, ferns and shrubs take possession of the ground, thereby blocking the natural drainage channels. In these conditions, what was originally a poorly drained site becomes an outright swamp, a process of soil deterioration that can be observed in many parts of Westland.

Farming has never yet been successful on the Waituta/Kumara/Okarito soil types. It is certain, therefore, that until some revolutionary land development technique is evolved, or until population pressure demands that all land of easy contour be used for growing food, regardless of cost, these soils will remain in the forester's charge. His dilemma is: difficult sites readily worsened by clearfelling the original timber stand; and indigenous species, though valuable when mature, of extremely slow growth and not financially attractive as a cultural forest crop. In New Zealand, with a history of successful exotic forestry, the normal reaction to this problem would be as the indigenous forests on the mature soils are cut out to replace them with faster growing exotics. Again we find that this possible solution is fraught with difficulties. Planting of exotics on Waituta loam has given fair results in the case of a few species, provided the areas planted are reasonably well drained. No species has yet been tried that promises to succeed on the Kumara or Okarito soils, although the range of species so far planted has been restricted to those that have given good results on better soils in other parts of New Zealand. Research to determine possible new species and suitable provenances of species already tried is now proceeding, but conclusive results are likely to be long delayed.

If the mature soils of Westland have a virtue at all—and the forester is hard pressed to see in them any attribute of this kind—it could be their readiness under certain conditions to support rimu and silver pine regeneration after logging. No logging has yet been carried out with the specific objective of securing natural regeneration, but some excellent examples have come about by chance. The best of these, covering several thousand acres, was unfortunately destroyed by fire in the summer of 1953. On this area, Lake Ianthe Forest, both rimu and silver pine had developed to a height of 8-10 feet, over quite significant areas and in quantity to ensure an adequate stocking, in a period of 25 years. The factors responsible for this result were undoubtedly groups of living trees bypassed when the main area was logged and thus providing a seed source, and freedom from fires since logging. This area was adequately regenerated; the second crop was seemingly past the stage when it was highly vulnerable to fire; and regrowth of broadleaved shrubs and decay of the

lighter slash since logging had allayed the fire hazard. Nevertheless, one dry summer and one man's carelessness with fire were sufficient in combination to wipe out a quarter-century's young growth in the space of a few hours. This instance is quoted to illustrate the long period over which indigenous regeneration—even where it can be induced—is susceptible to destruction by fire.

The fact that natural regeneration of indigenous species has occurred by chance on mature soils gives the forester grounds for hope that he can do as well or better by design. These soils are under no pressure from other land-using interests; no fast-growing species either exotic or indigenous can be planted on them with confidence; and their poverty is such that the yield, regardless of how the soils are used, is always likely to be low. To grow successive crops of indigenous timber may be the highest purpose for which such land can be used, and in the light of our present knowledge the forester has little option but to proceed on this assumption. Successful management of these soils to produce rimu and silver pine crops in perpetuity will demand drastic modification of the clearfelling technique, so far the only one used in harvesting Westland's podocarp forests. This break with established practice will tax the ingenuity of both the forester and his co-worker, the sawmiller, on whom will fall the burden of devising new methods to meet changed conditions.

The Waiuta/Kumara/Okarito soils are undoubtedly the "problem land" of Westland, a problem that has so far defied all efforts at solution. The forest industries of Westland have contributed heavily to the development of all New Zealand, with timber products grown on these soils; and foresters cannot meekly accept the hypothesis that this contribution must cease with the harvesting of the remaining timber resources. This would imply that we can neither reproduce our unique and valuable podocarp forests nor use the land on which they grew, an implication that cannot be reconciled with universally-accepted principles of resource management.

Future Trends in Land Use

Westland has been settled by Europeans for the comparatively short period of ninety years. For most of this time the bulk of the district's wealth has been won by some form of robber economy; that is, by "mining" the natural resources and thereafter abandoning the land. The forests were no exception to this general rule. Several factors have combined through the years to alter this pioneering outlook, and to emphasize the need for more constructive methods of land utilization. Farming is pointing the way, and the comparatively limited area of fertile land is gradually being brought to a state of higher and more permanent productivity.

Farming alone can use only a small proportion of the total land area, and can therefore support only a widely scattered and sparse population. It is not only desirable, but essential to the future welfare of Westland that the forest land should also make its full and permanent contribution to the local economy. The remaining timber

resources have a definite limit, and could be liquidated within the lifetime of young men working in the forest industries today. If this happens and the land is left derelict—a fate that has already overtaken a portion of the forest estate—the industries and the population now dependent on these forests must finally pass from the scene. With no alternative land-use in sight, it is the forester's duty to see that such a position does not arise.

As time goes on it can be expected that New Zealand will feel greater impact from the age-old trend in land utilization; more and more land once available for forestry will later be needed for the production of man's first requirement, food. The forester accepts this position, and is always ready to yield to the agriculturist when the need arises, and where his forest land can obviously be diverted to a higher purpose. It is logical, of course, that the most fertile land, able to give the best agricultural yield, will be the first so diverted. Applying this principle to Westland in the light of our present day knowledge of land management, the forester can feel reasonably certain that he will be left with most of his forest estate for a long time to come; certainly longer than would be required to liquidate the remaining forest resources of the district. So again, it is impossible to escape the conclusion that the present forest land, to serve its best purpose, must be kept in productive forest.

This brings us back, practically full circle, to the position set out on the first page of this discussion. Half of Westland is State Forest; not only State Forest but forest land unlikely to be required for any other purpose but forestry in the foreseeable future. Despite the predominance of indigenous species for which no practicable system of management has yet been devised; despite the apparent paucity of exotic species that will thrive in the region; and despite the general poverty and intractability of the soils, forestry is the only practicable system of land-use whereby one-half of Westland can make the maximum contribution to the local and national economy.

Conversion of the forests and forest industries from a basis of liquidation to one of sustained yield will prove a long and difficult process. It is primarily the responsibility of the forester; but he needs all possible assistance from his colleagues working in the basic sciences; the pedologist, the ecologist, and the botanist, to name a few. This paper was written to outline the problem, and perhaps stimulate the interest that might lead to its ultimate solution. If it does this it has been time well spent.

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