UTILITY OF INDIGENOUS WOOD

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Abstract

Present processing and use patterns of New Zealand's indigenous timbers are examined, and a programme is proposed to improve and rationalize some of the undesirable features present.

An examination of patterns of marketing and use of timber in New Zealand could lead to the conclusion that exotic softwoods have usurped the long-standing traditional role of indigenous woods in the economy of the wood-based industries and that indigenous timbers are of no particular utility. But, before concluding what the future role of indigenous woods should be, it is necessary to consider the following questions:

(1) Do indigenous woods fill an essential need?

(2) What are the problems to be resolved in making more effective and economic use of the indigenous resource?

DO INDIGENOUS WOODS FILL AN ESSENTIAL NEED?

In an analysis of the utility of indigenous timbers it appears necessary to first of all critically assess the timbers available and the uses to which they are being put, bearing in mind the principal characteristics affecting use patterns; and to see whether they are being used rationally and economically. These aspects will be considered under primary uses for timber.

Framing

The framing market is vital to the continuing production of sawn timber. Sawlogs inevitably yield a proportion of low-grade sawn timber and profitable outlets must exist if timber is to be sawn at all. Light timber framing as we use it in New Zealand is not very demanding in terms of strength and stiffness, the two factors which determine is suitability. In

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other words, framing is a relatively low-grade timber use and is the one remaining outlet of any consequence for both exotic and indigenous timbers. The national grade recovery figures for building grades generally accepted for the indigenous softwood cut is 48% and it is interesting to note that the Forest Service End Use Survey (Gilbert, 1975, Table 7) estimates that the total usage of indigenous framing in dwellings in the year ended 31 March 1973 was 36 million bd ft, which represents about 26% of all framing used and about 23% of the total indigenous cut of 161 million bd ft for the same period.

These figures suggest that either indigenous is preferred to exotic by some users or it is wanted because there is no other timber available, or price is in its favour. The answer probably lies between these three possibilities depending on fluctuations in market demand and on the region. The Forest Service End Use Survey shows that 65% of the indigenous building grades currently produced are used in the framing of houses in the South Island. The reasons for this are clearly divided between traditional preference for rimu — particularly in Canterbury and Southland — and more ready availability of rimu compared with radiata pine. However, in the Auckland region, where radiata pine is fairly readily available, there is a preference for heart building grade rimu for subfloor framing in house and flat construction. This is partly because of its superior stiffness and partly traditional practice.

Notwithstanding the fact that a reasonable balance in production and use of indigenous building grades has been maintained, it must be conceded that the future prospects for framing are heavily weighted in favour of exotics. They meet the strength requirements satisfactorily; they promise to be more readily available — even in the South Island —than indigenous; and the fact that exotic framing is universally preservative-treated means that it has a selling edge on indigenous. For this reason (of competition) the producer faces two options in the future. He must either reduce the output of building grades by changing the pattern of cutting or resawing, or both, or he must rely on competitive pricing. The latter would be made more difficult if current pressures building up result in a demand for preservative treatment.

Much of the indigenous timber now going into framing contains very small defects which should be admissible in finishing lines and much of this timber would yield clear cuttings for manufacturing purposes. There are no figures at present to quantify this contention but it is doubtful that anyone would disagree that the amount of timber so used would reduce the volume of building grades very significantly.

Unlike the situation in many other countries, there is no provision in the National Grading Rules for indigenous soft-

woods or hardwoods for cutting grades, that is, grades from which clear pieces of timber according to minimum length and percentage of the total length can be obtained by defecting. Nevertheless, the concept is being applied by one or two producers of silver beech and presumably it is profitable to do so.

Mention has been made that preservative treatment of Building A timbers will probably be demanded. At present most building specifications allow it to be used untreated for framing members above ground floor level in buildings. On the other hand, most specifications require all radiata pine framing to be preservative treated.

The Forest Service End Use Survey shows that, of the 23.9 million bd ft of non-heart rimu (and miro) used in framing in the year ended 31 March 1973, 95% was untreated. This quantity of framing represents enough framing for the construction of 3 170 average-sized dwellings.

The weight of logic and public pressure could remedy this anomaly. We have grown to accept preservative treatment as a desirable refinement for framing and it is not likely there will be a change of thinking. In times of economic recession and keen market competition, lack of compulsion to treat indigenous framing is an anachronism to the exotic sawmiller, who is obliged to treat radiata pine framing. Lack of ready availability of treated indigenous is galling to many users. Continued use of borer-susceptible framing does ensure, however, continuing business for pest eradicating firms but this is frequently at the expense, in terms of money and worry, of the home owner. If a charge for preservative treatment is imposed on indigenous softwood framing, the sawmiller's natural concern would be a reduction in the competitive position of rimu *vis-a-vis* radiata pine. At present the retail price for green gauged 4 × 2 framing is $16.56 per 100 bd ft for rimu and $21.54 for radiata pine. This price differential of $5 would be halved if rimu framing were preservative treated. This margin may not be regarded as sufficient, but it is suggested that there is room for greater price differential between grades than there is at present and that such adjustment could reasonably accommodate a small reduction in Building A grade price. Moreover, as has already been pointed out, there is scope for recognizing an additional cuttings grade which would be appropriately priced.

Weatherboarding and Fascia

In this use, as in others, there are degrees of performance determined by properties which rimu and matai and, to a lesser extent, kahikatea, have met exceedingly well. Despite the greatly reduced market for indigenous weatherboards, with a trend towards concrete blocks or substitution by hardboard

and asbestos cement planks and finger-jointed radiata pine, current demand for native timber weatherboards exceeds supply. Current use of timber for cladding and fascia of houses and flats (based on the Forest Service End Use Survey) amounts to 11.7 million bd ft annually, of which indigenous species at 3.2 million bd ft meets 27% of the demand. Locally grown exotics and imported timbers represent 55 and 18% of the total, respectively.

However, it is more than probable that the trend in favour of other materials, including the expected advent of an exterior grade particle board, will reduce demand for indigenous timber weatherboards. As far as heart rimu is concerned, this trend is to be applauded, as it is a grossly misplaced use of timber with natural beauty of unusual quality and with durability and dimensional stability in excess of needs.

Flooring

With high density particle board having commandeered over 75% of the wood strip tongued and grooved flooring market, there may seem to be little future for solid wood flooring. Certainly the transfer of preference to particle board has removed a great deal of pressure on the supply of indigenous timbers which previously met most of the flooring needs. This was one of the major uses of high quality decorative timber and also probably the most extravagant use of such timber in that both the quality and the attractive grain and/or colour were more often than not hidden by floor coverings. But not everybody wants a covered floor, nor an exposed particle board floor. There is still a demand for exposed decorative and durable flooring and it is reasonable to cater for a small market which is appreciative of beauty of colour and figure and of good wearing behaviour supplied by choice medium-density and dense native woods. It may be expected, and one would certainly hope, that the trend in their use will be as uncovered decorative finish in thin (nominal $\frac{1}{2}$ in.) secret-nailed, end-matched strip or parquet over lower grade exotic sub-flooring in timber or particle board. For utility flooring that is to be covered, exotic timbers, plywood, particle board, or hardboard are the logical materials. At present timber for strip flooring in new houses and flats accounts for 6.7 million bd ft met from locally grown species, of which 3.9 million bd ft is in native timbers — sufficient for about 1 200 houses (assuming 35% of flooring in wood strip).

Exterior Joinery (Windows, Exterior Door Frames and Doors)

Several years ago redwood and cedar took over from heart totara the bulk of sash manufacture and there has been limited use made of native timbers in preservative-treated or

heart stock since then. More recently radiata pine finger-jointed material has made a substantial and satisfactory contribution and no doubt will continue to do so and compete favourably with metal joinery.

The current annual usage of timber for exterior joinery in houses and flats is 10.5 million bd ft. Of this window joinery accounts for 7.6 million bd ft (64% indigenous), exterior door frames use 1.5 million bd ft (87% indigenous), and exterior doors use 1.4 million bd ft (22% indigenous). The total usage of indigenous sawn timber in this category was 6.4 million bd ft; 1.6 million bd ft was imported timber.

The most critical items in exterior joinery are sills, long transoms and mullions, and to some extent door and window frames. For these, native heartwood timbers have provided some very special qualities not matched in timbers currently available from local and overseas sources.

The recent efforts by the joinery industry to provide improved designs and profiles will continue to draw on the special qualities of native heartwood timbers.

Interior Joinery, Finishing, and Panelling

In these items, which include architraves, skirtings, mouldings, built-in fittings, interior door frames, door faces, stairwork (but excluding flooring), it might well be asked whether there is any real need for special-purpose woods. Most of these items require even texture, ability to machine well, to hold fastenings and paint, withstand knocks, and also to have decorative appeal when naturally finished. This is a tall order for exotic softwoods. They meet some of these requirements reasonably well, but no means all. Many of these items, in which density, machinability, and decorative qualities are important, are provided by rimu in solid wood and veneers and are unlikely to be matched by alternative available timbers or other materials. The same applies to veneered doors and veneer panelling. Also the denser native woods such as beech and tawa will continue to come closer to users' needs in these respects than the softer exotic softwoods, except for cores variously of particle board, plywood, and hardboard.

The total present usage of solid timber in new dwellings (houses and flats) for these purposes is about 21million bd ft; of this approximately 11.2 million bd ft is indigenous, 9.4 million bd ft is locally grown exotic softwoods, and the rest (less than $\frac{1}{2}$ million bd ft) is imported timber.

Furniture

In the year ended March 1973, the furniture industry used 22.5 million bd ft of timber. Of this, 14.2 million bd ft was locally grown exotic species, 5.7 million bd ft was native timber, and 2.6 million bd ft was imported timber. This appears

to indicate that exotic softwoods (mainly radiata pine) are acceptable furniture timbers. They are for the factory run of utilitarian kitchen and bedroom units and for some upholstered (covered) furniture, but the timber lacks aesthetic appeal and is too soft for high quality furniture.

Furniture is a traditional wood market where beauty of colour and figure, medium density, dimensional stability, and good-working, steam-bending, and finishing properties are required for good products. Imported timbers such as the mahoganies from Africa, teak, oak, and walnut have provided the yardstick for high quality furniture, but difficulties in procurement of imported furniture timbers, high prices, and limited overseas funds have naturally caused furniture manufacturers to show interest in local timbers, veneered particle board, and wood-based sandwich products.

The New Zealand timbers which come close to matching the specific end-user needs are silver beech, red beech, tawa, heart rimu, mangeao, and kohekohe, the last two in very restricted supply.

In view of the dwindling supply of the top quality preferred imported timbers and their very high price, it is in New Zealand's interests to ensure that any of our species with suitable properties for furniture should be used for that as much as possible. It may be expected that the demand for wood for furniture will increase, despite the substantial growth in use of particle board and competition from plastics and metal.

Total Wood Usage in Manufacturing Industries (other than furniture)

Results from the end-use survey of industry covered a complete sample of all manufacturing, including such major sectors as meat processing, tobacco, planing mills, joinery, boat building, toys and sports goods, and brushware. Desirable species and thus wood characteristics required for these uses obviously vary, but it is safe to say that the properties of exotic softwoods currently marketed in New Zealand do not match the needs in many instances. Partly for this reason no doubt, 26.3 million bd ft of native sawn timber was used in manufactured products (*i.e.*, the sawn timber was actually applied to the finished product). The rest of the sawn timber in this use category was 68 million bd ft of exotic and 5.3 million bd ft of imported timber, making a total of 99.6 million bd ft.

Apart from use of sawn timber in finished products, a large amount goes into containers, packaging, and pallets. Manufacturing industries including furniture in the year ended 31 March 1973 used a total of 224.7 million bd ft of sawn timber (exotic, 153.8 million bd ft; native, 59 million bd ft; imported, 10.8 million bd ft).

General Discussion of Primary Uses

The total sawn output of indigenous timber in the year ended March 1974 was 161 million bd ft. This review of the major uses of the timber accounts for 75% of the total, which is as far as the Forest Service End-use Survey of Wood has advanced at this stage. Of the total production of building quality timber, some 45% was used in dwellings and the remainder for manufacturing purposes. In the case of the higher grades, some 80% went into manufacturing, furniture, joinery, weatherboards and finishing lines, with the balance being used in commercial buildings, concrete form work, etc. The expected ratio of building to dressing lines based on standard production proportions is about 50:50.

Thus we have a good picture of the ultimate use of 75% of the production now and we expect to account for the balance of the production shortly. Meantime, it can be concluded from market and end-use surveys, together with a basic knowledge of the properties and appropriate uses of the timbers under consideration that:

— There is an essential specialty use role for practically all the commercial native species currently produced and some uses which exotic softwoods cannot fill satisfactorily.
— There are regional shortages of exotic softwoods for utilitarian uses.
— There are examples of gross misuse of high quality indigenous softwoods. Substantially clear grades of timber are being used for light framing and structural use in large dimensions; also high grade boards more suited to finishing and decorative purposes are being used where exotic softwoods would serve equally well.
— Under "normal" trading conditions there are regional surpluses of production and hence some export of sawn timber lines, which are mainly higher grades of indigenous softwoods.
— Under "normal" conditions of trade there is a steady, modest export of sawn silver beech to traditional buyers, mainly in Australia.
— Under buoyant market conditions for all wood products for the last 2 years, the indigenous wood producers have been hard pressed to meet the demand for practically all grades of timber and products.
— There is a burgeoning local interest in the greater future of silver and red beech timber and veneer for manufacturing purposes and a latent interest in the other beeches for sawn timber and veneer.
— There are promising overseas markets for fully and partially manufactured wood components from indigenous timbers.

Utility of the Beeches

Thus far, consideration of the role of indigenous timbers has related primarily to the softwoods, with emphasis on rimu as the dominant species. The beeches deserve special mention for the obvious reasons that the resource is large and its potential large-scale utilization is currently attracting considerable interest. It should be noted, however, that the present total production of sawn timber in New Zealand is divided between exotic softwoods, indigenous softwoods, and indigenous hardwoods (mostly the beeches) in the percentage ratios of 78:19:3.

All five species of the New Zealand beeches come within the general classification of "medium density hardwoods". Their mutual timber characteristics are: fine and even texture; associated even wearing; good machining, bending, turning, and finishing qualities; and freedom from the common woodboring *Lyctus* species, *Anobium* species, and *Ambeodontis tristis*. These several fine properties make them suitable not only for a host of general purposes but for several special purposes. The beech timbers may be compared with maple and birch and European beech for manufacturing purposes. Nevertheless, current production and markets favour silver beech, as it saws and seasons well in comparison with the other species. Red beech, because of its more difficult seasoning characteristics, finds its main uses where dry timber is not a critical factor. Hard beech, being relatively difficult to saw, has limited appeal to the sawmiller. Mountain and black beech share with many well-known overseas finishing timbers the disadvantage of a silica content which dulls ordinary saw teeth and knives and therefore are not sawn commercially.

Under normal market conditions the beeches have suffered from competition with the more readily available indigenous softwoods, which are also more easily converted and processed than hardwoods. Hence a ready and profitable market for the beeches has only been found for the finishing quality timbers where fine, even texture and associated characteristics are the main requirements. The lower grades have been hard to sell and find their main use in farm building, drainage work, mining timbers, and ships' dunnage.

Production of the beeches has decreased over the past 15 years after reaching a high of 20.4 million bd ft in 1956. In the year ended 31 March 1973, 9.6 million bd ft was produced by mills sawing 20 000 bd ft a year or more. From a 1973-4 in-depth study by the Forest Service (Gilbert, 1974) to provide information on production, usage, and future market potential for the sawn beeches, it was deduced that the then additional demand was 10 million bd ft — twice the present cut. However, almost 90% of this demand was for the higher (substantially defect-free) quality timber. As the percentage of

low-grade timber is of a similar order to indigenous softwoods — about 50% of the sawn output with customary patterns of conversion — finding profitable outlets for this quality of timber would present problems; it competes with comparable grades of locally produced softwoods.

Beech Veneers

The present usage of beech for rotary veneer is confined to small trials and for the production of toothpicks, ice cream sticks, etc., by one manufacturer. Overall usage in 1973 was in the vicinity of 150 000 cu. ft. A limited quantity of slice-cut veneer is produced in Christchurch, but the acceptance of slice-cut beech veneer relies on promotion, and the present problem with promotion is the lack of supply of suitable slicing flitches. Although only limited use has been made of the beeches in plywood manufacture, it is sufficient to say that a high grade of log can be readily peeled or sliced to yield attractive decorative veneers. Moreover, beech veneer stains well and will take many colour shadings of more expensive timbers.

Time and space preclude further consideration of the beeches in this review of indigenous timbers, but two important observations which are appropriate to the theme of this paper are:

(1) The properties of the beeches (and thus the demand for them) identify them with special end uses. The usage of beech in manufacturing industries expressed as a percentage of total market use of beech in New Zealand in 1973 was 30% for furniture, 20% for brushware, and 8% for dowling, turnery, and joinery in descending order. Of the beech coming on to the Canterbury market in 1973, 44% was used in furniture, 26% in brushware, 20% in dowling, turnery, and joinery — a total input to these industries of 90%.

(2) The second point which merits comment is that 15% of the beech cut was purchased by users who specify grades according to the National Grading Rules NZS 3631, 28% purchased according to an end-use specification, and 55% by stating the maximum allowable defects. The remaining 2% purchased cut-of-the-log material.

Of perhaps greater significance is that sawmillers in Southland and merchants in Christchurch consider that the demand pattern which has developed over the past 5 years is for dressed components and that it would be economic to produce cut-to-length components of 9 in. (or even shorter) from long lengths that contain defects. The benefits accruing to both parties are obvious; the end user does not have to invest in expensive machinery he cannot use to full capacity and face

waste-disposal problems, and the sawmiller achieves higher conversions from the log and by the same token finds a profitable outlet for lower grades and fuller use for drying and machinery plants. It is clear that the markets for wood components, both in New Zealand and in Australia, are developing rapidly. This trend in beech conversion is to be applauded and highlights the fact that the present grading rules for beech are outmoded in that they do not provide for a cuttings grade.

A final point of interest is that at the beginning of 1974, when the beech survey was completed, a few furniture manufacturers using beech were paying over $40 per 100 bd ft but only a small percentage of the potential users were prepared to pay this price. Mahogany (all species), for which beech is being used as a substitute, was then retailing at $90 per 100 bd ft.

Special-purpose Timbers

From time to time we talk or hear talk of the need to be self-sufficient in specialty timbers. The subject comes up generally in the context of wood for such things as shock handles for tools, sporting goods, match splints, musical instruments and many other items. In each instance the woods suitable for these purposes have a combination of peculiar qualities that set them aside as either pre-eminent or not easily matched by other woods. In many instances these timbers are not readily available; thus they are costly in the first place and their application is, or should be, directed primarily into the high value category of use they are most suited to. Whereas "general utility woods" may be defined as woods readily available and characterized by their ease of conversion and processing to meet most ordinary uses, "special-purpose woods" are those not in assured and continuous supply which possess pre-eminent qualities to match critical uses.

In the writer's view, kauri, heart rimu, totara, heart matai, the beech timbers, and tawa fit the description of specialty timbers. As they become scarcer so the range of uses to which they are put should logically become less or, conversely, it makes good sense to direct the higher grades of these timbers into special uses. We have done this with kauri, albeit belatedly. Its name is now synonymous with boat building and boat planking in particular. Then there is totara for window sashes and carving, matai for window and door sills and window mullions, tawa for furniture, silver beech for brushware, turnery, and furniture, and kahikatea for stepladders, toys and nursery furniture. But what of rimu, which represents 76% of the total indigenous cut?

It seems to the writer that the moment of truth is now: henceforth we must decide to make a determined effort to ensure that rimu is milled, processed, and marketed in a way

that virtually guarantees that its intrinsic qualities are put to matching uses. This means minimizing the use of rimu for purposes which can be adequately met by locally grown exotic timbers and maximizing the recovery of finishing and decorative grades for specialized products. Implicit in this object would be to convert appropriate logs into sliced or peeled veneer. Clearly, the same objective should apply to the other podocarps, silver and red beech and tawa. We should consciously accord ratings of merit to timbers with superior properties and availability for given end uses, and this superiority should be reflected in the price.

It is not inappropriate to comment here that forest operations restricted to a very small number of species will present notable deficiencies in our wood needs. At the Forest Research Institute Symposium in 1968 (Weston, 1971) considerable attention was focused on the place of timbers other than those few which have proved themselves in commercial plantings and the weight of opinion was that some special-purpose woods should be grown within the country, especially as the quantities are generally small. Again, at the 1969 Forestry Development Conference a review of this subject resulted in a recommendation as follows:

"That to help cater for the requirements of the users of special purpose and decorative timber, the growing of a limited number of suitable species should be encouraged on a regional basis to ensure proper management and continuity of supply."

In a different but related context the conference recommended "that more emphasis be placed on hardwoods, especially fast-growing eucalypts and poplars, and more research be undertaken into the problems of growing and using these hardwoods to see whether a more diverse planting programme is justified".

Yet, it seems that there has been no conscious or determined effort to programme plantings of several promising species that would meet definable special-purpose needs. If it is accepted that our slow-growing, difficult-to-manage native timbers fill an essential production role, it must surely follow that we should be diversifying our planting with species to match the special-purpose wood needs and at the same time extend the life of our native resource. Such a variety of plantings would also greatly enhance the amenity value of forests.

It is not suggested that we should aim to become self-sufficient in all specialty wods; there is much to be said in favour of international interchange of specialty woods, but it is questionable whether we can afford to risk being denied supplies of some which could be grown satisfactorily in New Zealand and which could not only supplement our native timber resource but provide for species diversification, satisfy

the user, and provide a degree of insurance against pathological risks implicit in growing one species.

Choice of species would have regard to the fact that profitability of production is bound up with the high grade proportion that is recovered in conversion and that outlets are reasonably assured for the lower grades.

Our present knowledge of and experience in growing exotic genera other than *Pinus* is not great, but it is sufficient to conclude that substantial contributions to the objectives already mentioned could be made by selected species of *Eucalyptus*, especially the ash group. Their natural self-pruning habit, their capacity to produce large quantities of clear timber at fast growth rates, and their timber qualities of medium density and hardness and attractive colour and grain commend them. The timber would be a good substitute for indigenous softwoods — for veneers and furniture and decorative needs generally, as well as for more utilitarian purposes such as construction lines and pulpwood.

Softwoods such as *Cupressus lusitanica* or macrocarpa or hybrids in the cypress group could provide for high durability, dimensional stability, even texture, and good machining qualities required in exterior joinery and boatbuilding and general construction purposes. Also the versatility of cypress timber for farm use should not be discounted.

This list is not exhaustive, but is indicative of some possibilities of substitution for indigenous timbers.

On a final note on this subject there are obviously good practical and economic reasons for growng a few, relatively proven exotic species on selected sites, reasonably close to integrated industries, rather than a large number of different species in dispersed areas. It goes without saying that production from such forests should be of sufficient volume to ensure continuity of supply for dependent industries.

BETTER UTILIZATION OF INDIGENOUS FOREST RESOURCES

In considering the problems to be resolved in making more effective and economic use of the indigenous resource, it is necessary first to examine present utilization patterns. However, the subject is large and complex and some important aspects can only be alluded to in the space available here.

Thus far emphasis has been placed on the specialized role of indigenous timbers and the need to minimize the use of such woods for purposes which other timbers can fulfil. High efficiency in recovery of the better grades of native species is an equally important objective to strive for in the utilization of a valuable and limited resource. Indeed, improved recovery in mills and more useful economic application of mill residues

are probably the most challenging aspects of conservation in the indigenous timber industry today.

It is a sad commentary that about 50% of the sawlog is lost in slabs, sawdust, edgings, and dockings, the percentages varying with log diameter, log shape, the gauge of saws used, and the sawing pattern adopted. In rotary peeling of veneers the recovery is no better with losses from the outer layer of the log, from the residual inner core, and from defect rejections.

Long-term Sales Agreements

As a result of recommendations of the 1960 West Coast Committee of Inquiry a number of long-term sales (LTS) agreements have since been negotiated whereby the Forest Service undertakes to supply a given quantity of wood if the company concerned agrees to invest capital in improved methods of conversion in bush and mill, to process 80% of their sawn production, and, with a few exceptions, supply peeler logs to a South Island manufacturer of veneer and plywood. The principal object of LTS agreements was to consolidate and intensify production to provide job security and hopefully increased employment opportunities in the region. A secondary objective was to encourage updating of sawmills and thus improvement in efficiency and to restructure the sawmilling industry so that wood waste could be collected and processed into secondary products.

A recent critical review by the Forest Service of the changes over the last 14 years in the wood-based industries in the West Coast region (Bagnall, 1974) shows that amongst other things a handful of companies hold 19 of the 25 LTS agreements* which account for 74% of the permissible cut volume held and, although there has been a drop of 18% in production of indigenous timber since 1960, the number of sawmills in operation has dropped 54%. This can be attributed to an increase in the number of higher production units at the expense of smaller units.

Moreover, all LTS licence holders except two now operate bandsaws as headrigs and resaws or headrigs only; 10 new sawmills have been built and most of the others have been updated to some extent. Also, as a result of the West Coast Committee recommendations regarding capital investment in the region, a new veneer and plywood factory came into being in 1965.

*All these agreements cover the commercial *Podocarpus* (kahikatea, matai, miro, totara) and *Dacrydium* (rimu) species. Only two agreements include the beech species each company is permitted to cut.

Leaving aside the question of long-term sales agreement effects on the labour situation, it is clear that this method of sale has affected the number, nature and dispersal of wood-conversion plants in the region. But the question to be answered is to what extent has this improved operational efficiency, recovery (of the high-quality wood), and useful application of mill residues.

From time to time it has been said that New Zealand would be better off and utilization of forest resources would be much better if in many districts there were a few large efficient sawmills rather than a large number of small inefficient ones.

It may be argued, however, that there are advantages in the large number of small, simple, conversion plants which has characterized the timber industry in the past. It could be held that the continued existence of small conversion units in practically every small town ensures ready availability of timber to meet local needs, thus maintaining high *per capita* consumption of wood as sawn timber and also giving forest owners the assurance of competitive local markets for their logs. The validity of such arguments is very doubtful. In the final analysis there is generally a strong positive correlation between efficiency and size in the sawmilling (and plywood) industries.

The introduction of bandsawing, which is expensive by comparison with circular sawing and can be economically justified only in medium to large sawmills, has improved overall recovery to the order of 6 to 8% through the reduction in sawdust from the thin-gauged cutting bands.

On a critical note, however, there is little evidence of improvement in recovery of high-quality and defect-free grades. The pattern of sawing has not changed basically over the years. Better utilization in the exotic timber sawmilling sector — forced on the sawmiller because of the average low grade of timber obtained from exotic forests — is not a noticeable feature of indigenous sawmilling. It seems that the relatively high yield of normal commercial lengths from indigenous timbers produced easily and the hitherto assured outlets in framing for most of the balance of production has dulled the interest of most producers in recovering intermediate grades with small defects suitable for finishing purposes and short clears or upgraded narrow stock for factory use.

The installation of seasoning, preservative treating and secondary-manufacturing facilities in two or three of the larger West Coast complexes has undoubtedly added value to the products from the sawlog. However, the record shows that the degree of processing beyond the green sawn stage required of long-term sales licence holders has not nearly been met by most operators and there is no processing of the very considerable amount of waste wood in bush and mills into secondary products, although there have been tentative investigations

to do so. It may be anticipated that any decision to utilize the beech resource on the West Coast will have regard for the productive use of both forest and mill residues from podocarps and from beech in the area.

Timber Prices

It has been inferred in this paper that price differentials between grades warrant examination, and by implication that increased prices of the higher grades by reduced supplies of indigenous wood would encourage wiser use and increased recovery of high-grade timber. Normally it cannot be denied that the price commanded by growers for wood as a raw material and the prices buyers are prepared to pay at various levels of product supply determine the type of processing undertaken. However, when the selling price of timber determines log stumpage, as it does at present in native timber sales, the prices buyers are prepared to pay at given levels of product supply will mainly determine the type of processing undertaken.

Over the years the price differentials between the higher and lower grades in indigenous timbers have been low — very low compared with those of many other timber-producing countries. For instance, whereas in the U.S.A. the best board grades are over seven times the price of the poorest grades of sawn timber, in New Zealand the best board grades of indigenous timber are not more than three times the price of the poorest grades. Again, price differences between imported timbers such as mahogany, redwood, and cedar and local timbers of high intrinsic worth are considerable. For example, at the time of writing sapele mahogany costs about $95 per 100 bd ft whereas heart Dressing A rimu is $35 per 100 bd ft. This is not to say that the prices should equate, as there are obviously other factors which influence species preference, but surely the price difference is inordinately great for timbers highly regarded for furniture and decorative use.

If it is agreed that the present prices of the higher grades of indigenous timber do not reflect a desirable use of indigenous timber, the remedy would be for the forest owner to restrict the supply of indigenous wood to a much greater extent than at present and to increase the price. By effectively increasing the price of indigenous wood, producers would be encouraged to increase the level of inputs into the production process, or, in other words, intensify recovery and processing of the higher grades and mill waste. The user, too, would be more discriminating in his specification and use of these timbers and, finally, but no less important, the increased return to the forest owner would enable him to do more in crop management.

Other Factors in Changing Production and Marketing Procedures

It would be wrong to impute that upward price adjustments of indigenous timber and products by sales agreements and other forms of control — or indeed the lifting of price control — could in themselves bring about improved efficiency in the recovery of finishing grades in the use of residues and in the more rational use of the products from the forest. It would also be fallacious to think in terms of trying by coercion to change overnight the pattern of production and use.

Discouraging the use of the better grades of indigenous timbers by increasing their price would be premature until suitable alternative timbers or wood products are available for some of the uses to which these grades are now put. As has already been pointed out, we have not reached that stage yet. The producer, too, has to adjust to new values to be placed on the diminishing resource and to develop new approaches to conversion, recutting, and upgrading of the sawn timber, to revised timber grading rules, and to diversifying products and outlets. It is clear, too, that an imaginative programme is needed to promote marketing of indigenous podocarps, the beeches, tawa, and minor indigenous species for special-purpose uses. The public at large and the specifier/user in particular are either unaware of the intrinsic value of indigenous softwods and hardwoods or are apathetic about them because the timber is fairly readily available.

To implement a promotional programme would take time, but it would not be unreasonable to make most major changes within the next 5 years.

World Trends for Wood

It is pertinent, at least briefly, to consider the future role of indigenous timbers in the light of world trends in the consumption of timber. According to a worldwide survey by Carruthers and Hanson (1974), it is not expected that in the next two decades there will be any shortage of wood or of products derived from wood such as sheet material or pulp for paper and paper products, provided that transport and processing are linked to the available resources. The review records that many of the familiar and at present extensively used species will become increasingly scarce and costly, so there will be a continual seeking out and adoption of new species. The outlook for New Zealand would seem to fit this prescription, except that thus far price has not become a determining factor in the extent of usage of indigenous timbers; and, although we have found in radiata pine a good substitute for many uses, the indications are that we will not have much other choice.

The review points out that with an assured wood resource the consumption of wood will be dictated by the acceptability of wood as a material in competition with other materials such as steel, aluminium, concrete and cement-based products, bricks and other clay-based products, and plastics. In this situation the prime controlling factor will be "the cost of performance". However, in the present writer's opinion, a major factor which influences and will continue to influence the choice of material for a particular usage will be "natural worth". A further important influence on the choice of material is the cost to the country of importing alternatives. This does not require further comment.

The review concludes that the long-term future for wood is assured, not only because it is a renewable resource but because of its favourable cost-of-performance factors when compared with the main alternative materials, whose supplies are finite and whose extraction and processing costs in many cases must rise relatively because of the rapidly increasing costs of energy. In the immediate future, however, wood as a material will increase its share of the market for some products while in others it will give way to alternative materials. The extent of the change, says the review ". . . will be dependent to some extent on the research and development input to the wood sector and this must be recognised by both growers and processors. Growers must increasingly be motivated to produce wood with the property desired by the user and the processor and must continually seek to improve the efficiency of the conversion of the tree into the end products required by the user". These comments are applicable to New Zealand.

CONCLUSIONS

The thesis of this paper is that we can no longer afford to regard the indigenous resource as simply one to augment radiata pine; we are bound to recognize the role of indigenous wood to be essentially a special-purpose supporting one and shape it accordingly for the future. Put in another way, there are sound technical reasons why we should continue to draw upon indigenous forests for part of the nation's wood consumption needs. Their products have a role which is complementary to the exotic softwoods. To draw an analogy: we all want to have meat, but we do not all want mutton.

There has been little change in the pattern of production and use of our indigenous resource since exotics have become predominant in terms of output and versatility. The dynamic technological development, innovation, and adaptation characteristics of the exotic wood-based industries is notably absent in the indigenous sector. Grade recovery could be significantly improved, use of the products could be more

rational, and large quantities of mill and forest waste could be profitably used

It is both feasible and necessary to immediately set in train a comprehensive programme to:

— Extend the productive life of native resources indefinitely by forest-management techniques by phasing down, if necessary, the present cut more rapidly than planned hitherto and by extending the special-purpose role of indigenous timbers with plantation-grown selected species.

— Encourage logging practices and techniques which are economic, environmentally acceptable, and compatible with management aims.

— Encourage milling that maximizes the recovery of finishing and decorative grades for specialized products and uses residues.

— Promote a more rational application of indigenous sawn timbers and veneers so that their intrinsic qualities are put to best use.

The initiative in such a programme seems to lie in the forest owner's restricting the quantity of raw material made available and raising the price of the raw material. Putting this policy into effect could be expected to lead to more discriminating conversion and use of the wood, but unless this is done over a reasonable period processors could experience major problems.

Finally it is inescapable that the total availability of high-quality wood from indigenous saw logs for essential purposes could be greatly improved. Adoption of the measures advocated in this paper, and a modest level of imports, could be expected to meet our absolute needs for special-purpose timbers even with a reduction in the present cut of indigenous softwoods.

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REFERENCES

Bagnall, R. K., 1974. *A Review of the Changes in the West Coast Sawmilling Industry since 1960.* Internal Forest Service report.

Carruthers, J. F. S.; Hanson, O. P., 1974. *Review and Outlook for Wood and Substitute Materials.* Prepared for the Tenth Commonwealth Forestry Conference.

Foley, T. A., 1970. The use of hardwoods for amenity, shelter, and timber production. *Farm Forestry, 12*: 28-44.

——— 1973. *Substitution of Native Timbers by Exotics.* Prepared for N.Z. Forest Service, limited distribution.

Foley, T. A.; Gilbert, J. T. E., 1974. *Role of Indigenous Forests in Meeting Wood Requirements.* Contribution paper to Forestry Development Conference 1974.

Gilbert, J. T. E., 1974. Production and utilisation of New Zealand sawn beech. *N.Z. For. Serv., Utilisation Dev. Div. Rep. No. 30,* limited distribution.

——— 1975. Incomplete end-use survey by the Utilisation Development Division, N.Z. Forest Service (unpublished).

Reid, J. S., 1965: Minor timbers and specialty uses. *N.Z. Jl For., 10*: 73-9.

Thomson, A. P.; Reid, J. S., 1965. Better utilisation of existing forest resources. *N.Z. Jl For., 10*: 221-33.

Weston, G. C. (Ed.), 1971. The role of exotic genera other than *Pinus* in New Zealand forestry. *Proc. For. Res. Inst. Symp. No. 10,* 258 pp.