The future for native forest logging in Australia

Judy Clark

Working Paper 1992/1
ISBN 0 86740 406 X
ISSN 0 313 – 7414

THE FUTURE FOR NATIVE FOREST LOGGING IN AUSTRALIA

JUDY CLARK

Abstract

This Working Paper examines the outlook for native forest logging in Australia assuming no major changes in government policy or action.

The paper examines the three main sectors of the Australian native forest timber industry – sawmilling, pulp and paper, and exporting of woodchips. It concludes that the 1990s will be a period of unprecedented structural change in the Australian timber industry as:

- the displacement of hardwood by softwood in the sawntimber market accelerates,
- native forest woodchip exports face intense competition from the large overseas eucalypt pulplog plantation resource with its quality advantages, and
- significant expansion of the Australian pulp and paper industry occurs from processing the extensive softwood plantation resource, rapidly growing hardwood plantation resource and recycled waste paper.

The plantation resource presents opportunities for significant growth in the Australian timber industry during the 1990s. It will also have major implications for native forest based wood processors who will find it increasingly difficult to compete against the quality, uniformity and scale advantages of the plantation based industry.

The volume of sawlogs and pulplogs harvested from native forests in Australia is expected to remain high but then decline significantly during the 1990s.

The inevitable substantial shift of industry to plantations has environmental and economic attractions. The paper discusses policies that government could implement to facilitate the transition. These include corporatisation of crown plantations, implementation of proper financial standards for forest agencies and a firm commitment to encouraging the development of an efficient pulp and paper industry in Australia without the need for substantial and on-going subsidies.

This Working Paper is based on a seminar presented at the Centre for Resource and Environmental Studies at the Australian National University on 28 March 1991.

Introduction

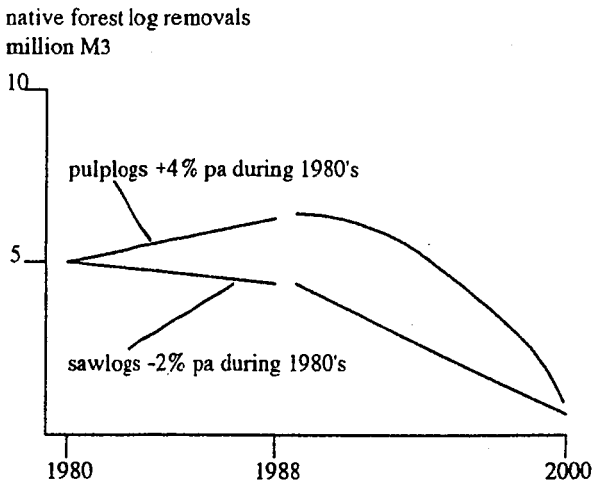
The development of timber industry and forest policies by government requires, amongst other things, an appreciation of the outlook for the industry assuming there is no substantial change in government policy or action. Major shifts in wood supply and industry development are already underway and likely to accelerate during the next few years, regardless of government decisions.

During the 1980s, a combination of declining sawlog removals and significant growth in pulplog removals has resulted in pulplogs becoming the dominant commercial product from native forests (Figure 1). Today, pulplogs account for about 55 per cent of logs harvested from native forests, compared with 14 per cent in the early 1970s; and the total amount of wood harvested from native forests is increasing as a result of pulplog harvesting (ABARE 1990).

This shift in the relative importance of sawlogs and pulplogs is likely to be accentuated during the first half of the 1990s but by the end of the decade, harvesting of sawlogs and pulplogs from native forests will decline significantly. This will be caused by the substantial completion of the Australian timber industry's shift to plantations and the erosion of Australia's dominance in the Japanese hardwood chip market by overseas eucalypt plantations.

This paper describes these major trends and points to some of the policy implications for governments. The purpose is to assist in the development of timber industry and forest policies. These policies should be developed after the community's expectations for native forests are articulated in a set of objectives. This paper deliberately avoids discussion of these objectives in order to highlight and clarify the changes already happening.

Figure 1. Outlook for native forest logging



Source: ABARE: 1988 & 1990

HARDWOOD SAWMILLING DECLINE

Hardwood sawntimber production, in volume terms, will continue to decline during the 1990s due to the intensification of competition from softwoods, likely real price increases for hardwood sawlogs and declining hardwood sawlog quality. The sawlog supply from regrowth forests is unlikely to alter this trend.

Softwood competition

There are major growth opportunities for the softwood sawmilling industry based on the increasing softwood supply from maturing pine plantations in Australia. Today softwood sawlogs account for 46 per cent (3.8 million m^3) of sawlogs harvested in Australia. By 2000, softwood sawlog supply will be at least doubled when the large areas of plantations established in the 1960s and 1970s mature (Victorian Government 1986, Cameron and Penna 1988). Figure 2 shows the significant growth in the projected softwood resource relative to domestic consumption of sawntimber.

Although the processing of softwoods is the major source of growth for the Australian sawmilling industry, there are considerable differences in opinion about the size of the potential industry expansion. This is due to the significant differences in the projected supply of softwood plantation sawlogs and major deficiencies in all projections of the Australian resource. These issues are discussed further in Appendix B.

Industry is already investing in softwood processing and new sawmills or major expansions will be constructed throughout Australia over the next five to ten years (see Table 1). For example, a new mill opened outside Maryborough (near Fraser Is.) in 1990; another is being built in south western Victoria and a

Table 1. Location of potential new or expanded softwood sawmills

Northern Tas*	Gippsland*
Albury	Otways*
Bathurst	South Australia
Eden/Bombala*	Central & South Coast Qld.*
NE Vic*	South West Western Aust.*
SW Vic	

* Sites of controversy over the logging of native forests. Note: The softwood plantations in North East NSW are insufficient to enable a major sawmill expansion, but other industry opportunities using this resource are possible. Location of mills is based on regional resource estimates by The Australian Forestry Council (1989) and information provided by state forest agencies.

major expansion is proposed for northern Tasmania within five years.

Most of these softwood mills will have the capacity to process upwards of 300 000 m^3 per annum taking advantage of the economies of scale that hardwood sawmills cannot match. About 1 per cent of hardwood sawmills have a log throughput greater than 45 000 m^3 per annum and there are no hardwood sawmills processing more than 100 000 m^3 per annum (ABARE 1990). This will allow softwoods to continue to displace hardwoods in the sawntimber market. In addition, the Australian softwood plantation resource will enable industry expansion based on import replacement. Imports account for approximately 30 per cent of the Australian sawntimber market and 80 per cent of sawntimber imports are softwoods (ABARE 1990)1.

Doubts have been expressed about the technical substitutability of softwoods for hardwoods in the sawntimber market, despite the dominance of softwoods in the rest of the world and in pre-war Australia that resulted from softwood sawntimber imports. In Australia today, softwood consumption as a proportion of total sawntimber consumption varies from 20 per cent in Western Australia to 91 per cent in South Australia and, Australia-wide, softwoods now have 61 per cent of the market (Table 2). The limits of substitutability have not been reached and there is considerable scope for further displacement of hardwoods in the Australian market. There is little doubt that during the 1990s all states will move closer to the 91 per cent market share that has been established in South Australia.

Table 2. Softwood as a percentage of total sawntimber consumed(a) – 1988/89.

SA	91 per cent
Qld	69 per cent
NSW	66 per cent
Vic	59 per cent
Tas	37 per cent
WA	20 per cent
Aust	61 per cent

(a) includes stocks and imports. Source: ABARE 1990.

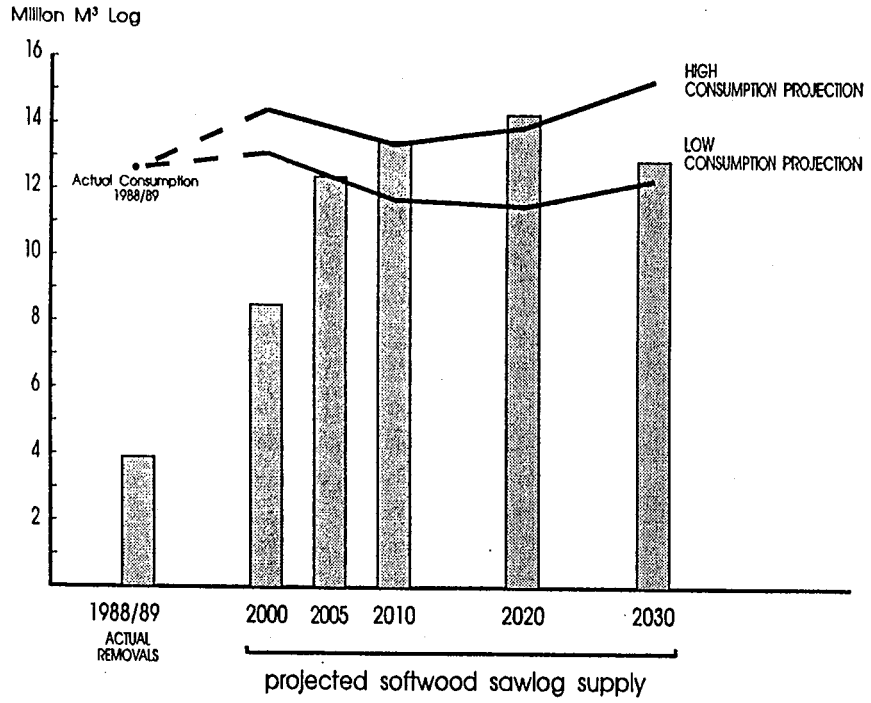
The Resource Assessment Commission found that softwood sawntimber is a satisfactory substitute for hardwood in most applications (RAC 1991) and the diversity of softwood products continues to be enhanced through developments such as lamination, fibre reconstitution and preservative treatments.

The majority of Australia's softwood plantations were established by clearing native forests. Consequently there is a high correlation between the location of current hardwood sawmilling (and forest controversy) and the location of new softwood sawmills or mill expansions. This suggests that with skills upgrading, many hardwood sawmill employees and contractors will have the opportunity to shift into the expanding softwood industry within the region where they are currently employed.

The New Zealand and Chilian radiata pine plantations are an additional source of softwood supply for the Australian market. They will also influence the structure and the growth of the Australian softwood industry.

Australia is New Zealand's 'second home' market for radiata pine sawntimber and has been targetted as a major market to export its surplus production. Despite agreements between the Australian and New Zealand marketing associations, imports of radiata pine sawntimber from New Zealand have increased by an average 12.5 per cent per annum since 1975 (Cox et al 1991, p 75). Imports of radiata pine sawntimber from Chile are relatively small, but there is potential for considerable growth based on the need for Chile to find new markets for their large and maturing plantation estate. Supply from radiata pine plantations in Chile and New Zealand is estimated to double during the 1990s and continue increasing early in the next century (Elliott 1982, AFIJ 1985). Both countries will have a large surplus to their

Figure 2. Australian softwood sawlog supply and projected consumption of sawlogs



Source: ABARE 1989 & Cameron and Penna 1988.

Note: The timing of the release of the bulk of the softwood resource is likely to be earlier than that shown in the figure. Most of the plantation yields have been estimated using 35 to 40 year rotations. For economic reasons, many plantations will be harvested five to possibly ten years earlier than previously considered.

domestic needs for export as logs or sawntimber (Leslie 1985).

The New Zealand plantation program was established earlier than Australia's. In addition, the recent corporatisation of crown plantations in New Zealand is also likely to bring forward the processing of that resource as growers explore opportunities for realising early financial returns. In the absence of Australian government policy to also corporatise crown softwood plantations, the New Zealand industry is likely to become more firmly established in the Australian market before the Australian industry embarks on its major expansion.

Corporatisation of crown softwood plantations is necessary to maximise industry growth and to achieve the best timing for the processing of these plantations. Even in the absence of corporatisation, there are pressures by industry to bring crown plantations on stream earlier than originally proposed.

This is likely to result in the bulk of the softwood resource being released earlier than indicated in Figure 2. Most of the plantation yields were estimated using 35 to 40 year rotations. Rotations of this length may maximise sawlog volume but not necessarily growers' profits. From a financial perspective, growers and sawmillers must trade off additional log growth against the interest cost of the capital invested in the plantations. Market developments, such as the early entry of competitors from New Zealand, will also encourage earlier harvesting. Some companies are now aiming to manage plantations with a final clearfell at 25 to 30 years (Centre for Farm Planning and Land Management 1989, p 43).

SEAS Sapfor's silvicultural practices have resulted in plantations providing a significant volume of sawlogs from thinnings which in effect brings plantations on stream earlier. The company thins their plantations at 18 years and clearfells at 28 years. Thinnings are a major source of sawlogs for SEAS Sapfor's sawmills accounting for 59 per cent of their sawlogs over the past five years (SEAS Sapfor 1990). This strategy requires sufficient volumes of sawlogs of known size to enable the appropriate mill design to process the specific resource. Managing and processing plantations in this way

enables earlier mill construction and therefore earlier financial returns from plantations as well as establishing a firm base in the Australian structural grade sawntimber market. SEAS Sapfor considers that this approach maximises sawlog production and financial returns. It is a strategy that the company uses for their plantations in South Australia and which it proposes for the crown softwood plantations in Tasmania.

The effect on total sawlog yield of harvesting softwood plantations earlier than originally envisaged and developing thinnings programs to supply a significant volume of sawlogs is difficult to determine. Much depends on the existing silvicultural practices. For example, SEAS Sapfor argues that a clearwood regime (with non commercial thinnings and pruning) could result in a 30 per cent loss in wood increment compared with their silvicultural regimes used on company plantations (SEAS Sapfor 1990).

Australia's softwood plantations will enable considerable expansion in sawntimber production during the 1990s. It is likely that these plantations will be harvested earlier than originally envisaged and that Australia will be largely self sufficient in sawntimber by the end of the decade. If a shortfall in Australian sawntimber supply eventuates, the deficit is likely to be met by competitively priced imports of softwood from New Zealand and Chile, rather than Australian hardwood sawntimber.

Hardwood royalties

Hardwood sawmillers are likely to experience real price increases for quality sawlogs during the 1990s and this will further erode the position of hardwoods in the commodity sawntimber market.

Two factors underlie the pressure for price increases. First, it is widely recognised that the market value for sawlogs, particularly premium grade logs, is often not reflected in the royalty charged by forest agencies. The recent NSW Parliamentary Accounts Committee Report on the Forest Commission states:

> In view of the strong evidence from the market place that native timber prices are generally below what the market will bear, the Committee believes that the case for raising prices on native timber is overwhelming, despite protests from sawmilling proprietors. (NSW Public Accounts Committee 1990, p 79).

The second factor, which is probably the more significant, is the continuing loss making performance of some forest agencies selling wood from crown native forests. Even where operating surpluses are being achieved they are relatively small and profitability (return on equity) is very low. There is increasing pressure on state governments throughout Australia to operate their commercial activities on a commercially sound basis. Forest agencies are unlikely to be immune from these pressures and there is scope for considerable improvement in their financial performance. Implementation of proper financial standards for forest agencies will result in real price increases for native forest sawlogs and pulplogs.

Declining log quality

The quality (including size and uniformity) of sawlogs from native forests is declining. The timber industry, like all resource processing industries, has for economic reasons, harvested the highest quality stands first. Quality must decline (even for a supposedly renewable resource) if logging is not conducted at a sustainable level, as appears to be the case in many of Australia's native forests.

In Tasmania, for example, sawmillers that are further processing the resource through kiln drying are experiencing problems in getting sufficient volumes of suitable species, size and consistency in log quality. This is affecting the economic viability of further processing (K.J. Last, Managing Director Kauri Timber Co. Ltd. pers. comm.) This trend of declining log quality is Australia-wide and will constrain growth in output of appearance grade sawntimber.

Regrowth forests

There is unlikely to be any large scale sawmilling development based on regrowth forests in the foreseeable future. Recoveries for select grade are considered by current processors of the resource to be too low. More growing years are required to provide logs of

suitable size, clearwood, timber stability and homogeneity to support a significant appearance grade production industry (Gunnersen 1987). Early harvesting of regrowth forests, considered by many to be before trees are at least 80 years old, will result in a significant proportion of output being of structural grade rather than select grade and therefore in direct competition with softwoods.

Options for hardwood sawmillers

There will continue to be many mill closures. Some mills will shift from hardwood sawmilling and develop their interests in softwood (eg. Hyne and Sons operating at Maryborough Qld; Gunns Kiln-dried Timber Industries in Tasmania; and Bunnings Forest Products with substantial hardwood operations and three softwood processing facilities in Western Australia).

Small, green hardwood sawmills supplying local markets and which are isolated from softwoods because of transport distances are likely to remain viable. Remaining mills face the choice of shifting into processing relatively low quality logs and producing large volumes of woodchips for export, or of entering the market for appearance grades of timber.

Exporting woodchips is highly profitable and more sawmillers will attempt to enter this part of the industry. For example, two of the main further processing sawmills in Tasmania are seeking to expand into processing low grade logs (estimated 10 per cent sawntimber recovery) and most of the resource would be chipped for export (Gay 1990 and Last 1990). These types of proposals were introduced into Victoria by green sawmillers as part of the value added utilisation scheme and are flowing to other states as flitch mill operations or proposals to utilise low grade sawlogs. They represent the final stage of the traditional hardwood sawmilling industry. They are essentially woodchip producing operations which provide additional revenue to supplement declining hardwood sawntimber sales.

The sawntimber part of the operation (probably at best 10 per cent of log throughput) will face problems competing against softwoods since most of the output can be readily substituted by softwood sawntimber products.

Hardwood sawmills with enough consistently high quality logs appear to have a future. To achieve this, some sawmillers are investigating mill 'amalgamations' with centralised further processing facilities. These have been investigated by industry since the early 1980s with, to my knowledge, no action. This suggests problems with the economics and uncertainty about the resource and long term markets for standard grade sawntimber which will always be a substantial by-product of this type of operation (Gunnersen 1987, p 10).

There are opportunities for labour intensive sawmilling using a varying log input (species, size and quality) to produce high value sawntimber for the appearance market. The increased cost associated with processing a variable log supply is offset by the higher returns from selling a higher value product. Due to the relatively small market for these products and the production techniques, mills are likely to be small scale but viable.

The erosion of traditional hardwood sawntimber markets by softwoods has focused attention on the opportunities for further processing hardwoods into appearance grade timbers. It is generally considered by industry that between six and ten per cent of the hardwood sawlog resource is currently used for appearance purposes. Whilst demand for appearance grade hardwood sawntimber is likely to increase, the actual volume relative to today's sawlog cut will be small. The volume of consistent and high quality sawlogs will restrict the number of mills with high throughput of appearance grade sawntimber and the labour intensive nature of smaller mills processing a variable quality log resource will limit the volume of sawlogs harvested by this sector of the industry.

Market factors will also constrain industry activity. The Australian market for appearance grade sawntimber is limited because of the high value of these wood products. There is likely to be expansion into export markets which currently take only about 1 per cent of hardwood sawntimber production (ABARE 1990). The complexities associated with marketing and distributing a specialised product into world markets will limit the volume of production.

WOODCHIP EXPORTS

Pulplogs are now the dominant product from native forest timber harvesting operations in Australia and their main use is as woodchips for export. In 1988/89, 40 per cent of the harvested log volume was exported as chips (ABARE 1990 & 1991). Exports of native forest chips have increased by an average 11.8 per cent per annum, in volume terms, since 1970/71 when this industry effectively commenced operations (see Figure 3).

The volume of woodchips exported has plateaued and more recently declined. It appears that this reflects structural factors rather than short term demand and supply factors as discussed below.

Japan is the destination for most of Australia's exported hardwood chips. Although Japanese demand has steadily increased since 1986, Australia's share of this market has declined from 67 per cent in 1986 to 45 per cent in 1990 (Bills 1991). Japan has been shifting its source of supply, mainly to native forests in other countries, particularly the USA, Canada and Chile. This does not reflect an Australian supply constraint because quotas set by government have recently not been fully met.

The significant decline in Australia's share of the Japanese hardwood chip market can probably be attributed to the combination of price, quality and Japan's desire for diversity in sourcing hardwood chips. The latter factor is particularly important given the never-ending controversy surrounding the industry and continuing uncertainty about pulpmill developments which may reduce the available volume of chips for export.

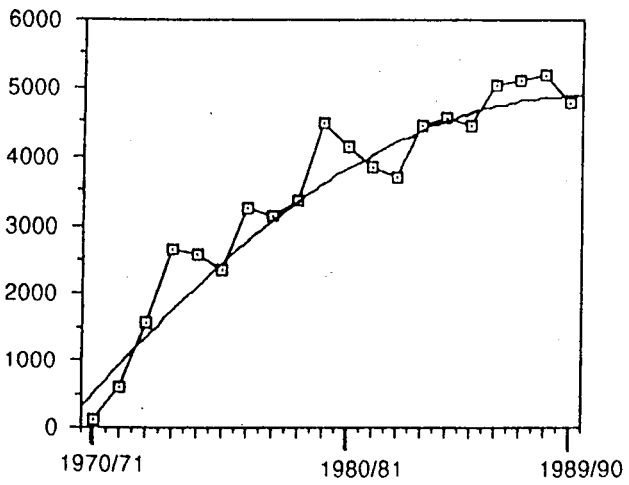
Nevertheless, Australia remains the dominant source of overseas hardwood chips to Japan and there will continue to be pressure to increase the volume of woodchip exports while profits are still high (particularly in relation to other sectors of the hardwood industry) and before significant volumes of higher quality overseas eucalypt plantations come fully on stream.

Export woodchipping is a highly profitable business activity. For example, the south east NSW export woodchip company Harris Daishowa (Aust.) Pty Ltd recorded an after tax profit as a percentage of shareholders funds for 1990 of 45 per cent (*Business Review Weekly*, 18 Oct. 1991). This is about double what would be considered an excellent return for any commercial business.

The extraordinary profits associated with exporting woodchips have encouraged the sawmilling industry's shift into chip production. As well, private forest owners, particularly in Tasmania, are keen to log their forests while demand exists for their old growth resource and to supplement declining farm income.

The situation of extraordinary profits and high volumes of Australian native forest chip exports is likely to be short lived. There will be a large increase in world supply of hardwood chips and pulp over the next five to ten years as eucalypt plantations (seven million hectares) mainly in Brazil, South Africa, Portugal and Spain come fully into production (Brett 1990, NAFI Forest Facts No. 8 *Eucalypt Plantations*). The projected capacity of eucalypt pulp processing facilities in these countries could be about eight million tonnes by the early 1990s (Phillips 1988). The production of eight million tonnes of chemical pulp requires an estimated 24 to 28 million m^3 of wood per annum, maybe less because of the relatively high pulp yields that some plantation grown trees are providing. Whilst the countries above are the main producers of eucalypt pulp traded on the world

Figure 3. Australian woodchip exports ('000 tonnes)



Source: ABARE 1991 & previous issues.

market, eucalypt plantations are also being established in Argentina, South East Asia and China.

Of particular interest to Australia is the projected supply of eucalypt wood from overseas plantations, rather than actual pulp capacity. It is the potential of these plantations to supply eucalypt chips and pulp which is of major importance to Australian suppliers of hardwood chips.

There appears to be no published projections of pulplog supply from overseas eucalypt plantations. A rough order of magnitude can be simply calculated by applying an estimated mean annual increment of 15 m^3/ha/annum to the seven million hectares of overseas eucalypt plantations to yield an annual pulplog supply of 105 million m3. Factors such as insect and disease damage and harvesting difficulties will reduce the actual yield whilst other factors such as the high annual increments (up to 70 m3/ha) in some plantations and high basic density resulting from intensive breeding programs (Phillips 1988) will increase the pulp producing capacity of overseas eucalypt plantations.

This growth in supply is significant when compared with projected growth in world wood pulp production which has increased by an average 2.3 per cent per annum over the past ten years ending 1988 (FAO 1990). If this growth continues, world wood pulp production is projected to increase by about 47 million tonnes (equivalent to about 140 million m3 of logs) over the period 1988 to 2000. Eucalypt pulp currently accounts for a small but growing proportion of world wood pulp production. As an indication of its significance, eucalypt pulp traded on the world market (as most is) accounted for about 12 per cent of total traded wood pulp in 1985 and only 20 to 22 per cent of world pulp production is traded on the world market (Simons 1990c). Eucalypt pulp therefore accounts for less than 3 per cent (4 million tonnes of pulp or an estimated 12 million m3 of logs) of world wood pulp production[2]. Thus the projected annual supply of 105 million m3 of eucalypt plantation pulplogs is likely to have a significant impact on the world pulp market during the 1990s. The resulting highly competitive world market is likely to be characterised by increasing attention to quality and customer service, price competition and product substitution during the 1990s[3].

There is little doubt that overseas eucalypt plantations will have enormous implications for Australia's native forests. Australia's current volume of annual woodchip exports from native forests represents less than 5 per cent of the projected annual pulplog supply from overseas eucalypt plantations. Even reducing this supply projection by 50 per cent implies that Australia's current level of woodchip exports will still only represent about 10 per cent of the pulplogs available from overseas plantations.

Plantations provide an economic and high quality resource which will be attractive to hardwood chip buyers. The Australian industry clearly understands these supply and quality issues. For example, the Private Forestry Council of Tasmania states that:

> It is imperative that as much of the remaining private old growth pulpwood resource as is available for sale is marketed over the next 15 years whilst market acceptance of this comparatively low commercial quality wood is relatively high. Quota restrictions on the harvesting of this resource must be lifted immediately. (Private Forestry Council of Tasmania 1990, p 12).

It should be noted that the 15 year time frame for logging available old growth native forests is probably a significant over-estimate. Five to ten years is more likely since the overseas plantations are already established and many are managed on short rotations.

Japanese and other buyers of woodchips will exploit this situation of rapidly expanding supply of hardwood chips over the next five to ten years. All sectors of the Australian native forest based industry will be trying to increase or maintain chip sales before the higher quality plantation resource comes fully on stream. Buyers are likely to put considerable pressure on Australian suppliers to reduce the price of native forest based export woodchips.

This downward pressure on woodchip prices is likely to be matched by increases in pulplog royalties and industry operating costs.

As the proportion of lower value logs in total volume sales of forest agencies increases, royalties must increase, all else held constant, to cover forest agency costs. In addition, forest agencies are likely to increase royalties as part of the general desire by state governments to improve the financial performance of their forest agencies. Industry calls for reductions in

royalties to maintain competitiveness against other suppliers are unlikely to be acted upon.

The cost of logging native forests predominantly for export woodchips will increase as community pressure intensifies and companies are forced to spend more on public relations, government enquiries, and meeting more stringent logging standards etc.

Due to the high volume/low value nature of the export woodchip industry, a relatively small increase in unit costs and/or decrease in unit price for chips can significantly affect economic viability.

The 1990s is likely to be a period of marked reduction in the profitability of exporting woodchips from Australia's native forests and increased competition from the large and relatively high quality overseas eucalypt plantation resource. Under these conditions, the volume of Australian native forest chip exports is expected to decline significantly during the 1990s.

AUSTRALIAN PULP AND PAPER PRODUCTION

There will be significant growth in Australia's non native forest fibre resource available for processing by the pulp and paper and wood based panels industry over the next 10 years (see Figure 4). The three main non native forest sources of supply are softwood and hardwood plantations and recycled waste paper.

Waste paper

Waste paper suitable for recycling is an important and often under emphasised source of supply. It currently provides between 25 to 30 per cent of the fibre input for paper manufacture in Australia. The contribution of waste paper is likely to be greater than that shown in Figure 4 since the projection is based on ABARE's work of 1989, and assumes no recycled waste paper input in the manufacture of newsprint (ABARE 1989). Since that time ANM has announced its intention to establish a waste paper recycling and de inking plant by the mid 1990s to provide recycled paper for newsprint production and Visy Board has also announced its proposal to manufacture newsprint using recycled waste paper.

Softwood plantations

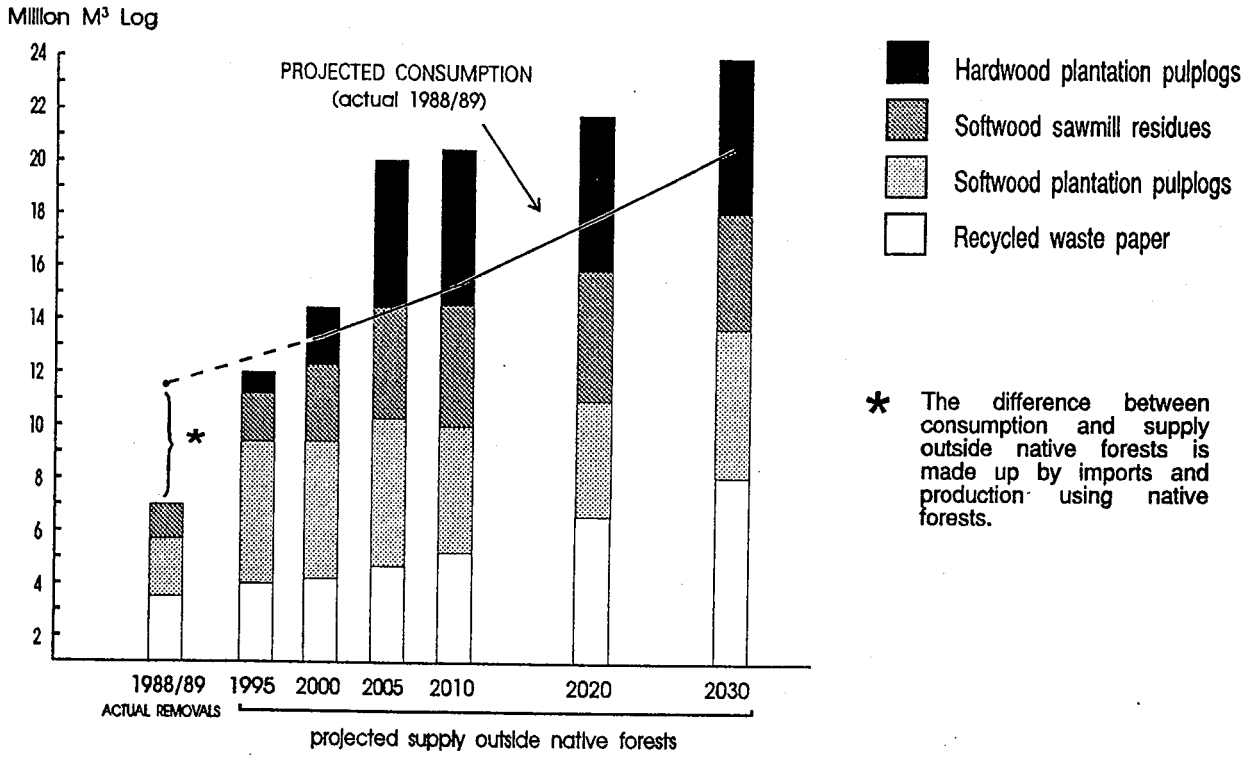
Softwood pulplogs and sawmill residues are projected to increase significantly through the 1990s and will be the major source of industry growth. Opportunities exist for new softwood based pulpmills, mill expansions and considerable development of the wood based panels industry.

Hardwood plantations

Australia's hardwood plantation resource of about 60 000 hectares is currently expanding by about 11 000 hectares per annum. New plantation establishment is projected to increase to about 22 500 hectares per annum during the 1990s (Appendix A). This plantation development is concentrated in Tasmania (APPM, Forest Resources and ANM), Victoria (APM and Vic. Govt.) and Western Australia (timber belt planting and Bunnings Treefarms). The industry began hardwood plantation programs in the late 1960's and decided to expand its plantings significantly from the late 1980s. It clearly sees that the future lies in company owned or controlled plantation feedstock, not native forests.

Eucalypt plantations currently provide only a small volume of pulplogs for the pulp industry but by the mid 1990s, they are projected

Figure 4. Projected pulplog and fibre supply outside native forests compared with projected consumption of paper, paperboard and wood-based panels (excluding ply and veneer)



Source: Consumption projections and projected use of recycled waste paper is based on ABARE 1988, softwood supply projections are based on Cameron and Penna 1988, and hardwood pulplog supply projections are presented in Appendix A.

to become a significant source of raw material supply for pulp production. By 1996 the projected supply of pulplogs from eucalypt plantations is expected to be slighlty higher than the volume of native forest wood currently processed by the Australian industry into pulp (Appendix A and RAC 1991, Table 3.34). By the end of the 1990s, eucalypt plantations are projected to supply about 2 million m^3 per annum of pulplogs increasing to 6.6 million m^3 per annum by 2006 when the plantations established under the current plantation development program come fully on stream (Appendix A).

This plantation resource will provide a high quality pulplog feedstock particularly suited for the manufacture of quality printing and writing papers.

There are developing trends in the utilisation of high quality plantation feedstock in medium scale but efficient mills to produce printing and writing papers. Bleached chemi-thermo-mechanical (BCTM) pulp and paper mills, in particular, appear to have some economic and environmental attractions (Simons 1990a & b). The commercial application of CTM pulping using eucalypt plantation feedstock to supply small to medium scale mills has been documented by Higgins who also notes that Forest Resources Ltd. has been conducting a feasibility study for a eucalypt CTM pulp mill (Higgins 1991). Forest Resources' eucalypt plantation program in Tasmania is projected to be able to supply a medium scale CTM pulp mill by the mid 1990s (Appendix A).

The Australian eucalypt plantation resource is being established at a rate which would enable four medium scale pulp and paper mills using CTM pulping to be operational by the mid 1990s producing about 0.9 million tonnes of paper per annum. This is equivalent to nearly double the current level of printing and writing paper consumption in Australia, which puts some perspective on the processing potential of

Australia's expanding eucalypt plantation resource. Additional industry expansion will be possible as the eucalypt plantation resource continues to expand during the late 1990s and early 2000's.

In reality, it is unlikely that four medium scale mills such as BCTM pulp and paper mills will be constructed. Rather, the resource is likely to be used to supply a combination of new large pulp mill(s), smaller mills such as BCTM pulp and paper mills and as a quality feed stock for existing mills and mill upgrades.

Native forests

A large part of Australia's native forest resource now available for pulp production is mixed age, mixed species, cut-over native forest and will not provide premium grade pulpwood. The nature of the resource will affect pulp yield, quality and cost of production (Phillips 1988). This resource quality issue will place Australian processors at a disadvantage relative to its main competitors supplying pulp processed from eucalypt plantations.

Low royalties for native forest pulplogs may compensate for the raw material quality disadvantage. In Tasmania, for example, APPM Forest Products pays a royalty of only $2.21/tonne for pulplogs from crown native forests used for domestic pulp production (Kohl & Graham 1991). This is a major subsidy which would be removed if forest agencies were required to operate on a commercial basis.

Regrowth forests and thinnings are the other potential sources of pulplogs. To compete effectively with plantation-grown timber would require that the regrowth be managed on equivalent rotations (10 to 20 years). This would in turn require a major shift in the publicly-stated policies of forest agencies. Under intense community pressure, governments have committed themselves to maintain 'sawlog-driven' regimes for native forests with rotations of usually 80 to 150 years (see for example, Victorian Government 1986, p 33).

Industry development

Growth in the pulp and paper industry is likely to continue to be concentrated on smaller scale, mainly import replacement projects rather than the highly risky approach of large scale, single commodity production substantially for sale in a highly competitive world market (Clark and Blakers 1989). This is a continuation of the historical industry practice of delaying mill construction or rebuilding until domestic demand is sufficient to absorb the incremental output and replace imports that have built up in the interim. The effect on Australia's balance of payments will be positive and as Figure 4 shows, the non native forest resource has the capacity over the 1990s to remove Australia's trade deficit in pulp and paper products through either import replacement or export.

CONCLUSIONS AND POLICY IMPLICATIONS

The 1990s will be a period of major structural change and growth in the Australian timber industry. These changes will result from the significant and maturing Australian softwood plantation resource, the continued establishment of short rotation eucalypt plantations in Australia and the competitive pressures that will result from overseas softwood and eucalypt plantations.

These changes in the timber industry's resource base will have major implications for all sectors of the Australian native forest based timber industry during the 1990s.

Hardwood sawntimber production is expected to continue declining but at an accelerating rate as the volume of Australian softwood sawntimber on the market increases. Overseas plantation grown softwoods, particularly from New Zealand and Chile, will provide an addi-

tional source of competition for Australian sawmillers.

Growth in the volume of woodchips from Australia's native forests has plateaued and the late 1980s may have been the turning point in the volume of chips exported. Alternative sources of hardwood supply are becoming available from large eucalypt plantations established overseas which will provide an attractive, relatively high quality hardwood pulplog resource for export chips or pulp and paper production. In the more immediate term, hardwood native forests in Chile, the USA and Canada are expected to continue to reduce Australia's share of the Japanese hardwood chip market.

Australia's eucalypt plantations are expanding steadily following the pulp and paper industry's assessment of the economic, quality and resource security attractions. This resource will be sufficient to enable the development of medium scale but competitive pulp and paper mills by the mid 1990s.

The volume of plantation wood available for logging during the 1990s will be significantly greater than is currently available. This provides opportunities for industry growth based on increasing domestic demand, import replacement and export. At the same time, native forest logging will decline substantially as plantations provide a more attractive source of supply for the sawntimber and pulp and paper industry in Australia and overseas.

This inevitable outcome has economic, environmental and social attractions. It presents government with essentially two approaches to timber industry policy – continue with business as usual in the knowledge that the timber industry will shift to plantations over time, or facilitate industry's shift to plantations and thus reduce the extent and intensity of native forest logging.

A policy of facilitating the shift would involve three major elements:

- corporatisation of crown plantations,
- improved financial performance of forest agencies,
- clear messages that pulp and paper projects must be economically viable without the need for significant or ongoing subsidies.

Corporatisation of crown plantations

Corporatisation of crown softwood plantations will facilitate the establishment of a diverse and competitive timber industry. In the following discussion, corporatisation is generally defined as the establishment of separate statutory authorities by state governments to manage crown softwood plantations and to operate as efficient and effective business enterprises.

Establishing a separate statutory authority will enable plantation managers to become fully focussed on the softwood plantation industry. The survival of the authority will largely depend on the long term competitiveness of the softwood processing industry (ie. an industry that is innovative and responsive to market changes) and so it has a major incentive to develop strategies to work with the industry to achieve this.

Corporatisation of crown softwood plantations will enable market factors to have a greater influence on plantation management, timing of harvesting and pricing of wood. It is essential that this orientation to the market is achieved in the early 1990s because it is highly likely that Australia will not fully develop the industrial capacity to process the large increase in the softwood resource.

In most state forest agencies, native forest wood supply programs attract a relatively high share of staff and financial resources. This skewed distribution reflects historical tradition, not the current and future economic requirements of Australia. Corporatisation provides a mechanism to enable crown softwood plantations to receive the appropriate level of staffing and finances.

Financial standards for forest agencies

The financial performance of Australian forest agencies managing native forests is poor. Historically they have been unable to cover their operating costs from revenue collected (ie. royalties). More recently, some forest agencies selling wood from crown na-

tive forests have achieved relatively small operating surpluses, but they still do not pay any or sufficient dividends to the state from their commercial operations. In addition, forest agencies operate with considerable subsidies that are not available to their competitors (ie. private growers of wood). These include exemptions from local rates and charges, income tax and payment of lease fees for the commercial exploitation of native forests. The NSW Forestry Commission considers these subsidies to be important. In evidence to the NSW Public Accounts Committee's recent inquiry into the Forestry Commission, Assistant Commissioner Fisher stated – 'We would be in difficulty if we had to pay tax' and the Chief of the Marketing Division stated – 'If we were a private sector company we would toss in the towel' (NSW Public Accounts Committee 1991, p 26, 27).

The implementation of proper financial performance requirements for forest agencies and resulting increase in hardwood royalties has a number of attractions. It would reduce the volume of wood harvested from native forests, particularly of those products where price is an important variable, such as woodchips and sawlogs for structural sawntimber. It would encourage the sawmilling industry to shift into the production of higher value appearance products and away from direct competition with softwoods. Finally, it would remove the competitive disadvantage that plantation developers and companies processing plantation wood currently face.

Financial assistance for pulpmill projects

Excessive attention has been focussed on the development of large scale, native forest based pulp mills supplying commodity pulp substantially for export. These projects are risky (Clark and Blakers 1989) and it is highly likely that they will require government assistance, particularly during the inevitable downturns in the world pulp market for which the industry is renowned. The Forestry and Forest Products Industry Council recognises the financial problems facing exporters and has recommended that the Commonwealth Government develop a 'risk sharing support scheme' to encourage the pulp and paper industry enter export markets (FAFPIC 1990, p 15).

The main risk factor is the well known volatility in market pulp prices. For most overseas pulp and paper producers, revenue from export pulp sales is a relatively small proportion of total income. In times of over supply, these companies will sell their surplus pulp on the market even if the price only enables operating (or variable) costs to be recouped. This industry structure and marginal cost pricing results in a volatile market and inevitable speculative activity (Deslandes 1987). In contrast, pulpmill projects that depend mainly on export markets for the sale of output are highly vulnerable because prices, over the long term must cover both operating and fixed costs. Capital charges are the single most important cost item for a world competitive bleached hardwood kraft pulpmill, accounting for about 40 per cent of the cost of production (Simons 1990b).

The relatively new world eucalypt pulp industry is structured differently to the world pulp industry, in that most eucalypt pulp production is traded rather than used in integrated pulp and paper mills. The industry is developing strategies to isolate itself from the volatility in the pulp market, but is not yet immune from market fluctuations.

If governments continue to under price the native forest resource and agree to provide subsidies for pulpmill proposals, native forest based pulpmill projects are likely to continue to be proposed by industry. Meanwhile, industry growth opportunities resulting from the substantial increase in the non native forest resource go largely unrecognised. Softwood and hardwood plantations and recycled waste paper provide opportunities for new pulp and paper mills or mill upgrades and a major expansion of the wood based panels industry in the 1990s. The level of employment and output resulting from these projects would be significantly greater than that resulting from one or even two large scale native forest based pulp mills. Irrespective of the outcome for native forest based pulpmills, processing the rapidly expanding eucalypt plantations, the major softwood plantation resource and recycled waste paper will be the major growth area for

the Australian pulp and paper industry in the 1990s.

ACKNOWLEDGEMENTS

Numerous people from all sides of the forest and timber industry debate have provided information that has assisted in the preparation of this Working Paper. I thank them all. In particular, Margaret Blakers and Dr Tony Norton have given valuable assistance in the preparation of the paper. I also thank Dr Mick Common for his useful comments on an earlier draft.

ENDNOTES

1. Oregon from North America and New Zealand accounts for about 50 per cent of sawntimber imports. Success in replacing this product will depend on Australian industry's ability to produce alternatives (laminated sections, gang nail plated lengths, products made by fibre reconstitution) at competitive prices and the development of an effective marketing strategy.
2. Due to increased eucalypt pulp capacity since 1985, the 3 per cent share figure will result in an under-estimation of the current significance of eucalypt pulp in the world industry. It is considered that this expansion would not have increased the share of eucalypt pulp beyond 10%.
3. There is no publically available information on the implications for the Australian export woodchip and pulp and paper industry of the expanding world eucalypt plantations. There is also a major deficiency in data relating to overseas eucalypt plantations and pulp processing plans. This Working Paper provides a 'first cut' at the task of putting the role of overseas eucalypt plantations into perspective. Even these basic calculations indicate that overseas eucalypt plantations will have a major effect on the world industry. It is certainly an area which requires more detailed examination and discussion.

APPENDIX A.
Eucalypt Plantation Projections – Australia

Introduction

All the companies currently processing native forest pulplogs into pulp and paper in Australia have well developed eucalypt plantation programs. In addition, there are companies without existing pulp facilities that are investing in major eucalypt plantation programs. Despite the significance of these investment decisions, there are no published projections of Australia's eucalypt plantation supply. This appendix presents projections of Australia's eucalypt plantation pulplog supply.

A eucalypt plantation is defined as a forest stand established by planting eucalypts selected for their wood producing properties and managed intensively for timber.

The projections do not include wood that may become available from reafforestation of unstocked and inadequately stocked native forests. They also exclude any resource from the 24 000 hectares of Eucalypt plantations in the Coffs Harbour region that was purchased by the NSW Government from APM. These plantations have been managed by the NSW Forestry Commission as part of the native forest estate (NSW Public Accounts Committee 1990, p 104). Since these plantations have not been intensively managed, they have been excluded from the projections.

Australia's eucalypt plantation estate is currently increasing by approximately 11 000 hectares per annum. The annual planting rate is projected to increase to about 22 500 hectares per annum during the 1990s (see Table A1). As a result of earlier plantation establishment activity and the more recent company decisions to significantly expand their plantation estate, the supply of pulplogs is projected to come on stream in two stages.

The first is from the mid 1990s when such companies as APPM Forest Products and APM Forests Pty Ltd can 'bulk up' their plantation log resource to come on stream by using longer rotations for their earlier plantations and shorter rotations for their younger plantations that will have the benefits of improvements in tree breeding and plantation silviculture. The economic attraction of this approach is that the eucalypt plantation resource (together with the necessary softwood pulp) would be sufficient

Table A2. Projected Pulplog Supply from Eucalypt Plantations ('000 m^3 per annum)

	APPM	Forest Resources	ANM	Apcel	WACAP	Timber Belt–WA	Other-WA	APM/ Vic. crown	TOTAL
1990	-	-	-	-	-	-	-	196	196
1991	-	-	-	-	-	-	-	196	196
1992	-	-	-	-	-	-	-	196	196
1993	-	-	-	-	-	-	-	196	196
1994	-	-	-	-	-	-	-	196	196
1995	336	260	-	-	-	-	-	325	921
1996	264	260	-	-	188	550	-	325	1587
1997	349	260	-	-	188	550	250	325	1922
1998	492	260	-	-	188	550	250	325	2065
1999	415	260	-	-	188	550	250	325	1988
2000	480	260	-	-	500	550	250	496	2536
2001	600	260	-	100	875	1000	250	496	3581
2002	795	260	-	120	875	1250	250	496	4046
2003	750	260	-	120	875	2500	250	496	5251
2004	825	260	-	120	875	2500	250	496	5326
2005	1238	560	250	120	875	2500	250	364	6157
2006	1688	560	250	120	875	2500	250	364	6607

to supply medium scale pulp and paper mills by the mid 1990s. Plantations in Western Australia will also start to come on stream by the mid 1990s, as will the plantations in Tasmania established by Forest Resources.

The supply of eucalypt plantation pulplogs is projected to increase steadily through the remainder of the 1990s and then expand significantly in the early 2000's as pulplogs become available from the more recently established plantations. On the basis of existing plantation investment and plans, by 1996 Australia's eucalypt plantations are projected to supply about the same volume of wood that the pulp and paper industry currently uses from native forests. When the plantation development program is completed early next century, eucalypt plantations are projected to supply, on a sustainable basis, five times the volume of native forest hardwood chips the industry currently uses (RAC 1991, p 253 and Table A2 below).

Tables A1 and A2 present the projected eucalypt plantation establishment rate and pulplog supply based on the following information on individual company plantation programs.

Table A1. Projected Eucalypt Plantation Establishment Rate during the 1990s

APPM	3750
Forest Resources	1500
ANM	1100
Apcel	600
WACAP	3500
Timber belt planting in WA	10000
WA – other	1000
APM Forests	1000
TOTAL	22450

APPM Forest Products

In 1982, APPM Forest Products, subsidiary of North Broken Hill Peko Limited, undertook a major review of its pulp and paper strategy. As a result of this review, APPM decided to develop a substantial eucalypt plantation resource in northern Tasmania (Whyte 1989). As at 1989, APPM has established 15 000 hectares of eucalypt plantations, including plantations established through schemes the company offers to private land owners.

Projected pulplog supply from the company's plantation program is presented in Table A2 and is derived using the following information and assumptions:

- The actual annual planting rate over the period 1972 to 1988 was obtained from Whyte 1989.
- A planting rate of 2750 hectares per annum was used for 1989 and 1990 (APPM 1989, p 47).
- The company is interested in increasing the plantation establishment rate to 3500 – 4000 hectares per annum (APPM 1989, p 48). The projections are based on an average 3750 hectares per annum being established from 1991.
- APPM expects to harvest eucalypt plantations on a 20 year rotation initially with a possible reduction to 15 years in future as the benefits of their tree improvement program are realised (Whyte 1989, p 6). Rotation lengths are a major factor in the economic viability of plantations for pulpwood. As Bills states – '... a plantation silviculture regime based on 10 – 20 year rotations to produce high quality pulpwood appears to be the only one that satisfies the economic test.' (Bills 1987, p 8). The projections assume a 20 year rotation for plantations established prior to 1980 and 15 years thereafter. APPM states that the first logs will be harvested in 1995 (APPM 1989, p 42). As a consequence, plantations established in 1972 to 1974 are assumed to be harvested at ages slighly higher than 20 years.
- In 1987, APPM was averaging MAI's close to 20 tonnes per annum and 'progress with cultivation, selection and tree breeding could result in a reasonably conservative 30 t. per ha per annum' (Bills 1987, p15). The projections assume a MAI of 20 m3 per hectare per annum for pre 1990 plantings and 30 thereafter.

The projected sustainable supply of pulplogs presented in Table A2 falls between the long term figures provided by Whyte who considered that on the basis of present growth rates, the company's plantations would generate well over one million tonnes per annum and, with productivity improvements, APPM's plantations could provide an eventual

yield of well over two million tonnes per annum (Whyte 1989, p 9).

APPM states that their eucalypt plantation program has been held back due to uncertainty about government support for the industry and problems in selling wood from native forests that are being cleared to establish plantations due to the Federal Government imposed ceiling on the tonnage of woodchip exports (APPM 1989, p 48). The projections assume that these factors will have little actual effect on the announced plantation program. APPM decided to embark on a major eucalypt plantation program and this is continuing even though export woodchip quotas set by the Federal Government have not been met. It should be noted that other companies (for example, WA Chip and Pulp Co. Pty. Ltd. who is also exporting native forest woodchips) consider that establishing eucalypt plantations on cleared land is economically viable, as demonstrated by their investment decisions.

Forest Resources

Forest Resources is a division of Petersville Sleigh Ltd. which is owned by Pacific Dunlop Australia Ltd. Forest Resources has embarked on a steady eucalypt plantation program to provide the company with the resources for any future pulpmill development of its own. By 1989 the company had established 6800 hectares of plantations in Tasmania, on company land and with private landholders. Plantation investment by Forest Resources has been set at an annual rate of 1500 hectares (Forest Resources 1989, pt. 9.11).

The projected pulplog supply from these plantations has been derived using the following information and assumptions:

- Existing plantations were established in the 1980s (Bills 1987, p 16), and were assumed to be planted at an average rate of 690 hectares per annum.
- A plantation establishment rate of 1500 hectares per annum will continue throughout the 1990s (Forest Resources 1990, Pt 9.11).
- A MAI of 25 m3 per hectare per annum is expected by the company (Forest Resources 1990, Pt 11.3) and this has been used in the projections. This high growth rate relative to APPM's experience reflects the benefits of improvements in plantation silviculture and tree breeding that Forest Resources with its younger plantation program has been able to benefit from.
- A 15 year rotation has been assumed, based on the comments above by Bills and Whyte regarding the expectation of increased yields and reduced rotations.

ANM Forest Management

ANM Forest Management is a division of Australian Newsprint Mills Limited. The company recently decided to establish eucalypt plantations in Tasmania to become self-sufficient in regrowth pulpwood requirements and provide a source of expansion for the company (ANM 1990, p 12). As at March 1991 the company had established 1300 hectares of eucalypt plantations and plans to establish 17 000 hectares over the next 15 years. ANM expects these plantations to provide a sustainable supply of 250 000 tonnes of pulplogs per annum (S. Balcombe pers. comm.).

The projections presented in Table A2 use the following information:

- A plantation establishment rate of 1100 hectares per annum until 2005.
- A MAI of 15 m3 per hectare per annum has been used based on the information above. This figure is likely to be conservative given the expectations of APPM and Forest Resources.
- A rotation length of 15 years has been used based on the above information.

Apcel Pty Ltd

Apcel Pty Ltd is a subsidiary of Kimberly Clark Aust. Ltd which is a joint venture between Amcor Ltd and Kimberly Clark Corporation of the US. Apcel is currently expanding its pulpmill at Snuggery in South Australia and part of the expansion will in-

corporate a facility to pulp eucalypt from plantations being established by the company. Apcel is currently importing 15 000 tonnes per annum of pulp made from eucalypt plantations in Brazil and Portugal but hopes to supply most of its hardwood requirements from plantations in South Australia within ten years (Australian Forest Grower 1991, p 10).

The plantations are being established by a combination of local landholders and forestry investment companies.

Apcel recently commenced their eucalypt plantation program following several years of trials. A total plantation resource of 6 000 hectares is planned by the company using a ten year rotation. Apcel plans to establish 500 hectares of plantations this year which will yield some 100 000 tonnes of wood by 2001/2 (pers. comm. Apcel Pty. Ltd. 25 June 1991).

The projected pulplog supply from this project is based on the following information and assumptions:

- A plantation rate of 500 hectares is assumed for 1991 and 600 hectares thereafter until 2000.
- A MAI of 20 is used based on the information above.
- A rotation length of ten years is used based on the information above.

WA Chip and Pulp Co. Pty Ltd

WACAP is 100 per cent owned by Bunnings Ltd. Since the mid 1980s WACAP has been establishing eucalypt plantations in south west Western Australia with 3 000 hectares established. WACAP has decided to significantly expand the eucalypt plantation resource and plans to establish 3500 hectares per annum over the next ten years through a variety of schemes. 'It is company policy not to clear native forests for the establishment of plantations. Plantations will only be established on cleared farmland'. WACAP research has identified Tasmanian blue gum as the most favoured species and in areas with rainfall exceeding 700 mm has MAI's of 25 to 35 m3. WACAP considers that these high growth rates will enable the company to harvest the plantations after ten years (Bunnings Treefarms 1990, p 8).

It is estimated that the plantation program will be sufficiently advanced by the mid 1990s to support a pulpmill (D.J. Carmichael & Co. 1989, p 8). WACAP has recently conducted a feasibility study into the establishment of a bleached kraft pulpmill in the south west.

The projected supply of pulplogs from this plantation program has been derived as follows:

- The 3000 hectares established by 1989 is assumed to be planted at the rate of 750 hectares per annum over 1986 to 1989.
- A plantation establishment rate of 2000 hectares is assumed for 1990 and 3500 hectares per annum until 2000.
- Plantations will be harvested after ten years.
- The lower MAI figure of 25 m3 per hectare per annum is used.

Timber belt sharefarming in Western Australia

The timberbelt sharefarming scheme has been developed by CALM following the previously unsuccessful Tree Fund. The scheme aims to harness the land care benefits of plantations on farms with the economic benefits of growing a tree crop. The scheme builds in flexibility in the roles of CALM and the land owner, but CALM undertakes to purchase the first (coppice) harvest. To date 10 000 to 12 000 hectares have been established under this and previous schemes and all plantations are less than five years old. CALM aims to have 100 000 hectares planted this decade. Ten year rotations are planned and in some cases where there is surplus water and salinity problems, this could be reduced to 7 or 8 years (J Bartel, CALM pers. comm.)

Research based on 60 growth plots established in existing plantations selected to represent the range of potential planting sites has provided yield estimates of 20 m3 per hectare per year over short 7-8 year rotations at the dry extreme and up to 40 m3 over 12-14 year rotations in high rainfall karri soils. Yield potential might be greatly increased by use of genetically

improved stock and better establishment methods (Bartle and Shea, undated, p 6).

The pulplog supply projections presented in Table A2 have been derived using the following information and assumptions:

- It is assumed that the 11 000 hectares of plantations established to date were planted at the constant rate of 2200 hectares per annum over the period 1986 to 1990.
- It is assumed that the goal of establishing 10 000 hectares per annum is phased in with 4000 hectares assumed for 1991, 5000 hectares for 1992 and 10 000 hectares per annum until 2000.
- The projections are based on ten year rotations and a MAI of 25 m3 per hectare per annum.

Western Australia – other developments

Other smaller plantation projects have been developed in Western Australia. H.B Holdings has established about 3000 hectares of blue gum plantations at Mt. Barker and there are two plantation developments at Albany.

The projections presented in Table A2 are based on the following information and assumptions:

- Approximately 1000 hectares of plantations were established per annum during 1987 to 1989 and this establishment rate is assumed to continue during the 1990s
- A rotation length of ten years and MAI of 25 m3 per hectare per annum was assumed.

APM Forests Pty Ltd

APM is a wholly owned subsidiary of Amcor Limited. APM commenced its eucalypt plantation program during the 1950s and together with the Victorian Government, has established a large plantation resource in the Latrobe region of Victoria. As at the end of the 1991 planting year, 16 452 hectares of eucalypt plantations have been established by APM and the Victorian Government in the Latrobe region. Although the crown plantations are uncommitted, it is likely that the resource will be used mainly for pulp production at APM's Maryvale mill.

The projections presented in Table A2 are based on the following information and assumptions:

APM's eucalypt plantation age profile is as follows:

APM's eucalypt plantation age profile

Five year period commencing -	Hectares established
1950	20
1955	102
1960	475
1965	1209
1970	2195
1975	1153
1980	351
1985	1634
1990	1124
Total	8 263

Source. Angus Pollock, pers. comm.

- Age profile information for the crown plantations in the Latrobe region is provided in the plantation area statement prepared by the Department of Conservation and Environment (1991).
- APM is currently expanding its eucalypt plantation estate by about 800 to 1000 hectares per annum (Angus Pollock, pers. comm.).
- A MAI of between 20 to 25 m3 per hectare is considered a reasonable estimate of APM's eucalypt plantation productivity (Angus Pollock, pers. comm.). The projections are based on a MAI of 23 m3 per hectare.
- APM states that their *E. regnans* plantations (as most are) are managed on 30 year rotations which is considerably longer than that proposed by other eucalypt plantation growers. For commercial reasons it is likely that rotation lengths will be reduced, particularly as the benefits from planting genetically improved stock are realised. The projections assume a 30 year rotation for plantations established prior to 1985 and 25 years for post 1985 plantings.
- The crown eucalypt plantations in the Latrobe region have not been specifically

allocated for processing into pulp although this is the most likely outcome. The projections assume that the crown plantation productivity and rotation lengths are the same as those for APM's plantations.

The projections presented in Table A2, show a dip in pulplog supply from APM and crown plantations from 2005. This reflects a major curtailment in plantation establishment in the early 1980s and yields of 560 000 m3 per annum are projected from 2010 onwards based on post 1985 plantings.

APPENDIX B.
Projected Softwood Sawlog Supply – Australia

Introduction

There will be a significant increase in the supply of plantation grown softwood sawlogs in Australia. Although growth in the Australian sawmilling industry will be centered around the softwood resource, it appears that many Australian forest agencies have, in the past, allocated relatively little time and resources to softwood plantations compared to native forest management.

Official projections of the softwood supply are inadequate. Major deficiencies exist in crown softwood plantation inventories for Australia. Inventories need revision, assumptions used in the projection exercise are usually poorly documented, silvicultural practices that are no longer applied or are of dubious economic viability are still implicit in projections, inbuilt safety margins that are not made explicit are incorporated and there is virtually no allowance for different management or silvicultural practices despite their significant effect on the volume and timing of the resource becoming available for processing.

Projections have also been based on the foresters view that plantations should be harvested at the point when MAI is maximised. When market and economic factors are considered, the optimum time of harvesting would be earlier than that presented in existing projections.

Establishing a realistic set of projections of Australia's softwood sawlog availability requires that market realities be taken into account and this be reflected in the management and silvicultural practices that should be adopted. It will not be until managers of crown plantations are able to operate in a truely market environment with normal commercial performance requirements, that reasonable projections of Australia's softwood supply can be made.

Plantation Projections

The Resource Assessment Commission has examined the projections of softwood sawlog supply for Australia and presented the range of projections graphically (RAC 1991, p 313). An examination of the actual projections for 2010 shows that the highest projection (BAE 1985) is 74 per cent greater than the lowest projection prepared by the Australian Forestry Council (AFC 1989). The difference of about 6 million m3 of sawlogs is equivalent to 15 large scale softwood sawmills. The discrepancy between the two projections increases to 8.3 million m3 by 2020.

This range in projections highlights the inadequacy of our knowledge of the plantation resource and the effect of applying different plantation management regimes on sawlog yields.

It is likely that projected sawlog supply under a range of management strategies will lie somewhere between these two projections. For the purposes of this Working Paper, the projections prepared by Cameron and Penna have been used (Cameron and Penna 1988, Appendix 4). Their methodology results in sawlog projections that are lower than the BAE Option 1 projections and higher than the recently released projections prepared by the Australian Forestry Council.

It is considered that the Australian Forestry Council's projections which are a summation of information prepared by the relevant state forest agencies and private investors, under-estimates the likely softwood sawlog availability from plantations for the following reasons:

The AFC projections for Tasmania (crown and private plantations) show a relatively small increase in softwood sawlog supply of about 80 000 m3 from today's cut to 2000. An existing softwood sawmiller in Tasmania has proposed a major mill expansion during the 1990s that would increase its throughput from 64 000 m3 to 400 000 m3 without reducing the input for mills with existing softwood allocations (SEAS Sapfor Forests Ltd. 1990 and P Titz, Manager

SEAS Sapfor Tasmanian Operations, pers. comm.).

There are two related explanations for this significant difference in the supply potential of Tasmania's softwood plantations. First, the Tasmanian Forestry Commission Softwood Availability Study (1983) which is the basis for the AFC projections for Tasmania, has apparently inadvertantly omitted in its summary table 200 000 m3 of sawlogs that will become available in the Devonport region. It is possible the AFC projections were prepared using the summary tables rather than referring to the more detailed discussion and diagrams presented in the Tasmanian Forestry Commission's report.

The second explanation relates to the differences in opinion between SEAS Sapfor and the Tasmanian Forestry Commission about how softwood plantations should be managed. In Tasmania large areas of crown softwood plantations are being managed to produce clearwood for appearance grade boards. Over the next 20 years, the percentage of softwood plantations managed as clearwood will increase from 3 per cent to 22 per cent (Simons 1990a). Managing plantations to provide clearwood can result in a 30 per cent loss in wood yield over a 25 year rotation compared to a management regime to maximise wood for structural sawntimber (SEAS Sapfor Forests Ltd. 1990). SEAS Sapfor also argues that managing plantations for clearwood production is less economically viable for plantation investors and requires longer rotation times.

In Western Australia large areas of crown plantations were to be managed for clearwood production. It is doubtful if the market for clearwood will be sufficient to absorb production (Thompson and McKenzie Smith 1990) and producers are likely to face intense competition from Chile and New Zealand imports of boards. In Western Australia, pruning and thinning in crown plantations for clearwood production has recently stopped. The AFC projections which were prepared in 1989 are unlikely to have allowed for these recently recognised commercial realities. On the basis of SEAS Sapfor's experience, plantation yields are likely to be considerably higher if clearwood management practices are replaced by practices to maximise structural sawntimber output.

The AFC does not describe what allowances have been made for risk factors. These safety margins can be significant as is the case for Victorian crown plantations and represent a 'built in' under-estimate of wood availability. In a review of management information systems, it was found that 'Determination of future supply levels using the customary unsophisticated methods of calculating wood flows, are deliberately conservative with inbuilt 'safety margins' (over and above fire risk factors, etc) of about 10 per cent to account for uncertainties in the data and growth projections. It is conceivable that with more reliable forecasts using sophisticated systems there is potential to increase commitments by up to 10%...' (Smith 1986).

The allowance for risk factors such as fire and insect damage, referred to above is usually about 5%. This allowance may be reduced because more plantations are nearing the end of their first rotation and information on actual losses can be incorporated into risk calculations for future rotations.

In the case of Victorian crown plantations, plantation productivity is expected to increase by about 15 per cent due to planting with genetically improved stock since the late 1970s. Official projections do not incorporate these productivity improvements.

The timing of harvesting

Most projections of softwood sawlog supply assume that clearfelling will occur when the plantation MAI reaches its maximum. To this foresters' criteria must be added commercial criteria that allows for market conditions and changes in relative prices, and interest rates. Timber should be harvested at the age where the marginal value of allowing trees to grow in volume just matches the interest cost of the capital locked up in the project (Tasman Economic Research 1990). As forest agencies become more commercially oriented, these economic considerations will have a greater influence in the timing of the harvesting of crown plantations. Therefore the significant increase in Australia's softwood sawlog supply from plantations is likely to come on stream earlier than all the current projections indicate (including those of Cameron and Penna).

The plantation silvicultural practices currently used by SEAS Sapfor in combination with the installation of appropriate processing facilities provides another economically viable mechanism whereby the industry can gain the benefit of processing plantations earlier than originally envisaged.

REFERENCES

AMCOR Ltd 1990. *Annual Report.*

ABARE 1988. *Australian Forest Resources 1987.* Canberra: AGPS.

ABARE 1989. *Long Term Consumption Projections for Forest Products. Implications for Trade and* Sector Development. Canberra: AGPS. (Discussion Paper 89.6.)

ABARE 1990. *Australian Forest Resources 1989.* Canberra: AGPS.

ABARE 1991. Agriculture and Resources Quarterly, March. Canberra: AGPS.

Australian Forest Grower 1991, Vol. 14 No. 2.

Australian Forest Industries Journal December 1985.

Australian Forestry Council 1989. *Australian Forest Resources – Present Areas and Estimates of Future Availability of Wood.* Prepared by the Forest Resources Committee for the Standing Committee of the Australian Forestry Council, Canberra.

ANM Forest Management 1990. *Submission No. 84 to the Resource Assessment Commission Forest and Timber Industry Inquiry, Canberra.*

APPM Forest Products 1990. *Submission No. 210 to the Resources Assessment Commission Forest and Timber Industry Inquiry, Canberra.*

Bartle, J. and Shea, S. undated. Development of a Pulpwood Cropping Industry in Western Australia. *Land and Water Research News*: 1.

Bills, D.J. 1987. *Evidence presented to the Helsham Inquiry 8/12/1987 re: Current Industry Plantation Programs in Tasmania.*

Bills, D.J. 1991. *Medium Term Market Prospects for Woodchip Exports.* Paper presented at National Agriculture and Resources Outlook Conference, Canberra, 1991.

Brett, D. 1990. Fast Growing Eucalypts Boost Plantation Prospects. *Ecos* 63.

Bunnings Treefarms 1990. *Submission No. 107 to the Resource Assessment Commission Forest and Timber Industry Inquiry, Canberra.*

Bureau of Agricultural Economics 1985. *Situation and Outlook 1985 – Forest Products.* Canberra: AGPS.

Cameron, J.I. and Penna, I.W. 1988. *The Wood and the Trees: A Preliminary Economic Analysis of a Conservation-Orientated Forest Industry Strategy.* Melbourne: Australian Conservation Foundation.

Carmichael, D.J. and Co. 1989. *Sharebroker assessment of Bunnings Ltd.* prepared 20 September 1989, Western Australia.

Centre for Farm Planning and Land Management 1989. *Consultant's Report to the State Plantations Impact Study.* Faculty of Agriculture and Forestry, University of Melbourne.

Clark, J. and Blakers, M. 1989. *Forest Conservation and Wood Supply – No Need for Conflict.* Melbourne: Royal Melbourne Institute of Technology, Faculty of Environmental Design and Construction. (Research Paper No. 7).

Cox, O., Horgan, G., and Maplesden, F., 1991. The New Zealand Timber Industry – Present Status and Future Impact on the Australian Timber Industry. Consultancy Series No. FTC91/22 prepared for the Resource Assessment Commission Forest and Timber Industry Inquiry, Canberra.

Department of Conservation and Environment 1991. *Plantation area statement No. 9.* Victoria.

Deslandes, L. 1987. *Eucalyptus Challanging the Paper Industry.* Paper May 1987.

Elliott, D. 1982. *Future Production of the Softwood Plantation Resources of Australisia, Chile and the Pacific Islands – A New Zealand View.* Paper presented at AusTIS Conference, June 1982, Caloundra.

FAO 1990. *Yearbook of Forest Products – 1988.* Rome.

Figueiredo, R.A. 1987. *Eucalyptus Pulp: Developments Worldwide and Supply Potential.* Paper presented at EXPO PAPER ASIA, Tokyo.

Forest Resources 1990. Submission No. *110 to the Resource Assessment Commission Forest and Timber Industry Inquiry, Canberra.*

Forestry and Forest Products Industry Council 1990. *Scope for Import Substitution in Paper and Paper Products.* Australian Manufacturing Council, Melbourne.

Gay, J.E. 1990. Submission to the Forests and Forest Industry Council on the Utilisation of Low Grade Sawlogs and the Need for an Export Licence. Tasmania.

Gunnersen, P.R. 1987. General Manager Marbut Gunnersen Industries Pty Ltd, Evidence to Helsham Inquiry, 1 December 1987. Tasmania.

Higgins, H.G. 1991. *An Assessment of the New Technologies Awaiting Full Implementation Within the Pulp and Paper Industry.* Consultancy Series No. FTC91/11 Prepared for the Resource Assessment Commission Forest and Timber Industry Inquiry, Canberra.

Kohl, B. and Graham, A. 1991. *Plantations for Pulp and Paper Production – Making Sure We Use What We've Got.* Tasmanian Hardwood Plantations and a Northern Pulpmill – A Case History. Prepared for the Wilderness Society, Sydney.

Last, K.J. 1990. Submission to the Forests and Forest Industry Council on the Further Use of Low Grade Logs for Sawmilling. Tasmania.

Leslie, A.J. 1985. *The International Logic of a high-value Policy for Australian Hardwood Forests.* Paper presented to the Prospects for Hardwood Forests Workshop, Centre for Resource and Environmental Studies, ANU, Canberra.

NAFI undated. Forest Facts – Eucalypt Plantations, No. 8.

NSW Public Accounts Committee 1990. Report on the Forestry Commission. Parliament of NSW, Sydney.

Phillips, F.H. 1988. Pulpwood Requirements for the Pulp and Paper Industry, *Australian Forestry*, 1988, 51(2).

Private Forestry Council of Tasmania 1990. Private Forestry Beyond 2000. Tasmania.

Pulp and Paper International 1990. Annual Review, July 1990.

Resources Assessment Commission 1991. Forest and Timber Inquiry Draft Report, AGPS Canberra.

SEAS Sapfor Forests Limited 1990. Submission in response to the Tasmanian Forests and Forest Industry Strategy Document.

Simons 1990a. *Pulp and Paper Options for Northern Tasmania: Focus on Fibre, Markets and Technology Related to Non Chlorine Bleaching, Main Report (Volume 2).* Prepared for Government of Tasmania.

Simons 1990b. *Competitiveness of Australian Forest Industries,* Report for FAFPIC, Australian Manufacturing Industry Council, prepared by H.A. Simons and McLennan Magasanik Associates.

Simons 1990c. *World Demand for Forest Products and Focus on Opportunities in the Asia Pacific Region.* Prepared for FAFPIC.

Smith, R.B. 1986. *Review of the Management Information Systems, Resource Assessment and Mensuration Research Program, Research Program Review Paper No. 4.* Victorian Department of Conservation and Environment, State Forest and Lands Service.

Tasman Economic Research 1990. *Forests and Markets, Submission No. 205 to the Resource Assessment Commission Forest and Timber Industry Inquiry, Canberra.*

Tasmanian Forestry Commission 1983. Softwood Availability Study.

Thomson, A.B. and McKenzie-Smith, G. 1990. *Sawn Recoveries From Crown Logs of Radiata Pine,* Report No. 15, Wood Utilisation Research Centre, Department of Conservation and Land Management, Western Australia.

Victorian Government 1986. Timber Industry Strategy.

Whyte, I.N. 1989. APPM's Tree Farming Program: Past, Present and Future. Paper Presented to the Prospects for Australian Plantations Conference, Australian National University 1989.