

**ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY**  
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REGIONAL STUDY - THE SOUTH PACIFIC

by

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### **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:

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## **INTRODUCTION**

*The South Pacific is a large and geographically dispersed region stretching more than 5000 kilometres from Papua New Guinea in the west to Pitcairn Island in the east, and from the equator to the Southern tip of New Zealand. Occasionally political boundaries may exceed these definitions. It is broadly made up of the nations and territories which comprise the sub-regional groupings of Melanesia, Polynesia and Australasia.*

*In such a region enormous diversity is inevitable. For instance, it is not normally possible to make meaningful generalisations which will accurately describe some facet in, for example, both Australia and Tuvalu. For almost every theme discussed in this paper there will be subtle differences between the situation in individual countries that will detract from the accuracy of any generalisation. Nonetheless, the paper deals in generalisations and examples and hopefully builds a picture which broadly describes the forestry situation in the South Pacific region, if not for specific countries of the South Pacific.*

*The paper can be divided into two parts. The first section comprises a series of short profiles for the countries of the region outlining the forestry situation, major issues and future prospects for each. New Zealand, as the subject of a separate individual in-depth study, is omitted and generally given a minimal focus throughout the paper. The second section is a series of thematic studies which attempts, where possible, to treat the South Pacific as a single entity and look at patterns across a variety of themes while also examining various countries under these themes.*

*[At the outset it should be noted that the study is a desk-based research, mainly reliant on existing studies and statistics. It was evident in the course of research that the Pacific Islands forestry situation is generally not well documented in terms of statistics. There are few recent forest inventories, production and trade data are generally neither recent nor readily available. Given the generally small land areas of the Pacific islands, forest resources can be significantly depleted in a very short time in response to policy change. In some instances, patterns assumed in making future projections may have changed since the most recent available data and consequently attention should be paid to the currency of the sources noted].*

The Melanesian countries are all heavily forested. Table 3 shows wooded land cover in Melanesia ranging from Fiji at 47 percent to Papua New Guinea with 93 percent. On a per capita basis Melanesia is well endowed with forests. With the exception of Fiji, which has only slightly more than one hectare per head of population, the other Melanesian countries have between five and ten hectares of forest per head. However, with the exception of Papua New Guinea, the Melanesian land area is relatively small. While Papua New Guinea is similar in size to Spain, the remaining Melanesian islands collectively have a land area only slightly larger than Ireland. As a consequence, even short run departures from sustainable management forest regimes can have significant long run impacts on forests.

## **1. COUNTRY OVERVIEWS**

### ***1.1 Australia***

The Australian continent covers a land area of 7.54 million km<sup>2</sup>. A large portion of the country, however, particularly the interior, is arid or desert land. Australia's forest resources are mainly located in a broad coastal band extending the length of the eastern seaboard. It has 418 000 km<sup>2</sup> of forests which, while covering only 5 percent of the land area, give Australia the largest forest resource in the South Pacific. An additional 1 057 000 km<sup>2</sup> is classified as woodlands.

The vast majority of the Australian forest resource is natural forest. This comprises 407 000 km<sup>2</sup> or 97.5 percent of the forest resource. The greater part of this forest is dominated by eucalypts, with the balance being a made up of cypress pine (*Callitris spp.*), paperbarks (*Melaleuca spp.*), and tropical rainforest. Around 70 000 km<sup>2</sup> (17 percent) is reserved for conservation purposes in

National parks and reserves. The remainder is in very roughly even portions of state forests (30 percent), private forests (28 percent) and other Government lands (26 percent). The state forest resource is generally of considerably higher quality than the private resource and around 60 percent of the state resource is available and accessible for harvest within a multiple use framework.

Australia presently has about 11 000 km<sup>2</sup> of plantations. Of this, 87 percent is softwood (mainly radiata pine) and 13 percent is native hardwoods. Plantations are being established at a current rate of around 25 000 hectares per year. The bulk of the plantation estate is less than 25 years old. Consequently, plantation woodflows are unlikely to peak until some time after 2005. In the meantime Australia's plantation harvest potential is accelerating toward a point where it will become a net exporter of forestry products.

Australia and New Zealand are the only developed nations in the South Pacific. They are also the only countries with fully integrated downstream forestry processing facilities. Australia presently produces a full range of forestry products including 3.7 million m<sup>3</sup> of sawn timber, 1.5 million m<sup>3</sup> of panel products and 2.2 million tonnes of paper and paperboard. Australia is also the world's largest exporter of woodchips. Despite this, Australia runs a forest products trade deficit, largely because its production is mainly consumed domestically, its exports are dominated by less processed products (more than half the value of exports are woodchips) while its imports are mainly more processed products.

The future for the Australian forestry industry is promising, particularly in comparison with most other countries in the South Pacific. Australia's major problems are similar to those of many developed countries and on a different plane to the less developed countries reviewed in this study. Australia's major challenges are in accessing investment capital to maintain competitiveness, resolving industry-environmental tensions and restructuring the government-industry interface particularly as it relates to wood supplies. Australia will become a net exporter of forestry products some time during the next 15 years with the majority of production swinging toward plantation grown wood.

## **1.2 Papua New Guinea**

Papua New Guinea is the second largest country of the South Pacific behind Australia. Its land area of 452 000 km<sup>2</sup> is comprised of the eastern half of the island of New Guinea, the Bismarck archipelago and a cluster of small island groups. Most of the country is mountainous with the highest point, Mt Wilhelm, an impressive 4500 metres. There are also, however, extensive lowland plains in basins of the major river systems.

The total area of natural forest in Papua New Guinea is estimated (PNG Forest Authority: 1995) to be 360 000 km<sup>2</sup> (78 percent of the total land area). However, similarly to the Solomon Islands, the potentially operable estate is considerably smaller at around 126 000 km<sup>2</sup>, and the presently commercially viable forest area is estimated at 88 000 km<sup>2</sup>. The World Bank (1990) quoted an estimated annual sustained yield for the PNG forests at between 3.6 (with a 50 year cutting cycle) and 6 million cubic metres. The latest PNG Forest Authority estimate is 4.9 million cubic metres with a 35 year cutting cycle.

At present official statistics indicate the PNG forest products industry is operating in the vicinity of sustainable yield management. Log exports in 1994 totalled 3.1 million cubic metres accounting for almost 99 percent of PNG's forest products export revenues. No clear figure exists for additional harvest but the World Bank (1990) quotes a projection of domestic sawn timber and plywood consumption for 1993 at 500 000 cubic metres. This projection appears significantly beyond PNG's processing potential and even if it were achieved, at a conversion rate of 35 percent, the harvest remains below the PNG Forest Authority best estimate for sustainable yield. The major questions regarding sustainability are as to the accuracy of this best estimate and the extent of illegal or unrecorded logging in PNG.

Plantation establishment in PNG has been sporadic, dependent on availability of funds, supervisory personnel and land. However, by 1992 PNG's plantation estate totalled around 43 000 hectares with the Forest Authority managing around 18 000 hectares, provincial departments a further 10 000 hectares, and the private sector making up the remaining 15 000 hectares. Eucalyptus and Pine species together make up roughly half of the estate with *Araucaria spp.* and *Tectonis grandis* the other major species. The major difficulty in continuing plantation expansion is land availability particularly since almost all the available Government land has been planted. Presently 4 000 hectares of plantations are targeted for establishment each year.

The forestry industry in PNG has significant potential for further processing development. Log exports completely dominate forestry exports (PNG is the world's second largest exporter of tropical logs). Despite a number of discussions with multi-national forestry companies the Independent newspaper (12.4.96) reported no off-shore processing investment has come to fruition. The most recent available description of Papua New Guinea's existing processing capacity dates to 1992 when the PNG Forest Authority reported 49 fixed sawmills with a total capacity of 207 000 m<sup>3</sup> and an output of around 160 000 m<sup>3</sup>. As well as a number of mobile sawmills (estimated 600) there was also one plywood/veneer mill utilising plantation grown *Araucaria*, one woodchip mill and almost 30 furniture factories.

Papua New Guinea's forestry future is likely to remain controversial. The Government is caught between the country's cashflow needs and its stated desire to manage and protect the forest resource. For example, PNG Forest Authority (1995):

*The economic circumstances also resulted in some pressures on the Forest Authority to return to the era of granting logging permits irrespective of whether projects were sustainable.*

While PNG's topography guarantees it will retain a high proportion of forest cover, it, like the Solomons, is not reaping a substantial portion of the value of its resource. Insufficient resources are being reinvested to ensure ongoing sustainability and, particularly, the development of processing facilities. While a major decline in the forestry sector is presently less imminent than in the Solomons, PNG needs to look very closely at its development strategies and ensure it maximises returns from resource liquidation. In the present regional wood supply climate it is, however, questionable whether Papua New Guinea can profitably develop a substantive wood processing industry.

### 1.3 Solomon Islands

The Solomon Islands is an archipelago comprising seven major islands and a host of smaller ones. The total land area is 27 990 km<sup>2</sup>. Much like the topography of Vanuatu, the islands generally comprise a narrow coastal strip rising to steep mountainous country. Most of the Solomon Islands experiences high rainfall (3 000 mm per annum) and is vulnerable to periodic cyclone damage. The population of the Solomons is presently in excess of 350 000 and with one of the fastest growth rates in the world is projected to continue to grow rapidly. Agricultural pressures associated with population expansion are likely to place further pressure on both existing forests and reforestation efforts on agriculturally viable land. Agricultural pressures associated with population expansion are already placing pressure on existing forests, less so on reforestation efforts. This is particularly apparent on the island of Malaita, especially in north Malaita where population pressures are already high. The Solomon Islands' population is dominated by the native Melanesians who comprise 94 percent of inhabitants.

The Solomon Islands is extensively forested with 88 percent of the country under forest cover. More than 80 percent of the country is under high rainforest with the remaining 8 percent mainly swamp forest, including mangroves, and upland forests. The rainforest has generally fewer species than surrounding countries, with around 60 which reach large sizes. The major species harvested are *Pometia pinnata*, *Calophyllum spp.*, and a mixture of whitewoods. Despite the extensive forest cover, a very large proportion of the forests are presently non-commercial given the steepness and inaccessibility of location. Almost 22 000 km<sup>2</sup> of forest can effectively be designated as primarily

protection forest but this is in no way its legal status. Oliver (1992) identifies a commercially exploitable natural forest area of only 2 540 km<sup>2</sup> of which 1 300 km<sup>2</sup> had been logged by 1990. The more recent Solomon Islands National Forest Resource Inventory (1995) (SINFRA) is more optimistic. It estimates 5 985 km<sup>2</sup> of potentially merchantable forest (defined as below 400 metres and on slope of less than 30°) though this estimate is reduced to 2 782 km<sup>2</sup> after deducting areas of ecological significance for environmental protection, etc. The area of degraded forest is estimated at 2 560 km<sup>2</sup>.

The Solomon Islands has operated a plantation establishment programme for almost 30 years. Annual plantation establishment has averaged around 1000 hectares per annum with the current plantation estate standing at around 29 000 hectares. Most of the older plantings are in indigenous species, particularly *Camptosperma brevitola*, while the more recent plantings have been dominated by exotic species particularly mahogany and eucalypt species. The initial plantings were planned to supply the domestic market, more recently the focus has turned toward the export market. In 1989 a joint venture plantation establishment project between the Solomon Islands Government and the Commonwealth Development Corporation began planting a planned 13 500 hectare estate for pulpwood and sawlog production on Kolombara island. The major problem in forestry in the Solomon Islands is land ownership. The 30 000 hectares of land that is now under plantation was all planted on Government owned land for this reason. Some of it, including the Commonwealth Development Corporation project has now been given back to local communities.

The Solomon Islands processing industry is not well developed. The sawmilling sector has significant potential for development. Presently, around 30 000 m<sup>3</sup> of sawn timber is exported annually, while log exports totalled 592 000 m<sup>3</sup> in 1994 (FAO). The Solomon Islands report to the 1996 Heads of Forestry meeting reports a 1995 harvest in excess of 700,000 cubic metres and a 1996 harvest on target to comfortably exceed 800 000 cubic metres. The report suggests a sustainable harvest level of 325 000 cubic metres with an average per hectare harvest volume of 50 m<sup>3</sup>. Earlier estimates of harvest volumes in the Solomon Islands suggested yields were closer to 30 cubic metres per hectare. Taking a mid-point with the natural forests yielding 40 m<sup>3</sup> per hectare this suggests an area in excess of 200 km<sup>2</sup> (approaching one-tenth of SINFRA's recommended harvestable area estimate) is being cut over annually. The Solomon Islands is the world's sixth largest exporter of tropical hardwood logs (though exporting less than one-thirtieth of Malaysia's total in 1993). In 1988 there were 34 fixed site sawmills licensed by the Solomon Islands Government though there are some 700 sawmills operating in the Solomon Islands if all the portable chainsaw mills are included. Probably only half these are working at any one time due to lack of spare parts, no maintenance. No panel products have been produced since a veneer mill closed in the early 1980's.

The future for the Solomon Islands forestry industry seems patchy at best. Although the non-commercial upland areas will ensure the Islands retain a good proportion of forest cover, literature from the early 1990's made a general prediction most of the commercial natural forest would likely be logged out by the turn of the century. While, at current estimates of resource, this prediction seems a little premature there appears to be little doubt that harvest levels will need to curtail quite sharply from recent levels to avoid this logged-out scenario during the first decade or so of the 21st century. A mini-boom in plantation establishment in the late 1970's means there will be several years around the turn of the century when plantation forests will be able to maintain similar wood output to the present. However, from very early next century the forest industry will, of necessity, begin to decline in the face of dwindling log supplies. From an industry point of view this decline may be mitigated somewhat if a global or regional supply shortage forces log prices sufficiently high to make harvesting less accessible sites economic. Nonetheless, the basic story at present appears to be that of a resource being harvested too quickly and unsustainably with few of the benefits being re-invested to ensure the long term viability of the forest industry. Given this situation there is unlikely to be significant investment in upgrading processing capacity so log exports can be expected to continue at their current level unless Government intervenes directly.

## 1.4 Fiji

Fiji is comprised of around 300 islands with a land area of 18 270 km<sup>2</sup>. The two main islands, Viti Levu and Vanua Levu, make up 87 percent of the total land area. These islands are volcanic in origin with steep mountain ranges dividing each island and encouraging orographic precipitation patterns. The whole country is subject to cyclones. The eastern sides of the islands, with an annual rainfall in excess of 2500 mm support tropical rainforest while the western portions receive 1000-1700 mm annually and support a higher proportion of grass and savannah lands. About 51 percent or 9 350 km<sup>2</sup> of Fiji is forested.

The Fijian population totals around 800 000 inhabitants with 90 percent of these living on the two main islands. Fiji is characterised by racial diversity and, under the current government regime, some racial tension. In 1994 54 percent of the population was estimated to be ethnic Fijians, while 44 percent was comprised of ethnic Indians. Fiji, compared with the other island countries, is more urbanised and industrialised, with the French territories being probably the only more advanced economies.

The production forest estate comprises 2 670 km<sup>2</sup> of indigenous forest and 1 450 km<sup>2</sup> of plantation forest (although this figure includes 400 km<sup>2</sup> of coconut). Around 650 km<sup>2</sup> of the indigenous production forest had been logged to 1990. Another 6 300 km<sup>2</sup> of forest is protected and other non-commercial forest. Since 1967 an estimated 1 200 km<sup>2</sup> of forest have been converted to non-forest landuses. This has resulted in a marked change in the distribution of forest types. The drier lowland forests of the main islands have borne the brunt of this deforestation.

Fiji has had the most aggressive plantation establishment policy of any of the Pacific Islands. The main softwood plantation species grown is Caribbean pine (*Pinus Caribaea*) mainly under the management of the Fiji Pine Commission. The main hardwood species are mahogany and teak managed by the Fiji Forestry Department. Most of the commercial forests, including the plantations, are located in the dry western ends of the main islands.

Fiji is a producer and exporter of woodchips, sawn timber and plywood/veneer. Total roundwood production in Fiji is presently approaching 550 000 m<sup>3</sup>. Roundwood production more than doubled between 1986 and 1989 with pulpwood and sawn timber production the most important components. As with most other aspects of its forest industry, Fiji's processing industries are more sophisticated than other Pacific Islands. Presently, Fiji's production of sawn timber is estimated at around 150 000 m<sup>3</sup>, with around half of this exported. Almost two-thirds of the production is sourced from the natural forests. Plywood/veneer production is a smaller, but still significant industry. Sandalwood remains a viable production option.

The forestry future for Fiji is promising. The country has invested strongly and early in plantation reforestation which will provide for an expanding harvest over the coming twenty years. The World Bank (1990) quotes a study by Cameron et al which forecasts Fiji's total log production to reach 1 148 000 m<sup>3</sup> by 2010 and 1 800 000 m<sup>3</sup> by 2020. This will be a significant expansion on current production and given Fiji's determination to process domestically, a significant source of foreign exchange revenue.

## 1.5 Vanuatu

Vanuatu is comprised of around 80 islands of which 12 are of significant size. The total land area of Vanuatu is 12 190 km<sup>2</sup>, with the largest islands being Espiritu Santo, Malekula, and Erromango. The islands generally consist of a narrow coastal plain rising through broken foothills to a steep mountainous interior. Much of the interior country is forested. Around 5 500 km<sup>2</sup> of land is considered to be potentially arable. The population of Vanuatu is presently around 160 000 inhabitants. The average rainfall of Vanuatu is 2 300 mm with the northern islands receiving the heaviest rains (in excess of 3 000 mm per annum).

Almost 75 percent of Vanuatu is covered by natural vegetation. However, the quality of natural forests, in terms of commercial forestry, is poor. Much of the natural forest is on steep

inaccessible sites and even accessible sites contain few species of commercial use. Oliver (1992) estimates the timber yield from the best 50 000 hectares of natural forest to be only 15-20 m<sup>3</sup> per hectare. The World Bank (1990) describes the composition of Vanuatu's natural forests as dominated by species "with low density, little figure,...., little durability and low strength." In the mountainous island interiors much of the natural forest has primarily a protective role. However, even these forests have been degraded by conversion to grazing and in places burning. In some areas erosion and soil degradation are significant problems.

A National Forest Inventory and related reports in 1994 estimates total merchantable volume of timber on Vanuatu at 12 883 000 m<sup>3</sup>. If the minimum economic yield per hectare is 10 cubic metres of timber then a sustainable annual timber yield for Vanuatu is estimated at 51 700 m<sup>3</sup>. There is, however, difficulty in relating these assessments to commercially accessible timber areas.

Vanuatu's Department of Forestry has operated two plantation forestry schemes over the past 20 years. The success of these has been limited. Local Supply Plantations (LSP's) were planted between 1975 and 1986 to meet future wood needs at village level. These plantations were established in recognition that the natural forests, because of their quality, composition and distribution will not indefinitely meet wood needs. The LSP's were planned to make Vanuatu self-sufficient in wood supply. However, funding problems, inappropriate species selection and disease have conspired to significantly limit the effectiveness of the LSP scheme. In all, around 1000 hectares (almost entirely in *Cordia alliodora*) was planted to 1986 when the scheme was put into a maintenance status awaiting review and redesign. It appears LSP's will fall far short of meeting domestic supply requirements.

A second plantation scheme, Industrial Forestry Plantations (IFP's) began in 1982 and was designed to establish larger areas of forest plantations for processing and export supply. Once again establishment targets have not been met and locations of the plantations which have been established are not favourable to transportation. It is likely these plantations will also be eventually utilised for domestic supply. In 1991 IFP's totalled 1 200 hectares of mainly *Pinus caribaea*. More recently a project to plant 525 hectares of plantation forest on Espiritu Santo has been funded by European Union ODA. Around 325 hectares have been planted on a 5 500 hectare site. On completion of the planned planting the large remaining area is planned to be leased for private forestry projects.

The wood processing industry on Vanuatu is not well developed. The sawmilling industry comprises three significant fixed site mills and several smaller mills plus around 50 portable sawmills which operate sporadically and produce relatively low quality timber. The fixed site mills generally have some form of pressure treatment facilities. There is one plant producing low grade veneer, and a small furniture manufacturing industry producing for the domestic market. The Government of Vanuatu has intermittently operated a log export ban to assist in developing a domestic processing industry. A notable Vanuatuan forestry export is sandalwood. This has been Vanuatu's most famous forestry export for upwards of a century. Tonga and New Caledonia also have sandalwood although Tonga's is virtually non-existent.

It is evident that Vanuatu has the potential to be self sufficient in solidwood products and to develop a modest export industry. However, it is equally evident that achieving this goal requires better organisation and management of forestry programmes than occurred in the earlier LSP and ISP programmes. The future will probably see Vanuatu continuing to supply the majority of its sawn timber needs but importing panels, paper and speciality sawn timber.

## 1.6 New Caledonia

New Caledonia is a French territory comprising one large island, Grande Terre, and an archipelago of smaller islands. The total land area of New Caledonia is 19 103 square kilometres, with Grande Terre covering almost 17 000 km<sup>2</sup>. A rugged mountain range extends the length of Grand Terre precipitating a higher rainfall on the north-east coast (3 000mm per annum) compared with the south-west (1 000 mm per annum). This diversity of precipitation and a diverse pattern of soils gives New Caledonia a greater array of vegetation than most of the other Pacific islands. Rainforest is found on the eastern side of the mountains. The western side is covered by 5000 km<sup>2</sup> of *Melaleuca sp.*

savannah. New Caledonia's population is around 170 000 people of whom half live in the capital, Noumea. New Caledonia's population comprises 45 percent Melanesian and 33 percent European. New Caledonia has, probably, the most advanced economy of the Pacific Islands (excluding Australia and New Zealand).

New Caledonia's natural forests cover around 3700 km<sup>2</sup> with 1560 km<sup>2</sup> considered to be production forest, though a large proportion of this is relatively inaccessible. The focus for production is on the mid-altitude forests since as well as being most numerous and accessible, they are also richest in high-value timbers. Currently roundwood removals from New Caledonia's forests total around 5000 m<sup>3</sup> per annum, producing around 3000 m<sup>3</sup> of sawn timber. *Agathis spp* are predominant. Domestic production of sawn timber meets only 10-15 percent of New Caledonia's needs, the remainder is imported.

New Caledonia began plantation establishment around 1965 and has presently a Territorial inventory of approximately 8000 hectares of *pinus caribaea* and *pinus elliottii* plus an additional 2000 hectares of private woodlots. It is envisaged these plantations will eventually provide construction materials and some transmission poles. Thinnings are presently producing posts and some joinery timber.

In terms of conservation, New Caledonia has made greater strides than most of its Pacific neighbours. An Absolute Protection Reserve (5 080 hectares), four Provincial Parks (11 311 hectares), four Fauna Reserves (22 520 hectares), four Flora and Fauna Reserves (1 117 hectares) and seven Botanical Reserves (totalling 15 192 hectares) have been established. There are also extensive water catchments where logging is prohibited so the total area where logging is protected against totals 170 000 hectares. The major environmental problems relate to opencast nickel mining with mine spoils covering more than 3000 hectares. (Grand Terre contains one-third of the world's nickel reserves). Forests may play a role in rehabilitating some of this land.

The future for New Caledonian forestry activities is promising. While it is unlikely to actually become self-sufficient in timber it appears to have this capacity. Its natural forests have been comparatively well managed and as the plantation estate matures it should supply around 40 percent of New Caledonia's wood requirements. Estimates are that an annual planting programme of 400-500 hectares would be required for New Caledonia to become self sufficient. Present planting rates are around 150 hectares per annum.

## **1.7 French Polynesia**

French Polynesia is comprised of five archipelagos (Society, Austral, Tuamotu, Gambier and Marquesas) containing 130 islands with a total land area of 3 660 km<sup>2</sup>. Two-thirds of the 200 000 inhabitants live on Tahiti in the Society Islands.

French Polynesia's economy, while having significant diversity, is distorted by the presence of the Centre d'Experimentation du Pacifique (CEP) and the Commission d'Energie Atomique (CEA) which, along with a substantial French military presence, contribute significantly to the territory's high GDP. The CEP alone contributed 22 percent of GDP in 1993. Tourism is the other major contributor. Coconuts are the main cash crop and provide the major potential source of timber. There is no significant domestic forest industry and sectoral needs are met from imports, around 35 000 cubic metres of sawn timber and 5 000 tonnes of paper and paperboard per annum.

## **1.8 Western Samoa**

Western Samoa is comprised of eight islands with a total land area of 2830 km<sup>2</sup>. However, two islands, Upolu (1820 km<sup>2</sup>) and Savai'i (1100 km<sup>2</sup>), are by far the most important. The population of Western Samoa is around 170 000 people, the majority of whom live on the coastal plains of Upolu. The climate is tropical oceanic with the main islands having annual average rainfalls ranging from 2500-7000 mm from their windward to leeward sides. Western Samoa is in the tropical cyclone belt and in recent years has suffered extensive damage at the hands of tropical cyclones Ofa and Val.

Western Samoa's forest area comprises around 37 percent (1056 km<sup>2</sup>) of the total land area. This can be further divided into 31 percent non-merchantable indigenous forest, 5 percent merchantable-indigenous, and 1 percent plantation. Deforestation is a serious problem in Western Samoa. Heavy exploitation of the indigenous forests did not really begin until 1974. However, in a 15 year period from 1978 it is estimated that 50 percent of the merchantable forest and 30 percent of the non-merchantable forest has been cleared. Much of the remaining merchantable forest has suffered from severe cyclone damage. Annual forest clearance is presently estimated at around 4000 hectares per annum. This is primarily clearance for agriculture. Commercial logging has been halted on Upolu since 1989 since less than 800 hectares of merchantable forest remain. At present extraction rates Savai'i's forests will also be logged out shortly after the turn of the century. The 1993 Forestry Review Team noted:

*On a global scale this is a dramatic rate of rainforest clearance. Proportionately a far greater loss for Samoa than is rainforest clearance in Indonesia. For Western Samoa this loss of indigenous forest is a tragedy, representing the loss not only of natural ecosystems, plants and animals that are found nowhere else, but also a dramatic loss of water catchment areas, forests that maintain soil stability and long term sources of food, cultural materials and timber products from the forest ecosystems.*

Effective plantation establishment in Western Samoa began only in 1974 with the planting of Mahogany and Australian Red Cedar. In November 1991 the total plantation area managed by the Western Samoan Forestry division was 3 522 hectares after significant losses to cyclone Ofa. More than 90 percent of the remainder was damaged by tropical cyclone Val with 45 percent written off initially and a further 45 percent later abandoned. Mahogany is the predominant species particularly given its superior resilience to wind damage. Teak and Eucalypt species are also important.

It seems likely that Western Samoa will continue to be at least partially dependent on imports of timber for the foreseeable future. If strategies alter, to manage the remaining indigenous forest sustainably, then Samoa will continue to supply a good proportion of its own timber needs. If harvesting continues at the present rate then by 2010 most of Samoa's timber needs will, of necessity, be imported.

## **1.9 Tonga**

Tonga consists of an archipelago of 171 islands with a total land area of 730 km<sup>2</sup>. Six islands comprise 75 percent of the land area and contain 90 percent of the population. The largest island is Tongatapu with an area of 260 km<sup>2</sup>. Tonga's population is close to 100 000 people.

Most of the islands are uplifted limestone formations covered with a veneer of volcanic ash. Most of the agriculturally important soils are of recent volcanic origin and have good nutrient properties making them capable of supporting a wide variety of crops. Tonga has a tropical maritime climate with distinct wet and dry seasons. Rainfall is, however, unreliable and prolonged droughts are common. Tropical cyclones are a frequent occurrence and often cause widespread damage to trees and woodlots.

Limited indigenous forest remains in Tonga. Logging exhausted nearly all of the available and accessible forest some years ago. About 4000 hectares of the natural hardwood forest remains, mainly on uninhabited islands, in very steep or inaccessible areas, in coastal littoral areas and swamps, and in mangrove areas. Most of the remaining forest is on Eua Island in an area that has been proposed as a national park.

Tonga's major timber resource is currently coconut palms. A 1982 survey estimated Tonga's coconut population at almost 5 million trees of which 12 percent were senile. Production of coconut timber presently totals around 1500 m<sup>3</sup> per annum. This is 80 percent of Tonga's sawn timber production. Most of the production comes from the Government-owned Mataliku Sawmilling Centre. The remainder is produced by small portable sawmills.

Tonga is moving to establish a commercially viable and sustainable plantation estate. Currently Tonga's objective is to establish 1500-2000 hectares of plantation forest. Large scale planting began in 1984 and by 1992, 579 hectares had been planted. Most of the plantings are Caribbean Pine (*Pinus Caribaea*). Presently the target is to plant 80 hectares per year. Projections show this would be adequate to sustainably meet 80 percent of Tonga's sawn timber needs. Tonga will continue to import its requirements for other wood and paper products.

Agroforestry remains an important landuse with Government particularly keen to promote planting of species for timber and fuelwood, planting improved varieties of fruit trees and nitrogen-fixing trees, coconut rehabilitation and replanting, and commercial intercropping. Eucalyptus saligna has been the most popular agroforestry species in recent years.

### **1.10 Kiribati**

Kiribati is comprised of 33 islands in three distinct groups; the Gilbert Islands in the west, the Phoenix Islands in the centre, and the Line Islands in the east. Consequently, while Kiribati's total land area is only 690 km<sup>2</sup>, its sea area covers more than 3.5 million km<sup>2</sup>. The 17 islands of the Gilberts comprise 39 percent of the land area of Kiribati but are home to 93 percent of the population. The 8 atolls of the Phoenix Islands are largely uninhabited with most of the remaining population resident on Christmas Island in the Line Group. Christmas Island comprises more than 50 percent of Kiribati's land area. Kiribati is home to around 80 000 people.

Kiribati lies in the dry equatorial oceanic climate zone. Rainfall is variable across the islands with drought years on the driest islands sometimes yielding as little as 200mm of rain in a year. The annual averages across the islands of Kiribati ranges from 700mm to 4000mm. Consequently rainfall, or the lack of it, is a major determinant of forest viability in Kiribati. Almost none of the islands have surface fresh-water. Kiribati's atoll soils, derived from coral limestones, are shallow, alkaline, coarse textured and lacking in nutrients. Thaman and Whistler (1995) describe them as being amongst the poorest in the world.

Despite these limitations Kiribati has developed a quite sophisticated and intensive agroforestry system based on coconut, breadfruit, bananas pandanus and native figs. The system tends to represent a natural forest rather than plantation since the trees occur spontaneously, in a variety of different patterns and ages. Coconut is by far the dominant species. There is virtually no formal forestry activity although a number of species have been trialled for windbreaks, coastal protection and fuelwood or timber production. Kiribati unsuccessfully trialled a milling scheme for senile coconut palms in the mid-1980's. Costs of maintenance made the scheme uneconomic.

### **1.11 Nauru**

Nauru, with a land area of 21 km<sup>2</sup> and a population of around 10 000 people, is one of the wealthiest Pacific Islands (and on a per capita basis one of the more wealthy countries in the world) due to mining of its extensive phosphate resources. The island effectively comprises a fertile band several hundred metres wide encircling an ancient coral reef which rises as a 60 metres cliff inland to form a plateau in the centre of the island. This plateau contains the phosphate deposits. The Government-owned Nauru Phosphate Corporation has operated the phosphate mining since 1970. Around three-quarters of the phosphate revenues have been invested in a trust fund for future development of Nauru once the phosphate reserves are exhausted. This time is not far distant.

Only 250 hectares of land is presently available for cultivation with coconuts being the main crop. Soils are poor and highly porous, rainfall is generally variable. The known flora of Nauru consists of almost 200 species, of which 30 are indigenous, and covering around 17 percent of the land area. The major tree species are Coconut, Tomanu and Banyan. There appears to be little scope for the development of any sort of commercial forestry (beyond coconut groves). The major roles for trees are likely to be as shelterbelts, for amenity purposes and to assist in soil improvement programmes. When the phosphate mines are eventually played out there may be areas of the central

plateau that could be made suitable for afforestation. The small scale of such afforestation would mean, necessarily, tree planting would be mainly for amenity purposes, though other values might also be incorporated into such development.

In the foreseeable future Nauru will meet all its forest products needs through imports. Presently, virtually everything, including forest products and fresh water, must be imported into Nauru. When the phosphate mining eventually ends, the permanent population of Nauru will decline and presumably demand for forest products will correspondingly decline. The extent to which Nauru is able to develop viable domestic industries to replace mining will determine whether there is potential for expanding demand for forest products.

### **1.12 Niue**

Niue, with a land area of 260 km<sup>2</sup>, is a single upthrust coral atoll rising to a height of 60 metres. A substantial portion of Niue is covered with scrub or bush type vegetation and several thousand hectares of dense indigenous forest. A 1981 forest survey showed roughly 70 percent of Niue to be forested, though only 32 km<sup>2</sup> was considered merchantable, the remainder being scattered or coastal forest. However, in the fifteen years prior to 1981 20 percent of Niue's forest cover was lost. This trend has reportedly continued though without a detailed inventory this cannot be confirmed. The primary cause of deforestation is clearing for subsistence gardening. A 1990 survey of Niue's forests reported a total merchantable volume of 245 000 m<sup>3</sup> compared with a volume of 535 700 m<sup>3</sup> calculated in 1966. Nonetheless, the Niuean Department of Agriculture, Forestry and Fisheries (1993) reported wood was used only for traditional purposes such as house and canoe building, and handicrafts. Niue's conservation estate is limited to 160 hectares of mature forest placed under a traditional "Tapu" (a restricted or sacred area).

In the late-1980's the Niuean Department of Agriculture, Forestry and Fisheries embarked on a project to establish a high quality hardwood plantation forest. The aim is to achieve a plantation estate of 4000 hectares over a 40 year period established at a rate of 100 hectares per annum. The majority of plantings are mahogany (*Swietenia macrophylla*) or *Toona australis*, both of which demonstrate superior resistance to cyclone damage. Eventually, the plantation estate is expected to yield a sustainable supply of unprocessed logs for export. Project results in the formative years show this is an ambitious target. In June 1993 Niue's plantation estate was 120 hectares. Nonetheless, New Zealand Government aid funding has been agreed through to 1997 with the project's future presently due for review. A major obstacle may be continuing to access lease land for the project.

The future for Niue's forestry sector appears positive in that concerted effort to provide for the future is being made. The success of the plantation project will determine whether the forestry industry makes a future contribution to Niue's economy. However, the non-merchantable forests should ensure Niue will retain good forest cover into the future.

### **1.13 Cook Islands**

The Cook Islands consist of 15 islands divided into two groups, the Northern and Southern Cook Islands. These groups are distinct from one another in that the Southern Cook Islands are volcanic in origin and generally much larger, while the Northern Cooks are coral atolls. The total land area of the Cook Islands is 240 km<sup>2</sup>. The Southern Group comprises 211 km<sup>2</sup> with Rarotonga, the largest island, covering 67 km<sup>2</sup>. Rarotonga is also home to 45 percent of the population which totals around 18 000 people.

The climate is generally tropical maritime. Annual rainfall in Rarotonga averages 2000mm and, although the Cooks lie in the hurricane belt, major storms are infrequent.

Natural forests in the Cook Islands occur only in the Southern Group. The area under forest has not been formally assessed or inventoried but it contains a wide variety (estimated at 650) of species. Vegetative cover is both lush and extensive on the Southern Group although anecdotal observation suggests a shortage of accessible, millable timber. The main purposes of the natural

forests are presently for conservation and watershed protection. Sawn lumber is produced, however, from trees felled in site clearing for agricultural purposes. The Northern Group has a similar geography to neighbouring Tokelau and similarly its wood resources are mainly limited to coconut palms although some other species are present and are utilised for construction.

Turner (1990) lists 8 sawmills in the Cook Islands. Five were Government owned and three were privately owned. All were portable mills and none were operating on a full-time basis. Several of the mills were not in an operational condition. Regardless, these mills are able to supply only a small fraction of the Cook Islands' timber needs.

The Cook Islands began systematic plantation development in 1985. To date, the majority of plantings have been on Mangaia, Rarotonga and Atui islands and comprise *Pinus caribaea* (90 percent), *Acacia spp.*, and *Casuarina equisetifolia*. The plantation resource is presently approximately 660 hectares in size. Soil conservation and fernland protection is the primary purpose of plantation establishment with timber production a secondary objective. A Forestry Division annual planting target of 125 hectares appears to have been discontinued with the downsizing of general Government activities.

### **1.14 Tokelau**

The islands of Tokelau, with a land area totalling only 12 km<sup>2</sup> and a population of around 2000 people, are an overseas territory of New Zealand. The islands comprise 3 coral atolls ranging in size from 3.5-4.7km<sup>2</sup>. Tokelau, as with most of the other atoll countries does not have "forest" as such, but a limited variety of trees. Coconut is the primary species, with *Pandanus spp.*, *Cordia subcordata* and *Pisona grandis* the other major species.

Wood products are used mainly for handicrafts. Wood is also occasionally used for canoe and house-building materials. Occasionally wood is used for fuel. Tokelau has no commercial forest industry.

Tokelau lacks the land resource to develop a viable forest industry. For the future trees and forests will play a role in soil protection, continue to provide a fuel source and to meet minor wood and fibre demands, and provide a backdrop to any tourism development.

### **1.15 Tuvalu**

The nine islands of Tuvalu (formerly the Ellice Islands) have a total land area of 26 km<sup>2</sup>. However, Tuvalu's population exceeds 10 000 people and, consequently, these islands have a considerably higher population density than similarly small Tokelau. All the islands are low coral, atoll or reef, formations with none rising above 4 metres. Soils are very infertile comprising mainly rock or coral sand. Vegetation is poor and there is little commercially useful timber with the most important tree, and Tuvalu's only cash crop, being the coconut. Coconuts occupy 77 percent of the land area.

A number of exotic tree species have been trialled over the years in Tuvalu with the most successful being casuarina (*Casuarina equisetifolia*). This was planted to serve as a windbreak for coconuts, and as a firewood and timber resource. In the future it may also provide an important source of timber for domestic purposes. A variety of fruit trees, nitrogen fixing trees and other multi-purpose indigenous species have also been planted. Tuvalu does not presently have timber processing facilities though consideration is being given to obtaining a portable mill for sawing senile coconut palms. Chainsaws are used to produce rough timbers for livestock pens and suchlike. House-building, canoe construction and handicrafts are other wood uses on Tuvalu. Tuvalu will continue to be dependent on imports of more processed wood and paper products.

### **1.16 Norfolk Island**

Norfolk Island is an Australian-administered territory with a land area of 36 km<sup>2</sup> and a population of around 2000 inhabitants. Uninhabited prior to European colonisation, it was used as a British penal colony and also to repatriate Pitcairn Islanders. Norfolk Island rises in a series of precipitous cliffs to a highpoint of 319 metres. It has fertile volcanic soils, however, these are easily erodible once vegetation has been cleared. Rainfall is around 1300 mm per annum. Much of the land has been cleared for arable farming, however, the once dominant Norfolk Pine trees (*Araucaria Excelsa* or *A. Heterophylla*) remain notable features of the landscape. There is a reforestation programme underway using native Norfolk pines and seed from the pines remains an export item. Tourism is now the Island's largest industry.

### **1.17 Pitcairn Island**

Pitcairn Island is a territory administered by Great Britain. Pitcairn, with a population of less than 100 and a land area of only 35 km<sup>2</sup> actually comprises 4 islands of which Pitcairn Island itself is the only one inhabited. The largest island, however, is Henderson Island which was placed on the World Heritage List in 1989 as a means of protecting its unique birdlife.

Pitcairn Island was initially settled by the famous *Bounty* mutineers and their Tahitian consorts. In 1856 the Islanders were removed to Norfolk Island due to overpopulation pressures, however, some of the Islanders later returned. Most of Pitcairn Island is cleared of trees though a reforestation scheme was begun in 1963 growing native miro trees as a future source of rosewood used in making carved curios for sale. Presently miro-wood is sourced from Henderson Island. Most Islanders live a subsistence lifestyle, fishing and growing gardens and crops. Major problems for Pitcairn include landowner absenteeism and overpopulation.

### **1.18 Wallis and Futuna Islands**

The Wallis and Futuna Islands are a French territory comprising two main islands and several smaller ones with a total land area of 170 km<sup>2</sup>. The islands have a combined population of around 14 000, mainly Polynesian, inhabitants. The Islands' natural forests have been almost completely removed with the exception of the small island of Alofi which has some residual rainforest. Agricultural encroachment onto forested land has been the significant deforestation factor. There have been limited plantation trials on Wallis Island with around 200 hectares of *Pinus Caribaea* planted in the north of the Island. Presently, the Islands' wood needs are imported.

Subsistence farming is the main economic activity and French aid funding is the major source of territorial revenue.

## **2. CONTEXT**

### **2.1 Economy and Economic Policy in the South Pacific**

There is a considerable diversity in the economies and economic characteristics of the countries of the South Pacific. Australia and New Zealand operate as "developed" countries, both with considerable wealth in natural resources, skilled and educated populations and substantive financial resources. Australia's economy has built primarily on its vast natural resource wealth, most particularly its agricultural and mineral resources. The greater size and diversity of the Australian economy make it generally more robust than that of New Zealand and hence it was better able to absorb the shocks of the 1970's - notably oil shocks and Britain's entry to the European Common Market. Consequently, in the 1980's Australia's economy was in considerably better shape than that of New Zealand. Since the Australian economy was less in need of urgent reform the extent of reforms in New Zealand over the past decade have tended to overshadow changes in Australia. However, over the past 5 years Australia has moved more cautiously, and more at a State level, but along the same

market-led path. More moderate levels of "user-pays", privatisation and subsidy elimination have been evident. In 1990 Australia and New Zealand signed a bilateral free trade agreement. The most recent Australian elections elected a Government campaigning on a market-led economic platform. This should see moves to place Australian industry, including forestry, on a purely market-oriented basis. An example is the July 1996 privatisation sale of the South Australian State Government's timber processing business. While this is unlikely to foreshadow complete privatisation of State forest resources in the foreseeable future, it is an example of Australian government moving toward making domestic industry more globally competitive.

The Melanesian group of islands, Papua New Guinea, Solomon Islands, Fiji, Vanuatu and New Caledonia, are all relatively well endowed with significant land area, fertile soils and natural resources. Their export bases tend, however, to be narrow. Papua New Guinea's exports are centred on minerals, particularly copper and gold, while logs, coffee, palm oil and copra are also important. New Caledonia's economy is founded on its extensive nickel reserves. Fish, timber and copra are the staple exports of Fiji, Vanuatu and the Solomon Islands, with the Solomons also additionally exporting palm oil and cocoa, Fiji exporting sugar, garments and gold, and Vanuatu exporting beef. All of the countries of Melanesia and Polynesia receive development aid although Fiji, and to a lesser extent Papua New Guinea, are considerably less dependent on aid than most others. The various territories receive allocations from their parent Governments according to policy and requirements. Of these, New Caledonia and French Polynesia are particularly noteworthy as having a generally high standard of living compared with their island neighbours.

The islands of Polynesia and Micronesia are generally less well endowed with resources. Those which are of volcanic origin, for example Western Samoa and Tonga, have rich soils and agriculture or forestry provide development options. However, most of the smaller islands are coral-based and have very poor soils, small land areas and few land based natural resources. In the future the vast ocean areas falling into these countries' Exclusive Economic Zones may be found to contain resources to enable significant economic development. In many instances tourism is also a viable means of development. In the meantime, foreign aid and expatriate remittances form an integral part of the economies of these small nations. For example Siwatibau (Cole and Tambunlertchai; 1993) notes that, *"the annual value of remittances to Tonga hovers at around three times the value of its exports, half the value of its imports and 30 percent of its GDP."* For the smaller islands the dependency ratio is generally worse. Persistent trade deficits, welfare and investment expenditure in these countries can only be underwritten by foreign aid. For most of the small Pacific Island countries, geographic dispersion, lack of scale economies, immense distances and associated transport costs, lack of marketing expertise and vigorous competition present probably insurmountable difficulties to rapid economic or industrial development.

The Pacific Islands are not, however, desperately poor. Only a few islands are presently susceptible to population pressures. Most islands have a relatively strong subsistence economy and most people have access to land which often provides an alternative to waged work. In fact the existence of this alternative is a major reason why wage rates in the Pacific Islands are generally high relative to countries such as Indonesia and China. A further reason is the option, for many Islanders, of working abroad, particularly in Australia or New Zealand, and the need for domestic governments (particularly) and industry to be modestly competitive with this option to attract skilled employees.

The major impediment to development in the Islands is probably access to investment capital. With their narrow, and generally natural resource driven production, and the range of difficulties identified above there are few incentives for foreign investors to undertake major commitments in the region. Additionally, overseas aid may actually crowd some private investment out, particularly through its exchange rate and price ("Dutch disease") impacts .

Table 1 shows Australia, New Zealand, New Caledonia, French Polynesia and Nauru all with substantially higher GDP per capita levels than the other countries. New Zealand and Australia both have developed and diversified economies which are internally sustainable at this level, Nauru's future is dependent on the performance of its phosphate revenue investments. New Caledonia and French

Polynesia are dependent on France to maintain these GDP levels. Secession for either, but particularly French Polynesia, would entail a substantive decline in living standards.

Western Samoa is the only Polynesian country with a timber export industry. However, forestry makes a substantive contribution to the exports of all the Melanesian countries and to New Zealand. The Solomon Islands is notably heavily dependent on forestry to earn overseas exchange. This is a concern given the current high extraction rates in the Solomon Island forests and questionmarks over long run sustainable harvest levels.

**Table 1: Economic Indicators in the South Pacific (c.1993)**

Country	GDP/Estimated Income per Capita (US\$)	Value of all Exports (US\$)	Forestry Component of Exports (%)
Australia	14 464	43 104 000 000	2.0
New Zealand	14 081	13 253 000 000	10.5
Papua New Guinea	966	1 700 000 000	9.1
Solomon Islands	750	140 000 000	56.0
Fiji	2 140	424 000 000	6.9
Vanuatu	1 230	19 000 000	12.5
New Caledonia	13 400	447 000 000	0
French Polynesia	17 200	252 000 000	0
Western Samoa	980	7 000 000	5.0
Tonga	1 610	18 500 000	0
Kiribati	710	4 000 000	0
Tuvalu	350	80 000	0
Cook Islands	4 000	4 000 000	0
Nauru	10 000	73 000 000	0
Nuie	3 000	360 000	0
Tokelau	760	36 000	0
Norfolk Isl.	-	-	-
Pitcairn Isl.	-	-	-
Wallis & Futuna Isl.	-	23 000	0

Source: Europa 1996

The future for most of the Pacific Islands countries is probably for modest, aid assisted growth. It is difficult to see any of them sustaining growth rates to match those of, for example, the Asian Tigers. Papua New Guinea might match such growth rates in the short run by rapid exploitation of its wealth of resources. The revenue from such exploitation would, however, need to be invested in competitive industrial and infrastructural development if the country were to sustain growth. This all seems an unlikely scenario. Nonetheless, Papua New Guinea and Fiji, with ODA comprising respectively 11 percent and 3 percent of GDP in 1990 appear to be the only two countries presently with capacity to comfortably exist without aid. Nauru, with its extensive phosphate trust funds naturally provides a special case, as do the various Territories in their relationships with their parent countries.

## 2.2 Political Situation in the South Pacific Region

With a large number of countries and territories spread over an extensive area there is naturally considerable diversity in the range of political systems and situations that have evolved in the South Pacific. Nonetheless there is also a considerable degree of commonality as well. One factor shared by all the countries is, on a global scale, their relative youth. European settlement in the South Pacific did not really begin until the latter part of the 18th century and most countries have achieved, or had thrust upon them, political independence only in the past 25 years.

The majority of countries are members of the Commonwealth and have adopted political systems based around the Westminster system. Obvious exceptions to this are New Caledonia, Wallis and Futuna Islands, and French Polynesia which remain overseas territories of France. Tokelau, Samoa, Norfolk Island and Pitcairn Island are respectively overseas territories of New Zealand, United States, Australia and United Kingdom. Niue is a self-governing territory in free association with New Zealand. Fiji, formerly a Commonwealth member, declared itself a republic after the coup of 1987. Vanuatu is also a republic while Tonga, a member of the Commonwealth, is also a monarchy in its own right.

For most of these countries, lack of political stability is not generally perceived to be the greatest obstacle to development. Nonetheless, a number of the island countries have suffered civil disturbances in the recent past with secessionist violence in Papua New Guinea, Vanuatu, New Caledonia and French Polynesia and a coup in Fiji. Additionally, few of the countries in the region have been immune from political scandals involving misuse of funds.

Problems in Papua New Guinea and Fiji have probably assumed the highest profiles. Dolman, (General Manager of the PNG Forest Service) (1996) in reporting his experience of serving four Forestry Ministers in 10 months notes that "*Papua New Guinea is a little on the wild side*". Frequent no-confidence motions against successive Governments resulted in changes to the constitution granting an incoming Prime Minister a minimum of 18 months before such a motion may be presented. While the country as a whole is not overtly politically unstable, there are sufficient reports relating to violence, crime, corruption and civil unrest to generally dissuade many investors from considering Papua New Guinea an attractive investment destination. Civil war is effectively being waged on the island of Bougainville which is pressing claims to secede to the Solomon Islands.

Semi-political factors also contribute to criticism of Papua New Guinea's environmental record in forestry. Corruption and violence allegations against concession-holders are rife, particularly in the environmental media. Dolman (1996) notes a recent Cabinet approval of "Guidelines for Agro-development" which specifies "*agricultural developments will comply with the existing laws (Forestry, Investment, Environment Acts) except where the provisions affect the pace of development*".

Political instability in Fiji is probably more a matter of perception than reality. An election in 1987 resulted in the transferral of power from (in very simple terms) an ethnic Fijian Party to an Indian-Fijian Party. The ethnic Fijian military, responded by staging two coups and assuming power. Since the coups the new republic has consolidated and is relatively stable. However, Government policy dictates that political power remain in the hands of ethnic Fijians with other racial groups effectively disenfranchised. It seems plausible that cautious investors would note these problems and the problems of the past and may find them dissuasive. Naturally as time passes this perception will continue to weaken as new stability is proven. A similar degree of caution may apply to Vanuatu where secessionists briefly declared Espirito Santo a republic in 1980, and more recently New Caledonia where strong moves towards creating the Karnaky Republic in 1988 created civil unrest. The upshot was the suspension of direct rule by France and the establishment of three provincial councils. A territorial plebiscite on independence is expected to be held in 1998. In 1992, rioting in Noumea resulted in the burning of the principal commercial centre. Similarly, in French Polynesia, 1995 protests against French nuclear testing escalated to home-rule riots.

For most of the South Pacific countries (Papua New Guinea is probably an exception) it is difficult to argue these factors have seriously impeded development. However, it would certainly be fair to say they have not assisted in attracting investment.

Aside from stability, the dominant political issue of relevance to forestry across the region, for the future, will be balancing development objectives against environmental and conservation objectives. This will be particularly true for those countries with significant forestry resources and is probably as true for Australia and New Zealand as for the island countries. The South Pacific is surrounded by examples of countries which have exploited their natural resources to fund development. Nauru provides one interesting example. Malaysia, Philippines, Thailand and Indonesia

also provide differing models of forest resource usage from which development lessons might be learned.

### 2.3 Demographic, Social and Human Context for Forestry

Hooper (Cole and Tambunlertchai; 1993) notes that, "*Each Pacific society is comprised of three main parts, the Government, business and the professions, and the traditional part.*" Forestry interaction with society generally extends to each of these parts. However, from a social perspective the traditional aspect is most important.

At the centre of the "traditional" island sphere is land. While the importance of land tenure systems in landuse patterns and commercial forestry is discussed elsewhere these systems have equal importance in determining social structures in the South Pacific. It is notable that with the exception of Australia, New Zealand and several of the French territories none of the countries have been subject to large scale colonisation and consequently systems of land tenure have remained less disturbed than in many other regions. Consequently, there is often only a small percentage of landless inhabitants who are forced to sell their labour as a means of subsistence. The remainder have access to land sufficient to maintain at least a subsistence lifestyle including forest or scrublands which provide the main source of fuel, and fibre and wooden materials used for construction (for example, houses and canoes), general household implements, community and religious purposes.

Employment in forest-based industries is only substantial in the countries with significant forest resources. However, where subsistence and shifting cultivation are the norm increasing populations are having a significant cumulative effect on the forests. Population pressure and unsound landuse practices are significant contributors to deforestation and land degradation in the region. Table 2 shows population, densities and growth rates for the countries of the South Pacific.

**Table 2: Population Indicators (1990)**

Country	Population	Growth Rate (%)	Population Density 1990	Population 2010	Population Density 2010
Australia	17 090 000	1.5	2.3	21 366 000	2.8
New Zealand	3 350 000	0.8	12.5	3 775 000	14.1
Papua New Guinea	4 011 000	2.7	8.9	5 981 000	13.2
Solomon Isl.	320 000	3.5	11.4	536 000	19.1
Fiji	726 000	1.4	39.7	894 000	48.9
Vanuatu	150 000	2.6	12.3	220 000	18.0
New Caledonia	168 000	1.8	9.2	219 000	12.0
French Polynesia	198 000	2.7	54.1	295 000	80.6
Western Samoa	158 000	0.2	55.8	162 000	57.2
Tonga	96 000	0.4	133.3	102 000	141
Kiribati	71 000	2.0	97.3	96 000	131
Tuvalu	10 200	4.1	392	19 000	730
Cook Islands	16 900	-0.2	71	16 400	69.2
Nauru	9 300	2.3	443	13 080	622
Niue	2 500	-4.0	7.7	1 400	5.4
Tokelau	1 800	1.5	180	2 250	225

Source: FRA 1990; Cole & Tambunlertchai

It is evident from Table 2 that Polynesia, at least, is suffering significant population pressures. Only Niue has a population density below 50 people per square kilometre. Significantly, Niue also retains easily the highest rate of afforestation in Polynesia. In the island countries densities on specific

islands may be markedly higher than noted here. For example, on South Tarawa in Kiribati the density is 1350 people per square kilometre.

Annual population growth rates are also high for many countries which may cause further difficulties in the future. Tuvalu and Nauru have very high growth rates as well as the concurrently high population densities. A simple extrapolation using the average growth rates (1980-1990) listed in the table shows marked increases in the population densities of several countries which appear likely to cause significant additional pressures on the forests. For countries such as Tuvalu and Nauru it seems evident the current rates of population increase cannot be sustained, even in the short run, without creating major resource pressures. Among the countries with larger populations, Solomon Islands and Papua New Guinea have rapidly expanding populations which will increase demand both for forest products, and particularly for revenues from forest products to fund social programmes. This is likely to maintain pressure on these countries to continue exporting logs.

Australia and New Zealand, as developed countries, are less susceptible to economic and subsistence imperatives impacting on their forests. The social values of forests are generally more easily separated from the economic values. Forests contribute 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 forests. Forests are also important in a wide range of other recreational activities such as diving, fishing, horse-riding, boating, bird-watching, orienteering, mountain-biking and motorcycling.

### **3. THE SOUTH PACIFIC FOREST RESOURCES**

#### ***3.1 Landuse in the South Pacific***

Landuse patterns in the South Pacific are immensely varied between the various groups of countries. However, countries of similar size and with a similar degree of development tend to exhibit similar patterns in their broad landuse. Table 3 describes landuse in broad terms for the South Pacific.

The large developed countries, Australia and New Zealand, have both cleared substantial areas of natural forest to establish pastoral agricultural systems. The Australian Resource Assessment Commission (1991) notes that since European settlement approximately half Australia's forests have been cleared or severely modified, while New Zealand has cleared one-third of its forests in the same period, and a further third in the preceding millennium of Maori settlement. In terms of proportion of total land area in forest or woodland, on a global scale, both Australia and New Zealand are at best moderately forested; comparable with countries such as the United States, France and Germany. In terms of actual forest area, Australia, due to its large arid interior, is relatively unforested. However, on a per capita basis both have well in excess of 2 hectares of forest per head of population; comparable with Brazil and Sweden. Both also have plantation resources in excess of a million hectares.

The Melanesian countries are all heavily forested. Table 3 shows wooded land cover in Melanesia ranging from Fiji at 47 percent to Papua New Guinea with 93 percent. On a per capita basis Melanesia is well endowed with forests. With the exception of Fiji, which has only slightly more than one hectare per head of population, the other Melanesian countries have between five and ten hectares of forest per head. However, with the exception of Papua New Guinea, the Melanesian land area is relatively small. While Papua New Guinea is similar in size to Spain, the remaining Melanesian islands collectively have a land area only slightly larger than Ireland. As a consequence, even short run departures from sustainable management forest regimes can have significant long run impacts on forests.

***Table 3: Landuse in the South Pacific***

Country	Total Land	Natural	Plantation	Other	Total
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	Area (km <sup>2</sup> )	Forest Area (km <sup>2</sup> )	Forest Area (km <sup>2</sup> )	Wooded Land (km <sup>2</sup> )	Wooded Land Cover (%)
Australia	7 544 000	407 000	11 000	1 057 760	19.3
New Zealand*	267 800	62 280	13 700	0	28.3
Papua New Guinea	452 900	360 000	490	60 850	93.0
Solomon Islands	27 990	26 260	290	450	87.7
Fiji	18 270	8 970	1030	60	47.0
Vanuatu	12 190	8 020	28	0	66.3
New Caledonia	19 103	7 010	105	5 790	70.5
French Polynesia	3 660	0	0	1 150	31.4
Western Samoa	2 830	1 240	25	320	58.0
Tonga	730	40	8	80	11.0
Kiribati	730	0	0	20	2.7
Tuvalu*	26	0	0	.....	~0
Cook Islands*	240	~100	8	.....	.....
Nauru*	21	0	0	.....	~0
Nuie*	260	~91	2	~91	69.6
Tokelau*	12	0	0	.....	~0
Norfolk Isl.*	36	5	.....	.....	~13.9
Pitcairn Isl.*	35	~5	.....	.....	.....
Wallis & Futuna Isl*	170	.....	2	.....	.....

Source: Forest Resource Assessment 1990 (\* except where noted)

The larger Melanesian islands in common share mountainous interiors which generally preclude economic commercial logging. While the total Melanesian woodland resource comprises 475 000 km<sup>2</sup>, less than 20 percent of this area is considered commercially exploitable. The remainder seems likely to suffer small-scale incursions in the form of shifting cultivation and other agricultural conversions, but, for the foreseeable future should remain largely intact. The story is likely to be markedly different for the accessible lowland forests. In Papua New Guinea, Solomon Islands and Vanuatu, despite the absence of unimpeachable data, it seems clear that at best harvesting is being carried out in a fine margin of sustainability. The reality is likely to be significantly worse. For instance, there are a number of references in the literature to the Solomon Islands exploitable forest being cut out around the turn of the century, although available statistics appear to indicate the resource will have greater longevity. Vanuatu, which in 1994 relaxed plans to limit annual allowable cut to 25 000 m<sup>3</sup> and ban log exports, may find itself moving down a similar path. As the lowlands are cleared it is conceivable that some areas will be left to regenerate to forest while other land may be planted in plantation species. However, it is inevitable that pressures of increasing population and demand for arable land will see at least some of the forest land converted to agricultural purposes.

Fiji is presently the only Melanesian country with a significant plantation estate. Fiji has 4.2 percent of its land area under plantation forest.

The islands of Polynesia comprise two main types, those which are volcanic in origin which tend to be larger, more fertile and more heavily vegetated, and those which are coral based which are uniformly, low-lying with infertile sandy soils and generally with small land areas. Western Samoa is the only Polynesian nation with significant forest resources, and these are rapidly being depleted. The

FAO Forest Resources Assessment 1990 notes it as being the only forested Polynesian country though Niue, Tonga, French Polynesia and Norfolk Island all report small forested areas, elsewhere.

In general the small islands and atolls have only small and scattered patches of bush and scrub. For many of the smaller islands coconut comprises the most important wood resource in addition to its more direct role in the production of coconuts, copra and palm oil. Coconut trees tend to be used in agro-forestry systems providing shelter and shade to crops and gardens, while providing both a nut crop and a wood and fibre source of themselves. This system seems to hold the most promising prospects as the most appropriate landuse system for atoll nations. However, information on the extent of coconut resources from a forestry perspective is sketchy at best. Table 4 attempts to estimate coconut wood resources based on coconut production.

**Table 4: Estimated Area under Coconut in the South Pacific**

Country	Total Land Area (km <sup>2</sup> )	Coconut Production 1994 MT (1)	Estimated No. Coconut trees (2)	Land under Coconut (km <sup>2</sup> ) (2)	Proportion of total land %
Papua New Guinea	452 900	790	42 473 000	2 123	0.5
Solomon Islands	27 990	220	11 827 000	591	2.1
Fiji	18 270	201	10 806 000	540	3.0
Vanuatu	12 190	259	13 924 000	696	5.7
New Caledonia	19 103	10	537 000	27	0.1
French Polynesia	3 660	86	4 623 000	231	6.3
Western Samoa	2 830	130	6 989 000	349	12.3
Tonga	730	25	1 344 000	67	9.2
Kiribati	730	65	3 494 000	174	24.0
Tuvalu*	26	2	107 000	5	19.2
Cook Islands*	240	4	215 000	11	4.5
Nauru*	21	2	107 000	5	23.8
Niue*	260	2	107 000	5	1.9
Tokelau*	12	3	161 000	8	66.6
Wallis & Futuna Isl*	170	2	107 000	5	1.2

Source (1) FAO (2) Author

Table 4 extrapolates from coconut production to estimate the potential coconut wood resource in the South Pacific<sup>1</sup>. While the simple extrapolation technique is far from perfect it can be seen that the estimated coconut land coverage is at least feasible and (with the probable exceptions of Nauru and Tokelau) generally meets reasonable expectations. It is notable that the small unforested Pacific Islands appear to have significant proportions of coconut landcover. As noted, the basis for extrapolation is 1982 Tongan data. It seems reasonable to expect that, allowing for a country's "developedness", for countries smaller than Tonga the extrapolation will overstate coconut coverage since pressures will be higher to manage land more intensively. For countries larger than Tonga the reverse is likely to be the case.

It is interesting to note that in Tonga itself traditional farming system crops are grown under the canopy of trees (predominantly coconut). However, shifting practices from traditional to commercial farming has notably reduced the number of trees on Tonga (easily seen by comparing the 1982 and 1994 nut production levels) due to; increased mechanisation requiring wider tree spacing, farmers on leased lands not being interested in tree planting, and intensive cultivation not allowing trees and shrubs to become established.

<sup>1</sup> The estimates are derived from Tonga's 1982 coconut production (93,000MT) from an estimated coconut tree population of 5 million. Production of 1 MT of coconuts is thus assumed to require 53.76 coconut trees. The land area extrapolation assumes a stocking of 200 trees per hectare.

### 3.2 *Land Ownership and Tenure Systems*

Land and its ownership is a vital and integral part of the societies in the South Pacific. In almost every country land ownership, or controversy surrounding ownership, has had a significant impact on the development of the forestry sector in that country.

Crocombe (1987) notes that, "*The Direction and extent of change in tenure has paralleled closely the relative numbers and powers of immigrant as opposed to indigenous people*". Consequently changes to traditional systems have been greatest in Australia and New Zealand, with Fiji and New Caledonia in an intermediate stage of change, and countries such as Tokelau and Tuvalu, with almost no immigrant population, retaining traditional systems with little change.

Australia has, until recently, been relatively unaffected by questions of land tenure. However, in June 1992 the High Court of Australia held, for the first time, that the common law of Australia recognised the prior land rights of Australian Aboriginal people. The decision (*Mabo v Queensland* (1992) 175 CLR 1) overturned a judgement of 21 years earlier, that Aboriginal title to land had not survived British settlement of the continent. The decision recognises that although the British Crown acquired sovereignty over territory which is now part of Australia, it did not acquire the universal and absolute ownership of all the land. The decision recognises a form of native title which reflects the entitlement of the indigenous inhabitants, in accordance with their laws or customs, to their traditional lands.

The Federal Government passed the Native Title Act in 1993 to give effect to the principles of the *Mabo* decision. The Act provides a regime for determining whether native title exists over particular areas of land or waters, for validating certain past acts of government and for regulating future acts which may affect Aboriginal rights in land. Claims for compensation are also provided for by the legislation which is administered by the National Native Title Tribunal. The Tribunal is essentially a negotiating and mediating body. It can be assumed that where forest lands are under dispute there is potential for forests to be returned from government ownership to aboriginal tribal ownership. New Zealand is working through similar colonial repercussions and has a similar mechanism.

The other former British territories in the South Pacific were much less colonised and consequently land has generally remained more closely aligned to traditional tenure systems. Much of the land in the Pacific islands is under customary ownership i.e. owned by tribes, clans, families or other native groups, rather than individuals. Under such systems members of a tribe generally have free use of the land owned by their tribe. The land generally cannot be sold or can only be sold to other customary groups or to the Government. The land can generally be leased to non-natives for use under various conditions. Ownership is not always clear-cut and resolution of disputes can be difficult, protracted and not always final.

In view of the relatively low populations in most of the countries, this form of land tenure may serve to protect the ownership of the land for future generations who may otherwise face the possibility of being dispossessed of the land. However, although customary land has been leased for plantation or other commercial development e.g. Fiji, Papua New Guinea, the customary ownership system is generally considered to be an impediment to commercial land development. In fact, Government agencies often restrict their activities to Government owned land thus reflecting the sensitive nature of the land tenure issue.

The major problem with communally, as opposed to individually, held land is the dampening effect on individual entrepreneurship. Where the benefits of one individual's efforts, labour and investment are shared by all owners there is little incentive to work or invest above the norm. A second difficulty, which relates more directly to long term landuses such as forestry, is the need to gain communal agreement to a landuse. Where there is disagreement in the landowning group it is often impossible for projects to proceed or productivity is lessened. A common problem is the not unnatural reluctance to allow customary land to be used for reforestation in view of the long term withdrawal of such land from customary usage. With problems of absentee stakeholders and disputable property rights a laissez-faire attitude may often predominate. For instance on Niue the

government is implementing a forest establishment scheme which requires Government to lease land or enter into joint venture partnerships with landowners. The Niuean report to the 1992 Heads of Forestry meeting noted that effectively all the land available for reforestation is privately owned (i.e. on customary land). Since the Government owns no land all land must be acquired from landowners through either lease or joint venture. A major problem is that these arrangements require that the land is titled and surveyed and this process can be difficult and take much time to resolve. Many families prefer not to have their land surveyed because of the disputes that arise.

Similarly on forested land customary ownership may present barriers to commercial exploitation of the forest. For example, 87 percent of the total land area of the Solomons is under customary ownership and this is constantly increasing as Government relinquishes some of its titles. Hence the development of the forest resources must take into account the primary rights and ownership of the customary landowner. Disputes over ownership are common during logging. Kuki and Thorpe, reporting on their individual experience of chainsaw milling in the Solomon Islands to the 1992 Pacific Islands' Heads of Forestry meeting, noted an example where a foreign company commenced felling on Kuki's land with permission from a man who was not a real landowner.

A further difficulty in land development may occur when the system of tenure is individualised but the inheritance system either fragments physical parcels of land, or fragments ownership rights. Crocombe (1987) notes this second problem is particularly prevalent in the Society, and Cook Islands and in New Zealand. *"It is not uncommon to find that pieces of land too small to support a single family have a hundred or more legal owners. (Similar provisions in the Republic of Nauru have resulted in fifty or more shareholders in many one-quarter acre sections...)"*. This effectively converts individually owned land to a communal system and the attendant problems discussed above.

The tenure systems in Kiribati and Tonga appear more susceptible to physical fragmentation. Land ownership in Kiribati is individualised. The head of the household is usually the landowner and all lands belonging to him are jointly used by the members of the family including those who have married and established their own households. Land is usually shared out among the children at the death of the landowner and thus a new cycle begins. As population pressures increase it is easy to envisage the individual landholdings becoming gradually smaller. Similarly, in Tonga, all male taxpayers are entitled to an 8 acre allotment. In 1984 63 percent of Tonga's land was held in allotments. Such a system appears to limit forestry development to only small scattered woodlots probably for only personal use. It is difficult to see the potential for commercial forest development. Change to this system is likely to occur in the future, however, as the government has very limited land remaining to distribute.

There are numerous variations on the land tenure systems outlined above. A separate final example worth noting is New Caledonia. Oliver (1992) proposes that land ownership in New Caledonia is arguably even more complex than elsewhere in the South Pacific. In the Eastland Province the vast majority is held in customary ownership, as it is elsewhere. Private ownership is concentrated, often in large holdings, in the western savannah of Grande Terre. Officially, all lands not in private ownership on Grande Terre are held by the French State. Nevertheless if the provincial departments wish to acquire land for tree planting it is prudent to seek the agreement of the local tribes, the de facto landowners (as primary landusers). In addition to the usual difficulty of getting within tribe consensus, conflicting land claims abound among tribes because they have often been displaced one or more times by the French State. Agreements consist of making arrangements for a local labour force to plant and tend the trees. Since the tribes are not official landowners no rental payments or royalties are given. (Not surprisingly, Chandrasekharan (1977) reports instances of newly established plantations being burned in the 1970's).

### **3.3 Influence of Overseas Interests**

Possibly the most controversial issue in South Pacific forestry is the influence of overseas interests in the exploitation of resources and the development of processing industries. This is an issue

mainly affecting those countries with commercially viable timber resources and, notwithstanding New Zealand's privatisation programme, primarily of significance to Papua New Guinea, Solomon Islands and Vanuatu.

The forestry sector in these three countries, particularly, is firmly caught in a conservation versus development debate. On the one hand the countries see the forest resource as a means of financing an improved standard of living, better education, healthcare and infrastructure; on the other hand conservation interests recognise ecologically precious areas of unique and virgin rainforest. The debate is further fuelled in that the countries do not have a sufficiently strong forestry industry to enable them to utilise the resource themselves. Consequently logging rights are sold to foreign companies which to date have exported unprocessed logs as opposed to investing in processing facilities which might further contribute to their host country's development..

These overseas companies have been widely criticised in the environmental press as being pillagers of the forests. There are two main thrusts to this criticism. Firstly, that the concession-holders do not pay a fair price for the timber they extract; and secondly, that the companies do not invest in further processing in-country.

In a pure free market situation it would be difficult to see these arguments holding water. Where concessions are openly sold then it is reasonable to expect that natural competition will ensure a fair payment for the standing value of the timber. However, if the market is constrained because of lack of information on behalf of the sellers, because of a lack of willing buyers, or because of a corruption of the market, then a lower price can be achieved. Generally, some protection against lack of price information is offered to resource owners by requiring government approval of harvesting. However, rural poverty and widespread ignorance of legal frameworks have been conducive to exploitation. There are also numerous allegations of both physical dissuasion of competitors and of bribery and corruption in the allocation of timber concessions.

While there are few proven instances of corruption against the overseas loggers and a large proportion of the forestry business carried out is doubtless legitimate there is no doubt that, at a global level at least, the public relations aspects of logging in Melanesia are generally a disaster. Historically, at least, logging companies have used landowner information deficiencies to act as arbitrageurs. Equally, insensitivities toward the local population have seen deals entered into which make it difficult for the loggers to be seen as good corporate citizens. For example, in April 1995 the Solomon Islands Government had to send security forces to Pavuvu Island to quell protests by islanders resisting a compulsory resettlement scheme which the Government had agreed to implement as part of a logging rights sale agreement with a foreign company (though the complexity of landuse issues in the island countries is highlighted by noting that the Pavuvu Island community were also split over the Malaysian forestry proposal. The New Zealand Imported Tropical Timber Group had in fact already negotiated with them to run a sustainable portable sawmilling operation). Similarly, a current refusal by logging companies to pay increased timber royalties in Papua New Guinea is unlikely to enhance their image. Public confrontation of a host government will engender neither sympathy nor respect for the loggers.

As regards investment in further processing, it is trivial to note that companies will generally only invest if it is economic to do so. In Vanuatu and the Solomon Islands the exploitable forest resource may be too limited and geographically dispersed to encourage the establishment of competitive international scale mills. In all three countries the less-developed infrastructure and business environment will limit the competitiveness of such mills relative to, for example, hi-tech Japanese processors. There is, consequently, the usual chicken and egg situation for developing countries eager to attract foreign investment.

While conservation groups appear to have captured the moral high-ground at a grass roots level their campaign is also viewed with some hostility. Dolman (1996), in describing the impacts of new forestry regulations in Papua New Guinea notes that Papua New Guineans do not necessarily view the conservationists as a benevolent overseas influence.

*"While donors, development agencies, the concerned public, and environmental groups continue to rejoice at all the checks and balances, most Papua New Guineans are livid. They see forests as their window for leaving the stone age and moving into education, health clinics and the shop window. They know that timber is now worth real money and do not appreciate being told to keep their hands in their pockets. These are customary landowners - they are losing patience, and with some justification. Only one new timber permit has been issued in the past three years, and even that is now being crucified by outsiders who have gained locus through the new transparency and participatory approach.*

*In seeking to regain lost opportunities, village big-men, local and national leaders have joined hands in resisting the Forestry Act which they have come to see as consonant with conservation but against development. Out of this rumble has emerged a new respectability for the game of "find the loophole", and the legal profession is having a field day.*

*In this game the winner takes all (timber) by disguising logging within a bogus oil palm or infrastructure project. No-one seems to mind oil palm, even though it requires wholesale forest destruction."*

Dolman argues that,

*"for the most part the need is for a more moderate and considered approach from conservation interests. All those who wish to play a role must accept the inevitability of new development. The pragmatist will now shift focus towards ensuring that new timber projects are good projects. Only by working with this process may we hope to guide it".*

### **3.4 Natural Forest Resources**

Forest Resource data for the countries of the South Pacific is poorly documented. It is generally neither recent, consistent, nor inspiring of confidence in its accuracy. Consequently the data in Table X should be approached with caution and probably trepidation. Significant variation between estimates of the total forest resource areas for several countries is indicative of the uncertainty which surrounds resource assessment. Similarly, estimation of the merchantable forest area is dependent on good base data, but also a large degree of judgement on behalf of the assessor. It should be noted that definitions of merchantable forest differ among the statistics quoted here. For some, the definition relates to commercial accessibility, for others legislative restrictions are more important. Estimated harvest rates are generally based on a best estimate of total roundwood harvest converted to represent the amount of forest which would need to be clearfelled to achieve that harvest. Consequently, the estimation scenarios represent fully stocked forest areas rather than dealing with larger, but more subtle, areas of degraded forests. Where merchantable forest areas do not decline over time it is assumed these countries are operating under sustainable yield regimes.

Australia and Papua New Guinea dominate the natural forest resources of the South Pacific. These two countries have 87 percent of the natural forest resource. New Zealand and the Solomon Islands contribute a further 10 percent of the total resource.

Australia will publish a National Forest Inventory in late-1996 which will provide a clearer picture of the size and structure of the Australian forests. Australia has, in addition to 40 million hectares of natural forests, an additional 100 million hectares of other wooded lands which could provide a valuable fibre source. Australia, with a substantial plantation estate, is expected to manage its natural forests in a sustainable manner for the foreseeable future. There is a similar expectation of New Zealand. Regenerating natural forest in these countries is assumed will form part of the protected forest estate.

Papua New Guinea is well-forested with 78 percent of the land area dominated by natural forests. However, the PNG Forest Authority estimates only 42 percent of the forests could be harvested using conventional techniques. The merchantable forest area is estimated from a recent

Rapid Resource Appraisal project. The more difficult assessment is the size of the current harvest. As noted below there is a significant portable sawmilling industry in PNG which, coupled with ongoing allegations of illegal logging make it difficult to assess the extent of timber industry extractions from the forest. There are also few indications of a settled forest policy on which future extrapolations can be based. Nonetheless, the available data appears to indicate that commercial logging in Papua New Guinea is not far from operating on a sustainable yield basis. Agricultural incursion onto logged land preventing regeneration may be a factor in failing to meet this objective. Consequently the merchantable forest area is assumed to decline modestly over the forecast horizon.

The Solomon Islands National Forest Resource Inventory (SINFRA) estimates a natural forest resource of 2 626 375 hectares. Of this, almost 400 000 hectares has been logged or otherwise degraded. A large proportion of the forest (77 percent) is considered non-merchantable because of its inaccessibility or level of degradation.

Similarly to Papua New Guinea, considerable doubts exist over current logging rates in the Solomons. Other country log import data does, however, indicate the Solomon Islands is operating above the sustainable limits of its merchantable forest area. Even modest harvest assumptions in Table 5 show the merchantable forest area declining from almost 600 000 hectares to 470 000. However, the SINFRA recommends almost half of this merchantable area should not be logged for ecological or social reasons. If the SINFRA's recommended logging area is used as a base for the harvest path scenario in Table 5 then in 2010 the remaining area of recommended merchantable forest in 2010 will be 153 321 hectares. A problem the Solomons shares with all smaller resource holders is susceptibility to long-run repercussions from short run actions. Significant proportions of the Solomons forest resource can be logged in a very short-time. Consequently, if the current level of harvest is sustained it seems evident that by 2010 the Solomon Islands merchantable forest will be gone.

Vanuatu retains a similar susceptibility to logging but is less dependent than the Solomon Islands on forests as a source of export revenues. Vanuatu's forests are less commercially productive than those of its Melanesian neighbours and consequently the large differences in the total forest area estimates for Vanuatu in Table 5 are probably a result of differing classification of woodlands. A similar explanation probably holds for New Caledonia. Vanuatu completed a forest inventory in 1994 however this has not been obtainable in its entirety and without the complete set of data there is difficulty in relating the assessed annual sustainable yield estimate of 51 700 m<sup>3</sup> with the reported commercially available forest area (20 percent of total forest). Recent harvest data from Vanuatu from the 1996 Report to Heads of Forestry meeting reveals that the Vanuatuan harvest has varied between 20 000 cubic metres and 44 000 cubic metres per annum during the past 5 years (below the assessed sustainable yield). The assumption modelled in Table 5 is that while the Vanuatuan harvest is below its total sustainable yield, the area of commercially viable forest is declining. The Report to Heads of Forestry meeting also notes, that current Timber licences



authorise a maximum annual cut of 226 000 cubic metres though obviously this capacity is not presently being exploited (nor is it envisaged).

New Caledonia has a large forest resource much of which, as noted earlier, is protected from commercial logging. The merchantable forest presently appears to be cut at well below its sustainable level and is presumably less economic to harvest than importing timber.

The exploitation of the Western Samoan forests is a recent occurrence. Thaman and Whistler (1995) report for Western Samoa that although there were valuable stands of indigenous timber, mainly on Savai'i, these were not heavily exploited until between 1974 and 1987 when timber exports ranged between \$288 500 and \$1 207 000 per year. Over the past 15 years about 50 percent of the merchantable and about 30 percent of the non-merchantable forest has been cleared. Forest clearance is assumed to continue into the future though at a markedly slower rate.

Of the remaining Pacific Islands only Niue and the Cook Islands (and possibly Tonga) have any substantive commercial forestry. On Niue, most forest clearing can be directly attributed to subsistence gardening activities. Soils that occur under forest are acknowledged as giving a superior crop yield. Bulldozers have been used in recent years for land clearing but increasing costs have resulted in a return to traditional slash and burn methods of land clearing. Forestry is a new concept to most Niueans and particularly the matua (elders) who control the land. While trees are valued for traditional uses, generally speaking, forest is something that is cleared away so that food crops can be grown. Between 1966-1981 it is estimated logging accounted for only around 16 hectares of land clearance per annum out of an average of 250 hectares cleared annually (The Natural Forest of Niue Island 1990).

Data on the Cook Islands forest resource is poor and only very rough estimates are provided in Table 5. Judging by the size of the current harvest relative to the estimated area of forest cover it seems likely that the harvest is above its sustainable level and this is the extrapolation shown. No information was located on the extent of the French Polynesian forest resource.

For the atoll islands lack of space and poor soils preclude natural forest development. For example, Thaman and Whistler (1995) note the indigenous floras of both Kiribati and Tuvalu are extremely poor. Terrestrial vegetation associations are limited to coastal strand vegetation, small areas of mangroves and coastal marsh, relict stands of inland forest, often on uninhabited islets, and escarpment vegetation on Banaba Island.

### **3.5 *Plantation Forest Resources***

Plantation forestry is widely accepted in the South Pacific as a means of supplementing wood supplies from natural forests. Almost all countries with any substantive land area have some plantation forestry. Table 6 provides estimates of current plantation areas and, based on proposed planting schedules, estimates scenarios for future plantation establishment in the South Pacific countries.

**Table 6: Scenarios For Plantation Establishment (hectares)**

Country	Best Estimate of plantation forest	Year of best estimate	Estimated average net planting rate	Estimate of plantation forest for 1994	Estimate of plantation forest for 1998	Estimate of plantation forest for 2002	Estimate of plantation forest for 2006	Estimate of plantation forest for 2010
Australia	1 100 000	1995 <sup>2</sup>	25 000	1 075 000	1 175 000	1 275 000	1 375 000	1 475 000
New Zealand	1 436 000	1995 <sup>3</sup>	50 000	1 370 000	1 570 000	1 770 000	1 970 000	2 170 000
<b>Australasia</b>			<b>75 000</b>	<b>2 445 000</b>	<b>2 745 000</b>	<b>3 045 000</b>	<b>3 345 000</b>	<b>3 645 000</b>
Papua New Guinea	43 000	1992 <sup>4</sup>	4 000	49 000	65 000	81 000	97 000	113 000
Solomon Is.	24 000	1989 <sup>5</sup>	1 000	29 000	33 000	37 000	41 000	45 000
Fiji	96 000	1993 <sup>6</sup>	7 000	103 000	131 000	159 000	187 000	215 000
Vanuatu	2 200	1991 <sup>15</sup>	200	2 800	3 600	4 400	5 200	6 000
N. Caledonia	10 000	1991 <sup>15</sup>	150	10 500	11 000	11 600	12 200	12 800
<b>Melanesia</b>			<b>12 350</b>	<b>194 300</b>	<b>243 600</b>	<b>293 000</b>	<b>342 400</b>	<b>391 800</b>
Western Samoa	3 330	1991 <sup>15</sup>	400	2 500	4 000	5 500	7 100	8 700
French Polynesia	0	1990 <sup>7</sup>	0	0	0	0	0	0
Tonga	579	1992 <sup>8</sup>	120	820	1300	1780	2000	2000
Kiribati	0		0	0	0	0	0	0
Nauru	0		0	0	0	0	0	0
Niue	120	1993 <sup>9</sup>	50	170	370	570	770	970
Cook Islands	510	1992 <sup>15</sup>	125	785	1385	1985	2585	3185
Norfolk Island	~0		0	0	0	0	0	0
Pitcairn Island	~0		0	0	0	0	0	0
Tokelau	0		0	0	0	0	0	0
Tuvalu	0		0	0	0	0	0	0
Wallis Futuna Islands	200	1990 <sup>10</sup>	0	200	200	200	200	200
<b>Polynesia</b>			<b>695</b>	<b>6 475</b>	<b>7255</b>	<b>10 035</b>	<b>12 655</b>	<b>15 055</b>
<b>SOUTH PACIFIC</b>			<b>88 045</b>	<b>2 645 775</b>	<b>2 995 855</b>	<b>3 348 035</b>	<b>3 700 055</b>	<b>4 051 855</b>

New Zealand and Australia have easily the largest plantation forest resources in the region and both are important plantation producers at the global scale. Radiata pine forms the bulk of both

<sup>2</sup> Source: DPIE 1995

<sup>3</sup> Source: NZMOF 1995

<sup>4</sup> Source: PNG Forest Authority 1992

<sup>5</sup> Source: Oliver 1992

<sup>6</sup> Source: Fiji Forestry Department 1994

<sup>7</sup> Source: FAO Forest Resource Assessment 1990

<sup>8</sup> Source: Thaman and Whistler 1995

<sup>9</sup> Source: Foran 1992

<sup>10</sup> Source: Europa 1996

countries planted forest estate, with eucalyptus species comprising a smaller hardwood estate in Australia. Australia is presently establishing around 25 000 hectares of plantations each year. The scenario presented in Table 6 assumes this trend continues.

Fiji is the third largest plantation producer in the region with its current resource around 100 000 hectares. The Fijian planted forest is divided approximately equally between hardwood and softwood species. Fiji plans to expand the plantation forest by around 7 000 hectares per annum with a target in excess of 160 000 hectares by around 2000. The hardwood forests are expected to form a source of quality sawn timber. The softwood *pinus caribbaea* is most likely to form a source of export pulpwood.

Papua New Guinea and the Solomon Islands both recognise the potential for plantation forests to provide a substitute to natural forest production. However, neither country has successfully implemented a sustained plantation establishment programme. Consequently, the plantation estates in these two countries have relatively uneven age classes and are of variable quality. In Papua New Guinea plantations have been planted in areas where there are few alternative wood supplies such as near the plywood mill in Bulolo and the swamps near Mt Hagen. In the Solomon islands plantations comprise the significant reforestation effort for logged areas. Plantations have not, however, kept pace with the loggers and consequently the plantations do not yet approach the potential to provide a long term substitute for the natural forest industry.

Vanuatu has established very little in the way of plantation forests. However, the 1995 Draft Forest Policy for Vanuatu notes an initial target of 20,000 hectares of plantations which, if predominantly whitewood, would provide a conservative volume of 5 million cubic metres on a 25 year rotation - a sustainable yield of 160 000 cubic metres per annum. Planting is recommended to be carried out at 800 hectares per annum. The draft Policy recommends the Government require logging companies to establish these plantations as part of their licence agreement. The scenario shown for Vanuatu in Table 6 shows a continuation of the current 200 hectares per annum forest programme.

New Caledonia's plantation forests were established for domestic consumption, mostly for construction timber and transmission poles. Oliver (1992) notes that operational planting began in 1965 but due to internal political strife planting was virtually halted between 1984 and 1990 leaving a significant disparity in age-class distribution. Planting to 1992 has resulted in 8 000 hectares of *pinus caribbaea* and *pinus elliottii* plus an additional 2000 hectares of private woodlots. The current planting programme is around 120 hectares per annum with 300-500 hectares estimated as being required for self sufficiency on a 40 year rotation. Land acquisition is the major constraint. The scenario shown in Table 6 is for a continuation of the present planting programme.

Western Samoa's efforts to establish a viable plantation estate have been greatly hindered by cyclone damage. In January 1990 Western Samoa's plantation estate stood at 4 392 hectares. Cyclone's Ofa and Val (along with stands which were written off due to poor establishment) destroyed 92 percent of this area. At September 1995 only 350 hectares of the original plantings remained. However, since 1990 2 100 hectares of new planting has occurred leaving Western Samoa with a plantation estate of 2453 hectares in September 1995, 70 percent of which is Mahogany (*Swietenia macrophylla*).

The Tongan Forestry Department has targeted a 1500 hectare estate to be established by the turn of the century and a final estate of around 2000 hectares.. In 1992 the estate totalled 579 hectares with large scale plantings having commenced in 1984. Most of the plantings are *Pinus caribbaea* on 'Eua Island. Annual planting is targeted at between 80 and 120 hectares per annum which will yield an estate of around 2000 hectares by 2010 as shown in Table 6.

Plantation forests are primarily established on the Cook Islands for soil and watershed conservation. Around 1700 hectares of fernland has been identified as requiring protection and a planting rate in excess of 100 hectares per annum has been targeted. The planted forests will, however, also yield a valuable timber source when mature. Presently planting is of *Pinus caribbaea*, *Acacia mangium*, and *Casuarina equisetifolia*.

Niue Island aims to establish a 4 000 hectare estate over a 40 year period planting at 100 hectares per annum. to date this planting rate has proved optimistic, however, significant efforts are being made to promote the plantation programme and community participation has played an important role in plantations established to date. *Swietenia macrophylla* and *Toona australis* are the main species planted.

There have been limited plantation species trials in most other countries of the Pacific. For example on Wallis Island around 200 hectares of *Pinus Caribaea* has been planted in the north of the Island

#### **4. FOREST INDUSTRIES IN THE SOUTH PACIFIC**

There is currently a considerable gulf between the forestry industries of the developed countries, New Zealand and Australia, which have large integrated processing industries, and the other countries of the South Pacific which have, at best, a sawmilling sector and, in a couple of instances, plywood milling. For most of the small countries of Polynesia there is no scope to develop forest products processing industries. There is insufficient resource to justify investment much beyond portable sawmilling.

For the Melanesian countries the issues are more complex. Papua New Guinea, Solomon Islands and Fiji could all potentially support integrated processing industries. Vanuatu, New Caledonia and Western Samoa could develop sawmill and woodchipping industries on varying scales. In Fiji's case it is moving down the path toward a sustainable processing industry. Solomon Islands and Vanuatu appear to be depleting resources through log exporting, while Papua New Guinea is immersed in conflicts from which no clear future path is discernible.

The following sections develop simple "most likely scenarios" as opposed to pure forecasts. Production and trade scenarios for each country are consistent with apparently available resources and thus present an intuitively reasonable outlook. However, no effort is made to build in complex constraints and risk factors. For instance, the potential for the development of command processing (for instance, by a country imposing a log ban) is ignored.

##### ***4.1 Forestry and Logging***

Table 7 shows projections of roundwood removals based on the best available current harvest data, and descriptions in the literature of likely harvest scenarios for countries. Note the base data comprises the 1993 FAO Forest Products yearbook estimate of industrial roundwood production, and the best alternative data source. This is done largely because almost all the FAO data are estimated data, equal to the roundwood total from the last statistical return officially submitted by a country. For many of the Pacific Island countries the base data is from the mid- or even early-1980's.

The dominance of Australia and New Zealand in South Pacific production is evident with rapid growth in the plantation forest harvests from both of these countries overshadowing the changes in other countries. The South Pacific wood harvest in 2010 is likely to be around 50 percent higher than the current harvest, however, the total harvest of Melanesia and Polynesia seems likely to decline. Of the island countries, only Fiji and New Caledonia, both countries with sizeable maturing planted forest resources, are projected to increase production over the period to 2010.

**Table 7: Scenarios for Industrial Roundwood Removals (Cubic metres)**

Country	1993 FAO Industrial Roundwood Production <sup>11</sup>	Alternative Estimated Roundwood Production	Year and Source of Alternative Estimate	1995 Estimated Roundwood Production	2000 Estimated Roundwood Production	2005 Estimated Roundwood Production	2010 Estimated Roundwood Production
Australia	17 633 000	17 633 000	1993 <sup>12</sup>	19 000 000	24 000 000	25 250 000	26 500 000
New Zealand	15 898 000	15 898 000	1993 <sup>3</sup>	16 400 000	20 000 000	23 000 000	25 400 000
<b>Australasia</b>	<b>33 531 000</b>			<b>35 400 000</b>	<b>44 000 000</b>	<b>48 250 000</b>	<b>51 900 000</b>
Papua New Guinea	2 655 000F	3 600 000	1995 <sup>13</sup>	3 600 000	3 600 000	3 600 000	3 600 000
Solomon Is.	330 000F	413 000	1993 <sup>14</sup>	600 000	500 000	400 000	300 000
Fiji	270 000F	561 000	1995 <sup>15</sup>	560 000	640 000	730 000	820 000
Vanuatu	39 000F	44 000	1994 <sup>16</sup>	33 000	60 000	60 000	60 000
N. Caledonia	6 000F	6000	1993	8 000	15 000	25 000	35 000
<b>Melanesia</b>	<b>3 300 000F</b>			<b>4 801 000</b>	<b>4 755 000</b>	<b>4 685 000</b>	<b>4 610 000</b>
Western Samoa	61 000F	30 000	1992X	20 000	15 000	12 000	12 000
French Polynesia	N/A	N/A		0	0	0	0
Tonga	5 000F	~4000	1992X	~6000	~6000	~6000	~6000
Kiribati	N/A	0		0	0	0	0
Nauru	N/A	0		0	0	0	0
Niue	N/A	625	1992X	800	800	800	800
Cook Islands	5 000F	5000		5000	5000	5000	5000
Norfolk Island	N/A	N/A		0	0	0	0
Pitcairn Island	N/A	~0		0	0	0	0
Tokelau	N/A	0		0	0	0	0
Tuvalu	N/A	0		0	0	0	0
Wallis and Futuna Islands	N/A	N/A		0	0	0	0
<b>Polynesia</b>	<b>71 000F</b>			<b>31 800</b>	<b>26 800</b>	<b>23 800</b>	<b>23 800</b>
<b>SOUTH PACIFIC</b>	<b>36 902 000</b>			<b>40 232 800</b>	<b>48 78800</b>	<b>52 958 800</b>	<b>56 533 800</b>

Source: Author (and as footnoted)

McLarin (1995) reviewed, and attempted to reconcile a variety of projections for Australian wood supply and demand. From this report it is evident that the bulk of growth in Australian wood supplies will be in coniferous sawlogs from the plantation estate. Supplies of broadleaf (hardwood) sawlogs and pulplogs and coniferous pulplog supplies are all predicted to remain, at best, static or to decline. The forecast path utilised here is drawn from the Forest Resources Committee (1989) which McLarin considers the most likely harvest path. This path, however, presents a very rapid production expansion over the coming 4 years after which the harvest stabilises for the coming decade. An intuitively more likely scenario may see a more gradual expansion with a slightly higher harvest level in 2010 reflecting an older average harvest age.

<sup>11</sup> Source: FAO Forest Products Yearbook 1993<sup>12</sup> Source: McLarin 1995<sup>13</sup> Source: PNG Country Statement 1995/World Bank 1990<sup>14</sup> Source FAO Forest Products Yearbook - Direction of Trade IND ROUNDWD (NC) TROP - Solomon Islands = 351,000 m<sup>3</sup> + Average Observed Domestic Consumption 1982-1990 = 62,000 m<sup>3</sup>.<sup>15</sup> Fiji Forestry Department Annual Report 1995<sup>16</sup> Source 1996 Vanuatu Report to Heads of Forestry meeting

Forecasting Papua New Guinean harvests is probably the most difficult for any country in the South Pacific. It is evident that Papua New Guinea has enormous short-term harvest potential, however, its long run sustainable yield is relatively low. The actual Papua New Guinean harvest will be highly dependent on Government policy and commitment to sustainable management objectives. The scenario presented here is for sustainable yield harvesting.

Recent data on logging volumes from the Solomon Islands indicates rapid escalation in harvest. As noted earlier harvests are presently in the region of 800 000 cubic metres per annum. The Solomon Islands National Forest Resource Inventory (1995) estimates an indicative allowable cut of 325 000 cubic metres. The inventory notes, *"In the late 1980's the annual cut from the Solomon Islands was generally between 300 000 and 400 000 cubic metres per year. By 1993, the total that was being removed was said to be over one million cubic metres."* Tracking other country import data suggests this latter estimate to be exaggerated.

Given the volatility of recent harvest data it is difficult to make any prediction about the future harvest. There seems, however, to be a general consensus in the literature that throughout the 1990's the Solomon Islands has been harvesting above the sustainable yield of its merchantable forests. The figures above suggest the harvest has been at least 30 percent above sustainable yield. Consequently, a slowdown in harvest levels from 2000 onward is predicted though the slowdown is not as severe as predicted by those expecting the resource to be logged out around the turn of the century.

The Fijian Forestry Department Annual Report for 1995 notes industrial timber production in 1995 totalled 562 000 cubic metres of which 130 000 cubic metres was sourced from natural forests, 2 000 cubic metres was hardwood plantation logs, 124 000 cubic metres was softwood plantation logs and 306 000 cubic metres was plantation sourced woodchips. The projections to 2010 assume the natural forest harvest remains constant. The average annual hardwood planting rate 1960-1980 in Fiji was roughly constant at 640 hectares which on a 35 year rotation could be expected to yield perhaps 180 cubic metres per hectare. There will consequently be a considerable acceleration in the current hardwood plantation harvest, probably to around 120 000 cubic metres. The softwood plantations are operating on a 17 year rotation which suggests plantings in the early 1990's (around 2 500 hectares per annum) will come on stream in 2010 with a yield of around 230 cubic metres per hectare (Oliver 1992). Consequently, the Fijian forestry sector should be producing more than 800 000 cubic metres of wood in 2010, with potentially an acceleration in the following decade from the hardwood plantations at least.

The future status of the Vanuatu harvest is very unclear. Vanuatu has operated an intermittent log ban since the mid-1980's and appears generally to have harvested within sustainable yield limits. However, Europa (1995) reports,

*"In mid-1993 it was announced that the Government had granted a Malaysian group of companies a licence to log 70,000 m<sup>3</sup> of timber annually on Espirito Santo, Erromango and Malekula (compared with previous licences of 5,000 m<sup>3</sup> for all holders). An announcement that log exports would be banned from mid-June 1994 and annual allowable cut limited to 25,000 m<sup>3</sup> were modified in late-1994 arousing fears that logging would again reach unsustainable levels."*

It is unclear how these statistics, and several other numbers, reconcile against the sustainable yield of 51 700 m<sup>3</sup> quoted in the Vanuatu National Forest Policy 1995. Consequently the scenario developed here for Vanuatu is highly speculative.

Oliver (1992) notes the potential for the New Caledonian plantation forest resource to eventually supply around 40 percent of its domestic timber needs. With planting commencing in 1965 it is anticipated that by 2010 the resource should largely be achieving this potential.

Western Samoan production is in decline as the remaining natural forest is cut over. The scenario shown here assumes production for domestic purposes only. In 1992 Government restricted the allowable cut from the natural forest to 30 000 m<sup>3</sup>. However, by 1995 Thaman and Whistler note

Western Samoa is producing only 85 percent of its annual domestic demand for sawn timber (13,000 m<sup>3</sup>) which suggest harvest levels have fallen below the restricted level. Western Samoa's merchantable natural forest and plantation forest have been subject to significant cyclone damage in the 1990's. As a consequence, there is reduced capacity and a large gap in plantation age-class structures. Oliver (1992) reports an average age of only 3 years for Western Samoa's remaining plantations in the wake of Cyclone Val.

The Tongan harvest is almost entirely comprised of coconut. The Tongan report on sawmilling to the 1992 South Pacific Heads of Forestry Meeting noted,

*"Domestic production depends more and more on the extensive coconut resource as the indigenous hardwood forests are almost exhausted....Coconut timber makes up more than 80 percent of the total domestic cut of 1,700 m<sup>3</sup> per year. This is expected to increase over the coming five years with the establishment of two new proposed coconut portable sawmills."*

The Cook Islands continues to have timber production potential and a scenario of continued production at constant levels with a declining natural merchantable forest resource but increasing plantation resources is modelled here. Niue is also shown producing small amounts of timber.

For the smaller Polynesian islands there is some (unmeasured) coconut timber production or potential for production. No attempt is made to estimate the level of this production.

## 4.2 Log Exports

The wood export trade from the South Pacific is heavily dominated by unprocessed commodity exports, most notably logs. New Zealand, the world's fourth largest log exporter in 1994 leads the way, followed by Papua New Guinea, the world's sixth largest log exporter and second largest tropical hardwood log exporter. Log export volumes from the FAO 1994 yearbook and projected scenarios for future exports are shown in Table 8.

**Table 8: Log Exports in 1994 and Future Scenario Projections (cubic metres)**

Country	Coniferous log exports	Tropical Hdwd Log exports	Other Hdwd Log Exports	Total Log Exports <sup>17</sup>	Estimated Log Export Scenario 2000	Estimated Log Export Scenario 2010
Australia	415 000		3 000	418 000	2 000 000	600 000
New Zealand	4 837 000		204 000	5 041 000	6 000 000	8 500 000
Papua New Guinea	9 000	3 066 000		3 075 000	3 000 000	2 800 000
Solomon Isl.		592 000		592 000	440 000	200 000
Vanuatu		4 000F		4 000	30 000	25 000
Cook Islands	4 000F			4 000F	3 000	2 000
<b>Total</b>	<b>5 265 000</b>	<b>3 662 000</b>	<b>207 000</b>	<b>9 134 000</b>	<b>11 473 00</b>	<b>12 127 000</b>

Source: 1994 FAO Yearbook; 2010 Author.

New Zealand's increased potential for log exports is detailed elsewhere. Rapid growth in Australian log exporting is dependent on the accuracy of the Forest Resources Committee (1989) projections of wood supply for 2000 and beyond. If the wood harvest is to grow as rapidly as the FRC predicted then it is unlikely Australia will develop processing capacity and sawn timber export

<sup>17</sup> Source: FAO Yearbook 1994

markets rapidly enough to absorb a substantial harvest increase by 2000. If the FRC prediction used in Table 7 is accurate then the log export projection in Table 8 is likely to be conservative. Australian log exporting is a relatively recent development with the first shipments apparently leaving in 1990. However, in the year to June 1994 log exports totalled more than 400,000 cubic metres. With the largest increase in the Australian harvest expected to be in coniferous sawlogs it seems likely that log exports rather than woodchipping is the likely means of disposing of supplies surplus to capacity. The log export path projected here assumes additional processing capacity comes on stream in the following decade and log exporting is expected to decline from a short-term peak.

Log exports from Papua New Guinea are projected to remain at current levels unless the Government actively intervenes in the market. Despite on-going discussions over the establishment of processing facilities in Papua New Guinea there has been little progress in terms of real action. It is difficult to see Papua New Guinea being a competitive wood processor while it continues to operate as an open market log exporter. As hardwood supplies decline globally already the less competitive processors in countries such as Japan are being squeezed out of the business. Given this situation, while they are presented with a choice, the preference of the foreign logging companies in Papua New Guinea will surely be to export logs. A similar situation applies in the Solomon Islands for which log exports are projected to decline due to supply constraints rather than any development of processing capacity.

Projections for log exporting from Vanuatu are derived from the highly speculative harvest levels presented in Table 7. The development of new processing capacity in Vanuatu, with its smaller resource, seems even less likely than in Papua New Guinea or the Solomon Islands. Vanuatu has, however, shown past willingness to encourage processing by banning log exports and is certainly less dependent on log export revenues than the Solomons.

Log exports from the Cook Islands are forecast to remain at current levels.

### 4.3 Woodchips

Woodchips are a second important low level processed wood commodity export for the South Pacific. Australia is the world's second largest chip exporter and the largest exporter of hardwood chips. New Zealand, Fiji and Papua New Guinea also export woodchips. Table 9 shows current volumes of woodchip exports and a scenario projecting possible future volumes of woodchips.

**Table 9: Woodchip Export Volumes (cubic metres)**

Country	Current Volume of Woodchip Exports <sup>18</sup>	Projected Volume of Exports 2000	Projected Volume of Exports 2010
Australia	6 917 000	7 000 000	4 700 000
New Zealand	452 000	200 000	0
Fiji	251 000	300 000	475 000
Papua New Guinea	91 000	110 000	150 000
<b>Total</b>	<b>7 711 000</b>	<b>7 570 000</b>	<b>5 325 000</b>

Source: Author

Table 9 shows substantial declines in woodchip exports from Australia and New Zealand over the coming 15 years. As part of the 1995 Australian Wood and Paper Industry Strategy increased downstream utilisation of woodchips has been targeted.. This scenario assumes the construction of a new BCTMP plant early next century utilising around 2 million cubic metres of chips. The remainder being absorbed by other pulping or fibreboard capacity expansions. New Zealand's woodchips are expected to be absorbed into new fibreboard capacity.

<sup>18</sup> Source: FAO Yearbook 1994

Fiji has potential to establish some form of composite panelboard plant to further process its woodchips. Whether this occurs is a moot point and could divert woodchips shown here into panel products. Papua New Guinea's woodchip exports are shown as increasing on the basis that increased pressures on fibre sources are likely to make it worthwhile collecting logging residues which are currently not utilised.

#### **4.4 Sawn Timber**

Sawmilling is by far the dominant form of wood processing in the South Pacific in terms of geographic dispersion. As Table 10 shows, Australia and New Zealand are the dominant producers, but a number of other countries have significant sawmilling industries. Even many of the countries shown as producing no sawn timber have some limited portable sawmilling, often processing coconut.

New Zealand is presently the only major exporter of sawn timber in the South Pacific. However, it is notable that Australia is New Zealand's largest export market. A significant change in sawmilling dynamics in the region will occur over the coming fifteen years as Australia moves towards self-sufficiency in sawn timber production. This will change the South Pacific from a net deficit (300 000 m<sup>3</sup>) to a net exporting region (1 500 000 m<sup>3</sup>) for sawn timber. The major burden for finding new markets will fall on New Zealand, although Australia, which is likely to continue to import some timber will also become more active in export markets. Similarly, the changing regional dynamics may require Fiji to enter export markets more aggressively with Fiji certainly anticipating the need to niche market its production in the face of the softwood surplus.

The population growth rate in Melanesia and Polynesia is among the highest in the world. Consequently, even if per capita demand remains constant, a significant increase in the total demand for sawn timber can be expected. While Melanesian countries (with the exception of New Caledonia) are likely to remain largely self-sufficient in their sawn timber needs, Polynesian demand will increase quite markedly, while Polynesian production is likely to decline. There is scope for coconut to provide a substantive supply of sawn timber in Polynesia, however, whether it will be cost effective to do so is a moot point.

While the trade scenarios shown are likely to have a relatively high degree of accuracy it is apparent that production in many countries is poorly documented. With a large number of small-scale sawmillers in many countries using portable mills, or even chainsaws, to produce sawn timber it is difficult to ascertain how high actual sawn timber production, for local consumption, might be.

For example the SINFRA (1995) notes that small scale sawmilling is becoming increasingly important in the Solomons. Much of the milling is done by resource owners using portable sawmills. In 1992 the Forestry Division estimated there were around 1 200 portable sawmills spread throughout the Solomons. Chainsaws are also reasonably prevalent, the SINFRA found an average of two chainsaws per village surveyed. There are mixed views about the impacts of portable sawmilling. On the positive side operations can provide regular employment for owner operators and villagers. They also enable local people to control resource utilisation and return profits locally. On the negative side the quality of timber is poor and the forest resource is consequently being devalued.

**Table 10: Scenarios for Market Dynamics - Sawn Timber (Cubic metres)**

Country	Productn 1994	Consumptn 1994	Imports 1994	Exports 1994	Productn 2010	Consumptn 2010	Imports 2010	Exports 2010
Australia	3 185 000	4 384 000	1 243 000	44 000	5 000 000	5 000 000	500 000	500 000
New Zealand	2 773 000	1 840 000	53 000	986 000	4 050 000	2 500 000	65 000	1 615 000
<b>Australasia</b>	<b>5 958 000</b>	<b>6 224 000</b>	<b>1 296 000</b>	<b>1 030 000</b>	<b>9 050 000</b>	<b>7 500 000</b>	<b>565 000</b>	<b>2 115 000</b>
Papua New Guinea	117 000F	106 000	0	11 000	200 000	180 000	0	20 000
Solomon Is.	16 000F	6 000	0	10 000	40 000	28 000	0	12 000
Fiji	91 000F	69 000	0	22 000	170 000	120 000	30 000	80 000
Vanuatu	7 000F	6 000	0	1 000	15 000	15 000	0	0
N. Caledonia	2 000F	21 000	19 000	0	17 000	30 000	13 000	0
<b>Melanesia</b>	<b>233 000</b>	<b>208 000</b>	<b>19 000</b>	<b>44 000</b>	<b>392 000</b>	<b>343 000</b>	<b>13 000</b>	<b>62 000</b>
Western Samoa	21 000F	26 000	5 000	0	6 000	30 000	24 000	0
French Polynesia	0	34 000	34 000	0	0	49 000	49 000	0
Tonga	1 000F	5 000	4 000	0	2 000	5 500	3 500	0
Kiribati	0	1 000	1 000	0	0	1 500	1 500	0
Nauru	0	1 000	1 000	0	0	1 500	1 500	0
Niue	200	200	0	0	400	400	0	0
Cook Islands	0	4 000	4 000	0	1 300	5 000	3 700	0
Norfolk Isl.	0	1 000	1 000	0	0	1 500	1 500	0
Pitcairn Isl.	0	0	0	0	0	0	0	0
Tokelau	0	200	200	0	0	300	300	0
Tuvalu	0	500	500	0	0	1 000	1 000	0
Wallis and Futuna Isl.	0	1 000	1 000	0	0	1 500	1 500	0
<b>Polynesia</b>	<b>22 200</b>	<b>73 900</b>	<b>51 700</b>	<b>0</b>	<b>9 700</b>	<b>97 200</b>	<b>87 500</b>	<b>0</b>
<b>SOUTH PACIFIC</b>	<b>6 213 200</b>	<b>6 505 900</b>	<b>1 366 700</b>	<b>1 074 000</b>	<b>9 451 700</b>	<b>7 940 200</b>	<b>665 500</b>	<b>2 177 000</b>

Source: 1994 FAO Yearbook; 2010 Author.

#### 4.5 Woodpulp

Australia and New Zealand are the only producers of wood pulp in the South Pacific. There is little scope for any other country to undertake wood pulp production in the forecast period. Table 11 shows a likely woodpulp market scenario for Australasia over the coming 15 years.

**Table 11: Scenarios for Market Dynamics - Wood pulp (tonnes)**

Country	Productn 1994	Consumptn 1994	Imports 1994	Exports 1994	Productn 2010	Consumptn 2010	Imports 2010	Exports 2010
Australia	987 000	1 211 000	224 000	0	1 600 000	1 800 000	200 000	0
New Zealand	1 371 000	721 000	16 000	666 000	1 550 000	1 020 000	30 000	560 000
<b>Australasia</b>	<b>2 358 000</b>	<b>1 932 000</b>	<b>240 000</b>	<b>666 000</b>	<b>3 050 000</b>	<b>2 720 000</b>	<b>230 000</b>	<b>560 000</b>

Source: 1994 FAO Yearbook; 2010 Author.

As noted earlier Australia has significant potential to expand pulp production by manufacturing from current woodchip exports. The scenario presented here assumes the construction of at least one world-scale kraft pulp mill during the next 15 years diverting a significant quantity of woodchips (as above). Previous proposals for new pulp mills in New South Wales and Tasmania have not come to fruition due to difficulties in obtaining environmental permits or supply uncertainties. Neck et al (1996) note "...the availability of a large domestic resource may encourage expansion of Australia's pulp and paper industry. However, ...such expansions are uncertain."

New Zealand's modest increases in pulp production and focus are discussed elsewhere.

#### 4.6 Paper and Paperboard

New Zealand and Australia are also the only producers of paper products. Again, no other South Pacific country is expected to commence paper production. Modest amounts of paper are imported into all the Pacific Islands and values of these imports are documented in the FAO Yearbook. Table 12 shows market dynamics for paper and paperboard in the South Pacific.

**Table 12: Scenarios for Market Dynamics - Paper and Paperboard (tonnes)**

Country	Productn 1994	Consumptn 1994	Imports 1994	Exports 1994	Productn 2010	Consumptn 2010	Imports 2010	Exports 2010
Australia	2 232 000	3 000 000	1 043 000	275 000	2 900 000	4 040 000	1 415 000	275 000
New Zealand	860 000	646 000	156 000	370 000	1 070 000	980 000	190 000	280 000
<b>Australasia</b>	<b>3 092 000</b>	<b>3 646 000</b>	<b>1 199 000</b>	<b>645 000</b>	<b>3 970 000</b>	<b>5 020 000</b>	<b>1 605 000</b>	<b>555 000</b>
Papua NG	0	9 000	9 000	0	0	12 000	12 000	0
Fiji	0	17 000	17 000	0	0	23 000	23 000	0
N. Caledonia	0	3 000	3 000	0	0	4 000	4 000	0
F. Polynesia	0	4 000	4 000	0	0	5 000	5 000	0
Others	0	2 000	2 000	0	0	3 000	3 000	0
<b>Total</b>	<b>3 092 000</b>	<b>3 681 000</b>	<b>1 234 000</b>	<b>645 000</b>	<b>3 970 000</b>	<b>5 067 000</b>	<b>1 652 000</b>	<b>555 000</b>

Source: 1994 FAO Yearbook; 2010 Author.

As shown, Australian production increases in line with the prediction of a new world-scale integrated pulp and paper mill. Consumption demand in Australia and the Island countries is modelled as increasing at 2 percent per annum. This is very conservative compared with the 5.2 percent annual growth estimated by AUSNEWZ for Australia through to 2000 (Papermaker; Jan 1996). Also, by way of comparison, the similarity of population numbers between New Zealand and Papua New Guinea and the disparity in paper consumption between the two countries suggests this consumption growth forecast for the less developed countries may also prove conservative. There is significant potential

for consumption growth in the islands. A notable feature of Table 12 is the widening of the South Pacific paper deficit, from 589 000 tonnes in 1994 to a predicted 1 157 000 tonnes in 2010.

#### 4.7 Panel Products

Australia and New Zealand are the largest panel products producers in the South Pacific, however, both Fiji and Papua New Guinea also produce veneer and plywood.

**Table 13: Scenarios for Asia Pacific Panel Products Production to 2010 (cubic metres)**

Country	Particleb'rd Prodn 1994	Fibreboard Prodn 1994	Ply/Veneer Prodn 1994	Particleb'rd Prodn 2010	Fibreboard Prodn 2010	Ply/Veneer Prodn 2010
Australia	828 000	99 000	167 000	1 200 000	300 000	200 000
New Zealand	174 000	657 000	211 000	240 000	1 650 000	400 000
Papua NG	0	0	46 000	0	0	50 000
Fiji	0	0	16 000	(50 000)	0	20 000
<b>Total</b>	<b>1 002 000</b>	<b>756 000</b>	<b>440 000</b>	<b>1 440 000</b>	<b>1 950 000</b>	<b>670 000</b>

Source: 1994 FAO Yearbook; 2010 Author.

Table 13 shows modest growth in production for all sectors in all countries. Australian particleboard production and New Zealand fibreboard production are predicted to be the largest growth sectors. The potential for Fiji to substitute woodchip exports (as noted above) for a particleboard mill is marked in the table but not included in the total since this scenario is highly speculative. For the same competitiveness and supply reasons (noted earlier) no other new capacity is predicted for the island countries.

Table 14 shows amalgamated production figures for wood panels plus consumption and trade scenarios. Consumption for Australia and the island countries is modelled as increasing by 2 percent per annum.

**Table 14: Scenarios for Market Dynamics - Wood-based Panels (cubic metres)**

Country	Productn 1994	Consumptn 1994	Imports 1994	Exports 1994	Productn 2010	Consumptn 2010	Imports 2010	Exports 2010
Australia	1 094 000	1 192 000	197 000	99 000	1 700 000	1 600 000	200 000	100 000
New Zealand	1 042 000	525 000	9 000	526 000	2 290 000	594 000	22 000	1 718 000
<b>Australasia</b>	<b>2 136 000</b>	<b>1 717 000</b>	<b>206 000</b>	<b>627 000</b>	<b>3 990 000</b>	<b>2 194 000</b>	<b>222 000</b>	<b>1 818 000</b>
Papua NG	46 000	47 000	1 000	0	50 000	63 000	13 000	0
Fiji	16 000	12 000	2 000	6 000	(70 000)	16 000	2 000	(56 000)
N. Caledonia	0	2 000	2 000	0	0	2 700	2 700	0
F. Polynesia	0	7 000	7 000	0	0	9 500	9 500	0
Others	0	4 000	4 000	0	0	5 400	5 400	0
<b>Total</b>	<b>2 198 000</b>	<b>1 789 000</b>	<b>222 000</b>	<b>633 000</b>	<b>4 060 000</b>	<b>2 290 600</b>	<b>252 600</b>	<b>1 824 000</b>

Source: 1994 FAO Yearbook; 2010 Author.

#### 4.8 *Other Forestry Products*

A range of other forestry products particularly carved wooden souvenirs and furniture are produced for sale throughout the South Pacific. In some of the island countries, for example, Fiji, New Caledonia and the Cook Islands, production of wooden handicrafts as a contribution to the tourist industry provides a valuable source of employment and revenue.

Australia and New Zealand produce 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. The Melanesian countries all produce furniture and household effects, generally for their domestic markets.

These seem likely to be ongoing trends for each of these countries.

### **5. OTHER FORESTRY ROLES AND DIMENSIONS**

#### 5.1 *Fuelwood and Wood Energy*

Wood is an important fuel source in the South Pacific though, as with many areas of the world, the true magnitude of fuelwood consumption is not known. The 1994 FAO Yearbook provides estimates of fuelwood consumption for 7 countries in the South Pacific.

Table 15 records these estimates and some extrapolations based on them. It attempts to derive estimates of fuelwood consumption for countries which have no estimate and also uses an assumption that generally fuelwood consumption is understated. For example, New Zealand, which is both colder and has a lower GDP per capita reports significantly lower per capita fuelwood consumption than does Australia. Columns 5, 6, 7 and 8 re-work New Zealand's fuelwood consumption using Australia's per capita consumption and population estimates derived from Table 15. Similarly, the Melanesian and Polynesian countries' estimates are derived from the average fuelwood per capita reported for these countries in the FAO 1994 Yearbook (0.49 cubic metres), and also using the maximum per capita consumption (Papua New Guinea; 1.38 cubic metres).

**Table 15: Scenarios for Fuelwood Removals (Cubic metres)**

Country	1994 FAO Fuelwood Production <sup>19</sup>	Population	Fuelwood Consumpt'n per capita 1994	Estimated Fuelwood Production (Average) 1994	Estimated Fuelwood Production (Maximum) 1994	Estimated Fuelwood Production (Average) 2010	Estimated Fuelwood Production (Maximum) 2010
Australia	2 898 000	17 090 000	.17	2 898 000	2 898 000	3 632 000	3 632 000
New Zealand	50 000	3 350 000	.01	569 500	569 500	642 000	642 000
<b>Australasia</b>	<b>2 948 000</b>	<b>20 440 000</b>	<b>.....</b>	<b>3 467 500</b>	<b>3 467 500</b>	<b>4 274 000</b>	<b>4 274 000</b>
Papua New Guinea	5 533 000	4 011 000	1.38	5 533 000	5 533 000	8 253 000	8 253 000
Solomon Is.	138 000	320 000	0.43	156 800	441 600	262 600	740 000
Fiji	37 000	726 000	.05	355 700	1 001 900	438 000	1 233 000
Vanuatu	24 000	150 000	.16	73 500	207 000	107 800	303 600
N. Caledonia	.....	168 000	.....	82 300	231 800	107 300	302 200
<b>Melanesia</b>	<b>.....</b>	<b>5 375 000</b>	<b>.....</b>	<b>6 201 300</b>	<b>7 415 300</b>	<b>9 168 700</b>	<b>10 831 800</b>
Western Samoa	70 000	158 000	.44	77 400	218 000	79 400	223 600
French Polynesia	.....	198 000	.....	97 000	273 200	144 500	407 100
Tonga	.....	96 000	.....	47 000	132 500	50 000	140 700
Kiribati	.....	71 000	.....	35 000	98 000	47 000	132 000
Nauru	.....	9 300	.....	4 500	12 800	6 400	180 500
Niue	.....	2 500	.....	1 200	3 500	700	1 900
Cook Islands	.....	16 900	.....	8 300	11500	8 000	22 600
Tokelau	.....	1 800	.....	900	2 500	1 100	3 100
Tuvalu	.....	10 200	.....	5 100	14 100	9 300	26 200
<b>Polynesia</b>	<b>.....</b>	<b>563 700</b>	<b>.....</b>	<b>276 300</b>	<b>766 100</b>	<b>346 400</b>	<b>1 137 700</b>
<b>SOUTH PACIFIC</b>	<b>.....</b>	<b>26 378 700</b>	<b>.....</b>	<b>9 945 100</b>	<b>11 648 900</b>	<b>13 789 100</b>	<b>16 243 500</b>

Source: FAO; Author

The Australasian countries may still be significantly under-reported using the Australian per capita fuelwood estimate. Nonetheless, it is evident these countries' fuelwood demands are unlikely to significantly encroach on relatively large forest estates. The same cannot be said for the other countries. Applying the 0.49 cubic metres per capita estimate to 2010 population projections shows only Fiji and Niue are likely to have industrial production higher than fuelwood consumption. Using the higher (1.38 cubic metres per capita) estimate significant difficulties are evident for a number of, particularly Polynesian, countries.

For example the Tongan report to the 1992 Heads of Forestry meeting noted:

<sup>19</sup> Source FAO Forest Products Yearbook 1993

*Fuelwood use in Tonga has only been determined for the main island of Tongatapu. It is estimated that for Tongatapu alone 100,000 tonnes of fuelwood is used. Since 80 percent of the households use fuelwood for cooking, over 70 percent of the fuelwood is consumed by households. Fuelwood is sourced mainly from large hardwood trees on tax allotments, however, increasing amounts are transported from 'Eua island. Other sources are sawmill residues and coconut husks and shells.*

It can be noted that this fuelwood estimate falls in the range (independently) calculated for Tonga above.

Similarly, Thaman and Whistler (1995) note:

*"Increasing populations in small Pacific Island countries, particularly in and around their urban centres, are resulting in serious shortages of fuelwood, the traditional energy source for cooking. The alternatives, electricity, gas and kerosene are expensive and in limited supply. A 1988 survey of Tarawa atoll found that 97 percent of household reported shortages of wood fuels. As early as 1982 a woodfuel shortage on Tongatapu was found to be imminent. One consequence of these wood fuel shortages is that coconut husks, twigs and other organic material which might be used as mulch to improve soil fertility are increasingly being used for cooking purposes."*

They additionally point out that fossil fuel imports cost both Kiribati and Tuvalu more than the total value of agricultural exports.

Fuelwood shortages are not confined to Polynesia. The Solomon Islands NFRI (1995) notes the results of a village survey:

*"...all the villages surveyed gather firewood from the forest. This is mainly used for cooking and is usually readily available, being generally gathered from recently cleared garden areas within 30 minutes walk of the village. Villagers in Guadalcanal are more likely to report firewood hard to find (29 percent of villages). The percentage for other provinces ranged from 7 percent to 20 percent. There are some parts of Honiara where the lack of easy access to firewood causes hardship.*

In the Solomons fuelwood, both for domestic use and the drying of copra, is a major forest product usage though there is little information available regarding consumption. Fuelwood removals in 1989 were estimated at 138 000 m<sup>3</sup> though most of this arises as a by-product of land clearing for gardening and therefore probably does not have a significant impact on the forest resource per se.

## **5.2 Agriculture and Deforestation**

In addition to harvesting to meet industrial and fuelwood demand, a third, and probably most significant, cause of deforestation in the South Pacific is the clearance of forest for agriculture. Few statistics record the extent of agricultural clearance however anecdotal evidence is strong that as population pressures increase so too does forest land clearance. For example, Thaman and Whistler (1995) record that:

*Due to increased population pressures and expanded export cropping, and commercial livestock development, the processes of deforestation, forest degradation and removal of trees from agricultural lands have been intense, and in some cases accelerating. ....In areas of increasing pressure on land due to increasing population, and in locations closer to settlements, the area of primary forest decreases, secondary forest is younger and floristically less complex, and large areas are covered by almost pure stands of scrub, small trees and degraded grasslands.*

The 1995 Solomon Islands National Forest Resources Inventory provides one of the few numerical estimates of agriculturally based deforestation. It notes that ninety percent of the Solomon Islands population is reliant on subsistence gardening especially for the production of staple root crops. This gardening is usually carried out using slash and burn shifting cultivation techniques. A

survey of villages found 32 percent of gardens under cultivation had been cut from primary forest and the average length of cultivation was 16 months after which the average length of fallow was 3.8 years. The inventory estimates, based on 1986 population figures, 1500 ± 300 hectares of forest is cleared annually for gardening. By 1996 this could have reached 2150 ± 350 hectares. Since Solomon Islands population is presently growing at 3.5 percent per annum, a simple extrapolation suggests annual land clearance by 2010 could be around 3480 ± 560 hectares.

For a country with forest resources the size of the Solomons such a rate of clearance does not seem to present a major problem in the short run (from a deforestation perspective declining quality of agricultural land, distances from settlements, loss of merchantable forest and representative stands, and other such difficulties may be of considerable significance). Over the next 15 years such clearances would total less than 400 km<sup>2</sup>, less than 2 percent of the total Solomon Islands natural forest resource.

More immediate problems are those associated with the smaller countries with very limited forest and land areas where increasingly the balance between food production and wood resources is under pressure. For these countries a delicate equation balancing increasing population against increasing productivity of both agricultural and forest land is required. The role of imports in meeting increased demands, and the financing of imports, will be an important component of policies developed to meet these challenges.

For the future, as with all economic systems, relative scarcity will dictate value. The less forested a country becomes the greater will the relative value of the remaining trees. The 1992 Niuean report to the Heads of Forestry meeting sheds some interesting light on the prevalent attitudes on this subject from the perspective of one of the least populous and most heavily forested island countries:

*Because there is so much forest it is seen by the majority of people as a limitless resource - ...The most important forest yield, however, is the traditional one of land for subsistence gardening activities. ...The small size and population of Niue mean that all people would be aware of the Forestry Project although many would not agree with it (for a multitude of reasons; from a resistance to surveying the land, through to the perception that forestry is a "poorer" use of the land than traditional root crops or coconut). However, very few people would see any link between planting trees and improving or protecting the environment....this lack of awareness probably has as much to do with the richness of the resource as it does with any innate lack of knowledge".*

It seems safe to assume that this is the prevalent "traditional" attitude toward forests in the South Pacific. However, with increasing development and population pressures has come recognition that the forests are not a limitless resource and consequently greater value is assigned to their protection and management. For those countries where forests are still extensive; Niue, Papua New Guinea, Solomon Islands, Vanuatu; economics suggests the forests will continue to be exploited and cleared. For the countries with little remaining forest, the pressures will be toward conservation, sustainable management, and the development of agroforestry and plantation systems which efficiently utilise scarce resources.

### 5.3 Non-wood Forest Products

Forests provide a large range of non-wood forest products across the South Pacific region, many of which are only utilised by the collector or traded locally. The Solomon Islands National Forest Resource Inventory (1995) provides a good summary of the range of products found in the Solomons and, more generally, across the Island countries:

*Given that protein is relatively scarce, small animals, lizards and birds which are taken from the forest provide an important supplement to the more common fish diet in the Solomon Islands. A range of bird species are eaten, wild pigs are hunted, as are wild cats, dogs, goats, rats, bats and possums. Reptiles, worms, grubs and birds eggs are also collected. Solomon Island villagers use medicines gathered from the forests. Handicraft*

*materials include carving timbers, fibres for baskets and weaving, bamboos, fishing materials, tools and materials for customary artefacts (including, household utensils, dyes, body ornaments, perfumes, garden plants, ceremonial plants, weapons and musical instruments). Rural people are directly dependent on the forest for building materials: roof thatching (sago palm etc.) battens, pins for holding thatch to battens, rafters beams and studs, woven wall materials and vines for lashing the frame together. Canoes are made out of large logs of several species (generally Gmelina moluccana).*

*Interest is developing in the commercial potential of honey and nuts from the forest. The tree Canarium produces a nut that is beginning to gain acceptance on the international market. Rural Communities are being encouraged to collect these nuts. There is potential for more intensive management of the tree on a plantation scale which is being investigated by the forestry division.*

In the Solomon Islands rattan cane is the only minor forest product which is exported in any significant volume. Exports rose from 6 tonnes in 1985 to 100 tonnes in 1989. Local industries have also developed around rattan and are also exporting finished products. Regulations were introduced in 1990 to restrict the export of unprocessed rattan cane so as to ensure adequate supplies available for these local industries.

The Solomon Islands list encompasses almost all the major non-wood forest products mentioned in the literature for other island countries. An interesting exception is Maire, a vine found on the Cook Islands, which produces a nice fragrance and is exported to Hawaii.

#### **5.4 Wood Supplies from Non-forest Areas**

For the small island countries, as noted earlier, almost all wood supplies come from coconut or agroforestry systems. The small atolls generally have little, or no, remnant natural forest stands. For the larger heavily forested Melanesian countries non-forest areas are probably important mainly as readily accessible fuelwood sources.

In Australia and New Zealand shelterbelts and other farming systems can provide significant wood supplies. Australia also has a very large non-forest wooded land area [106 million hectares; FRA (1990)] which provides extensive fibre potential though much of this area is presently not commercially viable.

#### **5.5 Recycling and Other Fibre Types**

Small population bases and the absence of pulping facilities means recycling has very limited potential or applicability in the Pacific Islands. Similarly, although bamboo and rattan are available in some areas it is unlikely that any substantive processing industry will develop on the islands. At best these products may be used in handicrafts or provide a raw material for export (see NWFP's above).

Recycling in New Zealand is only marginally viable. Only in Australia is paper recycling of much significance. Sledge and Bull (1995) note that in 1994 Australia consumed 3 million tonnes of paper while waste paper collected that year was 1.2 million tonnes (40 percent of consumption). Waste paper utilisation in Australia has risen sharply throughout the 1990's, from 34 percent of total fibre input in 1989-90 to 48 percent in 1993-94. This is above the global average of around 40 percent. Sledge and Bull cite an upper limit of 55-58 percent to the collection of wastepaper for Australia and expect this level to be approached in the medium-term.

Australia also exports significant quantities of wastepaper, 114 000 tonnes in 1993-94. The major markets are Indonesia and the Philippines.

## **6. FORESTRY POLICIES LEGISLATION AND INSTITUTIONS**

### ***6.1 Forest Policy and Legislation***

Most of the preceding analysis is made under the assumption of the status quo in terms of policy and legislation. However, in the fluid policy environment of the South Pacific such an assumption is probably unrealistic in anything much beyond the short-term. By way of example, a number of countries have recently completed or are in the process of completing reviews of forestry conservation and environmental policies and legislation (e.g. Fiji, Western Samoa, Vanuatu, Cook Islands American Samoa). On smaller islands forestry legislation is often embodied in related conservation or environment acts (Cook Islands, Niue). Some small Pacific Island countries remain without forestry policy and legislation (Kiribati, Tuvalu).

At the core of almost all forest policy in the South Pacific is commitment to sustainable management of forests. In New Zealand and Australia this is the basis for creation of disparate production and conservation estates. In Melanesia it is a justification for occasional log bans and closely tied to a desire to develop domestic processing industries. In Polynesia it is resulting in plantation establishment and plans for self-sufficiency in fuel and industrial wood needs.

The broad thrust of forest policy in Australia is summarised in the *National Forest Policy Statement* (1992). The overriding theme of the NFPS is the ecologically sustainable management of Australia's forests. This vision has a number of important characteristics including: maintenance of the biodiversity and integrity of the forested landscape; increasing the total forested area; a holistic management view of forest values; a sustainable industry based on excellence and innovation; community participation; and efficient and environmentally sensitive utilisation. More recently, a supplementary policy, proposing the establishment of *Regional Forest Agreements* has been announced. These Agreements are designed to reconcile the inherent conflict between conservation and industrial development aspirations in forestry. The Agreements will provide for comprehensive regional resource assessments to strike a long-term (20 year) regionally based balance between conservation and development objectives. The policy developments allow for the development of a wood and paper strategy to be developed in tandem with the regional resource assessments and provides structural adjustment funding for industry.

The Papua New Guinean *National Forest Policy* was released in 1991. It has two overarching objectives: firstly, to ensure sustainability of Papua New Guinean forests; and secondly, to ensure harvesting of the forests brings about economic growth, job creation and local participation in the industry. The first objective is to be achieved by requiring all harvesting to be carried out under permit, and permits to be limited to a pre-determined allowable cut (presently set at 4.9 million m<sup>3</sup>). The second objective is to be met by promotion of investment opportunities and participation opportunities and a system of levies which will maximise benefits to the State and to resource owners.

Additionally, a Forestry (Amendment) Act 1993 builds a foundation of sustainable development, value-added, participatory management and equity sharing. However, Dolman (1995) notes:

*"We [the PNG Forest Service] are now facing a backlash against the reformation which, with hindsight, would seem to have been pursued with a little too much enthusiasm.... Only one new timber permit has been issued in the past three years and even that is now being crucified by outsiders".*

In the present regional climate it is difficult to see Papua New Guinea achieving its secondary aim of developing processing facilities in the absence of command processing. A Papua New Guinean processing facility will find it difficult to compete directly against, for example, a Japanese facility with vast infrastructural advantages. However, to invoke a log ban to encourage processing is almost certain to reduce the stumpage prices paid to landowners. Consequently, the Government has, to date, largely resisted the temptation to ban log exports. It is, however, encountering difficulties in imposing higher log export levies.

The Solomon Islands 1989 *Forest Policy* is the Government's official statement of aims for the forestry sector. The Forest Policy is based on six essential principles or imperatives. These are: forest, soil, and watershed protection; sustainable use; provision of the population's basic needs; exploiting the forests potential to achieve economic development; participation of Government, provinces and customary landowners in the control and management of the forests; and distributing the benefits so all sections of the community receive their fair share while accepting an appropriate share of the responsibility for maintaining the forest resource. The Forest Policy has, however, been criticised for its failure to recognise structural obstacles such as lack of information for planning; unbalanced reforestation; over-reliance on log exports; limited institutional capacity; and divergent community attitudes. Most of the problems faced by Papua New Guinea are also attendant to the Solomons. However, the Solomons' smaller resource and much greater reliance on forestry for export revenues means it is even more vulnerable to over-exploitation of its forests. Most of the literature surrounding Solomon Islands forestry displays little confidence that the current policy settings will achieve the Government's aims.

Vanuatu's forests are similarly vulnerable to those of the Solomon Islands although Vanuatu is less dependent on forestry export revenues and has intermittently operated log export bans over the past decade. In 1995 a draft Forest Policy was released which noted the overall aim of sustainable forest management. The policy recognises sustainable yield principles and notes these can be met from a declining resource area by enhancing productivity through plantation establishment. The draft policy specifically advocates giving firm legal effect to a continued log export ban. It also advocates an annual allowable cut and licences which encourage commitment to value-added processing and reforestation, including logging companies being required to lodge performance bonds with Government. The policy drift appears to be toward greater regulation. Conversely, in recent times Vanuatu has appeared to relax its controls and take a more exploitative approach toward its forests (see 4.1 above).

The 1988 *Fijian Forestry Sector Review* lists the objectives of the Forestry Sector as being:

*"To maximise the sustainable contribution of the Sector to the development and diversification of the economy whilst bringing the Fijian people into fuller and more active participation in sectoral development of all levels and stages and, at the same time, protecting and enhancing the effectiveness of the country's forest in environmental conservation."*

This is a broad summary of the policy objectives for Fiji which are carried out under the 1992 *Forestry Decree*. The forest policy concerns for Fiji are probably more akin to those of New Zealand than its Melanesian neighbours. Its major challenge is to successfully market its increasing plantation resources while maximising local benefits through domestic processing. These objectives are likely to continue as a focus for the sector for the foreseeable future, with policy designed to facilitate niche marketing and to enhance competitiveness. One single factor dominates the timber market outlook for Fiji. This is the perceived softwood surplus in the Pacific rim region from the plantations from the maturing of plantations in Chile, New Zealand and Australia. The Fijian perspective is a need for virtually a complete reversal of direction concentrating almost exclusively on speciality high quality products and secondary processing tailored to specific customers in a narrow range of market areas.

Forest policy in Western Samoa is centred around sustainable management of remaining forest resources and maintenance of domestic supplies of industrial and fuel wood. In 1991 the Government set an annual allowable cut of 29 000 cubic metres to facilitate sustainable management. Maintaining a viable forestry industry in western Samoa requires an expansion of the current forest estate and policy over the coming 15 years is likely to be directed toward encouraging plantation and small woodlot development.

Tonga does not have a formal forestry policy. National forestry objectives are set out in government's five-year development plan; to promote balanced landuse considering the importance of trees for soil and water conservation, wood production and shelter, to promote optimal use of senile

coconut timber resources; to encourage private sector investment in reforestation, and to encourage woodlot planting for industrial and fuelwood purposes.

There is little information on formal forestry policies for the remaining Polynesian islands and generally no forestry specific legislation in place. In general, the thrust of Government in these countries is to maintain, as far as is possible, supplies of wood for both industrial and, generally more importantly, fuel purposes. Soil protection is seen as a primary role for trees, particularly on the atoll countries. Both the Cook Islands and Niue are actively seeking to increase their plantation estates as production substitutes for natural forests.

### **6.2(a) Environmental Issues and Initiatives - Ecosystem and Biological Conservation**

The need for active conservation is a relatively recent concept in the South Pacific. As noted earlier, prior to European settlement the forests were generally regarded as limitless resources and, under the demands made of them in pre-industrial society, the forests in all likelihood were limitless in terms of actual human needs. However, development over the last hundred years with industrial utilisation of wood and mounting population pressures have led to situation in which conservation, as a means of ensuring wood supplies for future generations and as a means of preserving natural ecosystems, has become a necessity in most, if not all, countries.

Australia and New Zealand each have extensive systems of protected national, parks, reserves and scenic areas. In Australia more than 7 million hectares (17 percent) of the natural forests are permanently protected in conservation reserves. Many of these are included in National parks and listed on the Register of the National Estate. Some, such as the tropical rainforests of north Queensland and the forests of south-west Tasmania are included on the World Heritage List. The future for forest conservation in Australia will be determined under the newly implemented scheme of Regional Forest Agreements. This is likely to see a well balanced approach to sustainable forestry management with probably moderate increases in the conservation estate likely.

The Papua New Guinea report to the 1996 Heads of Forestry meeting identifies 55 existing protected areas totalling 1 784 107 hectares (4 percent of land area) the largest of which, Tonda, covers 590 000 hectares. A further 24 protected areas are identified without noting land area. The report also identifies an additional 93 areas proposed for protection. This is apparent evidence of a substantially increased conservation effort. By comparison, a 1981 report by the Papua New Guinea National Parks Board identified 7 declared parks, 7 approved areas, and 10 proposed areas for conservation. an additional 17 areas were declared wildlife sanctuaries or management areas with 60 other areas proposed for this status. Given the progress in increasing protected areas over the past 15 years it is reasonable to expect further significant increases in line with proposals over the coming 15 years. By 2010, Papua New Guinea should have well in excess of 100 protected areas. However, the 1996 report notes the major problem with the provision of protected areas relates to who pays. Private landowners are generally unwilling to shoulder the burden and the State has not, to date, provided compensation for landowners whose land is designated a protected area.

The 1992 Solomon Islands report to the Heads of Forestry meeting noted that in the past very little has been done in the way of identifying areas for national parks, however there has been an upsurge in interest in protection of flora and fauna, mainly as a result of much-publicised ecotourism. Three areas had been identified for nature site development and two others had been given World Heritage listings. The 1996 Solomon Islands report to the Heads of Forestry suggested that, in addition, steep and inaccessible areas are inappropriate for logging and are apparently considered de-facto conservation areas though without formal protection listings. Variations in composition between montane and lowland forests suggest there are likely to be species endemic to forests which are accessible for logging which may be seriously threatened without formal conservation measures.

Effective conservation areas in Fiji total almost 300 000 hectares of which 30 260 hectares is under Forest Reserve status, and 267 000 hectares comprises indigenous protection forest. These protection forests are valuable preservation areas despite the absence of legal status as conservation areas. Fiji has 16 Forest Reserves, the largest of which is Taveuni covering 11 290 hectares.

Negotiations are underway to establish a further new reserve and a World Heritage Site in the Sovi Basin.

The 1996 Vanuatu Report to Heads of Forestry notes that the formal concept of conservation, protected areas and National Parks is very new to Vanuatu. The report specifically notes 4 established reserves totalling 6 700 hectares, at least one of which is involved in ecotourism. There are also a number of conservation areas proposed by landowners including a proposal for a National Park on Efate. Conservation efforts are, however, constrained by lack of resources, lack of effective coordination between agencies involved in conservation and restricted capacity to implement the National Parks Act. Consequently, only modest progress in establishing and developing additional conservation areas should be expected.

In terms of conservation, New Caledonia has made greater strides than most of its Pacific neighbours. An Absolute Protection Reserve (5 080 hectares), four Provincial Parks (11 311 hectares), four Fauna Reserves (22 520 hectares), four Flora and Fauna Reserves (1 117 hectares) and seven Botanical Reserves (totalling 15 192 hectares) have been established. There are also extensive water catchments where logging is prohibited so the total area where logging is protected against totals 170 000 hectares.

The activities of these largest South Pacific islands are indicative of conservation trends throughout the South Pacific. The concept of conservation is generally a recent advent in the South Pacific. However, the need for conservation efforts is increasingly being recognised and most countries now have some area designated or planned as a formal conservation reserve. Among the other South Pacific countries notable developments include: the establishment in Western Samoa of O le Pupu Pue National Park and Mount Vaea reserve in 1978. Tonga's 1992 gazetting of 450 hectares of natural forest on 'Eua Island as "Eua National Park"; and the recent proposal to establish a Havalu Forest Conservation Area Project (5400 hectares) on Niue.

## **6.2(b) Environmental Issues and Initiatives - Soil and Watershed Conservation**

One of the most important roles for forests in the South Pacific is as a means of soil and watershed protection. The incidence of cyclonic storms, generally high rainfall levels, winds, coastal erosion and salt water incursion in the South Pacific all suggest protective roles for trees. Additionally, most of the larger islands have steep mountainous interiors making them susceptible to erosion, while the atoll countries are very low lying giving rise to deleterious effects from salt water spray, and storm surge.

The roles of trees for protective purposes are well understood and most countries are using some degree of tree planting to assist in protection or land rehabilitation. In the Melanesian countries the primary protective role is reforestation of degraded mountainous areas to prevent erosion. Accelerated erosion as a result of deforestation is a common feature. In countries such as Tonga and Western Samoa deforested areas have converted to unproductive and more erosion prone fernlands and reforestation efforts are being made in these areas. A number of other features also contribute to watershed deterioration and erosion including, unregulated water flows, improper roading design, cropping on riverbanks and floodplains, stock grazing and unregulated use of agricultural chemicals. Trees can play a role in alleviating impacts of all these factors.

In all the islands planting in coastal areas is necessary to protect against coastal erosion. Protection of mangrove areas, which are highly resistant to storm damage, is particularly important in this regard. In the low lying atoll islands there is ready recognition of the importance of coastal vegetation in protecting gardens and other agricultural areas from salt spray and a number of introduced species have been trialled in this regard as well as maintaining indigenous species. Soil improvement roles of trees in these countries is also important with the increased organic material provided by trees assisting fertility by improving soil water holding capacity, reducing soil pH, providing nutrients, reducing leaching effects of wind and rains and reducing run-off and evaporation.

In the future it is expected protection forestry will continue to be implemented, with funding for public works probably the major constraint in most countries.

## **7. SOUTH PACIFIC IN A REGIONAL AND GLOBAL CONTEXT**

### ***7.1 Trade Flows in the South Pacific***

As noted earlier, exports from the South Pacific region are dominated by unprocessed logs and semi-processed woodchips. The dominant market for these is Japan, followed at some distance by Korea. Most other Asian markets take smaller quantities of logs, particularly from New Zealand and Papua New Guinea.

However, beyond these exports, the South Pacific is predominantly a self-contained market. Excluding Japan, Australia and New Zealand are respectively the major forestry export market for the other. They are also, by far, the predominant export markets for processed products from the other countries of the South Pacific. New Zealand, Australia and Fiji provide most of the sawn timber and panel import requirements of the Island countries, and probably supply the majority of paper requirements (though no statistics are available for these). The majority of processed forest production surplus to South Pacific requirements is from New Zealand and this is largely exported to Asia and the United States.

Australia and New Zealand import significant quantities of paper and paperboard from Europe, North America and Asia. Australia also imports significant, but declining, quantities of sawn timber from the United States, Canada and Malaysia.

The most significant development over the coming fifteen years will be Australia achieving nominal self sufficiency in wood production. As noted this will create a significant softwood sawn timber surplus in the region and necessitate New Zealand, Australia and Fiji seeking new markets for particularly sawn timber production.

### ***7.2 International and Regional Roles***

The most important regional organisation in the South Pacific is the South Pacific Forum. Forestry issues, especially the exploitation of tropical forests, have been highlighted at recent meetings. At the 25th meeting in 1994 an agreement to draft a Code of Conduct for logging in the South Pacific was reached. The Code sets minimum standards which will allow selected forests to be harvested with the minimum of adverse impacts. The Code was ratified by Australia, New Zealand, Papua New Guinea, Solomon Islands, Fiji and Vanuatu.

Most intra-regional trade is governed by the South Pacific Regional Trade and Economic Co-operation Agreement (SPARTECA). SPARTECA was established in 1981 to assist in easing import restrictions on imports of Island goods into New Zealand and Australia in an attempt to adjust the massive trade imbalance that exists. In 1987 all duties and quotas on Island goods were removed. A problem with SPARTECA is the large differentials in economic power between the largest and smallest Island nations. The Closer Economic Relations Agreement (a free-trade agreement) between New Zealand and Australia is a major determinant of trade patterns in the region. It will become of particular significance in the forestry sector as Australia moves toward self-sufficiency in forest products in that it is likely to assist New Zealand to continue to supply sawn timber and other forest products to Australia, thereby forcing some Australian producers to seek markets off-shore.

Environmental issues in the South Pacific are generally handled under the South Pacific Regional Environment Programme (SPREP). SPREP was established in 1982 as a result of an increasing number of environmental problems being raised at the South Pacific Forum. Its major contribution to forestry thus far is in a general agreement on the need for regional cooperation to achieve sustainable resource management.

In terms of international forestry organisations, Australia, New Zealand, Papua New Guinea, Fiji, Solomon Islands and Western Samoa are members of the Asia-Pacific Forestry Commission and these countries with the addition of Cook Islands, Tonga and Vanuatu are members of FAO. The ITTO is the other forestry organisation which is of significance in the region and Australia, New Zealand, Papua New Guinea, and Fiji are member countries.

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