REPORT OF THE COUNCIL OF THE
NEW ZEALAND INSTITUTE OF FORESTERS ON
THE N.Z. FOREST SERVICE BEECH UTILIZATION
PROPOSALS

INTRODUCTION

The New Zealand Forest Service has recently investigated the prospects of greatly increasing the utilization of low-altitude beech forests in Nelson, northern Westland and Southland, and has put forward tentative proposals. The New Zealand Institute of Foresters was invited by the Director-General of Forests to examine these proposals and accordingly two subcommittees were formed to study their environmental and management aspects. The subcommittee members were:

Environmental subcommittee: J. M. Mitchell, Dr N. H. Taylor, Professor P. J. McKelvey and R. Cleland.


The findings of these subcommittees form the basis of this report, which is submitted by the Council of the N.Z. Institute of Foresters on behalf of all members of the Institute. The Institute wishes to thank the N.Z. Forest Service for the opportunity to examine its beech management proposals, and to record its appreciation for the information and assistance so freely given.

OUTLINE OF FOREST SERVICE PROPOSALS

Policy

The main tenets of Forest Service policy for indigenous beech forests are:

1. In all areas where the need makes it applicable, soil and water conservation shall be the first priority of land use.

2. Forest management will be in perpetuity with production areas managed on a sustained yield basis and with a forest cover retained in protection areas.

3. The only areas to be clearfelled will be those suitable for sustained yield forestry, either by beech regeneration or conversion to exotics.

4. The beech forests will be managed to stimulate regional growth and maintain stability, both economic and social, through the utilization, processing and marketing of wood.
5. The public's use and enjoyment of the forests will be maintained and enhanced.

6. For various reasons — scenic, recreational and scientific — local areas of indigenous forests will be preserved even though the presence of extensive beech forests in nearby National Parks and State Forest Parks could be considered to remove the need for major reservations. Desirably, all reservations will be large enough to form ecological units capable of survival on their own despite changes in adjacent areas.

7. The pattern of reservation will be such as to ensure ecological diversity.

8. All forest utilization will operate under Working Plans approved by the Minister of Forests. The Working Plans' objects of management will encompass the above policy. The implementation of the above policies requires the beech forests to be zoned or classified according to the different forest and land uses envisaged.

**Provision for reserves**

1. **Protection forests**

   For the purpose of soil and water conservation, as a general principle no forests will be exploited on slopes greater than 26° or above 2,500 ft in altitude. There may be logical exceptions to this rule but they will be insignificant and only in line with the agreed policy that soil and water conservation will be a first priority in land use.

2. **Amenity forests**

   Areas required for scenic or recreational purposes will be reserved from clearfelling. Roadside reserves will be maintained, particularly alongside main highways and scenic routes such as the Maruia Valley. The reserves will range from broad vistas to small pockets of forest with particular attention being paid to close rather than long-range views. It is not possible to lay down firm rules as to the widths, areas or shapes of these reserves, as the configuration and nature of the country will dictate them. Other areas reserved for amenity and recreational purposes will include strips or belts alongside all rivers, lakes, and where appropriate, the coastline. As required, locally valued forest areas close to towns will be preserved.

3. **Biological reserves**

   Areas reserved for scientific reasons will fall into three categories. Associations of particular botanical, zoological or general ecological interest will be reserved whether or not they merit forest sanctuary status; adequate habitats for native birds will be maintained; and a patch-work quilt of native forest will be preserved solely to provide ecological diversity. It is not known whether any of the areas under consideration for utilization contain any rare species of native
birds; if so, the habitats will be protected. Likewise it is not known if there are any rare plants or plant associations represented, but if there are, consideration will be given to their legal protection as forest sanctuaries.

Production management categories

Forested areas not reserved for the above purpose will be considered for utilization, with management directed towards one of the following four objectives:

1. Clearfelling followed by conversion to exotic forest. The management of these exotic forests will aim to create aesthetically attractive forests.

2. Partial felling, leaving a proportion of the original crop as seed bearers in order to regenerate beech with a view to subsequent sustained yield beech management.

3. Partial felling followed by enrichment with compatible exotic species. The species will be chosen for their suitability for the sites and their ability to provide an acceptable wood mix for industry.

4. Clearfelling followed by establishment of pastures.

Any of the above four management objectives will likewise be adopted on the quite considerable areas of beech forest which have been partially worked in the past. Alternatively, these may be enriched with hardwoods before felling. Some potentially productive forest sites currently do not support any beech forest, being in manuka or other scrub species. Most, though not all of these, will be afforested. Since many such areas are in sight of main roads, management will be directed towards the growing of forests which are attractive as well as having a high productive value.

Regional proposals

1. The Nelson Project provides for the clear or partial felling of approximately 45,000 acres of beech forest yielding some 100 million cubic feet of timber largely for chipping. Export of beech chips is committed until 1976 but may continue for longer. Eventually it is hoped that there will be a large integrated forest industries complex in Nelson, with not only sawmilling but also pulp and paper mills, based predominantly on the softwood resources of Golden Downs and other Nelson forests. The local beech resource will be supplementary, but may be important in enabling the industry to start earlier than would otherwise be possible. Approximately 30,000 acres of beech forest would be converted to exotics and 15,000 acres would be naturally regenerated.

2. The West Coast Project could involve the exploitation of some 595,000 acres of indigenous forest (470,000 acres of beech, 125,000 acres of podocarp/hardwood) yielding possibly 1,000 million cu. ft of wood over a 30-year cutting cycle. Because there is no large established exotic forest to provide the base for a pulp and paper industry, any industrial develop-
ment would start *de novo* as a purely beech one. To provide continuity to a pulp and paper industry some 239,000 acres could be converted to exotic pines. Of the remaining acreage, 206,000 acres would be naturally regenerated to beech or partially regenerated and enriched with exotic hardwoods; 51,000 acres of the podocarp/hardwood element would be managed for their podocarps and 14,000 acres of forest, mainly beech, would be clearfelled and the sites converted to farms.

3. *The Southland Project* is intermediate in size between the other two. It is expected that 200,000 acres of beech would yield 500 million cu. ft of timber. Of the total area, 160,000 acres of beech forest would be converted to exotics and another 40,000 acres would be naturally regenerated.

**FINDINGS OF THE N.Z. INSTITUTE OF FORESTERS**

*Evaluation of policy, categories and criteria*

1. Policy statements

The Institute of Foresters congratulates the Forest Service for the clear, unequivocal manner in which it has stated its aims, and endorses all the tenets given in the policy statement for managing indigenous beech forests. It believes that some, if not all, of these tenets should be applied to forested land of other tenures in the planning regions concerned. It strongly recommends the adoption by other government departments of the same planning criteria for the management of forested land. The Forest Service and the Lands Department should seek to collaborate in delineating reserves and securing freehold land which has particular scientific or amenity value.

In the interests of the engendering and maintenance of good public relations in a matter that has such important, long-term, economic and social implications, the Institute recommends that the Forest Service consider making the appropriate Working Plans, including a map showing the forest classifications, available to the public for scrutiny before being signed by the Minister. This action would have a precedent in that the Working Plans for State Forest Parks are available for public scrutiny where no Advisory Committee has been appointed (Clause 63, 2 (b), (c), Forests Act).

The forests in the project areas contain a proportion of trees suitable for veneer and sawn timber production. The Institute would like to see included in the policy declaration a statement to the effect that the wood will be utilized for end uses for which it is best suited.

2. Reserved areas

(a) Protection forests. The Institute recognizes the need for the Forest Service to have some prior criteria for delineating protection forest where no exploitation should take place, but considers that the adoption of an arbitrary slope limitation of 26° and an altitudinal limit of 2,500 ft to be unsatisfactory. Detailed planning will have to take cognizance of
many other factors, including the erodibility of the soil, the general condition of the catchment, the frequency and intensity of storms, and the down-stream values at risk.

(b) Amenity forests. The Institute agrees with the general principles that the Forest Service has adopted for reserving amenity areas. Because forest margins are particularly vulnerable to windthrow, fire and insect attack, it considers that reserve boundaries should conform to natural contours. Wherever possible, narrow strips with straight boundaries should be avoided. In its overall planning, the Forest Service should attempt to amalgamate amenity reserves with other reserves, including existing scenic reserves and those held under other tenures.

(c) Biological reserves. The aims of the Forest Service in setting aside biological reserves that have particular scientific value are laudable. Because a number of biological disciplines are concerned, it is difficult for any one body to put forward criteria for demarcating boundaries that will satisfy all interests. It is essential at this juncture that the existing plans be considered provisional subject to modification or addition as further knowledge is gained. Current work by the Forest Research Institute underlines the urgent need for the reservation of regional ecosystems encompassing not only the whole range of virgin floristic types but also including a representative range of soils and landscape. The fundamental purpose of these reservations will be for basic research into the nature, function and productivity of each ecosystem, in order that the acquired knowledge may be applied to the more efficient management of other areas that have the same kind of forest.

In the North Island, the Forest Service has already implemented a policy of giving forest sanctuary status to blocks of virgin forest containing suites of forest types typical of the region, or forest types of local significance. The Institute would like to see this policy applied in the regions concerned, with particular emphasis given to reserving complete suites of forest types extending from valley floors to the timberline.

The committee believes it is important that there are rational and consistent bases for the reservation of forest lands for scenic, recreational and scientific purposes. The extension to the beech project areas of the South Island of the joint interdepartmental survey (as conducted by the Lands and Survey Department and the Forest Service on behalf of the National Parks Authority), could be a means of surmounting the problem that there is no complementary planning on other tenures — particularly on unalienated Crown land and Crown leases.

3. Rationale for demarcating management categories

In the proposals, the existing beech forests are seen as a large wood resource capable of initiating or supplementing the establishment of a large industry in each locality. It is clear in all cases that the main wood resource to sustain these industries in perpetuity is to be supplied from exotic coniferous forests. The area of exotic forest required for this
necessitates that some, but not all, the beech forest felled be converted to exotics. Therefore, at some point in time, there will be a transition from beech to pine. Because areas have been set aside for beech management in all three project areas, it is assumed that substitution is not to be complete and that a continued supply of beech is desired in all cases. However, the sustained level of beech production desired has not been stated, so it is difficult to assess the adequacy of the beech management proposals. Where it is envisaged that the beech resource will be used to establish a pulp and paper industry, the Institute believes it would be prudent to plan for a substantial continuing supply of hardwoods. Until there is proof that this supply can be met by exotic hardwoods, sufficient area should be regenerated to beech to meet this requirement.

4. Criteria for demarcating management categories

The criteria used for delineating the different management categories require clearer definition.

(a) Conversion to exotics. If it is correct that the beech forests in each locality can be readily converted to exotic conifers, it would be feasible to convert greater areas than have been scheduled. It would appear, therefore, that the areas to be converted have been determined on the basis of supplying a sustained yield at a predetermined level rather than on availability of sites suitable for exotics. Apart from making generous provision for reserves of all types and for a sustained yield of beech where needed, a better criterion would be to aim for maximum production to obtain the benefits of economy of scale. The aim of creating aesthetically attractive forests is desirable in so far as it conforms with good management practice.

The implementation of the Forest Service policy that soil and water conservation shall have first priority will impose limitations on the form of logging used. It will affect the pattern of logging, the sizes of felling coupes, the siting of landings, and the layout and standard of logging roads and tracks. It is also important that stream channels be kept open.

(b) Beech management. Where beech management for sustained yield is prescribed, the main criterion for selecting areas should be the ease with which they can be regenerated to preferred species. Regeneration techniques have been proven on some favourable sites for red, silver and probably mountain beech, but to date regeneration of hard beech has been unreliable. Methods of treating regeneration to produce healthy wind-firm stands requires much further study.

A factor that should be considered in locating beech management areas is that they will not be aesthetically attractive for the first decade after logging. Pathogens which build up in the stumps, logging slash and residual seed trees will be a hazard to marginal trees where management areas abut small reserves.
(c) Enrichment. The Forest Service has given a commitment to maintain felled areas in production. Where they are unsuitable for conversion, and beech management cannot be assured, the concept of supplementary stocking with species compatible with the silviculture and utilization of beech is sound. However, it is not clear how such stands are to be managed. The use of the term “enrichment” could be misleading; it was coined to describe supplementary planting where there is a resource left after logging. There is unlikely to be any residual resource where a forest is logged to chipwood specifications. Planting to supplement regeneration is an entirely different situation and poses special problems. The species used must be silviculturally compatible; they must not unduly hinder the establishment of beech regeneration and should favour its development. This necessitates using light-canopied species grown at wide spacing, that can be harvested along with the beech, preferably for the same end use. Some eucalypts that have the desired attributes appear promising, but their site tolerances and form at different stockings under different overwood conditions need to be more precisely determined.

(d) Farming. Criteria for determining areas to be released for farming have not been specified. Land which is productive for farming is frequently some of the most productive and easily managed land for forestry. Land should be released for farming only where there are sound economic or social grounds for believing that farming is a superior form of land management.

(e) Podocarp management. Proposals have not been outlined for the areas set aside for podocarp management. The policy statement sets down that all production areas are to be managed on a sustained yield basis. Where forests contain a high proportion of podocarps and are not suitable for conversion to exotics, beech management, or release for farming, sustained yield can only be achieved by selection management for podocarps. Any utilization must preserve the essential structure of the forest and provide for sufficient regeneration to ensure continued productivity. The selection management of terrace podocarp forest in south Westland developed by the Forest Service is an example of the form of management required.

Evaluation of regional proposals

1. The Nelson project

In the Forestry Sector Report to the National Development Conference, Nelson is the next area after the Bay of Plenty where high priority should be given to building up forest resources as a basis for establishing major forest-based industries. The 1970 Annual Report of the Forest Service gives the area of exotic forest as 64,000 acres and the current planting rate as 5,500 acres per annum. Forest planners generally calculate on a base of some 200,000 acres of productive exotic...
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forest to sustain a kraft pulp plant. Apart from buying up pastoral land, a logical extension of planting would be into beech forest areas which, if the usable material is extracted, are easy to afforest. Thus the conversion of the beech forest in the Nelson project could be considered as part of a much larger exotic afforestation project.

(a) Resources. Beech resources are estimated to be about 100 million cu. ft on some 45,000 acres. Red and silver beech predominate, mixed with some hard and mountain beech. Tree size is variable, but most trees are over-mature with a high heartwood and defect content. The proportion suitable for sawlogs is low. The most suitable market outlet for such a limited defective resource is as chips. It could be for export so that the land could be converted to exotics, or held meantime as a readily available resource on hand to enable the establishment of a pulp mill to be brought forward, or held to provide a long-term supply of short-fibred hardwood pulp to blend with long-fibred softwood pulp.

A large proportion of the exotic resources that would have been available for initiating an industrial project has recently been severely depleted by windthrow. Thus, the establishment of young crops on a large scale is desirable if a local processing industry is not to be unduly delayed. On the evidence available, the first alternative to utilizing the beech resource given above seems to be the best, but the other options merit consideration.

(b) Site factors. Soils and topography are similar to those in neighbouring Golden Downs Forest and in themselves should present few difficulties for logging or for the establishment of exotic species. Big Bush and Howard Forests occupy part of the headwaters of the Buller River, one of the worst for flooding in New Zealand (Floods in New Zealand, 1920-53). Because the area is subject to high intensity rainfall, cognizance will have to be taken of the effects of logging and tracking, and of clearing for re-establishment, on run-off and erosion.

(c) Logging and roading. Provided soil and water conservation requirements can be met satisfactorily, logging and roading present few technical difficulties.

(d) Conversion. The area scheduled for clearfelling is not large and can be readily reafforested. Sites are of average site quality for radiata pine. Site preparation would be easy but adequate measures will need to be taken to protect the margins of reserves from fire.

(e) Beech management. The most questionable item in the proposals is to leave 15,500 acres under management for beech. The maximum sustained yield of beech from this area is estimated to be no more than 1.5 million cu. ft per annum, insufficient to make a significant contribution to a large industry. In view of the need for land for exotics, it would seem to be more realistic to convert the whole production
forest area to exotics, and to reserve more of the present cover for protection, amenity and scientific purposes.

(f) Reserves. All comments on reserves made earlier, apply. The following are further comments which apply specifically to this region:

Although it is not shown as a reserve, the Forest Service has indicated its willingness to reserve some of the marginal scrub along the southern margin of Big Bush Forest because it is fern-bird habitat. The Institute recommends that the Forest Service should incorporate the area in the adjacent biological reserve.

A large part of the eastern margin of Big Bush Forest is forested freehold land. The Institute recommends that strenuous efforts should be made by the Forest Service to secure these freehold lands in order to safeguard and extend the protection, scenic and biological reserves planned along the eastern boundary of Big Bush.

(g) Labour and finance. Labour and social services in the vicinity are adequate. Because Nelson is a high priority region for afforestation, the finance needed for the scheme should not adversely affect schemes elsewhere in New Zealand.

2. The West Coast project

The Forest Service proposals envisage the establishment of a large-scale pulp and paper industry with a minimum input of 25,000,000 cu. ft of wood per annum. To guarantee continuity of wood supply, some 150,000 acres would have to be converted to exotics. Should the scheme go ahead, it would have the effect of rejuvenating a region which is slowly declining. Nationally, the use of such resources and the management of a region of this size is highly desirable.

Because it has implications in many spheres, this scheme must be given most careful consideration. The Institute has not had sufficient time or opportunity to examine the industrial requirements of a scheme of this magnitude, but there are several major constraints, other than the wood and labour supply, which must be carefully evaluated before the overall viability of the scheme can be judged. These include the evaluation of the various transport alternatives, the quality and quantity of water available, effluent disposal from an inland site, and the measures needed to prevent air and water pollution.

In considering the forest management proposals, it should be recalled that the Forestry Development Conference considered that this region did not merit priority for afforestation since other areas of New Zealand offered much more promise. Recommendation 23 of the Forestry Sector Report to the National Development Conference gave bases for the selection of suitable areas, and Recommendation 25 indicated that, after Nelson, Hawke's Bay and Otago-Southland should receive high priority. Exotic State forest in the planning area amounts to some 8,800 acres (N.Z.F.S. Annual Report) in 1970, and current planting is at the rate of about 1,300 acres per annum.
Thus, if the proposed beech scheme goes ahead, it is a completely new afforestation scheme and must be considered entirely on its own merits in competition with, or in addition to, approved schemes elsewhere.

(a) Resources. The small areas of exotic forest are young and of rather varied quality. The beech forests comprise a wide diversity of forest types containing an admixture of red, hard, silver and mountain beech with or without other hardwoods and podocarps. In addition, there are considerable areas of podocarp-broadleaved forest, including some 36,000 acres of rimu/pink pine/silver pine forest. The area of the scheme is expected to be 594,400 acres and the current utilizable wood resource is thought to exceed 1,000 million cu. ft.

It might be said that a very considerable exotic forest could be built upon cut-over land without recourse to logging further areas, but this is not a sound argument because it would involve a large investment for a long period before it could pay its way. The utilization of beech, providing an annual income, together with reafforestation of cut-over, is a far more attractive proposition financially; indeed this is probably the only basis on which these large cut-over areas could be satisfactorily re-established.

(b) Site factors. The soils are related to topography and have been defined in only the broadest way. The greater part of the remaining forest lies on Blackball Hill soils; these are a mosaic covering a range of fertility which need careful sub-definition as a basis for management prescriptions. Not surprisingly, the performance of exotic species on these soils has been variable. In the poorer areas they are marginal for exotic afforestation and probably for enrichment, and where they carry hard beech they present problems for beech regeneration. Clearly much more needs to be known about species performance on Blackball Hill soils before a large-scale afforestation scheme in this region could proceed with confidence. Productive forestry would be largely confined to hilly land, much of which is steep, with entrenched streams.

The two rivers which will be affected by the proposed scheme, the Buller and Grey, flood frequently even though a large proportion of their catchments are in native forest not markedly affected by animal depredations. The ports of Greymouth and Westport are both greatly affected by flooding. Major floods can be expected every ten to twelve years, with at least two periods of heavy flooding between these. Indeed, there are very few years in which no flooding has been recorded. As far as can be gathered from the information released, some 10,000 acres, spread over several subsidiary catchments, would be logged or cleared annually. At least some of this would be on erodible soils and at any one time there could be up to 30,000 acres more or less denuded of vegetation. In addition, roading could increase by up to 50 miles per annum and if great care is not taken, this could aggravate erosion and flooding problems.
Windthrow, followed by rapid build-up of harmful insects, has been common in beech forests in the past. Both are factors which will have a marked bearing on beech management.

(c) Management proposals. Because of the diversity of the forests, better definition of forest types would be desirable as a basis not only for utilization but also for subsequent management. Owing to this lack of knowledge, the Institute is obliged to query the basis on which the various forms of management have been prescribed and their boundaries demarcated. For example, it is not clear whether 84,000 acres has been set aside for beech management to sustain a hardwood yield, or for some other purpose. Similarly, it is not clear how the area of 206,000 acres scheduled for enrichment has been derived. Without this information, it is not possible to evaluate these proposals except in a general way.

(d) Logging and roading. In this region, the cost of extraction will be a major consideration, particularly in view of the steep topography, the relatively low average volume per acre, wide range of tree size and amount of defect. Main roads are of a reasonable standard but all side roads would need upgrading. At the same time, the amount of forest roading required could be of the order of 50 miles per annum and most of this would be under relatively difficult conditions.

(e) Conversion. To date, there has been little conversion of beech hill forest. Radiata pine grows well on some sites but its performance on others, particularly where the present cover is dominated by hard beech, is not known. Also, it is too soon to judge the significance of Dothistroma pini in these climates. Sitka spruce could be a suitable species but current trials are small and recent. Douglas fir and Pinus contorta are subject to gross damage from opossums. Site preparation by burning, on the scale required, would present some difficulties.

Conversion of hill podocarp/hardwood forest has been proceeding for several years in north Westland with moderate success. Site preparation is costly but reasonably effective; it would be improved by the removal of hardwoods for utilization.

(f) Beech management. The forest set aside for beech management, without supplementary planting, is predominantly red beech on easy topography. Although red beech has only been regenerated on a very small scale, few problems are foreseen.

(g) Supplementary planting. The areas scheduled for supplementary planting occur on more difficult topography and contain a high proportion of hard beech. Small-scale attempts to regenerate hard beech have not been encouraging, and supplementary planting with nursery-raised beech seedlings has hardly been tested. Trials with supplementary planting of eucalypts have been limited to the enrichment of cutover forest where there is a residue of beech. Although the performance of the eucalypts has been promising, suitable
techniques for supplementary planting or regeneration where stands have been logged to chipwood specifications have yet to be devised.

(h) Podocarp management. The only operational form of silviculture for native forests in Westland is selection logging of podocarps. This is proving satisfactory in South Westland, but has so far not been attempted in the north. However, the area scheduled for this form of management is small.

(i) Reserves. The general comments on reserves made previously, apply. The following are further comments which apply specifically to this region:

Along both the lower and upper Maruia Valley there is a considerable area of red beech forest held by the Crown as unalienated Crown land or as Crown leasehold. Forest on these tenures usually lies in front of State Forest ownership and occupies land of the easiest contour. On the Crown leasehold properties the lessee can clear this forest cover in order to convert to grass without any restrictions whatsoever*. The Institute strongly recommends that the Minister of Forests have the Lands Department apply the same planning parameters to the management of forested Crown land in this region.

At one point close to Reefton, beech conversion to exotic forest is scheduled on steep country close to, and within full view of the main highway to the Rahu Saddle which is a scenic route. In view of the very careful planning elsewhere in relation to the preservation of vistas, the Institute feels that there is an inconsistency here and recommends that the Forest Service reconsider this classification.

(j) Labour. With a scheme of this size, the demand for labour would rapidly escalate, especially if an industrial plant is to be established. Although there is a background of skilled bush work in the region, there is not a large labour pool and it could be difficult to attract the numbers required. This could be a major consideration. Once the scheme gets under way, felling would have to receive priority in order to keep the industry supplied and thus, if there is a shortage of labour, it is most likely to occur in the reafforestation sector; this would have serious repercussions on the viability of the scheme in the long term. Housing and other social amenities such as schools would be a very large cost item.

(k) Finance. From the forest management viewpoint, this would be a costly scheme, not only on the basis of annual costs, but also on per-acre costs. It could probably not be undertaken without detracting from other, more technically and economically attractive projects now proceeding. Thus, if it went ahead for other reasons, it should be on the basis that finance for it would be provided in addition to schemes already in progress.

*Since this report was written Catchment authorities have invoked Section 34 of the Soil Conservation and Rivers Control Amendment Act 1959 by which both logging and logging roading can be controlled.
3. The Southland project

The scope of the Southland proposals has not been adequately defined. The Forestry Sector Report speaks of "Southland-Otago". In effect, however, since this covers a very large area, some decision must be made as to where the centre of the southern scheme lies. At the moment, major planting effort is centred round Balclutha, but it would be possible to contemplate an equally large scheme based on the Mataura or Waiau rivers. In fact, a major exotic scheme based on areas west of Gore (Hokonui, Taringatura, Longwood Ranges, and the forests west of the Waiau River) would be feasible. The 1970 N.Z. Forest Service Annual Report shows that over 12,000 acres is in exotic forest, with 2,665 acres planted that year. There are considerable areas of cut-over land in the Longwood and Hokonui Ranges and also west of the Waiau River that could readily be planted, and possibly run country in the Taringatura and Hokonui Hills could be purchased. The beech scheme could be accommodated into a major exotic scheme.

(a) Resources. The assessment of the available beech resource has not been finalized. The resource, which is predominantly silver beech, is expected to exceed 500 million cu. ft. Unlike the beeches in the Westland and Nelson schemes, Southland's silver beech is readily marketable as sawn timber and if it were handled properly, would command a much wider market on account of the intrinsic qualities of the timber. The proposed scheme would use the wood currently left in the forest — cull trees, poles, etc. If other hardwoods such as kamahi were acceptable, they could be extracted in conjunction with the normally unmerchantable residues.

In the Longwood Ranges, the two major types are podocarp (mainly rimu) forest and rimu/silver beech forest. At higher altitudes there is more or less pure silver beech forest. West of the Waiau, in the area defined by Holloway as of major potential for beech management, the major type is podocarp/silver beech forest, the podocarps being confined to ridges with a small admixture elsewhere. In Dean Forest there is more mountain beech, sometimes almost pure, but usually with silver beech and some podocarps. Both silver and mountain beech regenerate readily in these localities.

(b) Site factors. The soils of the Longwood Ranges and west of the Waiau River are reasonably fertile and present no foreseeable problems for afforestation or beech management. Most of the country is of easy contour. Although floods occur in Southland rivers from time to time, principally the Oreti and Mataura, the forest areas under discussion make very little contribution to flow in these rivers, which rise in northern Southland. The Waiau River, with the Manapouri scheme taking the bulk of the flow, will not be a problem. Only one town, Riverton, could be affected by flooding. Any major forest development in western Southland would have little or no adverse effect on downstream values in this respect.
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(c) Logging and roading. Most of the country is negotiable by crawler tractor, so logging and roading would be straightforward. One of the principal attractions of the scheme is that the area is served by good roads with few adverse grades from the forest to the port of Bluff. A rail link to the port is also present.

(d) Conversion. Conversion to exotics has been operational for several years and several thousand acres have been successfully established in radiata pine and Douglas fir. Site index for radiata pine on some Longwood sites is 95 ft and this species appears particularly well-suited to the coastal climates, except when very near the coast. There is no doubt that large-scale conversion to radiata pine could proceed with confidence. Site preparation on cut-over silver beech forest is straightforward.

(e) Beech management. Regeneration operations, on a trial basis, started in 1950. Some 2,000 acres have been regenerated to silver beech in the last 20 years with reasonable success. There seems little doubt that further areas could be regenerated as well or better if research results from recent trials are applied.

(f) Supplementary planting. Planting of Eucalyptus delegatensis for enrichment of regenerating beech stands was started in 1953. More recently E. regnans has been successfully established. While it might be too early to say that this technique is proven, so far it gives indications of being successful. The future silviculture of enriched and regenerated stands has yet to be determined.

(g) Labour and finance. There is a tradition of highly skilled bush work in this area, but to find sufficient labour for the scheme might not be easy. The small towns — Riverton, Otatau, Winton and Tuatapere are allied to strong and well-developed farming areas. To enlarge them to accommodate additional labour should not prove expensive. There is an existing base of schools and other social amenities to build on.

Within Southland Conservancy, it may be necessary to determine the relative priorities of the western Southland and the Otago projects. Should the beech utilization scheme proceed, the priority for finance would be weighted in favour of western Southland.

Comparison of the Projects

The Nelson project, being supplementary to a large industrial project, is well worth while, except that there seems little point in attempting beech management there. Some constraints will be necessary to avoid erosion during logging and roading.

The West Coast project as envisaged is a desirable concept from the viewpoint of rejuvenating a region that currently has a depressed economy, and in developing a large underutilized resource. However, the sheer size and logistics of the
enterprise envisaged are its major drawbacks in view of the many unknowns of forest management, the difficulties of logging on such a scale starting de novo and the industrial constraints of transport, power supply and availability of labour. A less ambitious proposal that would use lesser quantities initially would be more realistic as it would allow the requisite resources, skills and techniques required to establish a large industrial enterprise later, to be acquired. If the processing of the wood resource is at present not economically viable in its own right, the Institute of Foresters recommends that the project should be held over. The resource will accrue in value as the predicted world shortage of forest produce increases.

The Southland project, although perhaps too small for the establishment of a large industrial complex at present, nevertheless has many advantages, both technically and economically. It would be well worth while to consider this project in conjunction with a major exotic afforestation scheme embracing areas as far east as Slopedown, and perhaps including the Tapanui District, in place of the Otago-Southland scheme mentioned in the Forestry Development Conference recommendations.