ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY
WORKING PAPER SERIES

Working Paper No: APFSOS/WP/05

IN DEPTH COUNTRY STUDY - NEW ZEALAND

by

Chris Brown
Consultant
FAO Forestry Planning and Statistics Branch
Rome

Forestry Policy and Planning Division, Rome
Regional Office for Asia and the Pacific, Bangkok

May 1997

Chris Brown

The Asia-Pacific Forestry Sector Outlook Study is being undertaken under the auspices of the Asia-Pacific Forestry Commission.

This report comes under Workplan Number D23 (iii).

TABLE OF CONTENTS

INFORMATION NOTE ON ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

At its sixteenth session held in Yangon, Myanmar, in January 1996, the Asia-Pacific Forestry Commission, which has membership open to all governments in the Asia-Pacific region, decided to carry out an outlook study for forestry with horizon year 2010. The study is being coordinated by FAO through its regional office in Bangkok and its Headquarters in Rome, but is being implemented in close partnership with governments, many of which have nominated national focal points.

The scope of the study is to look at the main external and sectoral developments in policies, programmes and institutions that will affect the forestry sector and to assess from this the likely direction of its evolution and to present its likely situation in 2010. The study involves assessment of current status but also of trends from the past and the main forces which are shaping those trends and then builds on this to explore future prospects.

Working papers have been contributed or commissioned on a wide range of topics. They fall under the following categories: country profiles, selected in-depth country or sub-regional studies and thematic studies. Working papers are prepared by individual authors or groups of authors on their own professional responsibility; therefore, the opinions expressed in them do not necessarily reflect the views of their employers, the governments of the Asia-Pacific Forestry Commission or of the Food and Agriculture Organization. In preparing the substantive report to be presented at the next session of the Asia-Pacific Forestry Commission early in 1998, material from these working papers will be an important element but will be blended and interpreted alongside a lot of other material.

Working papers are being produced and issued as they arrive. Some effort at uniformity of presentation is being attempted but the contents are only minimally edited for style or clarity. FAO welcomes from readers any information which they feel would be useful to the study on the subject of any of the working papers or on any other subject that has importance for the Asia-Pacific forestry sector. Such material can be mailed to the contacts given below from whom further copies of these working papers, as well as more information on the Asia-Pacific Forestry Sector Study, can be obtained:

Rome: Mr. Mafa Chipeta
Senior Forestry Officer
Policy and Planning Division
Forestry Department
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
Rome, 00100, ITALY
Tel: (39-6) 5705 3506
Fax: (39-6) 5705 5514
Email: <mafa.chipeta@fao.org>

Bangkok: Mr. Patrick Durst
Regional Forestry Officer
FAO Regional Office for Asia and the Pacific
Maliwan Mansion
Phra Atit Road
Bangkok 10200
THAILAND
Tel: (66-2) 281 7844
Fax: (66-2) 280 0445
Email: <Patrick.Durst@field.fao.org>

INTRODUCTION

Each country of the world is unique. Each has its own peculiar combination of climate, geology, ecology, landscape, politics, economics, and social perspectives. The problems and challenges are different for each. However, there are also similarities between many aspects for many countries. Consequently, one country's experiences in a particular sphere can be relevant to a number of others. However, in learning from a particular real life "model" it is important to recognize the subtle dependencies between factors which contribute to success, or otherwise.

In the global forestry sector considerable interest is shown in the New Zealand "model". There are several reasons for this, most notably because New Zealand's forestry "policy" encompasses an ideological framework possibly furthest to the right from the mainstream of countries. Plantation forestry, privatization, free-markets and sustainable management are all issues which can be closely associated with New Zealand. These topics, along with an understanding of the attempts to create a dichotomous forest estate, are those which should be of most interest to the reader. However, this paper also attempts to pick out some other strands on which this overall strategy is woven and create a more complete picture of the New Zealand forestry sector and, particularly, where it is headed.

However, it is useful to note at the beginning that the present model of New Zealand forestry is a recent phenomenon and not the result of any consistent policy direction. Until the 1980's New Zealand was one of the most protected developed countries in the world. Even twenty years ago New Zealand being one of the world's few open market log traders would have been a thought few would have countenanced. Similarly, most of the architects of the plantation forests did not, for many years, plan for a substantial export industry. They certainly did not plan for privatization and generally remain staunchly opposed to this "experiment". However, change has happened, and rapidly. The vast majority of people involved in the forestry sector believe prospects on almost all fronts are more positive than had change not occurred. New Zealand appears to making headway in solving many of its forestry-related economic, environmental and social difficulties. Nonetheless, the forestry star has risen only lately in New Zealand. There is some considerable time before the New Zealand model can truly be deemed a success.

CONTEXT

The New Zealand Economy and Economic Policy

The development of the New Zealand forestry sector over the past decade has been integrally bound to New Zealand's economic direction. To understand the motivations for substantive changes in forestry during that period, and to understand the frame of reference from which New Zealand's internal and international forest policies emanate, an understanding of the broad thrust of New Zealand's market-led economic strategy is necessary.

During the period 1945-1984 New Zealand's economic performance can be characterized by on-going deterioration in wealth relative to other developed countries. New Zealand emerged from the Second World War with its industrial and agricultural capacities intact in a world facing major shortfalls in agricultural and consumer goods. The opportunities for a country with significant productive potential were such that in the early 1950's New Zealand's Gross National Product (GNP) per capita was second only to Switzerland. However, New Zealand's failure to capitalize on this wealth by developing industrial capacity, and its continued reliance on primary commodity products as its main source of income, saw it enter the 1980's ranked beyond 30th in a list of countries' per capita GNP's. By 1984 New Zealand was heavily indebted and facing a major currency crisis. Government budget deficits and Balance of Payments deficits were endemic and New Zealand had, probably, the most protected economy in the OECD.

In 1984 a change of Government ushered in a period of enormous economic reformation and restructuring. The new Government embraced a neo-classical, market oriented economic philosophy which adopted a handful of core principles and imposed these across every sphere of the economy. The key tenet was that efficiency in the economy would be maximized if markets were allowed to operate with a minimum of Government interference and distortion. The following decade saw an unprecedented drive to remove the hand of Government from almost every conceivable market. All forms of producer and exporter subsidies and incentive payments were removed, systems of import licensing and import quotas were eliminated, tariff protection was slashed, and consumer subsidies were largely removed. The exchange rate mechanism was reformed, moving from a fixed pegged system to a floating system. Government services were oriented along "user-pays" lines and the entire Government sector was restructured to improve accountability, reduce costs and focus priorities. Government-owned industries and service centres were re-oriented to work as closely as possible to a private sector model, often being corporatized with the Government taking a "passive" role as a sole shareholder. Where feasible, industries were completely sold-off to the private sector. Later reforms saw the Central Bank assigned a single role to control inflationary distortion in the economy, and saw labour market flexibility substantively increased through a dissolution in the power of organized labour.

The restructuring process was however, costly, at least in the short-term. Untrammelled exposure to the marketplace illuminated the lack of competitiveness of many New Zealand firms. With Government no longer prepared to support and subsidize inefficiency almost every firm was forced to identify and focus on areas of true competitive advantage and to shut-down or retrench areas outside of core competencies. A considerable number of firms were unable to make this transition and closed down or went broke. With Government concurrently maintaining a tight monetary stance to rein in inflation while also labouring to improve its fiscal situation New Zealand's productive sectors were severely squeezed over an extended period. New Zealand's average annual growth rate of real GDP for the 1980's was 1.5 percent. Meanwhile, unemployment, which had historically remained no greater than 5 percent rapidly accelerated to a peak of 10.9 percent in September 1991.

The forestry sector experience essentially followed the same path, and absorbed the same shocks, as did the general economy. Prior to 1984 the forestry sector was dominated by Government's forestry agency, the New Zealand Forest Service. In 1984 the Forest Service owned 52 percent of the planted forest estate. The Forest Service was partially funded out of tax revenues enabling it to operate as a benevolent supply source to independent processors.

Operating with a number of objectives the Forest Service restricted exports of log supplies, provided subsidized wood supplies to the private processing sector, and operated with a general mandate to promote the national interest through forestry as best it saw fit. Beyond the sphere of the Forest Service, the private forestry sector was also eligible for a range of export incentives and business development incentives (available generally to business), received substantial trade protection from a raft of regulatory barriers and, at various times, received targeted Government assistance for forestry development and improvement.

Between 1984 and 1987 the majority of this assistance was phased out, concluding with the dissolution of the Forest Service and the corporatization, and later privatization, of the planted forest estate. The extent of the reforms impacted significantly on the forestry sector, particularly in the area most exposed to competition - sawmilling. Annual sawn timber production between 1986 and 1988 fell by 24 percent. Similarly, new forest planting declined by 38 percent over the same period with both private and state planting declining by similar proportions. A number of small, inefficient mills were closed and almost every company went through restructuring and rationalization processes. Staffing numbers were reduced, machinery upgraded, processes revamped and production focused on areas of competitive advantage.

It was not until 1993 that the first real evidence of an economic recovery began to appear. But the appearance was both strong and robust. Real GDP growth accelerated to 6.2 percent in the year to June 1995. Unemployment began to track rapidly downward. In March 1994, unemployment was 9.4 percent. By March 1995 this had reduced to 6.7 percent and by December 1995 had further reduced to 6.0 percent. Meanwhile inflation had stabilized at around 2 percent, compared with 20 percent in the mid-1980's. The New Zealand dollar also began a strong appreciation against the currencies of most of its major trading partners.

The recovery of the forestry sector charted a slightly different path correlated with variables somewhat disassociated with the general economy. Firstly, a rapidly increasing harvest in New Zealand throughout the 1990's has always been seen as likely to reinforce the development of a stronger wood-processing sector and presage an acceleration in the growth of the whole sector. Secondly, a series of price booms, in log markets, for solidwood products and latterly in pulp and paper markets has provided a cash fillip for each sector and enabled firms to consolidate gearing ratios which might otherwise have caused instability in the sector. Separately, the privatization of a large proportion of previously Government-owned forests has provided enhanced access to offshore capital for processing investment.

The future for the New Zealand economy is promising. The economic reformation of the past decade has left a strong foundation for sustainable economic growth. Very few industries are now dependent on Government assistance for survival, and almost all forms of Government protection or assistance have been abolished. The current and forecast macro-economic indicators are generally healthy. The Reserve Bank Act continues to require that inflation be constrained in a 0-2 percent band, unemployment is declining, and the Government debt has fallen from close to 50 percent of GDP to below 30 percent of GDP. As the debt interest burden lessens so the rate of debt retirement can accelerate, even in tandem with less austere fiscal policies. A first round of tax reductions is due mid-1996 with a strong intention for later rounds also indicated by Government. The flexibility to further lower taxes provides Government an additional tool to help combat the onset of recession.

The economic position for New Zealand's forestry sector is also sound. Forest owners are free to sell logs on international markets and are able to openly compete against the agricultural sector for land resources. Despite the absence of significant Government forest planting, record planting levels are presently being achieved. Forest owners are operating profitably in an area of strong competitive advantage.

Free access to export markets allows integrated forest-growing and processing companies to structure their entire business to maximize profits, exporting logs and processed products as desired. However, processing companies without their own forests are in a more difficult situation. These companies must pay the international market price for logs while many of their competitors receive more favourable treatment through log export restrictions. The absence of domestic subsidies and incentives, and occasionally foreign tariffs and import restrictions, mean New Zealand's processing industry is susceptible to being squeezed out of markets by less efficient competitors. Conversely, the industry is not subject to special levies, it is not heavily taxed to provide subsidies to other sectors, nor are its production input and labour costs inflated by heavily skewed domestic prices. This sector's real competitiveness will be enhanced as Government debt retirement enables further reductions in the burden of taxation.

The present New Zealand Government's economic vision and strategy for the coming 15 years are outlined in a series of publications titled *Path to 2010*, *Towards 2010*, and *New Opportunities*. This document reviews Government's agenda since 1990 and specifies economic recovery in three phases; implementation of reform, a period of adjustment, and reaping of the benefits. The Government clearly believes New Zealand has entered the third phase although some areas of reform are still required. *Pathway to 2010* identifies a targeted sustainable growth rate of 3 percent per annum to 2010. Government debt is expected to be eliminated shortly after the turn of the century which will in turn free up finance for Government to upgrade social service spending, particularly education and health facilities. Unemployment should stabilize at its natural level, currently probably in the range of 4-5 percent.

In terms of strictly economic dimensions, forestry reforms are currently reaching the end of a chapter. In March 1996 the Government announced its firm intention to privatize the Forestry Corporation of New Zealand (FCNZ), the State-owned enterprise operating the majority of Government's remaining planted forests (12 percent of the national planted forest resource). It is likely FCNZ will be sold before the end of 1996. Government's arm will then rest only very lightly across the forestry sector. Government will own less than 4 percent of the planted forest resource. These are all forests with indigenous people's (Maori) claims against them or forests subject to special environmental agreements. Government will also retain leasehold forests totalling an additional 4 percent. Some sectors will retain minimal, and reducing, tariff protection. New Zealand was a proponent of the zero-for-zero tariff proposals for forestry in the GATT Uruguay round and agreed to eliminate pulp and paper tariffs. Beyond this, Government's primary economic role, assuming no dramatic policy reversals, will be to maintain the current "climate of enterprise".

The major economic challenges facing industry over the coming decade, again assuming consistent government policy, will be to retain export competitiveness in the face of likely exchange rate appreciations and a possible post-GATT proliferation of non-tariff barriers to trade. A major challenge will be to continue to attract investment capital in

processing industries thereby enabling more of the benefits of the increasing forest harvest to be captured within the country. While some difficulties remain, there is little doubt that the forestry industry in New Zealand is in good shape. This should be expected. There is little doubt that economic imperatives have dominated social policy objectives for the past decade in New Zealand. However, both the political and policy environment in New Zealand are changing and changing priorities may be less business-oriented relative to the current environment.

Political Situation in New Zealand

For the past hundred years New Zealand has operated an electoral system modelled on the Westminster system whereby party-affiliated candidates are voted to represent regional electorates in a Parliament. The party representing the majority of electorates is invited to form a Government, appointing Cabinet Ministers and, through a (generally) absolute majority in Parliament, enacting legislation and setting policy. In theory, with no limits to the number of parties eligible to stand for election, such a system will not necessarily yield a clear majority. In practice, in New Zealand only two parties have realistically contested Parliamentary control at any time. This system will change in the elections to be held in late-1996. A referendum held at the time of the 1993 general election gave majority support for a Mixed Member Proportional Representation (MMP) system.

In retrospect, the speed of economic reform in the 1980's carried with it the seeds of electoral reform. Successive Governments with large majorities and a will to reform implemented change at a level unprecedented in New Zealand. The reforms, which perhaps now are bringing new prosperity also brought widespread pain and disillusionment with Government. A perception grew that the existing electoral system conferred too much power to the ruling party, and within that party the Cabinet, or a small group of Senior Ministers within Cabinet, effectively wielded that power without adequate checks.

Consequently, the political situation in New Zealand is at its most fluid this century. Politically, there are four major players, with the present National Government representing the status quo to the Centre-Right of the political spectrum and the other three parties taking more Centre-Left stances. The most likely scenario for the coming election is for the current National Government to take 40-50 percent of the vote and to select the most acceptable coalition partner thereby remaining in power. It is unlikely under this scenario that a "bride-price" which involved significant deviation from the present core economic tenets would be acceptable. The alternative scenario is the formation of a more unwieldy Leftist coalition which might substitute more spending on social programmes at the expense of debt retirement and bring the process of privatization to a halt. Such a coalition would, however, probably find it difficult to agree on dismantling too much of the underlying economic framework in the short run.

In the medium term, through to 2010, it should be expected that in economic terms New Zealand will drift leftward with market-led economics being compromised to a greater or lesser extent to provide an enhanced network of social support. This expectation is based solely on the judgement that it is unlikely the current Government will retain power for the entire period and, in any case, its programme of economic reform is largely complete. Consequently, there is little probability of further reform to the Right. Essentially, the extent

of economic reform initiated during the next 15 years is likely to be largely dependent on the country's ability to afford whatever level of social spending a particular Government determines.

Likely political issues which would have substantive impacts on the forestry sector are; taxation reform, tightening of foreign investment controls, Maori land claims settlement, log export bans, and more stringent environmental controls. At present, however, it is difficult to seriously contemplate suggestions that the privatized forest estate might be compulsorily nationalized. At the macro-economic scale, reform of employment legislation and relaxation of the sole monetary policy target would not generally favour the forestry industry, or business in general, in the long run.

Social and Human Context for Forestry

Forests are an intrinsic part of New Zealand's cultural and societal identity. New Zealand, with a population of 3.6 million, is one of the world's least populous countries particularly considering almost the entire land area is potentially habitable. The small population, associated with relatively recent colonization, means New Zealand still has a considerable expanse of readily accessible wilderness areas. The scenic and landscape values of these areas are a fundamental cultural tenet and source of national identity and esteem. Many New Zealanders take pride in the image of a country which is clean, unpolluted, and unspoiled. The natural forests, covering a quarter of the land area, in their own right and inherently contribute to these values and image. There is little doubt that the preservation of these values will be an imperative for New Zealand for the foreseeable future. Certainly, over the next fifteen years the likelihood is that New Zealand's environmental performance will improve rather than deteriorate, and that forest regeneration will dominate degeneration.

At a less esoteric level, the forests make important contributions to a range of social values and activities. Naturally, employment in the forestry and supporting industries is one aspect of these contributions. However, forestry is not a major employer of people (i.e., 28,000 jobs in 1994). There are, however, a number of small communities dependent on forestry to maintain their viability. The level of employment in forestry has in fact been declining since late 1980s as a consequence of increasing plant automation and deregulation. Between 1988 and 1992, for example, 3,000 jobs were lost in the sawmilling and remanufacturing sector while timber output increased by 40 percent. Over the same period employment in the pulp and paper sector declined by 16 percent while output showed an increase. Prospects over the next decade are, however, for increasing employment in, at least, forest products processing industries. This will be in response to the commissioning of new mills to cope with the increased harvest in a number of areas. Nonetheless, despite the potential for significant employment expansion through the development of a strong remanufacturing industry, the evidence to date suggests the forestry sector will continue to be a relatively minor employer in New Zealand.

Outside of the forest industry there is also a significant, but largely unquantified, forest-dependent labour force. Building, tourism, recreation and conservation are all activities to which forests make an employment contribution. Naturally, forests also contribute a separate core dimension as a focus for tourism and recreation. Activities such as trekking, climbing, camping, hunting, photography and sight-seeing are all dependent or

extensively enhanced by New Zealand's forests. Forests are also important in a wide range of other recreational activities such as diving, fishing, horse-riding, bird-watching, orienteering, mountain-biking and motorcycling.

The forests also have a range of cultural values which include artistic, heritage, and spiritual values. The Maori dimension of these values is an important component. Historically, the Maori culture had strong forest associations. One of the principal Maori gods was Tane, the forest god, and the forests were a primary source of food, fuel, housing materials, clothing, and tools as well as providing carving, weaving and drawing materials for religious and artistic purposes. More recently, the impact of forests on the New Zealand lifestyle has been reflected in the prominence of forests in the post-colonial culture. New Zealand art, literature, and films almost invariably have strong natural and forestal themes.

In general most forest management agencies have assumed educational and research roles. The educative role covers a range of participants from school-children to adults and in some cases includes interpretation facilities to ensure that visitors can understand the role of forests in their surroundings. Visitor and Field Centres operate at sites throughout New Zealand. The Forestry Industry Training and Education Council (FITEC), a joint partnership arrangement between government and industry, is working to further educate New Zealand schoolchildren on forestry issues through its *Forestry Insights* programme. This programme aims to provide all schools in New Zealand with free-of-charge quality technical information about forest growing and processing. The material is fully integrated into the existing school curricula and provides a forestry context and examples across a wide range of core school subjects. The purpose is to stimulate school children's interest in forestry.

THE NEW ZEALAND FOREST RESOURCE

Land use in New Zealand

The total land area of New Zealand is 27,053,000 hectares, slightly larger than the United Kingdom and slightly smaller than Japan. As temperate island nations these three have a reasonable degree of geophysical similarity. However, New Zealand's markedly lower population density, one-twentieth of that of the United Kingdom and almost one-thirtieth of that of Japan, means generally less pressure is applied to New Zealand land and natural systems in meeting the variety of demands of its population. Nonetheless, settlement by Maori and later colonization by Europeans have had profound impacts on the pattern of land use in New Zealand. In its pre-human state, New Zealand had almost 80 percent forest cover. One-third of this forest was cleared during an estimated thousand years of pre-European settlement. A further third has been cleared in the past 150 years following European settlement.

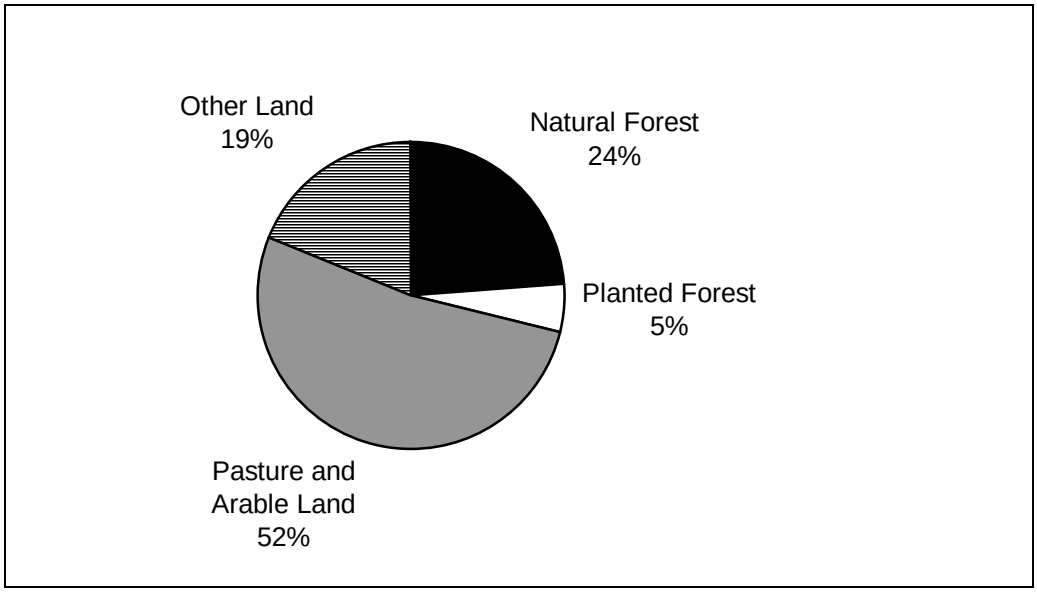
The arrival of Europeans saw New Zealand rapidly converted into an economy and landscape dominated by agriculture. New Zealand became the "food basket of Britain", and this role remained pre-eminent until Britain entered the European Common Market in the early-1970's. The past 25 years, since the dissipation of the British market, have seen considerable diversification in the New Zealand economy. While agriculture remains the dominant land-use, raising sheep is no longer the staple of the New Zealand economy. A range of new agricultural and horticultural products have been established in New Zealand ranging from kiwifruit and deer-farming, to orchids and alpacas. Tourism is now New Zealand's largest foreign-exchange earner, followed by dairying. In 1996 forestry has drawn level with the meat industry to become the equal third largest source of foreign exchange.

Nonetheless, as Figure 1 shows, more than 50 percent of the land remains in agricultural and pastoral uses. The closed natural forests, a reasonable proportion of which are virgin forest, cover 23 percent of the land, including particularly large tracts in the west and south of the South Island. The planted forests presently cover around 5 percent of land, and "Other Land"; including urban land, mountains, scrublands and other non-pastoral wooded or grass lands, rivers, lakes and swamps; makes up the balance.

In the absence of a major natural disaster it is unlikely that there will be enormous changes in these land use proportions over the next 15 years. However, some trends are likely to dominate. Harvesting in natural forests is now controlled and in most, by law, must be on a sustainable basis. Consequently, the natural forest area should not decline and some areas of marginal agricultural land, in the process of regenerating into natural forest, will mature sufficiently to enter this class. Planted forests are likely to continue to expand with scenarios of up to 100,000 hectares of new forest plantings being touted. A recent survey proposed an average level of planting of around 60,000 hectares through to 2010 and this probably forms an optimistic bound. By 2010 it would be realistic to expect planted forests to cover around 7 percent of New Zealand's land area. This expansion will be at the expense of both *Pasture and Arable Land* and *Other Land* classes. By 2010 it should be expected that

almost all potentially productive land (in the Other Land class) to be either in agricultural or forestry use. Future expansion by one of these sectors will necessarily be at the expense of the other.

Figure 1: Land use in New Zealand (1994)



Source: NZMOF

The Dual Forest Estates

New Zealand's forest resource can be conveniently divided into two distinct estates. The first, a natural forest estate is comprised of species indigenous to New Zealand and consists of either virgin or regenerated forest. The second is the plantation forest estate comprising exotic species which have generally been hand-planted. In addition to the obvious biological differences between the two types of forest, in recent years New Zealand has moved toward separating the estates in terms of their legal, institutional and functional dimensions.

From 1919 to April 1987 the New Zealand Government's forestry operations, in common with those of many countries, were conducted by a single agency, the New Zealand Forest Service. The primary objective of the Forest Service was to produce and profitably market forestry products. However, in attaining this objective other factors had to be taken into consideration, including policies and directives to undertake afforestation in regions requiring economic development, to provide employment, to utilize land with low productivity, and to plant and manage trees to achieve environmental ends. Prior to 1990 the Government owned about half the planted resource and maintained a proportion of the natural forests (the majority) similar to its present day holdings.

The New Zealand Government recognized in the early-1980's that the Forest Service's multiple objective mandate was less than ideal. It was obvious that where conflicts arose between various objectives the need to find a balance between the objectives was compromising the organizational efficiency of the Forest Service. Consequently, in 1987 the New Zealand Forest Service was disestablished with a view to enhancing the transparency

and accountability of Government forestry operations. The major objective in the restructuring process was to isolate the Forest Service's commercial activities and confine these to a newly established State-owned enterprise, the New Zealand Forestry Corporation. A clear uncluttered commercial focus was regarded as a prerequisite for the Forestry Corporation to effectively compete with the private sector. The non-commercial functions of the Forest Service were transferred to two new Government departments; the Ministry of Forestry, which assumed responsibility for policy, research, training, advisory and regulatory functions; and the Department of Conservation, which was assigned protection responsibilities for the natural forests.

In real terms the New Zealand Government effectively separated its two forest estates and defined specifically different roles for each estate. The establishment of two Government agencies, the Ministry of Forestry and the Department of Conservation, each with administrative responsibilities predominantly relating to, respectively, planted forests and natural forests, formalized the generally commercial raison d'être for the planted forests and the predominantly conservationist values attached to the natural forests.

The planted forests took on a "cropping" aspect, in that they are grown to be harvested, and became the primary focus of a Ministry of Forestry tasked with promoting sustainable development and economic growth. The Department of Conservation's concerns related more to the protection and preservation of New Zealand's natural resource heritage. This institutional separation helped to establish a general acceptance that commercial utilization of planted forests, by substituting for natural forest exploitation, is a method of conservation. There remains, of course, a role for planted forests in terms of conservation and social goals, particularly watershed management, land stabilization and employment. Equally, natural forests continue to supply small volumes of timber to commercial processing operations. However, in the main, the two types of forests are fundamentally differentiated in purpose, and the institutional goals of the two Government agencies reflect this.

In 1993 a legal dimension further reinforced the duality concept. The Forests Act 1949 was amended to require that areas of privately owned natural forest be managed in a way that maintains their ability to provide products and amenities in perpetuity while retaining natural values. The amendments were designed specifically to define and implement principles of sustainable management in New Zealand’s natural forests. Sustainable resource utilization in New Zealand is targeted by the Resource Management Act 1991 which defines a general standard applicable to most sectors of the economy. Specifically targeting the natural forests for additional control in a far more prescriptive manner, applying harvesting, processing and export controls, raises additional barriers to entry and discourages the industrial utilization of the natural forests.

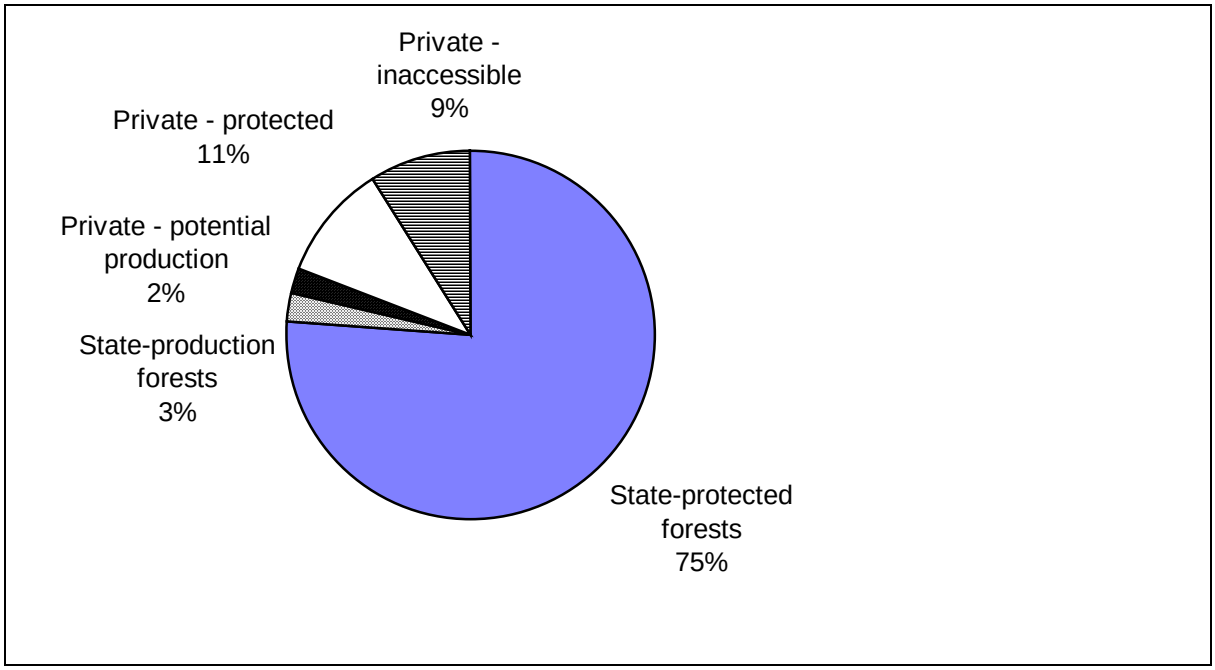
New Zealand's Natural Forest Resource

The natural forests of New Zealand are complex and have been described in as many as 94 separate types. However, at a very simple level the forests can be can be broadly divided into two main types; the beech forests, dominated by one or more of the four indigenous species of *Nothofagus*; or the conifer-hardwood forests dominated mainly by Podocarps, but also occasionally by Kauri (*Agathis australis*) and cedar species. At the beginning of European settlement (c.1840) the podocarp-hardwood forest type covered much

of the lowland North Island and were mixed with beech in the east of the South Island. Beech forests occurred in the North Island mountain ranges and dominated along all of the main ranges in the centre and west of the South Island. Today the only large tracts of undisturbed forests occur in the west and south of the South Island, with pockets in a number of other areas.

Data on the natural forests is less comprehensive than that available for the planted forests. It is estimated that two-thirds of New Zealand's original forest cover has been cleared, and a good proportion of the remainder has been degraded, both by harvesting and through the introduction of animals, most notably deer species, goats, pigs and the Australian brush tailed possum. However, the last comprehensive survey of the natural forest resource was carried out in 1956, though an extensive revision of this work was done in 1974. Subsequent revisions estimate New Zealand presently has 6.4 million hectares of natural forest. Figure 2 shows the ownership and allocation of the natural forests.

Figure 2: Ownership and allocation of New Zealand's natural forests



Source: NZMOF

As shown, the Department of Conservation holds more than 4.9 million hectares of natural forest in National parks, scenic reserves, forest parks and other protection areas. A further 650,000 hectares is privately owned protected forest. Discounting inaccessible areas there is effectively less than 300,000 hectares of natural forest available for wood production. Under the 1993 amendments to the Forests Act 1949, these areas can only be logged if they are subject to a Government-approved sustainable management plan or unless they are already subject to the West Coast Forest Accord, covered by the Landless Maoris Act 1908, or planted indigenous forest.

In effect, there is limited scope for further human degradation of the natural forests. The major source of degradation, barring catastrophe, is likely to be the brush-tailed possum. An estimated 70 million possums live in the forests causing extensive defoliation. While efforts are being stepped up to combat this problem, resources are still far below those

necessary to manage this pest. Over the coming 5-10 years this growing issue is likely to capture further Government attention and see significant efforts made to bring possum numbers under control.

New Zealand's Planted Forest Resource

The establishment of New Zealand's planted forest resource began in the 1870's with trialling of species by a number of forestry enthusiasts. In fact, even at this point concern regarding the depletion of New Zealand's natural forests was evident. A number of small groups advocating the need for preservation of the country's natural forests, were finally rewarded by the appointment of a Royal Commission on Forestry. The Commission reported to the Government in 1913. The report recognized that the natural forest not inexhaustible, the existing methods of use were wasteful, and that natural forest species were not commercially suitable for afforestation. The Commission recognized that future needs would have to come from imports, or from large scale planting of introduced tree species.

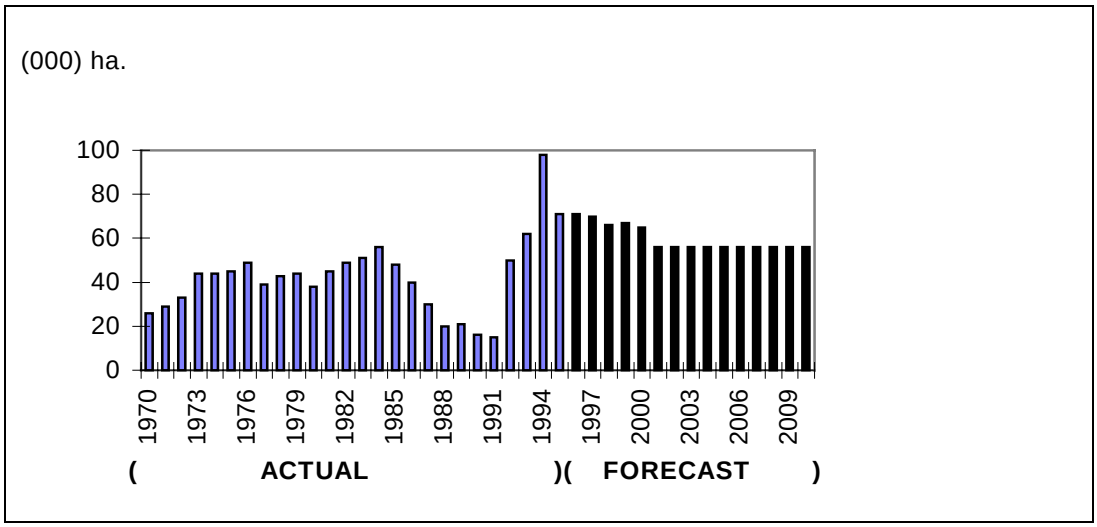
In response to the findings of the Commission a review of the country's natural forest estate was undertaken. The results of this survey, produced in 1925, confirmed the fears of the Royal Commission. Balancing the expected future total wood production from natural forests against anticipated future domestic requirements for timber revealed that the supply from natural forests would be exhausted by 1965 - 70. The remedial action put to the Government by the Director of Forests was to mount an extensive afforestation programme to increase the area of State planted forests from 26,000 hectares in 1925 to 120,000 hectares by 1930. In fact extensive afforestation continued through until 1936 by which time the New Zealand planted forest estate totalled 320,000 hectares. However, new forest plantings between 1937 and 1960 averaged only 2,900 hectares each year and were mostly State plantings in local supply forests. This slowdown coincided with labour shortages, especially during World War II.

After 1961 the planting rate increased steadily through until the mid-1980's. This was driven by renewed recognition that forestry has the potential to be among New Zealand's most important export based industries. In 1985, 56,000 hectares were planted. Unlike the first planting boom (which was concentrated around the Bay of Plenty of the North Island) afforestation in this second boom was more widely dispersed. This resulted in most regions of the country carrying some planted forests. However, the economic restructuring of the late-1980's affected forestry planting to the extent that only 15,000 hectares was planted in 1991.

Since 1991 the New Zealand forestry sector has entered its third planting boom. Excitement generated by the log price boom of 1992, in tandem with the New Zealand Government's removal of a tax disincentive to forest growing, stimulated a dramatic turnaround in new planting activity. The annual rate of new planting has increased from 15,000 hectares in 1991 to 98,500 hectares in 1994. Early in 1996 the New Zealand Forest Research Institute prepared a report forecasting new areas of planting to 2010. The report provides a medium term forecast describing the five years out to the year 2000. The report estimates new planting to be between 44,000 hectares and 95,000 hectares per year during this period with a best estimate of 68,000 hectares.

In the longer term, from the year 2001 to the year 2010, the report expects new planting to be between 37,000 and 92,000 hectares with a best estimate of 56,500 hectares per year. While, intuitively, these best estimates seem more likely to comprise an upper bound, even the minimum estimates will be sufficient to expand New Zealand's planted resource to around 1.9 million hectares by 2010. Figure 3 shows a comparison between historical planting rates and the forecast rates.

Figure 3: New Planting Actual And Forecast



Source: NZFRI, NZMOF

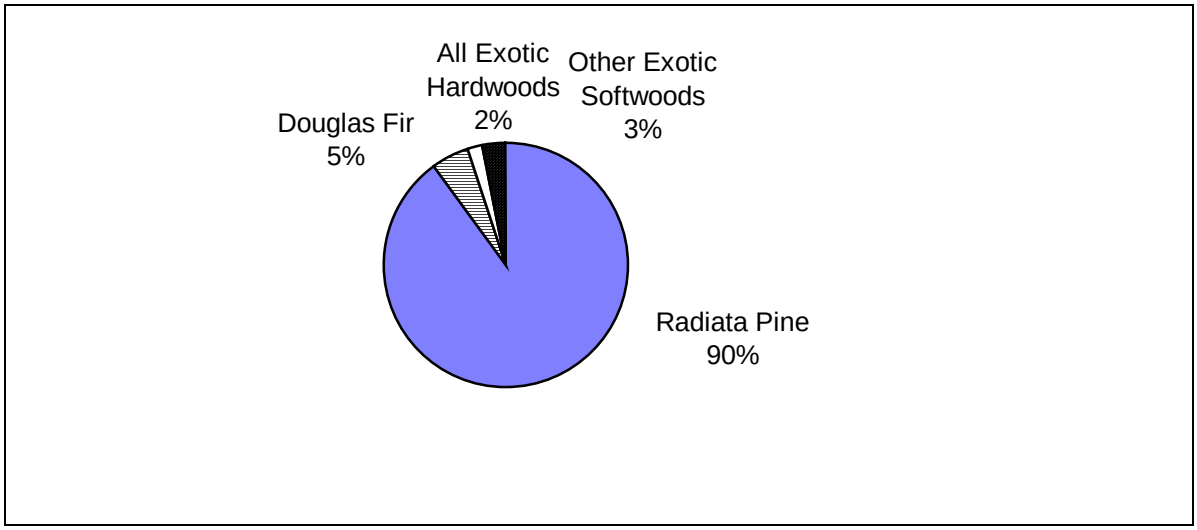
The New Zealand planted forest resource is presently overwhelmingly dominated by radiata pine. Of the 1.5 million hectares of planted forests, 90 percent is radiata pine. Figure 4 shows species distribution in New Zealand's planted forests.

Intensive tending regimes are the norm in New Zealand. More than 60 percent of the resource planted since 1970 has been pruned and this proportion will increase as recent plantings reach a pruneable age. The majority of these trees will be raised according to the "direct sawlog" regime, designed to produce a 5 metre pruned buttlog for sawing or peeling, and a lower quality toplog which might be sawn for low quality uses or pulped.

Extensive mensuration work and grade studies through the 1960's and early-1970's produced several radiata pine regimes which promised, other things being equal, the best returns on investment of any species grown commercially in New Zealand. In 1973 the optimal radiata pine regimes were yielding an (exceptional) IRR of 13 percent compared with a New Zealand Douglas fir IRR of 3.5 percent. (More generally an IRR of 7-8 percent is standard practice for application to a radiata pine forest). Nonetheless, new questions are being asked in New Zealand as to the efficacy of radiata's dominance in the planted estate. The increasing importance of composite wood products and improving technologies associated with these may, at some future point, significantly reduce the importance of conventional sawn timber. Substitution toward very high quality, special-purpose species, or peeler species for veneer, in tandem with ultra-fast growing, short rotation and coppicing species for fibre production may be appropriate. Although, already several companies are moving toward the development of limited eucalyptus estates for pulp production, it is unlikely that serious consideration will be given to a major departure from the current regimes

during the next 5-10 years. Depending on technology development the issue could take on increased importance toward the end of the next decade.

Figure 4: Species Distribution in Planted Forests as at 1 April 1994



Source: Turland et al.

THE NEW ZEALAND FOREST INDUSTRIES

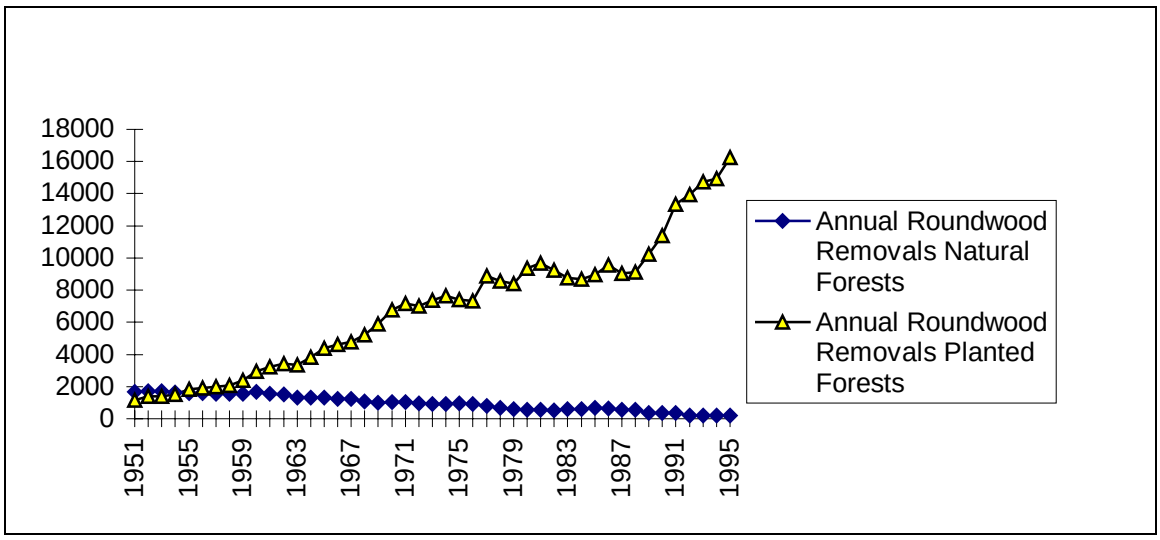
Forestry and Logging

New Zealand's roundwood removals have increased markedly over the past 45 years, averaging a 4.1 percent increase annually. Total roundwood removals from New Zealand forests for the year ended December 1995 are estimated at 17,085,000 cubic metres. Figure 5 shows the gradual decline in harvesting from the natural forests, to a point where natural forest harvest removals are negligible, and the rapid ascent of the planted forests to being New Zealand's major source of industrial wood. The industrial wood harvest from natural forests in 1995 totalled 114,000 cubic metres.

New Zealand's planted forests are regularly statistically surveyed with the results published in the *National Exotic Forest Description*. In 1992 a publication modelling wood flows on the basis of this data, the *National Exotic Forest Description* (NEFD) *1992 National and Regional Wood Supply Forecasts* published a range of wood flow scenarios based on planting rates, management regimes and clear fell age scenarios. The results of the *Base-cut*[1] and *50,000 hectares planting*[2] scenarios are shown in Table 1. More recent New Zealand Ministry of Forestry forecasts based on industrial capacity changes and economic conditions are included in the table to 2000.

Figure 5: New Zealand Annual Roundwood Removals 1951-1996

[1] Target clearfell age for radiata pine- 30 years. No new planting. Complete descriptions of assumptions included in publication.
[2] Target clearfell age for radiata pine- 30 years. 50,000 hectares annually of new planting. Complete descriptions of assumptions included in publication.



Source: NZMOF

Although not displayed, the actual harvest path to date has remained between the *base cut* scenario and an *early cut* scenario with a target clear fell age of 25 years. These two scenarios converge in 2001, as does an extension of the Ministry of Forestry forecast path. Beyond this, the NEFD scenarios outline a sustainable yield potential to 2010. The extent to which this theoretical maximum is reached will be largely dependent on the relative competitiveness of New Zealand's forestry industries.

Logs

Exports

Logs are New Zealand's largest forest products export, in terms of both value and volume. In 1995 New Zealand's log trade totalled 5.2 million cubic metres, with an f.o.b. value of US$430 million. The export market for New Zealand logs is presently dominated by Japan and Korea. In 1995 these two countries purchased 94 percent of New Zealand export logs.

Table 1: Annual Harvest Predictions (m^3)

Year ended	Ministry of Forestry	NEFD Base Cut	NEFD 50,000 ha Replanting
December 1993	15,175,000	14,402,000	14,507,000
December 1994	16,195,000	14,759,000	14,600,000
December 1995	17,088,000	14,858,000	14,774,000
December 1996	17,627,000	14,875,000	14,792,000
December 1997	17,859,000	14,522,000	14,447,000
December 1998	18,372,000	14,558,000	14,539,000
December 1999	18,752,000	16,836,000	17,031,000
December 2000	- - - - - - - -	17,738,000	18,256,000
December 2001	- - - - - - - -	20,647,000	22,450,000
December 2002	- - - - - - - -	22,099,000	23,507,000
December 2003	- - - - - - - -	22,063,000	23,609,000
December 2004	- - - - - - - -	22,731,000	24,720,000
December 2005	- - - - - - - -	23,062,000	25,315,000
December 2006	- - - - - - - -	23,048,000	25,608,000
December 2007	- - - - - - - -	23,125,000	25,842,000
December 2008	- - - - - - - -	23,216,000	26,090,000
December 2009	- - - - - - - -	23,391,000	27,943,000
December 2010	- - - - - - - -	23,699,000	28,725,000

Source: NZMOF, Turland et al

The development of a substantive New Zealand log trade is a relatively recent event and essentially parallels the increasing New Zealand harvest. As Table 2 shows, the annual New Zealand harvest increased by 6,192,000 cubic metres in the period 1981-1995. During the same period, log exports increased by 4,449,000 cubic metres while additional roundwood processed in New Zealand increased by only 1,733,000 cubic metres.

Table 2: Development of New Zealand Harvest Profile and Log Export Trade (000 m^3)

Year	1981	1983	1985	1987	1989	1991	1993	1995
Roundwood Harvest	10,245	9,358	9,626	9,613	10,619	13,693	14,937	16,437
Log Exports	803	440	360	426	1545	3,293	4,290	5,262
Processed (Roundwd Eq.)	9,442	8,918	9,266	9,187	9,074	10,400	10,647	11,175

Source: NZMOF, Author

Several points can be inferred from Table 2. Firstly, the rapid increase in log exporting corresponds with the privatization of the forest estate and reflects the private sector realities of obtaining returns on investment and maintaining liquidity. The differing objectives of the private sector and the Forestry Corporation of New Zealand compared with those of the New Zealand Forest Service are clearly apparent in the differing behaviours in terms of log exports in the pre- and post- 1987 periods. Secondly, it is evident that the transition to the higher harvest potential of New Zealand's forests has not been matched by development of processing capacity. It is evident that, at present, New Zealand does not have

sufficient effective processing capacity to manufacture its current harvest. Despite the planned installation of considerable capacity during the coming five years, it is apparent that the potential sustainable harvest will continue to outstrip the development of processing facilities throughout this period. Therefore, either log exports will continue to escalate, or a higher level of growing stock will be accumulated. Conventional wisdom in New Zealand, relating to the maximization of internal rates of return, suggests that provided reasonable markets are available then log exports will continue to accelerate.

Table 3 shows a simple scenario for the development of industry within the New Zealand forestry sector. Using the NEFD 50,000 hectares new planting scenario (see Table 1) to determine the potential harvest, and extrapolating the current rate of (announced) new capacity development Table 3 shows the substantial potential for increased log exports. There appears to be sufficient available wood available to increase log exports by more than 7 million cubic metres in the period 1996-2010. However, there are several good reasons to anticipate that New Zealand companies may not log the forest to its full potential thereby restricting log exports.

Table 3: Scenario for Growth in Log Exports and Processing Capacity to 2010 ('000 m^3)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Roundwood Harvest	17,627	18,372	20,000	23,507	24,720	25,608	26,090	28,725
Log Exports	5,476	5,500	6,000	7,000	7,500	8,000	8,000	8,500
Processed (Roundwd Eq.)	12,151	12,872	13,500	14,000	14,500	15,000	15,500	16,000
Accumulated Forest Stock	0	0	500	2,507	2,720	2,608	2,590	4,225

Source: Turland et al, Author

Firstly, there will be a need to find markets for additional log sales. While growth of the Japanese and Korean markets, and substitution for North American and tropical hardwood logs in these markets, could account for some of the growth in log exporting, other markets will also need further development. China is one market with enormous potential. Similarly, a number of other Asian markets offer possibilities. Log exports to South-east Asian nations including Malaysia, Thailand and the Philippines have grown steadily in recent years. China-Taipei and the USA are other markets which may be targeted.

Secondly, New Zealand log exporters will be aware that these same markets need to be targeted for the sale of more processed New Zealand forestry products and a propensity for companies to "shoot themselves in the foot" will need to be avoided. This will involve developing an integrated market strategy ensuring log exports do not spoil markets for processed products, and in which limiting log supplies may be used to maintain prices at a desired level.

Thirdly, and perhaps most importantly, log exports will remain a controversial topic in the New Zealand forestry sector. Log exports are often viewed as an export of employment. By limiting log exports to an "acceptable" level companies may avoid controversy and, particularly if Government policy begins to swing leftwards, avoid the possibility of Government regulation.

Presently, there are no quantitative controls applied to log exports from planted forests. This reflects Government's market-led economic philosophy which requires that land be used in a manner which is most economically efficient. If it were to curb forest growers' access to international log markets, Government argues, the return on an investment in forest growing will be lowered. In this instance land which, in the presence of no export restrictions, would have been used for forest growing may be diverted into some less efficient use.

This policy, while consistent with New Zealand's overall economic philosophy, has been the cause of substantial controversy. Exporting of logs has been equated to exporting employment and, particularly during periods of high international log prices, small domestic processors have been vociferous in their appeals for protection. These processors do have a legitimate argument where overseas processors have free access to New Zealand logs but have protection for their own more processed products. New Zealand processors are disadvantaged in competing in those markets. The Japanese tariff applied to sawn timber has been the principal target for this criticism.

The 1993 amendments to the Forests Act, designed to maintain the long-term sustainability of the natural forests, made exporting logs from the natural forests illegal. Consequently, there is no export trade in natural forest logs

Imports

New Zealand imports a very small amount of logs each year. In 1995 log imports totalled 1,365 cubic metres with more than half of these being sourced from Australia. Australian logs were probably eucalyptus used for speciality purposes (e.g. electricity line poles) or possibly to supplement wood pulping. Other speciality purpose logs were imported from USA, Canada, Papua New Guinea and Fiji. It is unlikely that in the future New Zealand will import logs beyond the current special-purpose trade.

Woodchips

Exports of woodchips comprise a very minor segment of the New Zealand forestry industry. Woodchip exports in the year to December 1995 totalled 303,000 bone dry units with an export value of US$40 million. Woodchips are presently exported mainly from four ports in New Zealand - Tauranga, Nelson, Dunedin and Bluff. Presently, Tauranga, Nelson and Dunedin export pine chips, and Bluff exports pine and beech chips. Japan is the sole destination for New Zealand woodchip exports. The chips are used in Japan's pulp and paper industry.

Beech chip exports are being phased out in line with the indigenous forest export provisions of the Forests Act 1949. Beech shipments are almost certain to end in 1996. Pine chip shipments, and possibly some eucalyptus chips will continue into the 21st century. However, new fibreboard capacity is being commissioned in all of the regions presently exporting woodchips. As a consequence chips may be diverted into the new mills reducing, and possibly eventually eliminating, New Zealand's woodchip trade.

Imports

New Zealand does not presently import woodchips and a trade is unlikely to develop.

Sawn Timber

Production

Production of sawn timber in New Zealand has grown strongly since the late-1980's. In 1988 sawn timber production totalled 1,821,000 cubic metres. By 1995 this had increased to 2,949,000 cubic metres, an average annual increase of 8 percent. However, there are signs that New Zealand's production of sawn timber is reaching a plateau in response to several potentially limiting factors in current export markets.

New Zealand has significant sawn timber productive potential. A 1992 *New Zealand Forest Industries Strategy Study* calculated a scenario based on available wood supplies showing the potential for New Zealand sawn timber production to reach 4.25 million cubic metres by 1995 and 6.3 million cubic metres by 2005. Achievement of this capacity would require the construction of around 30 sawmills of varying sizes throughout New Zealand and increased utilization of existing capacity. It is evident that New Zealand is some distance from having developed this capacity in 1995 and, based on growth performance during the past few years, expected difficulties in export markets and very limited announcements of new capacity over the next few years, it seems unlikely that the 1992 Strategy Study scenarios will be seriously threatened.

Table 4 provides an extrapolation of New Zealand Ministry of Forestry forecasts to 2000 and makes a "best guess" at the structure of the sawn timber sector in New Zealand through to 2010. The production scenario assumes an annual increase of 70,000 cubic metres.

Table 4: Scenario for Growth in Market Dynamics for New Zealand Sawn Timber ('000 m^3)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Sawmill Production	3,060	3,200	3,350	3,490	3,630	3,770	3,910	4,050
Exports	1,170	1,280	1,350	1,410	1,465	1,520	1,570	1,615
Imports	45	50	50	55	55	60	60	65
Consumption	1,935	1,970	2,050	2,135	2,220	2,310	2,400	2,500

Source: NZMOF, Author

Consumption

Sawn timber consumption in New Zealand is strongly related to housing construction rates and demand for packaging timbers. About 60 percent of sawn timber production is used in dwelling construction and the remaining 40 percent goes into industrial applications and furniture The majority of houses built in New Zealand are wooden framed with new residential dwelling constructions fluctuating between 15,000 and 25,000 units annually during the past 15 years with no substantive upward trend. On this basis, despite targeted GDP growth of 3 percent per annum it is more realistic to base a single scenario projection on 2 percent annual increase in sawn timber consumption. Table 4 shows that 2 percent annual growth in sawn timber consumption will see 2.5 million cubic metres of sawn timber used annually in New Zealand by 2010.

Exports

New Zealand's sawn timber producers are increasingly reliant on export markets to fuel the industry's expansion. Sawn timber exports have grown from an average of 300,000 cubic metres per annum in the 1970's to almost 1,200,000 cubic metres per annum.

Table 4 treats sawn timber exports as a residual of the production-consumption equation (Ex = P + I - C). To achieve the industry output shown in Table 4 New Zealand would need to find additional export markets for only an additional 450,000 cubic metres during the coming 15 years. However, this target may prove more daunting than it appears when dynamics in New Zealand's present markets are examined.

Australia is presently by far New Zealand's largest export market. In the year to December 1995 Australia imported 371,000 cubic metres of New Zealand sawn timber, 35 percent of sawn timber exports. And 1995 was a year in which the Australian housing market was in recession. A measure of the weakness of the Australian market is that in 1994 New Zealand sawn timber exports to Australia totalled 475,000 cubic metres. With the New Zealand dollar expected to continue to strengthen against the Australian dollar through to the end of the century, improving sawmill efficiency and improving quality systems will be a key to retaining price advantage in Australia. Australian production of sawn timber is expected to increase as Australia assumes a net exporter position for forestry products. Australian forecasts suggest this position will be reached between 2005 and 2010. In the

meantime the Australian market for New Zealand sawn timber is likely to dwindle. New Zealand will need to actively develop new markets particularly for wood presently cut for structural grades of timber. Presently, a high proportion of New Zealand's structural sawn timber production is exported to Australia. Japan, the second largest market, imports primarily packaging grade timber and generally in flitch form. The United States, the third largest market, imports mainly mouldings and shop grade timbers.

New Zealand's sawmillers will probably be required to compete in the same markets as are developed by log exporters. New primary target markets will probably include China, China-Taipei, Malaysia, Philippines and Thailand. For a commodity product such as sawn timber competition will largely be on price which means New Zealand will need to use technology to overcome the relative labour cost disadvantage (competing in Asia). Presently, New Zealand probably has a comparative advantage in treatment and drying of radiata pine sawn timber. However, these advantages are unlikely to remain in the long run.

Radiata pine from New Zealand and Chile has captured around 10 percent of the US markets for shop and mouldings and better lumber, largely as a result of decreased production of US Ponderosa pine. Further increases in export volumes of sawn timber into the US will be limited by radiata pine's capacity to further displace Ponderosa and competing species such as Southern Yellow pine in these markets. Increasing competition from other Central and South American countries also places constraints on New Zealand's ability to further penetrate the US market. Competition from other exporters will be stiff.

Imports

New Zealand imports a very limited quantity of sawn timber. Sawn timber imports totalled 42,000 cubic metres in 1995. Almost a half of this comprised Western red cedar imported from Canada. A number of countries supplied small quantities of hardwood sawn timber, the largest quantities being sourced from Indonesia, Fiji, Australia and Malaysia. These hardwoods are generally used for outdoor purposes such as decking and bridge-building, or for furniture. New Zealand is expected to continue to import small, but increasing, amounts of sawn timber.

Woodpulp

Production

Wood pulp production in New Zealand is presently carried out at 6 mills in New Zealand. Total production of wood pulp in the year to December 1995 totalled 1,410,000 tonnes, 3.8 percent above production in the December 1994 year. Table 5 shows the practical maximum capacities for New Zealand's pulp and paper mills. As shown, Kawerau and Kinleith are world-scale integrated pulp and paper mills, both also producing some market pulp. Penrose is New Zealand's major paper recycling plant.

Over the past five years, pulp and paper production in New Zealand has been largely stable. However, a major change is in the pipeline for Kawerau and may be a precursor for

future changes. Kawerau's production of pulp is likely to decline in volume terms due to a conversion from producing solely radiata softwood pulp to production of both radiata and eucalyptus hardwood pulp. Kawerau is to install a new thermo-mechanical (TMP) pulping facility to replace its ageing stoneground facility. The likely changes to paper production at Kawerau, discussed below, will also see, in the long run, a major reduction in the amount of market pulp sold out of the mill. Kawerau market pulp exports may decline by around 75 percent.

Table 5: Estimated Maximum Practical Capacities for NZ Pulp and Paper Mills (1995) (metric tonnes)

Mill	Kraft Pulp	Mechanical Pulp	Newsprint	Paperboard/Linerboard	Fine Paper	Tissue
Kawerau	290,000	330,000	420,000			
Kinleith	450,000			300,000		
Penrose				60,000		
Whakatane	10,000	40,000		90,000		
Mataura				10,000	20,000	
Caxton	30,000					50,000
Karioi		120,000				
Whirinaki		220,000				
Total	780,000	710,000	420,000	460,000	20,000	50,000

Source:Author

It is increasingly evident that the pulp and paper industry in New Zealand is entering a transitional phase. Obviously more wood-fibre is becoming available for pulping, but the increases are too dispersed to provide material for new kraft pulp mills. Areas which could potentially support a CTMP facility are instead building fibreboard plants. The *New Zealand Forest Industries Strategy Study* saw fibreboard mills and CTMP mills as two mutually exclusive options in the development of New Zealand's forestry sector. On the positive side New Zealand's economic growth will provide an increasing market for paper. On the negative side New Zealand will eliminate tariffs on pulp and paper in 2000 and around the same time large components in New Zealand's mills will be due for modernization. Some rationalization may occur around the turn of the century.

Perhaps a most likely scenario over the coming 10 years will see New Zealand's mills focus more heavily on the domestic market. Modernization and possibly expansion of existing facilities will allow gradual capacity increases through to 2010. The scenario shown in table 6 spreads these potential increases evenly across the next decade.

Consumption

Pulp is an intermediate product in the papermaking process. Presently, New Zealand has four integrated pulp mills with both Whakatane and Caxton supplementing their pulp

production with purchases (or in-Company transfers) of market pulp. Penrose and Mataura are the two small papermaking facilities without virgin pulping capacity.

Exports

Exports of market pulp are made from Kawerau, Kinleith, Karioi and Whirinaki. Karioi is jointly owned by two Indonesian companies, while Whirinaki is owned by New Oji Paper of Japan. Both these mills generally direct the majority (if not all) of their production to their parent companies. Whirinaki's exports ensure Japan is New Zealand's largest export pulp market. Australia, Indonesia, China-Taipei and Korea are other markets to which New Zealand's exports exceed 50,000 tonnes, however there are a broad range of markets importing lesser quantities of woodpulp. Few difficulties are envisaged in selling whatever market pulp New Zealand produces over the forecast horizon.

Table 6: Scenario for Growth in Market Dynamics for New Zealand Pulp ('000 tonnes)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Production	1,387	1,379	1,386	1,430	1,460	1,490	1,520	1,550
Exports	640	650	504	520	530	540	550	560
Imports	20	30	25	30	30	30	30	30
Consumption	767	759	907	940	960	980	1,000	1,020

Source: NZMOF, Author

Table 6 shows a smoothed increasing trend in pulp production in New Zealand. A major change in the focus of paper production at Kawerau causes a decline in exports in 2000, but using the same smoothing principle exports increase gradually from there-on to 2010.

Imports

New Zealand presently imports small volumes of pulp for speciality paper purposes. The USA and South Africa have been the major suppliers of pulp during the past two years. It is anticipated New Zealand will continue to import these, or similar pulp mixes, in small quantities through to 2010.

Newsprint

Production

New Zealand production of newsprint is carried out exclusively at Fletcher Challenge Ltd's (FCL) Kawerau mill. Production in the year to December 1995 totalled 395,000 tonnes, 6.2 percent above production in the December 1994 year.

In New Zealand a significant change in newsprint production is likely to occur over the next three years with the announcement of FCL's Australasian Paper Strategy. The strategy involves shifting newsprint capacity around Australasia with significant changes likely at Kawerau. FCL are examining the potential for converting Kawerau's No. 1 newsprint machine to produce fine coated paper. This plan would reduce Kawerau's newsprint output by 120,000 tonnes per annum, but would establish a 230,000 tonne fine paper facility. The newsprint reduction would eliminate the need to export into Asia spot markets and reduce the volume of exports into Australia. Table 7 shows a market dynamics scenario for newsprint in New Zealand.

Table 7: Scenario for Growth in Market Dynamics for New Zealand Newsprint ('000 tonnes)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Production	380	280	260	260	260	260	260	260
Exports	260	140	110	100	90	80	70	60
Imports	0	0	0	0	0	0	0	0
Consumption	120	140	150	160	170	180	190	200

Source: NZMOF, Author

Consumption

New Zealand's consumption of newsprint is likely to continue to match economic growth. There are suggestions that the profusion of electronic media may, in time, make newspapers redundant thereby significantly reducing newsprint demand. This paper does not subscribe to these suggestions.

Exports

Exports of newsprint in the year to December 1995 totalled 228,000 tonnes, 9.2 percent below the volume exported in the previous December year. Newsprint exports from New Zealand will decline as a result of the new paper strategy and will continue to decline, as shown in Table 7, as priority is given to servicing the New Zealand domestic market. Almost all exports will be to Australia as part of the FCL Australasian paper strategy.

Imports

New Zealand presently imports almost no newsprint. Newsprint imports in 1995 totalled 28 tonnes. There is unlikely to be significant change to Tasman Pulp and Paper's present monopoly.

Other Paper and Paperboard

Production

In the year to December 1995 New Zealand's production of other paper and paperboard totalled 508,000 tonnes. Table 5 shows the majority of this production is kraft linerboard, though smaller quantities of tissue and fine papers are also produced. Production and exports of coated printing and writing papers will be substantially boosted when FCL goes ahead with its planned upgrades at Kawerau. FCL would expect to capture the bulk of the New Zealand coated paper market. Table 8 shows substantial change to market dynamics in response to this planned conversion.

Table 8: Scenario for Growth in Market Dynamics for New Zealand Paper and Paperboard ('000 tonnes)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Production	500	660	710	730	750	770	790	810
Exports	100	190	220	210	200	190	180	180
Imports	190	140	140	150	150	160	160	170
Consumption	590	610	630	670	700	730	770	800

Source: NZMOF, Author

There are unlikely to be new paper mills built and, with the phasing out of paper tariffs around 2001, New Zealand's smallest mills may struggle to remain competitive. However, other existing mills are likely to expand capacities during upgrades to more than offset any closures and paper and paperboard production is likely to increase throughout the period.

Consumption

Consumption growth in other paper and paperboards is likely to mirror growth rates in the general economy. Consequently, consumption has been conservatively estimated at growing by around 2 percent per annum.

Exports

A significant portion of the coated paper produced through the expansion at Kawerau would be exported to Australia where FCL recently purchased Pratt Paper, an Australian paper distributor. Currently around two-thirds of all New Zealand's paper exports are sent to Australia. The other major markets appear to be spot market sales into Hong Kong and Singaporean trading markets. The FCL strategy is designed to eliminate the need for these sales by focusing on Australasia and signs are that the other paper mills (owned by Carter Holt Harvey) are following suit. Exports of paper over the longer term of the forecast are expected to decline substantially with increasing substitution to meet the demands of the domestic market.

Imports

Imports of other paper and paperboard comprise the vast bulk of forestry products imports into New Zealand. Total imports of forestry products in 1995 totalled US$535 million of which pure paper and paperboard imports comprised US$270 million, and manufactures of paper and paperboard comprised an additional US$150 million. Presently these are mainly sourced from Europe, Australia, Japan and the US.

The Kawerau conversion will markedly reduce New Zealand's forestry import burden with a major decline expected between 1998 and 2000. After 2000 increasing consumption should also see a trend toward increasing imports to meet the speciality paper needs which New Zealand cannot meet for itself.

Fibreboard

Production

Fibreboard capacity in New Zealand is growing rapidly. Production of fibreboard in the year to December 1995 was 664,000 cubic metres. With substantial new capacity planned to be commissioned during the coming five years annual fibreboard production over the next five years is expected to increase by around 350,000 cubic metres to 1,050,000 cubic metres in the March 2000 year. The bulk of this production increase will be exported. Table 9 provides a summary of production and capacity change over the coming five years.

Table 9: Estimated Fibreboard Production and Capacity by Mill

Mill	1995 Production	2000 Production	2000 Capacity	Start-up date
Canterbury Timber Products	185,000	210,000	220,000	
Nelson Pine Industries	210,000	340,000	370,000	(1997)*
FCL Auckland	42,000	40,000	45,000	
FCL Taupo	175,000	160,000	175,000	
Juken Nissho Kaitaia	85,000	85,000	85,000	
Rayonier Mosgiel	0	95,000	120,000	1997
Wenita Taeri	0	10,000	120,000	1999
Carter Holt Eves Valley	0	40,000	120,000	1999
Juken Nissho Gisborne	0	70,000	85,000	1998
Total	697,000	1,050,000	1 340,000	

*New line
Source: Author

Not all of this production is, or will be, medium density fibreboard. FCL Auckland produces hardboard and softboard, while the Juken Nissho mills produce tri-board (a fibreboard core with two facing veneers). The 1992 *New Zealand Forest Industries Strategy Study* identified a production scenario with the potential for 10 new fibreboard lines to be installed between 1992 and 2005. Presently New Zealand is tracking this scenario quite closely with 7 lines likely to have been established by 2000. The scenario mapped in Table 10 assumes 4 additional lines will start up in the first decade of the 21st Century. Table 10 provides a scenario of market dynamics for fibreboard in New Zealand.

Table 10: Scenario for Growth in Market Dynamics for New Zealand Fibreboard ('000 m^3)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Production	700	920	1,050	1,250	1,350	1,450	1,550	1,650
Exports	400	590	700	880	965	1,045	1,125	1,205
Imports	5	5	5	5	10	10	10	10
Consumption	305	335	355	375	395	415	435	455

Source: NZMOF, Author

Consumption

Consumption of fibreboard in New Zealand is generally for cabinet work, mouldings or for furniture manufacture. Some of this furniture is later exported. Consumption, in Table 10, is forecast to increase by around 3 percent per annum, in line with predicted general economic expansion. There is, however, considerable potential for pure fibreboard exports to be diverted into domestic consumption for remanufacture and later export. This potential is not modelled here.

Exports

International demand for fibreboard is growing rapidly and a large number of new mills are being commissioned globally to meet this demand. For example, US fibreboard capacity is expected to increase by 1.7 million cubic metres in the coming five years. Canadian capacity will expand by a similar magnitude, while a number of Asian mill start-ups will also impact on New Zealand's markets. The global fibreboard market is still relatively immature and it is difficult to estimate the overall price impacts of such rapid growth. It is also unclear whether, in fact, markets exist for all the production. Table 10 shows strong increases in New Zealand exports of fibreboard. This assumes no problems for marketing New Zealand's production and this may be an optimistic assumption.

Japan has become the dominant market for New Zealand's fibreboard exports, moving Australia into second place. In 1995 Australia purchased US$37 million, Japan took US$65 million and Taiwan bought US$18 million. These markets are likely to remain among the most important although several other South-east Asian countries including, Thailand, Malaysia and the Philippines may also become significant importers of New Zealand fibreboard.

Imports

New Zealand imports minimal quantities of fibreboard, mainly hardboard from Australia.

Particleboard

Production

Particleboard is produced at three mills in New Zealand. Currently production totals around 175,000 cubic metres per annum and there are presently no plans afoot to increase production. However, the most recently constructed mill, Kopu, was completed only in 1990 which suggests the economics of particleboard manufacture in New Zealand remain sound. There is probably scope for one or two smaller mills to be commissioned soon after 2000 and Table 11 shows this scenario.

Table 11: Scenario for Growth in Market Dynamics for New Zealand Particleboard ('000 m^3)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Production	170	170	170	190	200	200	240	240
Exports	120	116	112	128	133	129	164	160
Imports	2	2	2	3	3	4	4	5
Consumption	52	56	60	65	70	75	80	85

Source: NZMOF, Author

Consumption

Domestic consumption of particleboard has declines sharply in New Zealand over the past 10 years. In 1985 particleboard consumption totalled 156,000 cubic metres. In 1995 this had declined to 46,000 cubic metres. A large part of the decline has been the substitution of fibreboard for particleboard in construction purposes. Nonetheless it is difficult to see particleboard consumption declining further. Consequently Table 11 describes a modest recovery of particleboard consumption to 2010.

Exports

As New Zealand consumption of particleboard has declined exports of particleboard have increased. In general this trend is shown as continuing in Table 11, contingent on new particleboard capacity being installed. Australia and Japan are the most important particleboard markets for New Zealand.

Imports

New Zealand imports small quantities of particleboard. Particleboard imports in 1995 totalled 2,000 cubic metres. This is unlikely to change.

Plywood and Veneer

Production

Plywood production has been a growth area in New Zealand's forest industry during the past five years with laminated veneer lumber (LVL) an important subgroup of plywood production. The opening of Carter Holt Harvey's new Tokoroa plywood plant, in tandem with the Juken Nissho plant at Gisborne, has significantly increased the plywood/veneer capacity of the sector with the result that announced plywood capacity increases will be sufficient to increase production from 164,000 cubic metres in the year to December 1995, to 295,000 cubic metres in year 2000. Veneer production (most of which is used for plywood

production) will increase by a similar magnitude. The scenario described in Table 12 assumes further capacity increases around 2005.

Table 12: Scenario for Growth in Market Dynamics for New Zealand Plywood ('000 m^3)

Year	1996	1998	2000	2002	2004	2006	2008	2010
Production	165	255	295	310	310	350	380	400
Exports	130	208	256	270	268	306	335	353
Imports	5	5	5	6	6	6	7	7
Consumption	40	42	44	46	48	50	52	54

Source: NZMOF, Author

Consumption

Plywood consumption in New Zealand has never been substantial and, with continued growth in fibreboard production, there is limited scope for consumption to increase. Increases in line with 3 percent annual growth are modelled in Table 12.

Exports

Exports will increase very much in line with increases in production. Much of New Zealand's plywood production is likely to go into North Asia markets, particularly Japan and Korea, for use in low grade construction work particularly for concrete formwork. In latter years an increasing proportion of plywood classification exports will actually be laminated veneer lumber. Presently, this comprises around a third of New Zealand's plywood exports. Veneer exports will remain relatively small, but not unimportant. Presently New Zealand exports around 12,000 cubic metres of veneer.

Imports

New Zealand presently imports around 5,000 cubic metres of plywood and 2,500 cubic metres of veneer. These are generally hardwood products sourced from Indonesia, Malaysia, Fiji and Brazil. This low level of imports is not expected to increase markedly.

Other Forestry Products

Other forestry products comprise a range of manufactured and remanufactured items including furniture and furniture components, manufactures of paper and paperboard, mouldings, prefabricated housing components and other wooden manufactures. Production data for this range of articles is not compiled as part of the forestry statistics. However, these are significant industries. As an indication, the annual export value of these items exceeds US$130 million.

Solidwood remanufacturing has been identified as a major opportunity for New Zealand to enhance the contribution made by forestry to the economy. Relatively modest investments could, on paper, return high export returns and result in significant employment within forestry. The reality has yet to transpire. Radiata Pine's image as an industrial grade timber does not lend itself to promoting higher value enduses in many markets. Additionally, the Just-In-Time nature of many secondary components markets severely disadvantages exporters relative to local firms. It seems likely New Zealand firms will need to seriously revise their strategies to compete in remanufactured markets. This may involve establishing processing plants offshore (as is presently being done in Thailand) or large scale warehousing facilities.

Remanufacturing firms are likely to continue to further process sawn timber otherwise directly destined for the export market. It is unlikely that they will generate much additional demand for roundwood.

OTHER FORESTRY ROLES AND DIMENSIONS

Fuelwood and Wood Energy

New Zealand does not collect statistics on fuelwood production or consumption. The sole available statistic is an FAO estimate of 50,000 cubic metres per annum divided evenly between coniferous and non-coniferous species. Intuitively, the FAO estimate seems too low. New Zealand households rely on four primary sources of heating; electricity, gas, and coal or wood fired burners. Many households employ some combination of these. In urban areas electricity and gas are the most popular forms of heating although coal and log fires are still frequently utilized. In rural areas wood fires and electricity without doubt predominate. Anecdotal observation suggests that at least 70 percent of rural households retain the capacity to utilize wood fires.

Given a rough assumption of 100,000 rural household in New Zealand with 70 percent of these burning one cubic metre of wood, fuelwood consumption is already 70,000 cubic metres. If one in ten urban households burned the same then this would add an additional 40,000 cubic metres, without yet considering industrial consumption.

Industrial uses of wood energy are limited generally to the wood-based industries. Forestry processing industries account for around 12 percent of New Zealand's total industrial energy consumption. Energy from the burning of wood (8.1 PJ) and pulp residues (14.9 PJ) contributes around 40 percent of total forestry energy use. A major use of off-cut wood and bark in sawmills is to fuel drying kilns. Bark is also used for electricity generation at various mills, particularly the larger pulp and fibreboard mills. Co-generation plants are also increasingly being explored. The New Zealand Ministry of Commerce estimates total forest industry processing energy consumption in 2010 will be 72 PJ of which wood will contribute 11.4 PJ and pulp residue 17.8. These estimates are not necessarily consistent with the other forecasts in this paper.

A very small quantity of fuelwood is imported annually. Most of this is probably designated for very special purposes such as firing tandoori ovens in Indian restaurants.

Non-Wood Forest Products

Non-wood forest products tend to be collected on a commercial basis in New Zealand. This is generally because the majority of natural forests are protected from all forms of unlicensed exploitation, while the planted forests are often not open to the public.

The major non-wood forest products extracted from the planted forests are turpentine which is processed at a plant in Mt Maunganui, and pine cones which are used as a fuel and particularly as a fire-starter.

In the natural forests sphagnum moss, for use in plant nurseries and absorbent purposes, is gathered. However, possibly the largest commercially extracted non-wood forest product is honey. A large variety of natural forest honeys are marketed in New Zealand. Many ferns, shrubs and small plants are extracted legally or illegally for garden and house decoration. Several forest-based plants and resins are collected non-commercially for medicinal or other purposes. Matai resin and "magic" mushrooms are both utilized by recreational drug users.

Both the planted and natural forests are host to feral pigs, deer, goats and possums, all of which are hunted for recreational and commercial purposes. A small amount of livestock grazing is available in planted forests.

Forest Services and Ecotourism

Tourism is presently New Zealand's largest earner of foreign exchange. It is probably fair to say that although not strictly ecotourism, New Zealand's entire tourist industry is based around natural and wilderness attractions. Entry to national parks is free and all have well developed networks of trails providing easy access to natural forests. In terms of specific forest attractions, the giant kauri (*Agathis australis*) Tane Mahuta (Lord of the Forest) in Waipoua forest is without doubt the major draw card. The largest kauri were logged last century and these trees, although neither the world's tallest nor broadest, had the greatest timber volume.

The Department of Conservation currently allows over 600 tourism concessionaires to operate in New Zealand’s protected areas. A recently adopted Concessions Policy covers all tourism businesses operating or applying to operate in New Zealand’s national parks, reserves and conservation areas. The policy requires all tourism concession applicants to prepare an environmental impact assessment. Tourism concessions will only be granted if they are consistent with the protection of natural resources.

Wood supplies from Non-forest areas

New Zealand has a large area of land devoted to arable and pastoral farming. However, New Zealand's geographical location, sprawled across the path of the "roaring 40's"

means large tracts of protective shelterbelts have been developed in many areas. Many of these are commercial timber species, radiata pine, macrocarpa, Lawson cypress, although generally they have not been tended for timber values. Nonetheless there exists in shelterbelts a considerable exotic wood resource, probably several hundred thousand kilometres in length, additional to the planted forests. It is notable that during the 1992 wood price "boom" harvesting of shelterbelts became a regular feature. This may have raised awareness of the potential commercial value of shelterbelts and in due course industrial wood usage of shelterbelts may become more prevalent. Presently, shelterbelts often provide a convenient source of firewood or may even be merely felled and burned as rubbish - particularly when appropriate processing facilities are not readily available. However, if timber prices rise, shelterbelts may again become an economic source of feedstock for mills. Certainly be 2010 it will be realistic to expect a far greater proportion of maturing shelterbelts to have been tended to yield a better timber quality.

Recycling and Other Fibre Types

New Zealand's small and dispersed population means that presently, collection costs in most areas make paper recycling an uneconomic activity. Auckland, with a population exceeding one million is the only city where paper collection is economically viable (although it is collected in a number of other centres). The only paper mill processing recycled paper is at Penrose in Auckland. Plans have been mooted to build a second recycling plant in the Central North Island to supplement the pulp production of the two largest pulp and paper mills. Such a plant was to have used imported wastepaper as its primary feedstock. In addition to meeting a temporary fibre shortage the recycling plant would also have provided an ecological marketing edge for these mills' production. These plans may be resurrected during the next decade.

In terms of other fibre types, New Zealand produces a substantial quantity of grain, mainly wheat, oats and barley each year. Presently there are no processing facilities for straw residues and no plans to build such facilities. New Zealand has no fibre shortage pressuring it to utilize these residues. It is merely noted that there is a resource available which could, potentially, be tapped for production of paper or "strawboard".

FORESTRY POLICIES, LEGISLATION AND INSTITUTIONS

Privatization

The most far-reaching forestry policy of the past decade in New Zealand has been the privatization policy. Since 1987 Government has shed ownership of more than 30 percent of New Zealand's planted forest resource, selling much of the estate into the hands of overseas interests. Given the current interest in privatization, globally, a brief review of the New Zealand experience is appropriate.

The intention of actual privatization of public assets, including forests, was announced in December 1987 as part of a Government fiscal strategy statement. Government businesses

were to be sold with the primary aim of reducing public debt. More philosophical reasons for state asset sales were also given, namely; Ministers are not good owners of businesses; to avoid the potential for future calls from the businesses for Government cash; to minimize the Government's risk exposure in the business sector of the economy; and to enable Ministers to concentrate on matters of economic and social policy. The criteria for asset sales were that taxpayers must receive more from the sale of a business than they would from continued ownership; and the sale of a business must make a positive contribution to the Government's economic and social policies. However, the primary rationale for forest asset sales was probably ideological, namely the question of whether it is appropriate for the State to own commercial forests.

A major objective was to rationalize State forest assets to produce a more efficient, internationally competitive forestry sector. A 1988 Forestry Working Group noted, "It is generally recognized that the New Zealand forestry resources would benefit from rationalization. Ownership of forests does not often reflect sensible economic packaging". A particular concern was the need to provide security of supplies to processors in order to attract new investment into forestry value adding industries. The sale of forests to enable processors to integrate supplier functions into their current operations was seen as a long run optimal mechanism to achieve this end.

The first round of forest sales was in the form of a sealed bid tender which closed in July 1990. Bids were to be made for the outright purchase of trees and fixed assets but with the forest land being leased under a tradable Crown Forestry Licence. This initial sales round was relatively unsuccessful in terms of actual forest divestment. Only two bids, for 72,600 hectares of forests, were accepted with all other bids being rejected as being too low. However, on the basis of these bids the Government entered into a negotiated round of sales that resulted in the sale of an additional 174,000 hectares of forests. The buyers included New Zealand forestry corporates, and several Asian-based companies.

The third stage in the privatization of New Zealand's forests was the sale of forests placed under the authority of the State-owned enterprise New Zealand Timberlands. The sale intention was announced in the Government's July 1991 Budget. In April 1992 Timberlands was sold to an American Company, ITT Rayonier. Table 13 summarizes the sales of the privatization process.

Table 13: Details of Government Forest Asset Sales

Date	Purchaser	Area (ha)	Price (NZ$ million)
Forests sold by tender			
25.7.90	Fletcher Challenge	48 852	262
25.7.90	Earnslaw One	23 801	102
Forests sold by negotiation			
30.8.90	Carter Holt Harvey	100 208	410
-.9.90	Juken Nissho	43 531	126
19.9.90	Wenita Forestry	20 521	115
-.10.90	Other	9 793	13
Forests transferred to new State-owned Enterprises			
1.12.90	Forestry Corp	165 300	
1.12.90	Timberlnds West C.	21 400	
1.12.90	NZ Timberlands	116 900	
Forests sold by NZ Timberlands			
1.4.92	ITT Rayonier	97 453	366

Source: Brown and Valentine

The final step in the privatization process may be taken later in 1996[3]. The Government is presently in the process of selling the Forestry Corporation of New Zealand, its last remaining forests of national significance. Whether this sale is achieved prior to the 1996 election may determine, to a large extent, the shape of New Zealand's commercial forestry sector in the foreseeable future. It is unlikely a sale will be made by an MMP government.

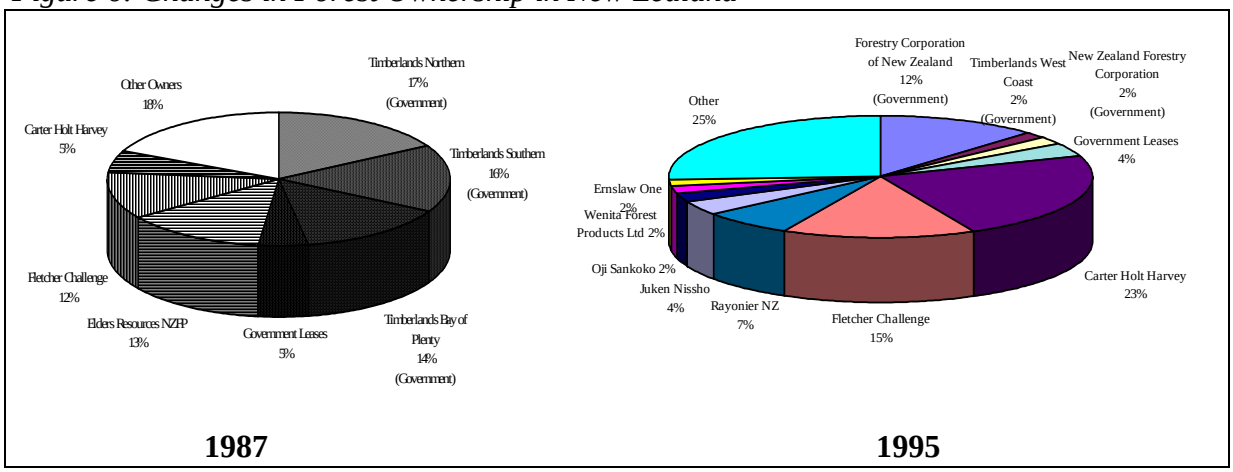
An important question in any privatization process arises as to the scope of the sale and, particularly, whether the sale should be open to foreign investors. In New Zealand the decision was relatively clear-cut. The principal rationale was revenue maximization and this end was most likely to be achieved by placing as few possible constraints on the process as possible and maximising bidding competition. The Government recognized that overseas investors had potentially greater access to capital and were consequently more likely to invest in new downstream processing facilities and this has generally proved to be the case. A side effect of the forest privatization was that it doubtless acted to effectively market investment opportunities in New Zealand forestry. The entry of foreign investors into the New Zealand forestry sector also had benefits in terms of the introduction of new technologies, the improvement of market awareness and opportunities and the promotion of efficiency through enhanced domestic competition. The major downside to opening the sale to foreign bidders was a negative public perception of foreign resource control.

[3] Stoppress: The Forestry Corporation of New Zealand was sold 20 September 1996 to a consortium of New Zealand and Chinese companies.

Patterns of Investment

The privatization policy and general economic liberalization of New Zealand have had a profound effect on investment and ownership in the New Zealand forestry Sector. Figure 6 shows changes in the status of forest ownership between 1987 and 1995.

Figure 6: Changes in Forest Ownership in New Zealand



Source: NZMOF

In 1987 the Government owned all of the Timberlands' forests. Fletcher Challenge and Carter Holt Harvey were predominantly New Zealand-owned companies and Elders Resources-NZFP was a short-lived and ill-fated Australian purchase of New Zealand Forest Products which shortly after reverted to Carter Holt Harvey.

By 1995 the picture is markedly different. A host of overseas firms have moderate holdings in New Zealand forests, ranging downward from Rayonier's 7 percent. Carter Holt Harvey's majority shareholder is American multinational International Paper, Fletcher Challenge also has the majority of its equity held offshore. Government maintains control of around 20 percent of the forests but is attempting to sell its 12 percent in Forestry Corporation, quite possibly to an overseas company, otherwise to one of the nominally New Zealand multinationals.

Investment in new forestry is being increasingly undertaken by small landowners rather than the forestry companies. In part, escalating land costs may be dissuading the forestry companies, however, the international focus of the sector in New Zealand may presently see better opportunities available in other countries where tangible investment incentives are still paid. There may also be a recognition, as forecast in Table 3, that New Zealand's processing capacity is presently insufficient to warrant further forest expansion, particularly with wood likely to begin to accumulate in the forest during the next decade.

Nonetheless, substantial investment has gone into increasing and upgrading New Zealand's wood processing capacity in the period 1988-1998 announced major processing investment totals more than US$1.4 billion. The majority of this investment has been directed at upgrading of pulp and paper facilities, establishment of new MDF capacity, or the development of laminating mills, particularly laminated veneer lumber and plywood. More than US$600 million of this investment has been by foreign-domiciled companies. The

1992 NZFIC *Forest Industries Strategy Study* identified an investment capital requirement of US$2.1 billion to implement its fibreboard dominated wood processing scenario to 2005. The study recognized that a large proportion of this investment would necessarily be foreign. These investment requirements seem relatively consistent with the scenarios presented in the Section on New Zealand Forest Industries, given the amount of investment which has occurred or been announced during the past 4 years, and a horizon to 2010.

Institutional Strengthening and Capacity building

In terms of the functions of Government in the New Zealand forestry sector the dis-establishment of the Forest Service in 1987 saw a fundamental restructuring of responsibilities within the State sphere. For the first time there was a formal recognition of, and a clear distinction made between, the separate roles of planted and natural forests in New Zealand, and a similar division between commercial and non-commercial forestry activities.

The Government's major strategy in restructuring and strengthening the forestry sector was to move toward efficient allocation of resources through specialization. The varied activities of Forest Service were spread across at least seven specialist agencies with the principal thrust being toward having a single and clearly defined purpose or goal for each of these agencies, and to make operations in these new agencies transparent and accountable.

In broad terms the restructuring gathered the planted forests into three separate state-owned corporations. The differing legal and contractual status of various Government owned planted forests made this a sensible structure. Two new Government departments were established. A Department of Conservation, with policy and administrative responsibilities for the natural forest estate, and a Ministry of Forestry with policy and forest health responsibilities pertaining mainly (but not exclusively) to the commercial, mainly planted, forests. In 1992 a restructuring of the science and research sector saw the Government's forestry research capacity divided into two Crown Research Institutes, The New Zealand Forest Research Institute and Landcare Research New Zealand. These remain Government-owned but have been given a strong commercial ethos and are expected to operate as competitive and commercial research facilities. An entire restructuring of New Zealand's science sector has attempted to promote commercially-oriented research with a sound economic basis.

Future change is imminent if the privatization of Forestry Corporation of New Zealand proceeds. This would leave only two small forest owning state-owned enterprises. Timberlands West Coast, with responsibilities for managing Government's few commercial operations in natural forests (the result of a deal struck with industry and environmentalists) is likely to see its activities quietly wound down to a point where Government no longer operates industrial forestry in natural forests. Crown Forestry Management which manages scattered forests residual to the forest asset sales process may also be quietly wound down. These forests may be used to help settle maori land grievances, used for natural forest swaps or sold to the private sector.

Environmental Issues and Initiatives - Sustainable Forest Management

Sustainable management is presently the key environmental driver in the international environmental debate on forests. In New Zealand, two pieces of legislation, the Resource Management Act 1991 and the 1993 Amendments to the Forests Act 1949 contain the central legal thrust toward sustainable forest management in a New Zealand context.

(i) The Resource Management Act 1991

The Resource Management Act (RMA) is the core of New Zealand's sustainable management strategy. It was introduced to specifically to promote the sustainable management of natural and physical resources. The Act establishes a national framework defining sustainable management and requiring that, beneath this framework regional authorities implement detailed plans establishing the broad variety of thresholds which are deemed to constitute sustainable management. By delegating the resource management planning process downward to smaller authorities Government is attempting to recognize that thresholds for sustainable management vary across regions and different geographic features.

Sustainable management is defined in the RMA as:

Managing the use, development, protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well being and for their health and safety while -

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life supporting capacity of air, water, soil, and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects on the environment.

The focus of the RMA is on controlling the environmental effects rather than activities per se. Consequently, thresholds are set for such measurable indicators as water quality, water quantity, soil retention, air quality and suchlike. A specific activity cannot be banned under the Act if it can be proved to adequately conform with all the prescribed thresholds. Note that the RMA impacts on both land use and industrial activities. Consequently, forest establishment, management and harvesting must comply with the Act, as must processing facilities and particularly their discharges, and disposal of wastes and effluents.

(ii) The 1993 Amendments to the Forests Act 1949

The Forests Act was amended in 1993 specifically to define and implement the principles of sustainable management of New Zealand's indigenous forest land. It defines sustainable management of indigenous forests as:

"the management of an area of indigenous forest land in a way that maintains the ability of the forest growing on that land to continue to provide a full range of products and amenities in perpetuity while retaining the forest's natural values".

The indigenous forest management provisions envisage both the retention of forests in their present extent and condition, and ultimately the enhancement of natural forest values. It is recognized that these forests are vital for the conservation of a wide range of New Zealand's biological diversity, particularly threatened plants and animals; and the protection of natural landscapes. The amendments require that a government-approved sustainable management plan cover all harvesting operations, that processing facilities be licensed by Government, and that unprocessed wood not be exported abroad. There are several exempted areas under the Act which remain controversial in New Zealand but are less important on a global level.

The indigenous forest provisions of the Forests Act work in conjunction with the provisions for sustainable management in the Resource Management Act 1991. Included in the Resource Management Act 1991 is scope for the protection of areas of significant indigenous vegetation.

Environmental Issues and Initiatives - Ecosystem and Biological Conservation

Conservation and preservation policy is developed and administered by the Department of Conservation in New Zealand. The Department of Conservation also administers the Government's protected natural forest estate. This includes National parks, forest parks and other state-owned protected forest land. In 1996 this forest estate was estimated at 4.9 million hectares.

The Department of Conservation also administers the Government's endangered species programme, a part of which comprises protecting unique ecosystems from disruption or incursion of introduced species. Most of New Zealand's rare or endangered species are forest-dwelling birds which have been decimated by introduced mammals. A central part of this programme involves maintenance of "clean" offshore islands which are free from predators, notably cats, rats, weasels and stoats.

The primary destroyer of natural forest trees and plants is the introduced Australian brush-tailed possum. This possum remains a major pest and present efforts to control possum populations are inadequate.

Forestry taxation

New Zealand's general approach to taxation is toward the creation of a system which is "neutral" in that it is equitable and does not provide advantage for any business sector over another. Consequently forest product businesses are treated in much the same way in terms of taxation as other businesses.

New Zealand's forestry specific taxation rules specify that costs incurred by a forestry business in planting, tending and maintaining a crop of trees are fully deductible from income of any source in the same year costs are incurred. This system replaced the previous system whereby costs incurred in forest growing were deferred until an income was generated from

the harvest of that forest. The value of a forest must be capitalized and expensed against revenue from the forest as it occurs.

Indigenous Peoples' Issues

Maori are significant players in the New Zealand forestry sector, with around 7,000 hectares of Maori controlled forest, and a further 70,000 hectares of forestry on Maori owned land. In some regions of New Zealand this involvement is proportionally more significant for example in Northland, where Maori forestry holdings make up more than 25 percent of the planted estate.

Significant claims have been registered with the Waitangi Tribunal for over 60,000 hectares of forest land. This Tribunal, charged with working through and resolving Maori land grievances, can return Crown lands (and potentially forests) to Maori if claims are substantively proved. Similar ownership issues affect "Crown" forestry leases, where the government holds forestry leases on Maori lands for periods of up to 90 years - tribal groups are looking to assume ownership of the forestry leases where a satisfactory settlement can be agreed with Government.

Increasingly Maori see forestry as a significant vehicle for sustainable capital development to benefit both current and future generations. In regions of New Zealand like the East Coast (where Maori landowners have access to grant monies to help with the planting of trees for conservation purposes) and on Northland (where the Ministry of Forestry works to facilitate forestry development on otherwise unmanaged land) forestry will play an important role in Maori sustainable development. A significant recent trend is the emergence of tribal-based forest companies. This is an example of increasing Maori economic confidence and independence.

NEW ZEALAND FORESTRY IN A GLOBAL CONTEXT

Evolution of Trade Flows

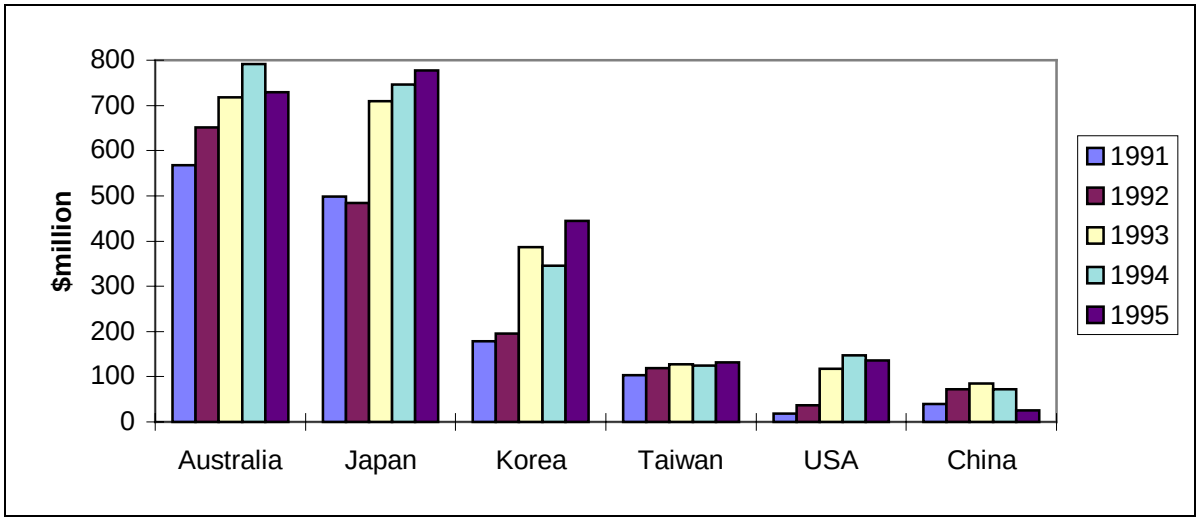
New Zealand's forestry trade is presently dominated by three countries, Australia, Japan and Korea. Between them, these countries absorbed 74 percent of New Zealand's 1995 exports. This market concentration leaves New Zealand vulnerable to downturns in any of these markets and is leading to New Zealand actively seeking a more diversified market base, particularly seeking greater scope to trade in processed products. Presently, logs comprise 82 percent of New Zealand's exports to Korea and 30 percent of exports to Japan.

A part of New Zealand's future trade strategy will be to substitute processed products for logs into Japan and Korea. Some slow progress has been made in this direction in Japan. New opportunities in these markets are expected as supply shortfalls from Indonesia and Malaysia occur, however, offsetting this will be reduced opportunities in the Australian market as that market moves toward self-sufficiency. Increasing production from Australia is a major concern for New Zealand since Australia presently absorbs around 30 percent of New Zealand's exports, including a considerably higher proportion of processed products. Increasing efforts are being devoted to the development of new markets.

In the long run, New Zealand may well find itself selling the bulk of its logs into Korea and China with some sawn timber being exported to these markets as well. China, although historically not proving a stable market, appears to offer vast potential. Japan may develop further into a market for processed product, particularly for panel products, while continuing to import a moderate volume of logs. New Zealand sawmillers may find their best opportunities in South-east Asia, Thailand, Philippines and Malaysia. Some high quality timber should continue to be exported to the United States. Market-trading countries such as China-Taipei, Hong Kong and Singapore are likely to continue to purchase a range of New Zealand wood products.

The pulp and paper sector is likely to become increasing focused on Australasia with only the Asian-owned pulp companies exporting beyond these bounds. This focus is likely to see a marked decline in New Zealand's imports of paper and consequently in total forestry imports. Figure 7 shows exports of forestry products to New Zealand's major markets during the past five years.

Figure 7: Value of NZ Forestry Exports by Destination Country 1991-1995 ($NZ)



Source:NZMOF

New Zealand's International and Regional Roles

New Zealand's roles in global forestry can be broadly summarized in four categories:

i) as already discussed, at an industrial level New Zealand is a net exporter of forestry products;

ii) in global forestry debates New Zealand is a small and generally moderate country regarded by most as having few "axes to grind". It's primary contribution is often as an arbiter or conciliator, seeking ways to progress deadlocks between more protagonistic countries. New Zealand's primary concern is to ensure plantation forestry, as practised in New Zealand, continues to internationally accepted as a means of achieving environmental objectives;

iii) as described in the introduction New Zealand provides a "model" for a range of topical policies including plantation forestry and privatization;

iv) in the South Pacific New Zealand is a substantial source of development funding. New Zealand's bilateral assistance on forestry is provided in response to specific requests from partner governments on the basis of their national and regional plans and priorities. Bilateral assistance is directed primarily to the island states of the South Pacific. New Zealand participates in projects by contributing technical assistance, cash grants, material supplies, and training. Currently New Zealand is associated with overseas development assistance in seven Pacific Island Developing Countries.

International Environmental Initiatives

(i) South Pacific Forum

The 25th South Pacific Forum held in Brisbane from 31 July to 2 August 1994 expressed concern at the destructive harvesting of forests in the region and the world. The Prime Ministers of Australia, Fiji, New Zealand, Papua New Guinea, Solomon Islands and Vanuatu agreed at the Forum to 'work towards a common code of conduct on logging of indigenous forests to which companies operating in their countries will adhere and on the need to increase urgently monitoring of logging and exports of timber'. A regional code of conduct was drafted through two meetings of government officials and technical foresters. It was ratified at the Forum meeting in mid-1995.

(ii) International Tropical Timber Organization (ITTO)

New Zealand became a member of the ITTO in 1992. This is particularly significant since at the same time when New Zealand was withdrawing from a number of other commodity agreements. At the 16th session of the Council New Zealand was elected as Vice-chair for 1995 and to be Chairman in 1996. New Zealand has unconditionally signed the renegotiated International Tropical Timber Agreement and is also a signatory to the attached Consumer Group statement which parallels Target 2000, committing to sustainable management of its own forests by 2000.

(iii) International initiatives for sustainable management of forests

New Zealand is playing an active role in international working groups seeking to develop criteria and indicators for the sustainable management of the world's forests, especially the Montreal Process. New Zealand has been actively involved in the range of initiatives and more recently this includes FAO's Ministerial meeting and COFO, Intergovernmental Panel on Forests, the World Commission on Forestry and Sustainable Development, and various certification initiatives.

(iv) Climate Change

The New Zealand Government has ratified the Framework Convention on Climate Change and has introduced a number of policy measures which are expected to limit CO2 emissions. These policies are spelt out in detail in New Zealand's national communication under the Framework Convention on Climate Change which was submitted in September 1994. New Zealand's forest sinks play an important role in New Zealand's CO2 emissions limitation strategy.

(v) Biological diversity

New Zealand undertook an analysis of its legislation and policies prior to ratifying the Convention on Biological Diversity in September 1993. In doing so it considered the status and management of its forests and related dependant ecosystems and species. The protected forested areas in New Zealand provide a significant contribution to conservation of New Zealand's biodiversity. Similarly, the measures that are available under a variety of other legislation (e.g. the RMA and the indigenous forest provisions of the Forests Act) provide for effective measures to ensure that any use of non-protected forest resources is sustainable and does not contribute to the loss of biodiversity or result in land degradation.

ANNEX 1: NEW ZEALAND - GENERAL STATISTICS

Population	3.6 million
Density	13.4 persons/km^2
Growth Rate	1.8 percent/annum (1995)
Literacy	>98 percent
Language	English
Capital	Wellington

Monetary Unit	New Zealand Dollar
Exchange Rate	NZ$1 = US$0.66 (1995 Average)
Inflation	
1993	1.4%
1994	2.8%
1995	2.9%
GDP real growth	
1993	2.1%
1994	5.5%
1995	6.0%
GDP per capita	US$15 180 (1995)
Labour Force	1,775,900 persons (1995)
Unemployment rate	6.2 % (December 1995)
Official Government Sector Debt	US$15,020 million (December 1995)
New Building Approvals	23,681 (Year ended March 1996)

ANNEX 2: NEW ZEALAND FOREST STATISTICS (FOR 1995)

Total Land Area	27,053 400 ha
Forest Area Total	7,884,000 ha
Natural Forest Area	6,406,000 ha
Planted Forest Area	1,478,000 ha
Total Government Ownership	5,331,000 ha
Total Private Ownership	2,553,000 ha
Total Productive	1,744,000 ha
Total Unproductive	6,140,000 ha
Legally Protected (IUCN classes)	5,573,000 ha
Inaccessible	545,000 ha
Total Coniferous Planted Forests	1,437,000 ha
Radiata Pine Planted Forests	1,378,000 ha
Non-Coniferous Planted Forests	41,000 ha
Total Annual Deforestation	25,600 ha
Total Annual Reforestation	98,200 ha
Planted Forest Standing Volume (Average)	207 m3/ha
Planted Forest Standing Volume (Total)	306,000,000 m3
Planted Forest Current Annual Increment	16.4 m3/ha
Average Rotation (Radiata Pine)	28 years
Average Age	13.3 years
Current Annual Harvest - Planted Forests	16,974,000 m3
Current Annual Harvest - Natural Forests	114,000 m3

ANNEX 3: ROUNDWOOD RECONCILIATION OF INDUSTRIAL PRODUCTION

Production scenarios for various forest industries in New Zealand are proposed in the main text. This table applies approximations of current roundwood conversion factors in New Zealand to the various industrial production to calculate roundwood equivalents. Comparing this calculation with the Turland et al harvest predictions shows the relative consistency of scenarios proposed in the text.

Year	Table[1]	Cnv.f[2]	1996	1998	2000	2002	2004	2006	2008	2010
Roundwood Harvest	3		17,627	18,372	20,000	23,507	24,720	25,608	26,090	28,725
Log Exports	3	1.0	5,476	5,500	6,000	7,000	7,500	8,000	8,000	8,500
Sawn Timber	4	1.8	5,508	5,760	6,030	6,282	6,534	6,786	7,038	7,290
Wood Pulp (Exports)[3]	6	3.08	1,971	2,002	1,552	1,601	1,632	1,663	1,694	1,724
Newsprint	7	2.5	950	700	650	650	650	650	650	650
Paper and Paperboard	8	4.6	2,300	3,036	3,266	3,358	3,450	3,542	3,634	3,726
Fibreboard	10	1.5	1,050	1,380	1,575	1,875	2,025	2,175	2,325	2475
Particleboard	11	1.5	255	255	255	285	300	300	360	360
Plywood	12	1.7	280	433	501	527	527	595	646	680
Industrial Rdwd Eqvt[4]	N/A		17,790	19,066	19,799	21,578	22,618	23,711	24,347	25,405
Efficiency Error[5]	N/A		163	694	299	578	618	711	847	905
Accumulated Forest Stock[6]	3		0	0	500	2,507	2,720	2,608	2,590	4,225

Notes

1 *Refers to Table No. providing data source in the main text.*

2 *1995 Conversion factor (derived from Ministry of Forestry Statistical Releases).*

3 *Non-exported production is used in Newsprint or Paper and Paperboard production.*

4 *Industrial Roundwood Equivalent is the sum of the 8 rows above*

5 *Efficiency error is the difference between the Turland et al forecast compared with Industrial Roundwood Equivalent added to Accumulated Forest Stock*

6 *Accumulated Forest Stock is the annual increase in the growing stock in the forest as a result of underharvesting*

ANNEX 4: EXPORTS OF FORESTRY PRODUCTS FROM NEW ZEALAND BY MAIN COUNTRIES OF DESTINATION 1995

Country of Destination	Logs and Poles		Sawn Timber		Wood Pulp		Paper & paperboard		Panel Products		All other forestry products	All forestry products
	Quantity (m3)	Value (NZ$000)	Quantity (m3)	Value (NZ$000)	Quantity (tonnes)	Value (NZ$000)	Quantity (tonnes)	Value (NZ$000)	Quantity (m3)	Value (NZ$000)	Value (NZ$000)	Value (NZ$000)
American Samoa	17	12	-	-	-	-	104	116	323	231	1,908	2,267
Australia	5,657	625	371,291	193,827	102,973	104,823	199,021	219,178	139,311	78,843	131,451	728,747
Belgium	-	-	-	-	2,558	1,886	-	-	-	-	47	1,933
Britain	-	-	659	473	51	38	-	-	17	23	3,855	4,389
Canada	-	-	243	324	-	-	-	-	-	-	542	866
Chile	-	-	813	1,192	-	-	-	-	-	-	688	1,880
China	116,426	13,277	2,603	763	11,509	9,397	200	249	1,762	838	1,160	25,684
Cook Islands	11	7	1,760	1,171	-	-	61	200	426	398	1,498	3,274
Fiji	-,	-	-	-	39	67	9,929	12,807	2,668	1,343	1,857	16,074
French Polynesia	-	-	254	214	-	-	1,586	1,823	1,086	898	3,061	5,996
Hong Kong	-	-	16,794	6,414	327	415	53,646	51,741	31,348	15,619	2,986	77,175
India	13	1	-	-	2,955	2,875	2,354	2,868	19	12	231	5,987
Indonesia	367	94	1,218	798	77,577	81,175	803	1,094	7,130	3,102	8,674	94,937
Japan	1,854,485	241,590	303,791	99,713	260,628	126,906	924	1,741	325,473	230,162	78,142	778,254
Korea, Republic of	3,080,229	363,323	69,286	17,465	49,560	52,974	729	803	22,671	8,757	1,891	445,213
Malaysia	10,413	2,374	700	447	14,815	15,399	19,260	18,794	451	188	1,005	38,207
Netherlands	-	-	150	121	-	-	-	-	47	162	965	1,248
New Caledonia	226	101	16,600	7,346	-	-	1,748	2,114	987	763	2,827	13,151
Papua New Guinea	-	-	-	-	-	-	2,484	2,863	262	243	1,681	4,787
Philippines	61,987	10,623	9,362	2,963	11,721	12,319	6,278	6,445	5,037	2,522	1,618	36,490
Singapore	154	79	1,675	840	185	227	19,583	19,752	16,968	7,088	822	28,808
Solomon Islands	-	-	-	-	-	-	75	220	231	190	393	803
Spain	-	-	-	-	517	579	-	-	-	-	137	716
Taiwan	65,422	8,760	79,873	23,956	64,874	65,882	143	131	67,939	31,998	458	131,185
Thailand	2,754	584	23,785	7,802	19,625	22,555	6,532	6,102	1,005	612	1,192	38,847
Tonga	103	54	2,163	1,290	-	-	161	379	376	317	900	2,940
USA	63,917	10,081	164,339	95,751	18,093	14,140	2,561	3,168	229	202	12,241	135,583
Western Samoa	-	-	1,167	683	-	-	164	421	900	739	3,170	5,013
Other Countries	109	32	4,041	1,984	2,804	2,521	2,589	6,386	1,788	1,056	6,106	18,085
Total	**5,262,290**	**651,617**	**1,072,567**	**465,537**	**640,811**	**514,178**	**330,935**	**359,395**	**628,454**	**386,306**	**271,506**	**2,648,539**

ANNEX 5: NATIONAL EXOTIC FOREST DESCRIPTION -NATIONAL AND REGIONAL WOOD SUPPLY FORECASTS - 1996

by Paul Lane (NZMOF) & Lisa Te Morenga (NZFRI)

In October 1996, the New Zealand Ministry of Forestry published the latest National Exotic Forest Description (NEFD) wood supply forecasts. The Overview from this report is reprinted below. [As can been seen, these new wood supply forecasts remain consistent with the forecasts used in the main paper with the base and new planting wood flow scenarios incorporating this paper's forecast for 2010 in their narrow range and a virtually identical late cut scenario used as is modelled in Table 3]

Overview

The potential sustainable wood supply available from New Zealand's planted production forests is forecast to rise from 17.1 million cubic metres in the year ending 31 March 1996 to almost 30 million cubic metres by 2010, a 73 percent increase. The volume of pruned logs is forecast to rise steadily from 1.5 million cubic metres in 1996 to 4.2 million cubic metres in 2010, an almost three-fold increase. Radiata pine makes up 89 percent of the wood supply in 1996 and is expected to increase to 93 percent by 2010.

The forecast 73 percent increase in annual wood harvest between 1996 and 2010 will result in a doubling of the area of forest harvested each year. The forecast harvest in 2010 will be from clear felling 53,000 hectares of planted production forest, compared with the estimated harvested area of 26,000 hectares in the year ending March 1996.

This study uses six scenarios to show the outcome of a range of options on the long-term, sustainable supply of wood. Three clear fell age scenarios: base cut, early cut, and late cut are based on the age of harvesting and assume no new planting.

Three new planting scenarios: plant 40,000 ha/year, plant 60,000 ha/year, and plant 90,000 ha/year are based on a range of new planting levels. The primary assumptions for each of these scenarios are shown in table A5-1.

Table A5-1: Primary Assumptions for Each Scenario

Scenario	Target clear fell age for radiata pine (years)	Area of national new planting (ha/year)
base cut	28	0
early cut	25	0
late cut	35	0
plant 40,000 ha/year	28	40,000
plant 60,000 ha/year	28	60,000
plant 90,000 ha/year	28	90,000

Radiata pine was modelled on a non-declining yield basis in all scenarios, and all areas clear felled are assumed to be replanted in the year following clear felling.

Increased growth rates from genetically improved planting stock have not been directly included in any of the scenarios. The long-term wood supply forecasts presented are considered to be conservative without the inclusion of genetic improvement.

The base cut scenario is the best forecast of future wood supply based on the existing planted forest estate. The early and late cut scenarios provide estimates of upper and lower bounds within which the future level of harvest will almost certainly fall. These clear fell age scenarios show the effect of selecting different target clear fell ages on the long-run wood supply when it is managed on a sustainable yield basis.

The new planting scenarios show the outcome of different levels of new planting on the long-run forecast wood supply. The impact of new planting does not dramatically increase the wood supply until 2020. The plant 60,000 ha/year scenario is the best estimate of future new planting. The other two new planting scenarios provide likely estimates of upper and lower bounds.

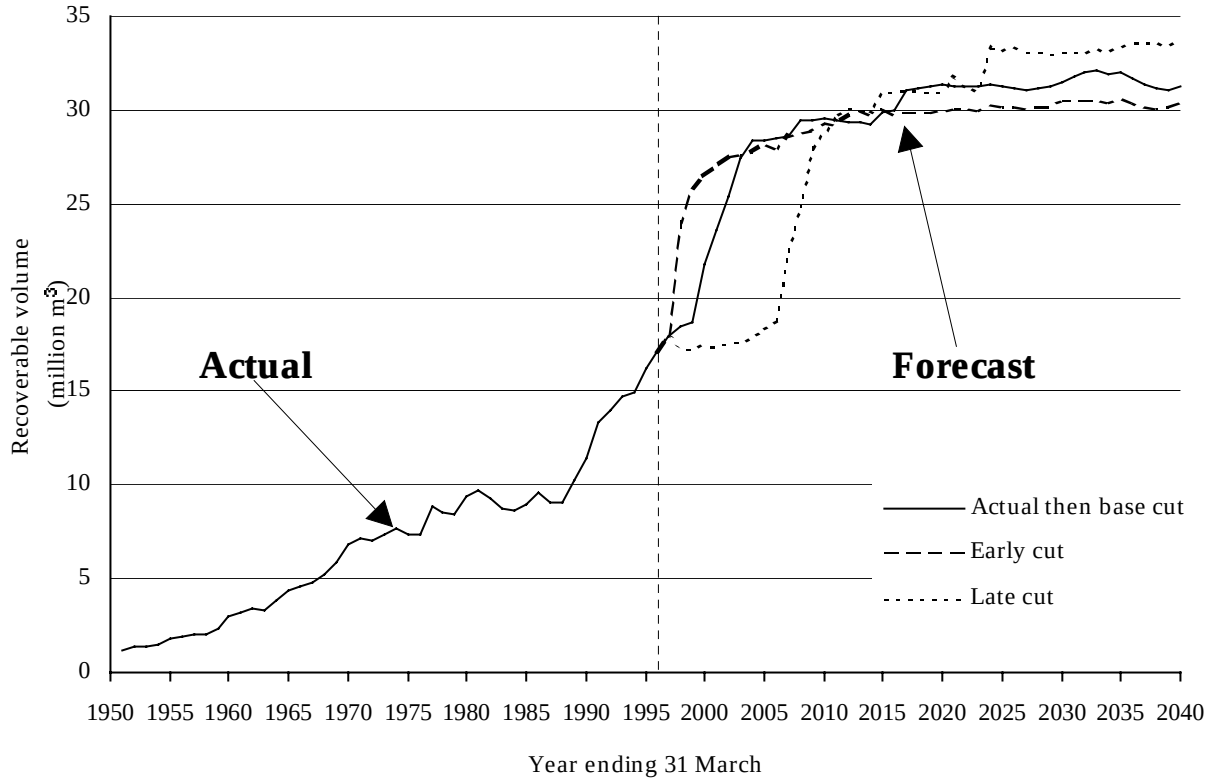
Separate forecasts were carried out for each of the 10 wood supply regions: Northland; Auckland; Central North Island; East Coast; Hawkes Bay; Southern North Island; Nelson & Marlborough; West Coast; Canterbury; and Otago & Southland. These were then aggregated to provide the national forecasts summarized in table A5-2.

Table A5-2: National Wood Supply Forecasts (Average Annual Recoverable Volumes Million Cubic Metres/ Year)

Lustrum	Base cut	Early cut	Late cut	Plant 40,000 ha/year	Plant 60,000 ha/year	Plant 90,000 ha/year
1996-00	18.8	22.3	17.4	18.8	18.8	18.8
2001-05	26.6	27.6	17.7	26.6	26.6	26.6
2006-10	29.1	28.7	24.6	29.2	29.2	29.3
2011-15	29.4	29.8	30.2	30.3	30.5	31.0
2016-20	31.0	29.9	31.0	32.0	32.4	32.9
2021-25	31.3	30.1	32.1	40.3	42.4	43.4

Graph 1 shows the wood supply forecasts in context with historical levels of planted forest harvest since 1951. This graph illustrates that the increase in the rate of harvesting that began in 1989 will continue until around 2005 in the base cut scenario. While there have been major structural changes in the ownership of planted forests during the 1990s, the primary reason for the increase in harvest was the establishment of significant areas of new planted production forests from the early 1970s to the mid-1980s. During the 15-year period 1971 to 1986 an average 45,000 hectares of new forest was established each year.

Graph 1: Actual and Forecast Harvest from New Zealand's Planted Forests



Notes:
1. The vertical line indicates the beginning of the forecasts (1996).
2. Source of actual planted forest volumes: New Zealand Forestry Statistics 1995, Ministry of Forestry, 1996. Table A11, pp 16.

The forecast for each of the clear fell age scenarios rises steeply from 1997 to 2010. Each of these scenarios reaches a plateau where the annual recoverable volume becomes reasonably constant indefinitely. Table A5-3 summarizes these levels and the years they are reached.

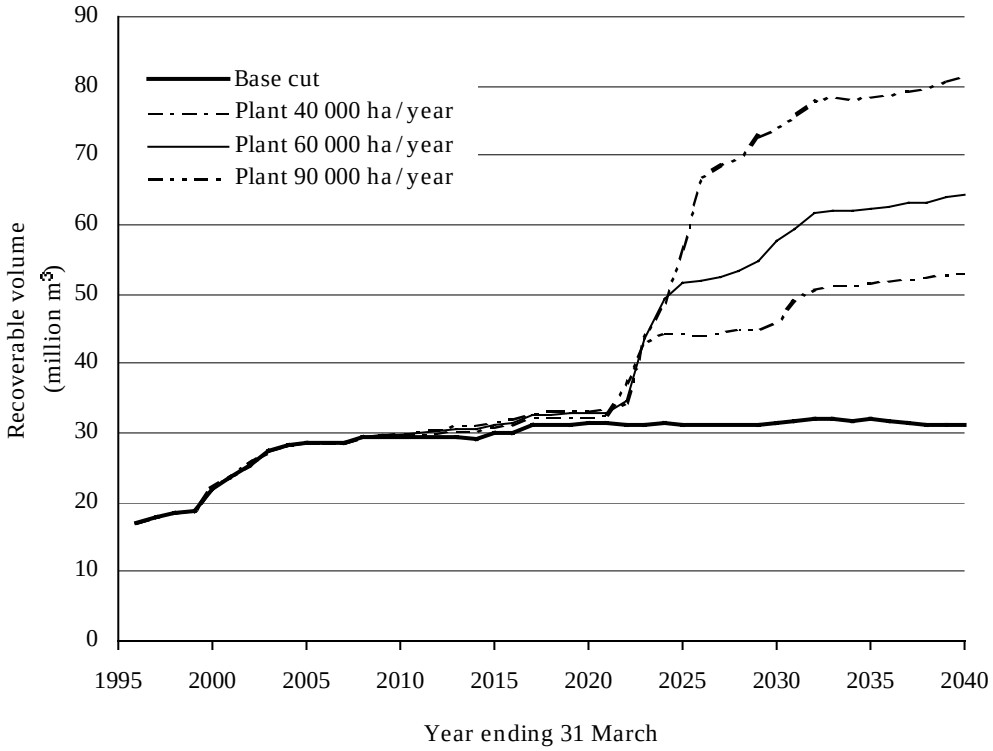
Table A5-3: Maximum Recoverable Volumes Forecast for the Clear fell Age Scenarios

Scenario	Target age of radiata pine (years)	Maximum recoverable volume (million m3/yr)	Year available from
Base cut	28	31.0 - 32.1	2017 on
Early cut	25	29.7 - 30.5	2012 on
Late cut	35	33.1 - 33.6	2024 on

The early cut forecast demonstrates a sharp rise in wood supply post-1997, reaching a plateau around 2012. However, this plateau stabilizes at a level one to two million cubic metres lower than the other scenarios. It is also important to recognize that the physical properties of radiata pine logs from 25-year-old stands are different from logs produced from older stands.

The wood supply forecast from the new planting scenarios does not reach a steady state plateau since new areas of forest are continuously established over the forecast horizon (see graph 2).

Graph 2: Forecast Wood Supply from New Zealand's Forests Assuming Constant New Planting



The Central North Island is the dominant wood supply region, producing 59 percent of the forecast national wood supply in 1996. While still remaining dominant, the future supply of wood produced in the Central North Island is relatively constant. In regions with extensive areas of young planted forests, such as Northland and the East Coast, there will be large increases in wood supply as forests in these regions begin to mature.

The forecasts in this report are essentially resource-based forecasts of the level of harvest attainable given the assumptions on yields, areas and harvesting constraints. This is not a prediction of how companies will manage the cut from their forests, nor is it a prescription for how their cut should be managed.

SOURCES

Algar H.M.; *Sustainable Forests: The New Zealand Experience*; Presentation to Sustainable Forests: Integrating the Experience; an International Conference on Implementing Ecosystem Management; June 5-9, 1995; Sault Ste. Marie, Ontario, Canada.

Brown C.L. and Valentine J*; The Process and Implications of Privatization on Forestry Institutions: Focus on New Zealand;* Unasylva Vol. 45:178; pp 11-19;1994/3; FAO.

CSD 95 National Report: New Zealand: Agenda 21-Chapter 11: Combating Deforestation and "Non-legally Binding" Forest Principles; 1995.

Edgar M.J., Lee D. and Quinn B.P.; *New Zealand Forest Industries Strategy Study*; 1992; New Zealand Forest Industries Council.

Fenton R; *Response to SDR's Thinking Aloud*; New Zealand Forestry; pp 4-5; May 1994; NZ Institute of Foresters.

Government of New Zealand; *Pathway to 2010*; Government Print Press; 1994.

McLarin M; *A Report on Wood Supply and Demand in Australia*; 1995; NZ Ministry of Forestry

New Zealand Ministry of Forestry; Internal Working Paper; *Skeleton Overview of the New Zealand Forest and Forest Products Industry;*1995.

New Zealand Ministry of Forestry; *Investment Opportunities in the New Zealand Forest Industry*; 1995.

New Zealand Ministry of Forestry; *Investment Update*; February 1996.

New Zealand Ministry of Forestry; *New Zealand Forestry Statistics 1995*; June 1996.

New Zealand Ministry of Forestry; *The Outlook for Forestry 1995/96 - 1999/2000*; March 1996.

New Zealand Ministry of Forestry; *Statistical Release* (Various); 1996.

Turland J, Wakelin S, and Lane P; *National Exotic Forestry Description 1992 National and Regional Wood Supply Forecasts*; Ministry of Forestry, April 1993.

List of documents already printed

APFSOS/WP/01	Regional Study - The South Pacific
APFSOS/WP/02	Pacific Rim Demand and Supply Situation, Trends and Prospects: Implications for Forest Products Trade in the Asia-Pacific Region
APFSOS/WP/03	The Implications of the GATT Uruguay Round and other Trade Arrangements for the Asia-Pacific Forest Products Trade
APFSOS/WP/04	Status, Trends and Future Scenarios for Forest Conservation including Protected Areas in the Asia-Pacific Region
APFSOS/WP/05	In-depth Country Study - New Zealand