

## PRESIDENTIAL ADDRESS

### EXOTIC AFFORESTATION AND LAND USE IN NEW ZEALAND

A. L. POOLE

*"Forests develop to full stature only with stable soil, climate and stable land management policy . . ." Journal of Forestry, Editorial.*

During the course of this Institute meeting we will be considering matters concerned with the establishment of exotic forests. Well over half of all forest produce in New Zealand now comes from those forests established but a short time ago, speaking in terms of tree rotations, and as time goes on our reliance must be placed more and more upon exotic forests. Not the least of the problems associated with them are questions of land-use, and in no part of the country do such questions form a more contentious issue than on the eastern strip of the North Island from Cook Strait to the East Cape. We will be seeing different examples of exotic forests in the hinterland of Hawke's Bay and can note how they fit into land-use. It will be as well to give serious thought to what the future holds for the development of a satisfactory farm cum forest pattern in this district which now faces a substantial deficit in locally grown forest produce. The subject has already formed part of a previous presidential address by Mr Hocking and I would refer you to this in the 1953 Journal.

The history of land settlement in New Zealand and the economic developments which have accompanied it—amongst these the attainment of a sizeable export trade in farm and pastoral produce—have given the community at large a dominantly agricultural outlook. Such pasture introductions as rye-grass, white clover, cocksfoot, brown-top and many others flourished upon the still smoking ash of the burned indigenous forest. The pastures formed by these plants, plus the native grasslands, modified also by fire, supported a flourishing live-stock industry from early days. Agricultural production, knowledge and investigation have grown in stature to place New Zealand in a pre-eminent position throughout the world in several respects in these fields. As a corollary, land-use has come to be regarded by many as almost synonymous with agricultural use. Forests are something to be cleared to make way for agriculture.

This has all taken place in little more than a century, which emphasises the great natural advantages of New Zealand climates and soils for the practice of a live-stock industry based on pasturage, and reflects great credit upon the settlers who built up such fine industries on the land and who developed the marketing organisations.

The forests that were being destroyed to make way for this primary industry provided more than ample timber for the settlers' needs

and even produced some surplus for export. These forests were for a number of reasons a wasting asset. They contained few of the ingredients upon which permanent forest management is normally based. There was never any prospect, as with the virgin forests of the North American Continent, of developing large and more or less permanent forest industries such as a pulp industry. Nor were farm woodlots based on the natural forest ever contemplated, a form of permanent forest and a source of forest production so common and so important in European and North American countries. The clearance of forest for farm land was unusually complete, and as often as not the only material salvaged would be enough fence posts with which to fence the farm which was carved out, and firewood. The only forest industry of any consequence was the sawmill industry which developed as an ephemeral, largely under-capitalised and somewhat squalid venture—a marked contrast to the efficient and flourishing agricultural industries.

Insofar as land-use matters were concerned, agriculture possessed the organisation, the wealth, the man-power, public sympathy and the ability with which to present its case.

Nevertheless, a day of reckoning had to come, and the first jolt from the mis-use, or rather the excessive clearance of forests, was in the form of soil erosion and alteration in the nature of the flow of some rivers. This led early on to the preservation of the large tracts of protection forest in the mountainous country. Thus, in rough outline, what was likely to be, and to remain, the permanent form of New Zealand's remnant indigenous forest estate appeared little more than fifty to sixty years after the first white settlement of the country began. Protection forest has for half a century now been a major item to be taken into consideration in New Zealand's land-use economy, and as time passes it will have an increasing value that will be measured principally in terms of water yield and, secondly, in terms of recreation benefits.

The next phase of thinking with regard to indigenous forest came, not as a jolt, but as a dawning that the uninterrupted slaughter of timber-bearing indigenous forest must, sooner or later, lead to timber shortages. And since it takes a long time to grow forests, provision against this shortage had to be made without delay. Thus organised afforestation began very early in the settlement of Canterbury, where timber was naturally scarce, and elsewhere started in earnest by the State at the beginning of this century. With ample land available, much of it open and of easy topography in the central North Island, there was no question at that time of any shortage for afforestation; in fact large tracts of Crown land were from time to time set aside for this purpose. Such was the situation even up to the time of the Second World War.

During, or shortly after, the Second World War, the State acquired further considerable areas of land for afforestation at a number of new locations. The distribution of these did, incidentally, go far

towards rectifying the maldistribution of previous exotic forests. As far as we are concerned here, however, the interesting point is that they were acquired fairly readily and without the voicing of much opposition from the farming community. Occupied land was in fact under-populated with labour, returned soldier settlement had not commenced in earnest and the post-war drive for increased primary production had not begun. Immediately following the war all these things changed rapidly and, moreover, the newly acquired afforestation areas were not wanted for the employment on them of discharged returned soldiers, which was one of the purposes for which they had been acquired. The telling results, from the discovery in 1937 of cobalt deficiency in some volcanic ash showers in the central North Island, had completely altered the situation in that country, the stronghold of exotic afforestation.

For the first time in the history of New Zealand's settlement there arose a serious conflict between farming and afforestation over matters of land-use. In this conflict foresters have found themselves at a marked disadvantage, pitted as they are against a highly organised agricultural community and industry. Nowhere has this conflict been more acute than in the Hawke's Bay and Wairarapa areas, so that it is an appropriate topic for consideration at the venue of this meeting.

New Zealand foresters are now better armed to analyse their case and to present it than they have been at any time in the past. The results of the survey of indigenous forest resources are at hand so that it is possible to predict with some accuracy how these resources might be used over the years. The potential of exotic forests upon which a large, permanent industry has grown up in the last ten to fifteen years is now taking a clearer shape.

The remainder of this address will, therefore, be devoted to a brief analysis of this land-use conflict that must loom larger and larger with time.

There is no need, to an audience of foresters, to make out a case for the continued planting of exotic timber trees, but, because the forester is frequently questioned by the layman on the need for any further planting, the following argument is set out.

Leaving aside the native hardwood resources which are, at least as far as the beeches are concerned, renewable, the remaining softwood resources have been calculated by the National Forest Survey at about 15,500 million bd. ft. The total quantity is only part of the story. If we consider the location and ownership of these resources as well and the industry based on them, then it is apparent that roughly twenty years from now, or even sooner, will see the end of all but two major areas of supply, the West Coast of the South Island and the Central North Island. Native softwood supplies of rough sawn timber can then amount to, at most, 100 million bd. ft. per year or 15 per cent. of the then requirements. From that point onwards these supplies must lessen no matter what results are obtained from the introduction of any forest management.

To these supplies can be added native hardwood timbers amounting, at most, to some 20 million bd. ft. per year. The production from these forests cannot increase greatly until their potential is improved in the second, managed rotation. The total cut of native timbers, both hardwoods and softwoods, would then, in about twenty years' time, amount to 120 million bd. ft. per annum. It becomes obvious that New Zealand must depend more and more upon exotic timbers, whether locally grown or imported. Since she can grow them as lustily as she grows rye-grass, it stands to reason that she should grow them herself. It must be assumed, therefore, that so long as the population increases, afforestation using exotic species must continue.

The outline sketched above is clouded in the public mind because, for the time being, New Zealand is "over-planted", a condition consequent upon the general success and speed of growth of radiata pine plantings. There is more raw material available than can be dealt with by utilisation plants or absorbed by markets. Such a condition will prevail for some time; in fact, theoretical calculations show until towards the end of the century. That the position will be overtaken long before then, however, is readily apparent when we review what has happened to the principal exotic forests in but a single decade. There are four more decades to this century and, moreover, they will see rapidly dwindling indigenous timber supplies. We cannot listen to those who loosely speak of the age of plastics and of building in wood substitutes. Wood in New Zealand must inevitably remain a major raw material and because of its cheapness will be used for all manner of purposes.

The calculations referred to above include a continuation of present planting of some 6-7,000 acs. per annum by the State and some 3-4,000 acres of non-State planting. This means that all areas held by the State for future planting must be retained and, if the rate of non-State planting is to be maintained, land has to be acquired.

But the holding of certain planting land by the State and the acquisition of some private land is being challenged vigorously by the agricultural community. Even land lying within the boundaries of long planned and partly established exotic forests is sought after again and again. Land acquisition on the Moutere Hills of the Nelson district for company afforestation is challenged under the Land Settlement Act. To the forester the most disconcerting feature of this is that the Crown itself is the challenger and the Land Settlement Board, composed of agriculturalists only, hears the application. The would-be purchaser, however, has a final right of appeal to a Court of Law.

From all this it is apparent that the boundaries of economic farming have greatly expanded since the last World War and now take in nearly all the land desired by the forester for afforestation and could include, if it were available, most of the land already afforested. The crawler tractor and the aeroplane have been added to the farmers' formidable array of equipment and he can now conquer

country that is even looked at askance by the forester. A full case must therefore be prepared for all land required for afforestation. The farmer can quote national exhortations pleading with him to increase production and has the backing of legislation and finance that assists him to do this on marginal land. Farmer organisations have also been able to bring forth considerable pressure in their quest to obtain land for soldier settlement and also do so for settlement by young farmers. Against all this the forester is conducting a rearguard action.

It will be as well at this stage to say something of the policies which govern the use of land for farming and for forestry. As far as land already afforested is concerned, there is no stated policy, but it would be difficult at the present time to imagine inroads being made into forests, the produce of which supports a permanent industry, especially if this is highly capitalised. Nevertheless, many envious farming eyes are cast on the pumice soils carrying forest. Some afforestation companies whose directorates are not interested in the practice of forestry have, in fact, disposed of their crop and their land and once the crop has been felled the land is being converted to farms. As time goes on there will undoubtedly be concerted attempts to wrest from forest much more of this pumice-land, planted in trees more or less as an historical accident. The practice of forestry will then have to be very intensive and the forester will have to prove that he is making the utmost use of the land. Outside this country, in a forest not yet committed to utilisation sales, there has been a promise by a Minister of the Crown that certain land once clear-felled will be transferred to agriculture. This, however, is probably an exceptional case not likely to be repeated.

For a number of years Government policy with regard to the acquisition of land for afforestation by the State has been that no land will be acquired that is suitable for farming. Such a policy has become somewhat of an anachronism because, with the expanding frontiers of farming, nearly all land that is already afforested or is held for afforestation is capable of being economically farmed. Moreover, this policy prevents the acquisition of areas to complete the provision for future local timber supplies. Some districts in New Zealand are now completely deforested and completely farmed. Substantial urban populations have grown up in them and these are dependent upon timber imports from outside. Governments have therefore waived the accepted policy with respect to these districts only.

Apart from "timber-hungry" regions, where only relatively minor areas of land would be required for afforestation, no major afforestation involving the use of agricultural land could be visualised.

The forester must now learn to use for afforestation the substantial area of cut-over and second growth land he holds, to include afforestation as an integral part of land development in the future opening up of difficult land, and to encourage farmers to practise woodlot

forestry. A fourth possibility, afforestation carried out primarily for the purpose of curing soil erosion and improving stream flow, must also be considered. Although in the protection class, such forests could usually serve a dual capacity, for much of the eroded land to be reclothed with forests consists of fertile soils derived from tertiary rocks.

All these forms of afforestation activity are proceeding and are passing through experimental and formative stages. It is incumbent on foresters to follow and study them closely because, if successful, the results should lead to an improved land-use in which productive forests will have a substantial and permanent place throughout the greater part of the country.

There have been many attempts, most of them experimental, by the Forest Service to reafforest cut-over indigenous forest. For the greater part these must be classed as failures or, at best, partial successes where there has been sustained and careful tending. More recently success seems to be better assured where planting has followed the felling of heavily timbered forest on particularly easy pumice soils and favourable sites. In all such planting, however, the forester has to contend with a plethora of indigenous diseases and the depredations of wild animals. Persistence is necessary because the use of this land for successful production forests is one of the foremost tasks facing foresters. The area involved has been calculated by the survey as something approaching one million acres and is increasing at the rate of at least 30,000 acres annually as indigenous forest is cut over. It is interesting to conjecture whether or not we might eventually have to get around to the methods used by the Queensland Forest Service whereby a complete clearance is made of tropical "scrub" forest before planting with either exotic or native species can succeed.

The integration of farming and forestry can already be studied on land held in fee simple at Rukumoana, on Crown land at Esk and Te Wera and in a modified form on the areas of North Island west coast drifting sands. At both Esk and Te Wera initial public agitation was for afforestation. Both areas contain a mosaic of good farming land and land marginal or sub-marginal to farming because of steepness. Agricultural interests dictated that the farming land was to be used as such, but it was decreed that both forestry and agriculture must be developed economically. On this approved basis land-use was worked out on the ground by practical foresters and agricultural development officers. The pattern is being set for this kind of joint development in other parts of the country. Many problems have had to be faced and others are looming, chief amongst which is the continual pressure that can be exerted by farming organisations to turn to farming, areas already set aside for afforestation. To my mind forestry has had to concede too much to agriculture judged by present-day forest economics. The prime costs in managing exotic forests are those of roading and of extraction, both of thinnings and

of clear-fellings. These costs are rapidly increased the more the forest area is subdivided and the more difficult the topography is.

The development of joint farming and forestry on and immediately behind the sand-drifts of the North Island west coast is now being pursued as a State venture. It presents special land-use problems. Similar work has had a long history which includes as many, if not more, failures than successes. From the failures the lesson is clear that sand fixation must be properly carried out from the building of the fore-dune to the fixation of the innermost edge of the drifting sand. Maintenance must be continual and promptly carried out for fixation quickly disintegrates under the blasts of coastal winds. This in turn means that adequate finance must always be available. The most certain way of achieving such an aim seems to be to establish as large an area as possible of productive forest in conjunction with the protective vegetation. It is often possible to establish a reasonable belt of productive forest since many coastal drifts have now encroached sufficiently far inland. It is, however, necessary for a liberal interpretation to be made as to what lands are allocated to forestry. Policy now allows for this but it is still necessary to resist the pressure of agriculturists who wish to develop the intricate pattern of salt flats reaching right out to the fore-dune and who also regard the sand-fixation phase as merely a temporary one giving way later to farming.

Afforestation designed to protect the soil and regulate water flow has scarcely yet been commenced by the forester. It is a broad field ranging from orthodox plantation establishment at lower elevations to the re-establishment of vegetation at elevations up to the timber line or above. The prelude to this latter work must be arduous, long-range investigations which will be accompanied by many disappointments and failures. A small start has been made in the badly eroded mountains in both this district and in Canterbury.

To what use the land is put will be the first decision to be made before rehabilitation work is undertaken. At high altitudes fencing is almost an impracticability so that any land upon which work is carried out must be cleared of stock, both domestic and wild, by means other than fencing.

Finance for such work is precarious. When money is plentiful it can be carried out, but when money retracts it is usually only possible to proceed with productive operations. It is, therefore, desirable where possible to have a so-called economic toe-hold to work being done in protection forests. In other words, it is highly desirable to have economic afforestation units around the foothills of these problem forests. These economic units provide permanent staff and permanent equipment for the carrying out of the work in the protection part of the forest. Such toe-holds have been provided for in one or two of the Hawke's Bay protection forests, but it is proving very difficult to hold on to the land. Farmers naturally want to develop as far back to the edge of real protection forest as possible, and fail to recognise the needs of forestry. That these needs are very

real and would serve an important long-term purpose in the rehabilitation of depleted protection forest should be made widely known by foresters to people concerned with the harnessing of rivers in their lower reaches.

Of more immediate concern to the forester are the indications that he will be asked to play a part in the stabilisation, largely by afforestation, of some of the most seriously eroded lowland areas. There is the possibility on these of establishing production-cum-protection forests. Many excellent examples, in miniature, are to be seen in farm woodlots on the high fertility soils of the erodable tertiary formations of the East Coast-Hawke's Bay-Wairarapa districts. The Soil Conservation and Rivers Control Council now gives a subsidy for this type of protective planting. The need for it on a much larger scale has become apparent with the undertaking of extensive and costly control schemes in the lower reaches of rivers flowing from catchments showing severe erosion. The problems of the Waipoao catchment were recently investigated by a sub-committee set up by the Soil Conservation and Rivers Control Council. The widespread use of trees singly, as woodlots, or as forests in this completely deforested catchment was the unhesitating principal recommendation of this committee. Two highly erodable rock formations in the catchment, the bentonites which flow when saturated and the crushed argillite which debouches huge quantities of fine material into the river during heavy rain, can only be stabilised by using trees. The latter formation requires complete reforestation urgently to safeguard the stop-banking carried out in the lower reaches of the river at a cost of close on one million pounds.

I will not deal with the development of farm-forestry, which is, in the North Island at least, undergoing a vigorous expansion in the hands of farmers themselves. I would only say that, assuming the technical competence of growing, the solid foundation and stability of this worthwhile movement must rest finally upon the success of marketing the produce grown. This means, of course, that the grower must be paid royalties sufficient to induce him to grow. At the present time this issue in New Zealand is confounded in several ways. The farm-forestry movement, with all it has at stake, must help in the unravelling of this problem.

Some of the things I have said here with regard to land-use may need alteration in the immediate future because of changing prices of agricultural produce. Nevertheless, this emphasises even more the need for forestry to determine as accurately and honestly as possible its proper role and, once having set a course, to travel along it unswervingly.