

ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY II

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SAMOA FORESTRY OUTLOOK STUDY

by

Sam Sesega*



**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
REGIONAL OFFICE FOR ASIA AND THE PACIFIC**

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* Pacific Environment Consultants Ltd., PO Box 3702, Apia, Samoa. E-mail: samsesega@conservation.ws

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INFORMATION NOTE ON THE ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

The Asia-Pacific Forestry Sector Outlook Study (APFSOS) is a wide-ranging initiative to gather information on, and examine, the evolution of key forestry issues as well as to review important trends in forests and forestry. The main purpose of the study is to provide a better understanding of the changing relationships between society and forests and thus to facilitate timely policy reviews and reforms in national forest sectors. The specific objectives are to:

1. Identify emerging socio-economic changes impacting on forest and forestry
2. Analyze probable scenarios for forestry developments to 2020
3. Identify priorities and strategies to address emerging opportunities and challenges

The first APFSOS was completed in 1998, with an outlook horizon to 2010. During its twenty-first session, held in Dehradun, India, in April 2006, the Asia-Pacific Forestry Commission (APFC) resolved to update the outlook extending the horizon to 2020. The study commenced in October 2006 and is expected to be completed by September 2009.

The study has been coordinated by the Food and Agriculture Organization of the United Nations (FAO), through its regional office in Bangkok and its headquarters in Rome, and implemented in close partnership with APFC member countries with support from a number of international and regional agencies. The Asian Development Bank (ADB), the International Tropical Timber Organization (ITTO), and the United Kingdom's Department for International Development (DFID) provided substantial financial support to implement the study. Partnerships with the Asia-Pacific Association of Forest Research Institutes (APAFRI) and the Secretariat of the Pacific Community (SPC) supported the organizing and implementing of national focal points' workshops and other activities, which have been crucial to the success of this initiative. The contributions of many other individuals and institutions are gratefully acknowledged in the main APFSOS report.

Working papers have been contributed or commissioned on a wide range of topics. These fall under the following categories: country profiles, sub-regional studies and thematic studies. Working papers have been prepared by individual authors or groups of authors and represent their personal views and perspectives; therefore, opinions expressed do not necessarily reflect the views of their employers, the governments of the APFC member countries or of FAO. Material from these working papers has been extracted and combined with information from a wide range of additional sources to produce the main regional outlook report.

Working papers are moderately edited for style and clarity and are formatted to provide a measure of uniformity, but otherwise remain the work of the authors. Copies of these working papers, as well as more information on the Asia-Pacific Forestry Sector Study, can be obtained from:

Mr. Patrick Durst
Senior Forestry Officer
FAO Regional Office for Asia and the Pacific
39 Phra Atit Road
Bangkok 10200
THAILAND
Ph. (66-2) 697 4000
Fax: (66-2) 697 4445
Email: patrick.durst@fao.org

EXECUTIVE SUMMARY

1. Forests and forestry in Samoa are impacted by a number of factors acting sometimes singly but more often, in combination. The most pronounced and dramatic in effect have been environmental, economic and demographic. Samoa's forest cover has been declining steadily since the first aerial photos were taken in 1954 due to agro-deforestation and later, during the mid 1970s, by logging. Tropical cyclones have played their part in forest degradation and fragmentation (Whitmore 1984), but the 1990 and 1991 cyclones were especially devastating, both in the extent of degradation and loss to the native forests, but more so on the plantation forest resource.
2. The combined effect of commercial exploitation for wood processing, tropical cyclones and agro-deforestation has left Samoa with only a few years of merchantable forests remaining. By all estimates, Samoa's merchantable forest resource will run out in a few years, at most five years. The existing plantation resource will not reach harvestable diameters until around 2021 and a gap in sawlog supply will mean the demise of the existing sawmills. All of Samoa's sawntimber requirements will then depend on imports.
3. Non-wood forest products are mainly in traditional medicines and are part of cultural usage normally considered part of subsistence existence. This is slowly changing. One of Samoa's main export crops is *Morinda citrifolia* (or *nonu* in juice and pulp form), a prolific, light-demanding pioneer with a broad ecosystem range. While it is now increasingly being cultivated, many of the current crops are naturally regenerated. Another traditional medicinal species called *mamala* (*Omalanthus nutans*)¹ is generating considerable interest in the USA where it is intensively studied for its potential for HIV/AIDS treatment and, if successful, will generate significant benefit for the country.
4. Matching the steady depletion of the forest resources, inevitably, is the decline in the sawmilling industry. Of the four sawmills operating in 2000, only two remained by the end of 2004, but in significantly reduced sizes. Low tech, low cost, portable mills have replaced circular and band sawmills as sawmillers seek to remain viable under conditions of extremely scarce resource throughput. One sawmill is getting into coconut wood milling, but the market is limited to local furniture/joinery.
5. As if to compensate for the loss of merchantable forests, Samoa has been outstanding in terms of forest protection. Since the year 2000, it established two additional national parks, and ten small forest reserves and botanical areas, adding 7,959 ha (or an increase of 73%) to its protected area network. This brings under protection 6.3% of its remaining forest area, or 3.8% of the country's total land area. This does not take into account several community-based conservation areas and areas designated and managed as watersheds.
6. Therefore, outside the challenges faced in wood production for sawntimber, forests continue to offer the full range of protection, ecological, hydrological, and social functions and services. There are issues with biodiversity conservation to be addressed, but current trends point to a promising outlook for Samoa from an environmental and protection perspective.
7. In terms of institutional arrangements, a new Forest Resource Management Bill is being finalized. This is intended to address the shortcomings of the current Forest Act 1967 and Forest Regulations 1969. There is a welcome push for greater integration in the

¹ A Whistler (1996: 77) noted that the spelling of "Homalantus" by some authors is incorrect.

management of natural resources, and for forestry, the new legislation is tailor-made for this objective. Having all agencies for water, land, parks and reserves, and forest resources under one ministry (the Ministry of Natural Resources, Environment and Meteorology) provides an opportunity to pursue this approach without the constraints of inter-agency politics that, in the past, tended to be obstructive.

8. Thus the critical issue confronting Samoa's forestry is in future wood production. There are indications of the direction to be taken and strategies for addressing this issue. This includes the withdrawal of the Government from plantation forestry — even converting its plantation resource in the Cornwall Estate into a 'reserve' — and forest resource replanting to be taken over by the private sector. An AusAID community forestry project in the pipeline is hoped to spearhead this shift.
9. It appears that the wood production imbalance is approaching crisis proportions. Worse still, it appears to be grossly underestimated (if at all recognized) at the policy-making level. The proposed strategy for forest resource development is also considered seriously inadequate, unless Samoa is content to import all of its sawntimber requirements — which between 2003 and 2005 were valued at \$10,580,152 — for the next 30 plus years. If not, then the gravity of the situation demands an immediate boost in forest replanting, from the current level of 100 ha per year to at least 400 ha per year, for the next ten years. The planned community forestry project offers a partial solution to the problem, but should not be expected to achieve significant planting targets in the face of the short-term profit maximizing behavior of landowners with more lucrative options (e.g. *nonu*, sandalwood [*Santalum* spp.], other agricultural crops and possibly *mamala* [*Homolanthus nutans*]) to choose from.
10. Samoa's comparative advantage in growing some of the highest valued timber on world export markets is not appreciated. There is significant potential for Samoa to be a net exporter of wood in value terms, with exports of high quality timber while continuing to import radiata pine for general construction needs. The existing mahogany-dominated plantations will produce high quality wood by 2021, but the quantity is too small to encourage investment in a sufficiently sophisticated industry to process it to export market quality. Economies-of-scale in the size in the resource throughput for processing is essential in achieving this. This can be achieved if the Government replants fully the Cornwall Estate within the next decade as the core resource, with private and community woodlots to augment it.
11. A serious stumbling block to commitment to an increased forest replanting program is the risk of cyclones, primarily as a result of the devastation caused by Cyclones Ofa and Val in the early nineties. Samoa must re-assess its perception of risk of tropical cyclones vis-à-vis investments in plantation forests. It is manageable and can be significantly alleviated with proper forest management practices and careful selection of windfast species.

1. INTRODUCTION

Background

The Consultant was asked by FAO (Apia) to prepare a country outlook report examining the current state of forests and forestry and outlining emerging scenarios of forests and forestry in Samoa and several thematic studies on issues of broader interest. The report updates previous studies completed in 1998, with scenarios projected to the year 2020.

The report contributes to the second Asia-Pacific Forestry Sector Outlook Study (APFSOS). The APFSOS is a wide-ranging initiative to gather information, examine the evolution of key forestry issues, and review important trends to identify the range of outcomes, and implications for forestry, that may arise from actions taken today. Its main purpose is to support policy review and reform.

The purpose of the APFSOS is to describe how forests in Asia and the Pacific might look in the future. It will develop a coherent and collective vision of the range of choices and options for action — and draw conclusions about the range of outcomes that might flow from these choices. APFSOS will help countries place their own policy objectives in a regional and global context, to facilitate better national policies and planning, whilst drawing a broad picture of change, to enable improved decision-making. The specific objectives of the APFSOS are to:

- identify emerging socio-economic changes impacting on forests and forestry;
- analyze probable scenarios for forestry developments to 2020; and
- identify priorities and strategies to address emerging opportunities and challenges.

In line with the above, this report forms Samoa's input into the APFSOS sub-regional and regional outlook reports. Additionally, the report's preparation provides an opportunity to develop a forward looking approach to improving the national forest programme and to develop a collective vision for the future.

Scope and coverage

The Terms of Reference for this exercise defined the objectives, process (methodology) and the main thrust of the report. Key areas of focus of the report are (a) a description of the current state of forests and forestry, (b) an assessment of main driving forces, (c) analysis of probable scenarios of socio-economic development to the year 2020, (d) implications of the scenarios on the forest sector to the year 2020, and (e) the priorities and strategies aimed to enhance the benefits to society from the forest sector.

Methodology

This report is based on information from three main sources (i) a desk review of a number of published and unpublished (internal) reports and documents, including Internet webpages, (ii) face-to-face consultations with a number of government, private sector and civil society representatives, and (iii) comments and feedback received from participants of two workshops conducted. Particularly targeted for consultations and workshops were officials and representatives of the Ministry of Natural Resources, Environment and Meteorology (MNREM), particularly those from the Forestry Division and to a lesser extent, the Water Resources Division and National Parks and Reserves. Similarly representatives of current sawmilling companies were of special interest.

Notwithstanding the extent of consultations conducted, there remain gaps in the required information. Some data such as in woodfuel consumption and sawmill production have not been collected. Others are dated, but recent data from living sources are inconsistent and unreliable.

During the workshops, presentations on the status of the forestry in Samoa, largely based on information from the Forestry Division, were presented. Key issues affecting forestry, as perceived by the author, were also discussed. A key part of the workshops was in visualizing the future, based on past and present trends and getting participants to envisage and visualize the shape and nature of the resource in the year 2020. This being said, the scenarios for the future presented in this report, based on business-as-usual and other improved versions, are largely constructs of the author.

Structure of the report

The report is organized along three main sections:

- (i) description of the current state of the forests and forestry in Samoa;
- (ii) issues faced that are impacting on its future development; and
- (iii) the future itself, based on trends past and present.

Some recommendations are made and these again are the author's views on actions needed to achieve an improved outlook for the future.

2. CURRENT STATE OF FORESTS AND FORESTRY IN SAMOA

Brief background on Samoa

Samoa is a small island nation in the South Pacific situated south of the equator between latitudes 14°10' and 13°20' South and longitudes 171°20' and 172°50' West. Its closest neighbor to the east is American Samoa, with Wallis and Futuna to the west, Tonga to the south, and the Tokelau islands to the north.

Part of the Samoan archipelago, the Independent State of Samoa is comprised politically of the largest two islands in the group (which also includes six islands that comprise American Samoa): Savaii is 1,820 km² and 'Upolu is 1,110 km². The home island of Upolu is home to nearly three-quarters of Samoa's population and its capital city of Apia.

The climate is tropical, with a rainy season from November to April. Savaii is still active volcanically, while Upolu is extinct or, at least, dormant. Vegetation types include littoral, mangrove and swamp forests, and a range of rainforest types.

Samoa's population in 1991 was 161,296. The 2001 population census' preliminary results recorded a population of 174,140 and the estimated population for 2005 was 177,287 (SPC 2005).

The economy has traditionally been dependent on development aid, private family remittances from overseas, and agricultural exports. The country is vulnerable to devastating storms. Agriculture employs two-thirds of the labor force, and furnishes 90% of exports, featuring coconut cream, coconut oil, and copra. Outside of a large automotive wire harness factory, the manufacturing sector mainly processes agricultural products. Tourism is an expanding sector; more than 70,000 tourists visited the islands in 1996. The Samoan Government has called for deregulation of the financial sector, encouragement of investment, and continued fiscal discipline. Observers point to the flexibility of the labor market as a basic strength for future economic advances.

Trends in forest resources — indigenous forests

The total land area of Samoa (Table 1) is about 285,000 ha (SamFris cited by SOE 2007). Around 60% (or 171,000 ha) is covered with forests of various types, including mangroves and wetlands (ibid.).

Table 1. Total land area of Samoa

| Land class | Upolu | | Savaii | | Total Samoa | |
|------------|-----------------|------|-----------------|------|-----------------|------|
| | km ² | % | km ² | % | km ² | % |
| 1 | 221.9 | 19.6 | 179.8 | 10.6 | 401.6 | 14.2 |
| 2 | 561.5 | 49.6 | 632.7 | 37.3 | 1193.6 | 42.2 |
| 3 | 108.7 | 9.6 | 490.2 | 28.9 | 599.6 | 21.2 |
| 4 | 238.9 | 21.1 | 393.5 | 23.2 | 633.6 | 22.4 |

Source: Ward and Ashcroft 1998.

Land Class 1: Few limitations to agricultural use

Land Class 2: Moderate limitations to agricultural use and few limitations to forestry

Land Class 3: Severe limitations to agricultural use and moderate to severe limitations to forestry

Land Class 4: Unsuitable for agriculture or forestry

Based on 1999 aerial photos, the remaining indigenous forest is estimated to be 165,166 ha (SamFris/FAO 2004). Recent reports, however, have redefined the remaining forests based on

the extent of forest cover, with forest types described in terms of closed (>65% tree cover), medium (<65% tree cover) and open forests (<40% tree cover). Using these terms, there are no closed forests remaining on the two main islands of Upolu and Savaii, with a small patch of 82 ha remaining on the Aleipata Islands. There are 72,563 ha of medium forests and 55,347 ha of open forests (ibid.). On the basis of these figures, FAO (ibid) describes Samoa's forests as 'extremely open and patchy'. The total break-down into forest types is given in Table 2.

Table 2. Forest types of Samoa (based on 1999 aerial photo interpretation with 2004 ground truthing. Source: FAO, 2004)

| Sum of area | | Island name | | | | | | | Grand total | % of Samoa |
|--------------------------------|----------------------|--------------|--------------|-------------|--------------|--------------|------------------|------------------|-------------------|--------------|
| FOREST STATUS | Main Vegetation Type | Apolima | Manono | Namua | Nuulua | Nuutele | Savaii | Upolu | | |
| Production forest | Medium Forest | | | | | | 18,050.29 | 247.7 | 18,297.99 | |
| | Open Forest | | | | | | 18,445.88 | 16,763.02 | 35,208.9 | |
| | Plantation Forest | | | | | | 3701.72 | 1,011.19 | 4,712.91 | |
| | Secondary Forest | 23.93 | 53.76 | | | | 18,146.82 | 10,824.56 | 29,049.07 | |
| | Mangroves | | | | | | | 0 | 0 | |
| | Wetland | | | | | | | 0 | 0 | |
| Production forest total | | 23.93 | 53.76 | | | | 58,344.71 | 28,846.47 | 87,268.87 | 30.71 |
| Protection forest | Closed Forest | | | | | 82.48 | | | 82.48 | |
| | Medium Forest | | | 9.27 | | | 54,100.67 | 154.75 | 54,264.69 | |
| | Open Forest | | | | 13.77 | 12.97 | 38,26.05 | 16,286.28 | 20,139.07 | |
| | Plantation Forest | | | | | | 95.96 | 293.66 | 389.62 | |
| | Secondary Forest | | | | | | 16,52.76 | 6,471.4 | 8,124.16 | |
| | Mangroves | | | | | | 16.4 | 353.15 | 369.55 | |
| Wetlands | | | | | | 16.85 | 417.67 | 434.52 | | |
| Protection forest total | | | | 9.27 | 13.77 | 95.45 | 59,708.69 | 23,976.91 | 83,804.09 | 29.49 |
| Grand total | | 23.93 | 53.76 | 9.27 | 13.77 | 95.45 | 118,053.4 | 52,823.38 | 171,072.96 | 60.20 |

Source: SamFris/FAO.2004.

- Notes:** 1. Protection forest consists of the following land uses: existing and proposed national parks and reserves, community conservation areas, areas above 30% slope (proposed forest conservation areas) and critical catchment areas. Many of these areas may not be actively protected except on paper.
2. "Production" forest does not imply that the area is suitable for production, merely that it is forest land that is not protected and is theoretically available for production. Areas actually suitable for production must satisfy a number of other criteria such as having a suitable timber volume of merchantable timber species, being accessible and having community support for logging.

Over the period 1954 and 1999, for which aerial photographic records exist, significant changes in the extent of forest cover have taken place. Table 3 compares forest cover (%) on the two main islands over this period.

Table 3. Changes in percentage of forest cover 1954-1999

| Year | Upolu (%) | Savaii (%) | Total Samoa (%) |
|---------|-----------|------------|-----------------|
| c. 1954 | 65 | 79 | 74 |
| c. 1987 | 43 | 63 | 55 |
| c. 1990 | 25 | 59 | 46 |
| c. 1999 | 46 | 69 | 60 |

Source: FAO.2005. Samoa Country Report.

A declining trend in the remaining area under forest cover between 1954 and 1987 is followed by an uncharacteristic increase over the period 1990 and 1999 (Figure 1). This 'increase' appears illogical and suggests a significant recovery during the period. Mathias (pers. comm.,

2005) clarified that this is the result of different sampling and surveying methodologies as well as different forest classification systems, with the surveys conducted in the latter years being more intensive and detailed.

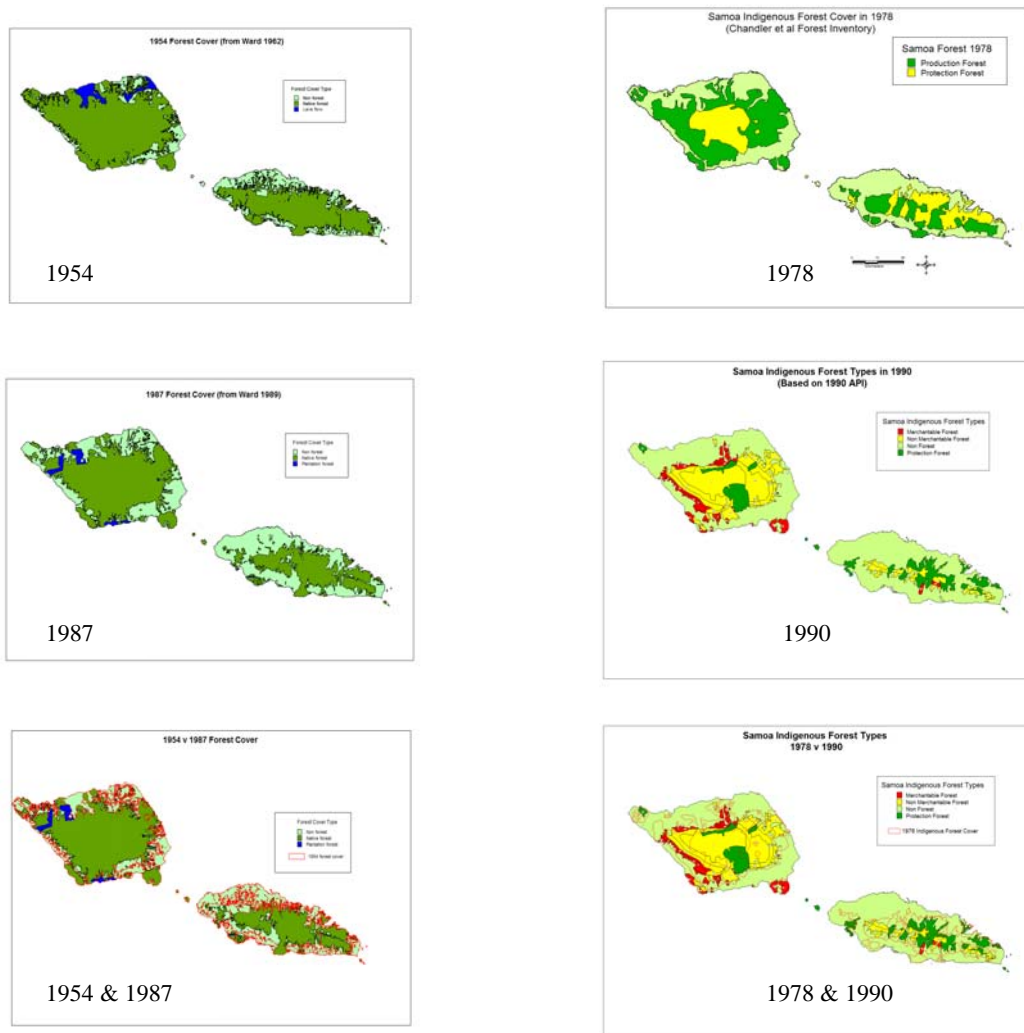


Figure 1. Maps comparing forest cover, 1954-1990

Table 4. Summary of forest types and areas

| | Forest type | Area (ha) | % of Samoa |
|------------------------|--------------------|------------------|------------|
| Non-forest area | | 113,111.2 | 39.8 |
| Forest area | Protection forests | 83,804.1 | 29.5 |
| | Production forests | 87,268.87 | 30.7 |
| | Total Forests | 171,073.1 | 60.2 |
| Total land area | | 284,184.3 | 100 |

Source: SamFris/FAO.2004. Based on 1999 aerial photo interpretation with 2004 ground truthing.

In summary, about 60.2% of Samoa’s land area (equivalent to 171,073 ha) is covered with forests based on 2004 analyses (Table 4). About 30.7% (or 87,269 ha) of this is production forests and 29.5% (or 83,804 ha) protection forests. The remaining 39.8% is not considered forested.

Trends in forest resources — plantation forests

A program to reforest logged over areas in Western Savaii began in the early 1970s, as policy makers and forest managers envisaged the need for a sustainable flow of wood to support local industries. Supported by NZAID and the World Food Program (WFP), the state-owned Cornwall Estate in Western Savaii and government-owned land in Togitogiga, Southern Upolu were replanted with mahogany, Spanish cedar (*Cedrella odorata*), teak (*T.grandis*)

and other exotic species. In 1984-1985, the reforestation program was expanded with an Asian Development Bank soft loan augmenting NZAID financial and technical assistance. Additional land was leased from customary landowners. Forest management also saw a shift in the choice of species to a greater emphasis on fast growing general construction wood. *Eucalyptus deglupta* and *Anthocephalus chinensis* were the main species chosen, managed on a 12-year rotation, with mahogany and teak still planted, but on significantly less area.

In the early 1990s, about ten years before the first plantation forests were to come on line for milling, two devastating cyclones¹ destroyed more than 75% of the entire plantations. Efforts were made to salvage some of the remaining stands, but most were unsuited for processing. Such was the extent of the devastation that many salvageable logs were destroyed by termites and other pests before salvage processing could be organized. The high risk of forest plantations as an investment was starkly illustrated by the cyclones. Post-cyclone reviews (Ernst & Young 1992) of the projects predicted more extreme risks of cyclones than was previously believed. NZAID phased out its assistance to reforestation following this review. While plantings continued at the two government blocks, annual targets were significantly reduced from more than 1,000 ha per year in the pre-cyclone period, to the present target of 100 ha a year. Customary-owned lands that were leased were also returned to villages, with remnants of planted forests which, it was hoped, would still produce useful sawlogs for future milling.

Today, the total remaining plantation forest of 1,554 ha is concentrated on two sites, 1,334 ha at the Cornwall Estate (Masamasa and Falelima, Savaii), and 220 ha in Togitogiga, South Upolu. The oldest stands are from 1991 plantings, immediately following the cyclones. Old remnant trees are scattered throughout the old plantation sites, but cannot be harvested without damaging the newer replantings. Mahogany (*Swietenia macrophylla*) comprises the main species planted, making up over 64% of the total plantation resource. Mixed plantings of mahogany and teak (*Tectona grandis*) and other high quality native species make up the remainder of this resource. The resource is managed on a 30 year rotation with an estimated mean annual increment of 5 m³/ha/yr.

A small community forestry component is also slowly introducing family owned woodlots and has replanted about 190 ha in small lots. Within MNREM, there is strong support for the use of the community forestry approach to rebuild the national forest resource (Tuuu/Sesega, July 2007; pers. comm.). AusAID is known to be in the design phase of a community forestry project that would promote and support the replanting of plantation species by the private sector (including traditional households).

Forest ownership

Most of the indigenous forests are on customary-owned lands and under the control of local villages. Customary lands are normally not surveyed or properly demarcated, and this is sometimes problematic when land boundaries need to be mapped or described for logging license applications. Disputes over boundaries between neighboring villages keep native forests from exploitation by logging companies, as is the case with the one such licensed area in Aopo-Sasina.

During the mid 1980's, a joint Samoa/New Zealand/Asian Development Bank-funded reforestation project expanded on on-going replanting activities in the Cornwall Estate and Togitogiga. In addition, customary lands were leased for an expansion of the project. The leases have (since 1995) been returned to villages after the project was scaled down in the aftermath of Cyclones Ofa and Val in 1990 and 1991 respectively. On their return, the leased areas were carrying varied stocks of planted exotic and local timber and pole species but

¹ Cyclone Ofa in 1989 and Cyclone Val in 1990.

empirical observations suggest that forest maintenance has not been kept up. Except for part of the Aopo teak forest,² these forests are likely to yield significantly lower volumes than anticipated.

Table 5. Ownership of forests in Samoa

| | Customary (village) owned (ha) | Government- owned (ha) | Privately owned (ha) |
|---------------------------|--------------------------------------|------------------------------|----------------------------|
| Savaii indigenous forests | 70,990 | 0 | 0 |
| Upolu indigenous forests | 27,390 | 0 | 0 |
| Plantations - Falelima | 0 | 491.2 | 0 |
| Plantations - Masamasa | 0 | 769 | 0 |
| Plantations - Togitogiga | 0 | 213.7 | 0 |
| Plantations - Aopo | 706.1 | 0 | 0 |
| Plantations - Puapua | 407.1 | 0 | 0 |
| Plantations - Saanapu | 248.7 | 0 | 0 |
| Plantations - Lefaga | 313.8 | 0 | 0 |
| Small Woodlots | 0 | 0 | 190 |

Source: SamFris, 2004. (Forest classification 2004/Aerial photography 1999).

The largest areas of forest plantations are government-owned. These are concentrated on the Cornwall Estate in Masamasa and Falelima (Western Savaii) and Togitogiga in South Upolu (Table 5).

In 1995-1996, the Forestry Division (FD) initiated a community forestry project targeting households and a resource of 190 ha has since been established in this manner. Small woodlots in backyards or near the road, many of them less than 1 ha, some in mixed planting with other agricultural systems of cattle and crops, are owned by households or individual families. Table 5 tabulates areas according to ownership.

The perceptions of forest plantations as an extremely high risk investment after the devastating impacts of Cyclones Ofa and Val continue to haunt the FD. Despite significant investment hitherto made in forest plantation infrastructure (i.e. roads, office stations, accommodation quarters, nurseries, mechanical workshops), NZAID's assistance was phased out because plantations were deemed too risky. Transferring this risk to local communities was obviously considered more acceptable. Today, there is keen interest from AusAID for a forest replanting program, targeting local villages and individual households. If this is to proceed, then the ownership of planted woodlots in private ownership will increase.

State of forest management

MNREM is responsible for the sustained yield management of the country's forest resources. Sustainable forest management is, in theory, implemented through the judicious application of a forest licensing system governing the allocation of indigenous forests, a forest permit system for plantation forests, and the Code of Logging Practices to ensure environmentally sound and sustainable resource extraction. The ineffective use of economic tools (e.g. stumpage and resource rent/royalties) to promote efficient forest logging and wood processing was a notable feature (Sesega 2006) of forest management over the years. Consequently, the existing resource rent on the indigenous forest resource remains grossly undervalued and this has had negative consequences on forest resource utilization (ibid.).

The extent to which the mentioned allocation mechanisms have been effectively used to pursue sustainable forest management is also limited. Logging licenses are granted on the

² Aopo village recently (2007) sold its teak plantation to Blue Bird Lumber (Ah Liki/Sesega, Jul 2007, pers. comm.).

basis of applications from customary landowners with respect to forests on their lands. To date, except for the Salelologa/Tafua forest, all other remaining merchantable forests have been licensed for exploitation. One remaining licensed area (Aopo/Letui/Sasina) remains unlogged as a result of inter-village disputes over land boundaries. Regarding plantation forests, the first forest harvesting permit was allocated — following an open competitive bidding process — to Strickland Brothers in 2005. However subsequent issues related to stumpage and high logging costs are inhibiting logging (Strickland/Sesega, pers. comm., 2007).

Regarding the Code of Logging Practices, MNREM enforcement is limited to licensed areas. However, an opportunistic shift of logging operations to Salelologa forest, which is not licensed, means that not all current logging is being monitored for compliance with the Code of Logging Practices.

Overall, the effective management of the country's forests is constrained by several factors. There are deep-seated contradictions inherent in the customary ownership of land and the Regalian doctrine of state ownership of forests that underpin Government's claims to its management. Aborted attempts by the Government to enforce a logging ban in early 2007, following pressure from customary land owners, demonstrate this problem. Collusion between customary landowners and logging companies to circumvent the legal licensing system is a regular occurrence.

Shortcomings in the two pieces of legislation³ governing forests on customary lands (Ey 2003), is another contributing factor. Ey (ibid.) observed that these shortcomings are carried through to the management functions of the responsible agencies. And while Government has (since Ey's report) merged the forests and land management functions under one agency (i.e. MNREM), amendments to the legislation are only now being drafted. The Forest Management Bill 2007 is intended to address these issues and to promote a more holistic and integrative approach to forest resource management. Such an approach is now deemed feasible and facilitated by the amalgamation of land management, forestry, national parks and reserves, and water resources management under MNREM (Taulealo/Sesega, pers. comm., July 2007).

Economic viability of forest management for wood production

The limited extent of the remaining indigenous forest resource and the relatively young age of existing forest plantations point to a gap in local sawlog supply within the next few years and extending until the oldest plantation stands are ready for harvesting in 2021. Until then, the country's entire general construction timber requirements will likely be fully imported. The economic viability of forest management for wood production is uncertain, at least in the short term.

However in the longer term, because Samoa is well suited to a number of highly marketable timber species including mahogany (*Swetenia macrophylla*), Spanish cedar (*Cedrella odorata*), taun (*Pometia pinnata*) and teak (*Tectona grandis*), the potential for financially viable forest management for wood production is promising. Forest plantation growth data estimate a mean annual growth increment of 5 m³/ha/yr, with mahogany harvestable at 30 years rotation and an estimated yield of 150 m³/ha. These yield figures provide a solid basis for a viable industry, assuming efficient processing and marketing. The critical requirement for viability is whether Samoa will invest in a sufficiently large plantation resource to achieve economies of scale.

³ Forest Act 1967 and the Forest Regulation 1969.

There are also risks and uncertainties — including the threat of cyclones. Cyclone modeling by Ernst & Young (1996) produced a statistical estimate of a ‘severe’ cyclone every 7.4 years or four severe cyclones within the life of a mahogany planted on a 30-year rotation.⁴ More recent modeling by NIWA (Salinger et al. 2005) predicts about nine tropical cyclones on average to be expected over the entire South West Pacific region in an ENSO-neutral season. For Samoa, Salinger (ibid) predicted an average of 1.3 tropical cyclones passing within 5° of the main island group in the 2005-2006 season. In the context of forestry, both predictions confirm the high risk represented by tropical cyclones for investment in forest plantations.

The questionable quality of potentially available land for forest plantations, outside of the Government-owned Cornwall estate, poses a significant risk. Past experience with customary land leasing for forest plantations points to extremely poor quality sites wherein supposedly fast growing species underperformed. Thus while there may be unused land that may be leased for forestry purposes, its low fertility and generally poor quality suggest poor forms and slower growth rates.

In effect the high risk of cyclones and lack of quality sites combine to make future investments in plantation forestry a challenging proposition.

Under the present situation, the challenge to remain viable given an extremely scarce and difficult resource supply situation, has seen the evolution of the industry from one dominated by medium-sized bandsaw sawmills, to smaller, highly-mobile, portable mills. Indigenous forests previously considered non-merchantable (i.e. $< \text{or} = 29 \text{ m}^3/\text{ha}$) are now the main source of sawlogs, and keeping logging costs to a minimum is essential. The two larger portable mill operators⁵ are also vertically integrated to timber outlets, which they themselves control, and this enables the transfer to final consumers of excess logging and processing overheads. Timber prices are also kept competitive relative to imported substitutes by retailing without any value-added processing (i.e. drying, dressed, or preservative treatment). In this way, financial viability is maintained.

⁴ A modest Cyclone Heta hit Samoa in 2004 but damage to forests was considered to be minimal.

⁵ Blue Bird Engineering and Strickland Brothers.

3. WOOD AND WOOD PRODUCTS

Current level of production and consumption of wood and wood products

Total sawntimber production was estimated at 957 m³ in 2006,⁶ and averaging 4,402 m³ between 2000 and 2006. Compared to the mid 1970s, when Potlatch Sawmills alone was processing around 45,300 m³ (Trotman 1978), the decline is dramatic. Table 6 maps the input sawlog volume of all sawmills operating from 2000 to 2006.

Table 6. Sawmill input volumes, 2000-2006

| Year | Input volumes per sawmill in m ³ | | | | Total |
|------|---|---------------------|------------------|---------------------|--------|
| | Blue Bird Lumber | Strickland Brothers | Savaii Sawmiller | Tui Vaai Sawmilling | |
| 2000 | 7,842 | 1,408 | 711 | 4,906 | 14,867 |
| 2001 | 10,854 | 2,334 | 579 | 3,931 | 17,698 |
| 2002 | 11,273 | 2,347 | 1,936 | 2,609 | 18,165 |
| 2003 | 6,384 | 728 | 2,392 | 148 | 11,652 |
| 2004 | 5,881 | 4,321 | nil | nil | 10,202 |
| 2005 | 7,639 | 5,097 | nil | nil | 12,736 |
| 2006 | 2,096 | 639 | nil | nil | 2,735 |

Source: Forestry Division, MNREM, July 2007.

The diminished volume harvested explains the exit of two sawmillers in 2004 and underscores the direct correlation between industry viability and resource availability.

State of forest industries

The existing forest industry consists of five portable Lucas sawmills processing a total estimated sawlog volume of about 10,000 m³ annually. All five mills operate on the island of Savaii. Two larger operations employ conventional logging machinery of logging trucks, skidders and loaders while three small operators mill on site with extraction by tractors and flatbed trucks. Timber production is entirely rough sawn, green and untreated. There is a small amount of coconut timber being milled, with an estimated output volume of less than 100 m³ per year, all of it for local joinery and furniture making.

The only value-added processing is offered by a kiln-drying facility in Apia, operated by a local joinery/furniture making company. Other than this, for general construction, timber is sold and used (in general) without further processing.

Trade in forest products

Estimates of local sawntimber produced are derived using actual sawlog input volumes and assumptions made about milling conversion ratios. Total sawlog volumes harvested by all operating companies between 2000 and 2006 are given in Table 6. Based on an assumed recovery factor of 35%, the volume of sawntimber locally produced during this period is derived and given in Table 7. In 2000, TCI estimated Samoa's annual sawntimber demand at 20,000 m³. This is the base figure used to estimate a constant percentage increase in demand over the period 2001-2006. Similarly a derived estimate of imported sawntimber to supply the

⁶ Based on a 35% recovery factor at the mill sorting table.

projected demand is given. This estimate correlates to the difference between local production/supply and projected demand.

Table 7. Derived local sawntimber production, demand and imported volume

| Year | Total | Derived Total sawntimber output ⁷ | Derived demand ⁸ | Derived volume of imported sawntimber |
|------|--------|--|-----------------------------|---------------------------------------|
| 2000 | 14,867 | 5,203 | 20,000 | 14,797 |
| 2001 | 17,698 | 6,194 | 20,500 | 14,306 |
| 2002 | 18,165 | 6,358 | 21,012 | 14,654 |
| 2003 | 11,652 | 4,078 | 21,538 | 17,460 |
| 2004 | 10,202 | 3,571 | 22,076 | 18,505 |
| 2005 | 12,736 | 4,458 | 22,628 | 18,170 |
| 2006 | 2,735 | 957 | 23,194 | 22,237 |

Actual volumes of imported timber are regularly compiled and are readily available. Table 8 gives volumes of sawntimber imported from the four countries Samoa trades with. A salient feature is New Zealand's dominance as the main exporter of sawntimber to Samoa, accounting for 95% of all imported sawntimber. Australia, the USA and other Pacific ACP nations combined, make up the remaining 5%.

Table 8. Imports of timber⁹ from three main importing countries, 2003-2005

| Sawntimber in various descriptions | Australia | | New Zealand | | USA | | Pacific ACP | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Value (SAT) | Qty (bd.ft) | Value (SAT) | Qty (bd.ft) | Value (SAT) | Qty (bd.ft) | Value (SAT) | Qty (bd.ft) |
| Wood in the rough...treated with paint, stains, creosote, etc. | 40,546 | 26,851 | 1,252,614 | 1,210,608 | 46,523 | 32,200 | 55 | 167 |
| Untreated coniferous wood in the rough | 0 | 0 | 331,217 | 264,827 | 0 | 0 | 125 | 1,333 |
| Wood in the rough, or roughly squared | 901 | 3557 | 37,786 | 10,202 | 10,317 | 6,134 | 0 | 0 |
| Coniferous wood sawn or chipped lengthwise, sliced or peeled 6 mm thick | 20,254 | 9,936 | 6,121,028 | 5,117,704 | 19,205 | 17,418 | 10,120 | 7,333 |
| Wood sawn or chipped lengthwise, sliced, peeled whether or not planed | 247,784 | 191,548 | 623,339 | 221,653 | 58,146 | 13,698 | 0 | 0 |
| Coniferous wood, continuously shaped along any of its edges, or faces | 19,909 | 6,386 | 1,645,074 | 1,042,566 | 50,281 | 20,855 | 17,584 | 8,888 |
| Non-coniferous wood, continuously shaped along any of its edges or faces | 222 | 122 | 6,450 | 1,881 | 20,240 | 7,033 | 252 | 41 |
| Sub-total | 329,616 | 238,400 | 10,017,508 | 7,869,441 | 204,712 | 97,338 | 28,136 | 17,762 |

⁷ A sawlog: sawntimber recovery factor of 35% is considered appropriate for small mills and circular saws used.

⁸ Demand is based on TCI's estimated demand for sawntimber in 2000 of 20,000 m³ and is assumed to increase annually by 2.5% with other construction substitutes not coming into play.

⁹ Timber refers to wood cut or squared and in the rough, treated and untreated.

| | | | | | |
|-------------------------------------|--|-----|--------|-----|----|
| Equivalent quantity in cubic metres | | 563 | 18,572 | 230 | 42 |
|-------------------------------------|--|-----|--------|-----|----|

Source: MFAT Database, August 2007.

Table 8 gives the total imports of sawntimber for the three years 2003-2005 at 19,406 m³ or an average annual imported volume of about 6,468 m³. The figures are significantly lower than the projected demand and imports in Table 7, suggesting either an overestimation of demand or the effect of other building substitutes (such as composite wood products) or both. More up-to-date data from Statistics New Zealand show New Zealand's exports of sawntimber to Samoa from 2002-2007 (Statistics-NZ, 2008). Figures 2 and 3 show levels of NZ imported timber to Samoa from 2002 and 2003 to be comparable to figures compiled in Samoa based on Customs Department import manifests. In the four years from 2004 and 2007, annual export volumes increased over 2003 levels by 83, 155, 120 and 208% respectively. On average, imports of sawntimber increased by 51% annually from 2004 to 2007. This increase is likely related to the beginning of the current construction boom driven by major government-funded sporting facilities for the 2007 Pacific Games and several privately funded constructions.



Figure 2. Volume of NZ exports of sawntimber to Samoa 2002-2007¹⁰

Source: INFOS Database, Statistics NZ. Derived from a table compiled by Forestry Statistics Section, Policy Information Group, MAF.

¹⁰ The full table showing quantity and value of NZ exports of sawntimber to Samoa is in Annex 3.

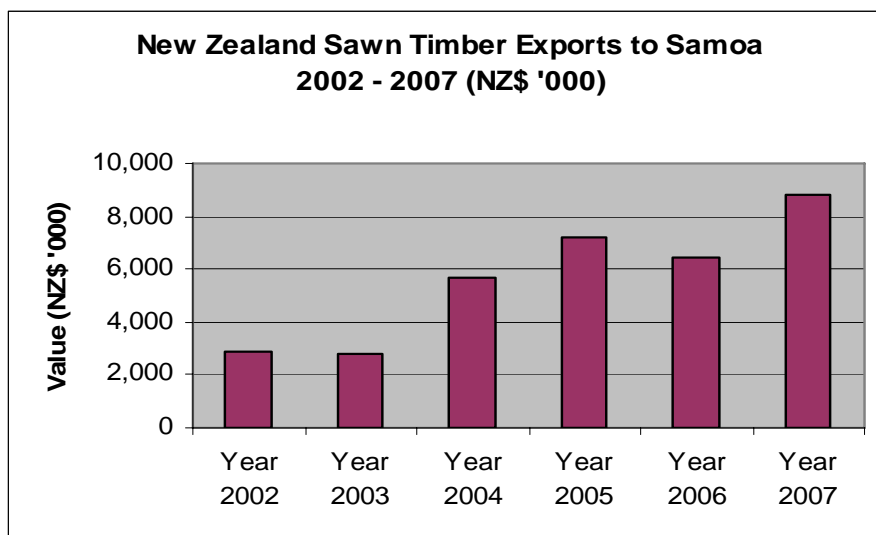


Figure 3. Value (NZ\$) of NZ export of sawntimber to Samoa 2002-2007

Source: INFOS Database, Statistics NZ. Derived from table compiled by Forestry Statistics Section, Policy Information Group, MAF.

In terms of trade in other wood products, composite wood panels comprise the second largest category. Amounts imported from Australia, New Zealand, the USA and Pacific ACP countries are given in Table 9.

Table 9. Imports of composite wood products from 2003-2005

| Composite wood products | Australia | | New Zealand | | USA | | Pacific ACP | |
|--|------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|
| | Quantity (bd.ft) | Value SAT\$ | Quantity (bd.ft) | Value SAT\$ | Quantity (bd.ft) | Value SAT\$ | Quantity (bd.ft) | Value SAT\$ |
| Coniferous veneer sheets and sheets for plywood, etc, =<6mm thick | 247,784 | 191,548 | 100,542 | 56,184 | 9,030 | 3,402 | 1,506 | 471 |
| Veneer sheets of tropical wood specified in Subheading Note 1 to this chapter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Veneer sheets and sheets for plywood and other wood, =<6mm thickness | 0 | 0 | 12,406 | 781 | 0 | 0 | 13,613 | 6,934 |
| Particle board and similar board of wood | 3,734 | 2,014 | 74,982 | 40,469 | 176 | 27 | 756 | 236 |
| Particle board and similar board of ligneous materials | 3,687 | 318 | 78,113 | 14,273 | 2,772 | 2,004 | 0 | 0 |
| Fibreboard of a density exceeding 0.8 g/cm ³ (hardboard) | 281,046 | 168,210 | 1,376,518 | 953,519 | 2,150 | 2,000 | 8,272 | 10,025 |
| Fibreboard of a density of > .35 g/cm ³ but <= .5 g/cm ³ (Mediumboard) | 7,104 | 2,000 | 29,844 | 17,477 | 28,792 | 15,724 | 308 | 1,143 |
| Fibreboard of a density of > .35 | 3,315 | 597 | 38,581 | 27,614 | 1,345 | 667 | 0 | 0 |

| | | | | | | | | |
|--|--------|--------|---------|---------|--------|--------|--------|--------|
| g/cm ³ but < .5 g/cm ³ (softboard) | | | | | | | | |
| Other fibreboard | 13,027 | 2,260 | 284,797 | 151,123 | 33,632 | 51,055 | 1,967 | 424 |
| Plywood consisting solely of sheets of wood, each ply <= 6mm thickness | 80,002 | 27,409 | 771,216 | 221,915 | 83,881 | 12,047 | 11,732 | 3,588 |
| Other, with at least one outer ply of non-coniferous wood | 333 | 1,111 | 342,029 | 142,913 | 39,816 | 86,805 | 36,153 | 16,298 |
| Other; plywood, veneered panels and similar laminated wood | 27,236 | 11,033 | 307,025 | 165,091 | 51,117 | 14,583 | 47,134 | 19,826 |

Source: MFAT Database, 2007.

In terms of trends in the pattern of production, trade and consumption, the increasing trend in sawntimber imports recorded up to 2007 will level off, when the boom associated with Samoa's physical infrastructure for the Pacific Games 2007 will have been completed. However, Samoa will continue to be a net importer of timber and forest products for the next 20 years in the absence of any significant local timber supply. Further into the future, a modest level of exports is possible when existing plantation forests of high quality mahogany come on line in significant quantities around 2021. However, this assumes that an industry with the appropriate level of efficiency and sophistication is in place to process logs into export quality products.

Wood as a source of energy

Wood is the main source of fuel for open fire cooking and stone-ovens which are the traditional ways of preparing food. However, modern lifestyle changes have seen the use of wood as fuel increasingly replaced by electricity and liquefied petroleum gas (LPG), and coconut shell charcoal for charcoal ovens. Local ready-to-eat foods cooked in the traditional way are readily available from roadside vendors and delicatessens, and buying local ready-to-eat food rather than cooking at home is a recent lifestyle change. The demand for woodfuel in homes is therefore lower and expected to be on a declining trend. These changes in lifestyles apply generally, but more particularly to the urban population of Apia. Statistics on woodfuel production and consumption have not been collected and although stacks of firewood are often seen at the produce market in Apia and on roadsides around the urban areas, it is estimated that the demand has been declining over the last ten years, and is probably leveling off.

Non-wood forest products

Non-wood forest products are mainly tree barks, roots and leaves of shrubs, vines and herbs used for traditional medicines. These products continue to be used despite the advent of modern medicines. Whistler (1996) documented 84 species of plants that Samoans commonly use for medicinal purposes. The potential of these becoming commercialized and traded for export are already evident in two species — *Omalanthus nutans* (locally called *mamala*) and *Morinda citrifolia* (or *nonu*). The former is documented as having potential for HIV/AIDS treatment and is being intensively research by a US-based conglomerate which has patented it. *Morinda Citrifolia*, commonly traded as *nonu* or *noni*, is already a major export crop, with manually extracted pure *nonu* juice and dried pulp exported to markets in Japan, Australia, NZ, the USA and Europe.

M. citrifolia's growing value as an export crop has led to its extensive cultivation and growing, but *nonu* itself is a prolific open space species that regenerates naturally. And many of the current harvests are from naturally generating *nonu* plants.

Sandalwood (*Santalum* spp.) is of growing interest as an export crop and is being promoted mainly by the Samoa Women in Business Inc. with support and technical assistance from FAO.

4. THE SERVICE FUNCTIONS OF FORESTS

Forest-based recreation

Statistics collected on the use of forests for recreation (e.g. bush hiking, trekking, outdoor camping, bird watching, etc) are limited to bush walking/hiking within the Le Pupu Pue National Park, the Vailima Botanical Garden, and Mt Vaea Reserve (Figures 4 and 5). Figures for 2003 show locals comprised over 70% of visitations, increasing to 93% and 92 % in 2004 and 2005 respectively.

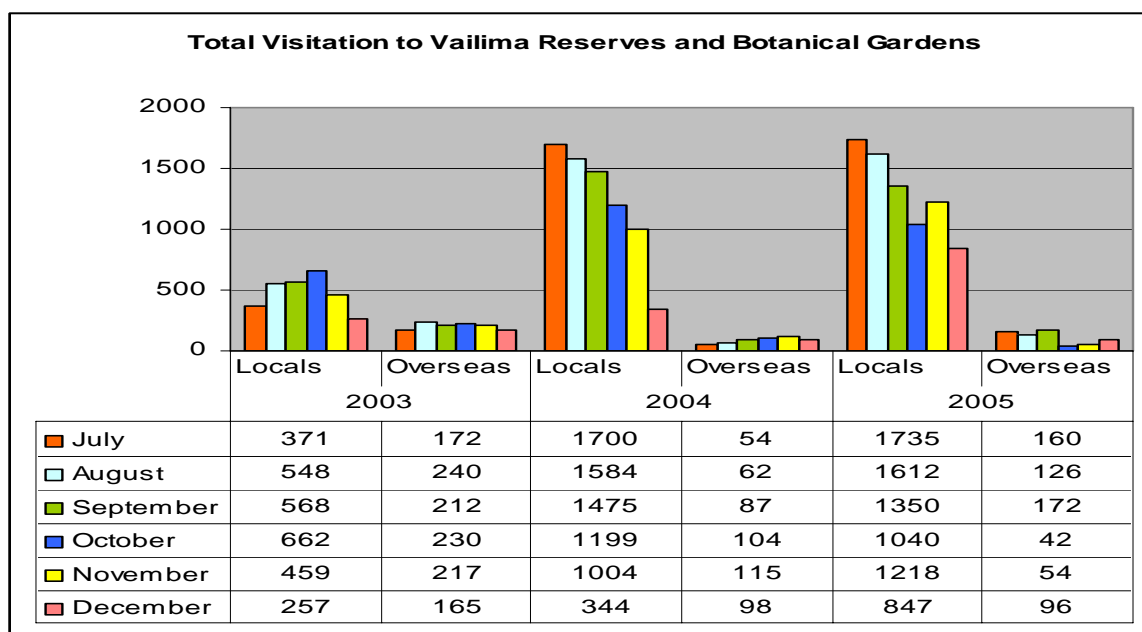


Figure 4. Visitations to Vailima reserves and botanical gardens

Note: From left to right, columns represent the months of July to December respectively.

Source: Based on information from Chief Parks Officer, Toni Tipamaá 2007.

There are no documented studies of attitudes towards forests as a place for recreation. Most locals visit the Vailima reserve and botanical gardens for physical exercise (Tipamaá/Sesega, pers com, 2007), with the other main category being school students and researchers for educational and scientific purposes. Visiting the grave of the famous Scottish author, Robert Louis Stevenson, at the mountain top is the main attraction for tourists. There is thus no basis for any conclusions related to the extent of public appreciation of parks or forests for recreation, based on these statistics.

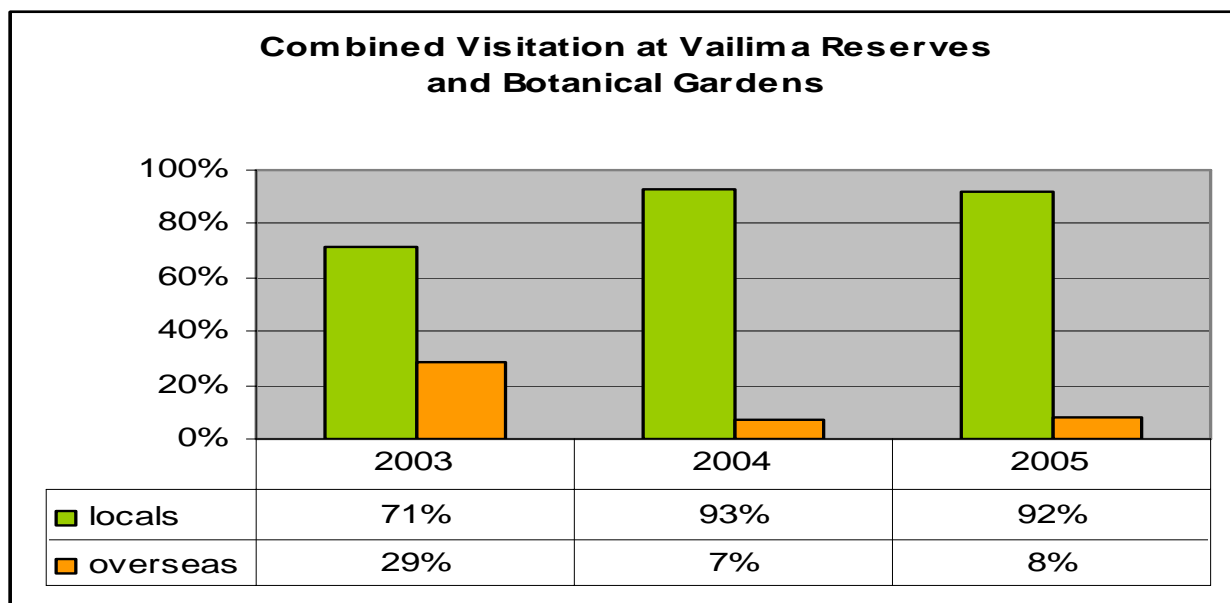


Figure 5. Combined visitations to Vailima reserves and botanical gardens

Note: Taller columns represent local visitors, smaller columns, overseas visitors.

Source: Based on information from Chief Parks Officer, Toni Tipamaá 2007.

Despite the lack of data, between 2000 and 2007, the Government declared and designated two new national parks and added a further ten reserves and botanical gardens to its protected area system (refer to Annex 1 for list of parks and reserves). For national parks, the underpinning rationale appears to be the need to protect fragile areas and ecosystems as opposed to a response to a perceived public demand for more forest recreation areas. The new additions to the forest reserves system, however, is more driven by government planners and land managers who appreciate the recreational value of open areas and forests, and who see an opportunity for recreation activities in unused Government-owned areas in accessible locations that would otherwise be overgrown with vegetation or revert to other less agreeable uses. Examples are the Fulusou Botanical Gardens, Taumesina Reserve, and the Vaitele Recreation Area. These reserves occupy strategic sites that are easily accessible to the public. Their establishment has significantly added and enhanced the general appeal and aesthetics of these areas.

The continuing growth and popularity of ecotourism based on marine and terrestrial ecosystems, have further raised public appreciation of unique and pristine forest ecosystems as areas for paid recreation. Several conservation areas in ecologically sensitive ecosystems such as coastal and mangrove forests are designed both to protect ecosystems and species, and to generate income from foreign tourists and local visitors alike.

Forests and water

Samoa has five main watershed areas (Baisyet 1983) which together control and supply 75% of the country's fresh water sources¹¹ (MNREM 2003). The role of forests in protecting water sources is well recognized in technical reports (Nelson 1983; 1996; Baisyet 1989) and in the policies and management plans of the MNREM's Water Resources Division. Evidence of this is reflected in the use of vegetation cover as the primary indicator for watershed health, and in recent efforts of the agency to rehabilitate watershed areas by replanting with trees. Prior to

¹¹ Other sources are springs (15%), boreholes (5%) and rainwater (5%) – MNREM, 2003. [Http://www.mnre.gov.ws](http://www.mnre.gov.ws)

the cyclones of 1990-1991, watershed vegetation cover was estimated at 58% in natural condition, 34% disturbed and 7% disturbed and extremely degraded. Cyclones Ofa and Val in 1990 and 1991 respectively, severely altered these figures. For the Vaisigano watershed, 40% of the trees were uprooted and 50% of standing trees were badly damaged (ibid). Sizeable areas of both Vaisigano and Fuluasou have since been replanted by the Ministry under its watershed rehabilitation activities.

In terms of governance and institutional arrangements, the management of watersheds was, before 2004, a responsibility of the Forestry Division, under the Ministry of Agriculture Forests and Fisheries (MAFF). In 2004, Forestry was transferred to MNREM, with water resources management as one of its responsibilities. Within MNREM, water resource management was removed and elevated in 2006 from within the Forestry Division into a full Division for Water Resources Management. This is indicative of the importance of water resources and the need for them to be accorded priority status within the Ministry's work program and budget. There are close linkages with the Forestry Division with most work previously undertaken by the Division now taken over by the WRM.

In terms of operation, Nelson (op cit) and Baisyet (op cit) identified, described and developed draft management plans, which have since been reviewed and updated. Consultations for this report revealed that work priority is on the implementation of management plans for the Fuluasou and Vaisigano watersheds, which serve the urban area of Apia (Penaia/Sesega, pers. comm, July 2007).

Conservation of forest biodiversity

Samoa is a party to a number of international environmental conventions, including the Convention on Biological Diversity (CBD). Its ecological fragility as a small island country is well appreciated at the highest political level. This appreciation is seen in the significant strides Samoa has made since 1999 in extending its state-managed protected area system. Since 1999, two new national parks and 13 reserves have been established and brought under management.¹² As a result, the total area under protection has increased from 4,734 ha in the early 1980s to 10,796 ha in 2007, or 6.3% of the remaining forested area and 3.8% of Samoa's total land area. Several other terrestrial areas are being negotiated for protection (Taulealo/Sesega, pers. comm., July 2007) and if these are successful over the next five years, they will further increase the total land area under protection to 16,846 ha (ibid), or 9.8% of the remaining forested area and 5.9% of Samoa's total land area.

Other forms of protected areas not included in the above statistics are community based conservation areas (CBCAs). Partly supported by the Government and other external donor organizations, CBCAs are making significant contributions to national biodiversity conservation. The Aleipata and Safata Marine Conservation Areas are the largest two, bringing under conservation management significant coastal forest areas, the mangrove forests of Saanapu-Sataoa and the Aleipata Islands; the latter contains the last areas of undisturbed indigenous forest.

Implemented parallel to area-based conservation approaches, are species-based measures targeting the protection of rare endemic species of flora and fauna, and the elimination of invasive ones. Rare bird species include the Tooth-billed pigeon (*Diduncula strigirostris*), maómaó (*Gymnomyza samoensis*) and tuameo (Shy Ground Dove or *Gallicolumba stairii*). The tree species ifilele (*Intsia bijuga*) is of cultural importance and is protected in one community conservation area. The highly invasive *Merremia* spp. vine is a major threat to forests and terrestrial ecosystems and is a challenge that the MNREM is presently addressing.

¹² Appendix 1 gives the full list of national parks and reserves.

The significance of progress made in area-based conservation may be assessed by examining the extent to which new areas are protecting representatives of rare ecosystems and habitats that are of national and global conservation significance. There are 14 such ecosystems¹³ in Samoa 12 of which are of global importance because of global rarity, endangered status or the concentration of species found only in Samoa. Twenty six sites were identified and prioritized for conservation with Grade 1 and Grade 2 Sites containing five and seven sites respectively (Schuster and Butler, eds. 2001). To date, three of five Grade 1 sites¹⁴ and three of seven Grade 2 Sites¹⁵ have been brought under conservation management. Notably, despite the large areas now protected in state-managed protected areas, all are in community-owned and managed conservation initiatives.

The lack of any specific focus on species and ecosystem endemism in the make-up of recent parks and reserves points to the constraints faced by the MNREM in acquiring for protection, lands under customary ownership. The pragmatic approach used to expand the parks and reserves system suggests a mix of opportunism and an eye for strategic land management. The end result, however, is a laudable system of protected areas effectively locking up large tracts of land and forests for their multiple roles as ecosystems and habitats, and for the protection of water and soil resources. Viewed in the context of the rapidly growing threat of unregulated exploitation of customary lands, the extended national parks system serves an indispensable purpose in the sustainable and wise management of Samoa's land, forests and water resources.

Forests and climate change

There is recognition by Samoa of the links between forests as carbon sinks and climate change. As a party to the Framework Convention on Climate Change and the Kyoto Protocol, Samoa actively contributes at the global level to the debate on ways and means of ameliorating this problem. At the national level, however, outside of the context of public education and awareness activities wherein climate change is discussed, this has yet to translate into real practical action. The issue of carbon credits and carbon sequestration are mere theoretical concepts yet to be concretized into anything tangible and beneficial. For Samoa, a wait-and-see attitude towards the development of carbon trading regimes in larger and developed countries is the approach being taken (Taulealo/Sesega, July 2007; pers. comm.).

¹³ Schuster, C. and Butler, D. eds. 2001. Samoa's Biodiversity Strategy and Action Plan. Government of Samoa.

¹⁴ Grade 1 Sites under conservation management – Uafato-Tiavea Coastal Forest (part of Aleipata MPA), Saanapu-Sataoa Coastal Wetland (Mangrove Forest) (part of Safata MPA), Aleipata Islands (part of Aleipata MPA).

¹⁵ Grade 2 Sites – Apolima Fou Coastal Wetland (METI), Saleapaga-Lalomanu Coastal Forest (part of Aleipata MPA); Vaiee-Tafitoala Peninsula (part of Safata MPA).

5. POLICY AND INSTITUTIONAL FRAMEWORK

General trends as regards forest policies and legislation

The Forest Act 1967 and Forest Regulations 1969 provide the legal framework within which forests are managed by the MNREM. A review of this legislation in 2004 (Ey 2004) raised questions as to their relevance and appropriateness in promoting the goal of sustainable resource management, particularly in the context of problems faced with the allocation of forests on customary lands, resource pricing and the often conflicting roles of Government as the custodian of customary lands on the one hand, and of promoting the interests of the broader public on the other.

To illustrate this point, a Cabinet Policy banning all commercial logging operations in early 2007 was short-lived, following pressure from customary landowners. A three month period wherein logging was allowed has since expired, yet no directive to guide the Forestry Division has been given. This is a sensitive political issue. Since the lifting of the ban, opportunistic logging operations seized and logged the unlicensed area of Salelologa and while these are all technically illegal operations, the Forestry Division is powerless to enforce the requirements of the legislation (Leavasa/Sesega, July 2007; pers. comm.).

Meanwhile, as a result of several public service restructuring exercises, MNREM assumed broad resource management responsibilities for water, land and forest resources. The opportunity for a more holistic and integrative approach to resource management clearly beckons (Tuuu/Sesega, July 2007; pers. com.), but the limitations in the current forestry legislation is a constraining factor. Addressing these constraints constitutes part of the underpinning rationale for the Forest Resource Management Bill now in its final drafting stages. The Bill is reportedly more pro-conservation and less development-oriented from a production forestry perspective (Powell/Sesega, July 2007; pers. comm.), and seeks to manage forests and their multiple functions in a holistic and more integrated manner (Taulealo/Sesega, op. cit.).

The Bill also promotes the private sector as the driver of forest resource development, with the Forestry Division to concentrate on a regulatory and research role and as a provider of technical expertise and advice to tree planters in the private sector.

6. OVERVIEW OF OVERALL STATE OF FORESTS AND FORESTRY

The critical issue facing forestry in Samoa is the inevitable depletion of the native forest resource and the absence of a replacement plantation forest resource to sustain the local industry. This issue has serious implications for the sustainability of the forest industry, trade in forest products, and rural development generally. The impacts on the timber milling industry are already being felt, with the industry adapting to the resource situation by reverting to low-cost logging and portable sawmilling technology to minimize costs. The down-side however is the loss in milling efficiency, increased wastage at the break-down saw and the loss of value-added processing that only larger economies-of-scale allow. That no plantation forests are ready to come on line to sustain local sawmills points to historical losses from plantations as a result of two devastating cyclones in 1990 and 1991. Remnant trees and plantations since planted will not be harvestable for sawntimber until around 2021 and, even then, the low level of forest planting today suggests that this future volume will be too small to encourage serious investments in forest timber processing.

Samoa is thus at the crossroads in terms of forest development. It must decide if it will maintain the status quo, and in the future, to depend entirely on imported timber for its general construction timber needs. Alternatively, Samoa may opt to work towards rebuilding a larger plantation forest resource on which a larger industry will be based to supply local demand and to export. Regarding the second option, the potential exists for Samoa to become a net exporter of timber in value terms because it has the genetic material, technical expertise and the climate for world class timber species such as mahogany, teak, taun (tava) and several others. But there are significant risks of cyclones and poor soils to contend with. The question of which direction Samoa should take in this cross-road is a decision that needs to be made soon, because trees are long term crops and 30 years will elapse before the impacts of decisions made today will be felt.

If Samoa decides to reduce its dependence on imports in the long term by tapping its own potential to produce world class timber for local use and export, how should it go about establishing this resource? There are differing views. Encouraging the private sector to drive forest replanting is the prominent view, using small scale woodlots and agro-forestry systems on customary and privately owned lands with the Government (i.e. Forestry Division) providing technical backup of information, seedlings, research and advice. The alternative is for the Government to continue to be heavily involved in plantation forest development.

Within the Forestry Division, there is concern that a private sector-driven forest replanting program will not establish a sufficiently large resource quickly enough. This view is less optimistic of the level of interest in woodlots by private landowners, considering the availability of other more profitable short-term crops. It argues therefore that the Government should fully replant the Cornwall Estate and possibly Togitogiga on the island of Upolu, to form the core of a national forest resource, until such time when the level of private sector involvement is significant enough to wholly drive the forest resource development program.

On the other hand, the private sector-driven approach to forest replanting may be seen as a low risk approach by the Government, with private tree owners to bear the risk associated with cyclones.

In terms of other forest values, the role of forests in water resources management is fully appreciated and work in the active management of strategically important watersheds is underway. The forest areas already designated for protection as national parks contribute significantly to this purpose, and demonstrate the benefits of Samoa's integrated multiple-use approach to forests and water resources management. The challenge, however, is maintaining this integration and balance, in the face of growing threats of factors such as agro-

deforestation and forest degradation from land clearing for development and infrastructure development, as well as the traditional practice of land-grabbing by clearing forests.

The conservation of Samoa's biodiversity has its challenges, despite the significant additions to the protected area system over the last ten years. The recent choice of land for protection as national parks reflects expediency more than biodiversity and conservation values. Many high priority conservation sites (NBSAP 2002) remain unprotected and are under serious threat of degradation and permanent loss. Many are on customary-owned lands and will therefore require the use of innovative approaches to conservation area management. The general success of community based conservation approaches in Samoa shows that a working model exists. In this model, it is essential that the income-generating potential from ecotourism of forests and pristine terrestrial ecosystems is utilized, to sustain community interest in, and commitment to, conservation objectives.

Finally, the inescapable fact of Samoa's smallness makes the holistic and integrated approach to natural resources management, particularly of land, water and forests, the only option. Fortunately, this is the vision and the direction espoused by the new legislation and by the current crop of resource policy makers.

7. WHAT WILL INFLUENCE THE FUTURE STATE OF FORESTS AND FORESTRY?

Demographic and socio-economic factors

Demographic and socio-economic factors such as population growth, growing expectations and aspirations, increased level of education, increasing integration into a cash-based economy (as opposed to a semi-subsistence economy), globalization, growing dependence on modern technology and so forth, all contribute to social, cultural and economic changes with direct implications and links to natural resources including forests. In most cases, there is direct increase in demand on forest wood products, fuelwood, and for its other related values including drinking water, forest recreation and spiritual nourishment.

The direct impact of population on forests is seen in the findings of Samoa's 2001 census. According to the census report, Samoa's population increased by 10% between the 1991 and the 2001 censuses for a total of 176,848 (Faafeu-Taaloga 2001). A direct link to forestry is the 26% increase in the number of buildings people live in compared to 1999 (ibid). Furthermore, houses using wooden floors and wooden walls increased over this census period by 11% and 22% respectively (ibid). Better quality houses is an indicator of people striving for an improved standard of living which in turn fuels demand for sawntimber and other wood-based construction items.

An increasing urban population also brings with it changes in lifestyles. For instance, working families rely less on wood fuel for cooking and more on LPG and electricity. The value of open spaces and forest parks increases as areas of recreation and relaxation particularly where families are confined in small suburban subdivisions or urban apartments.

The increase in urban migration particularly from the island of Savaii may suggest an increase in abandoned lands previously cropped and reduced pressure on forests of land clearing for cropping. In reality, this is not as significant as the experiences of other developing countries may suggest, at least in the initial years following relocation. Migrating households often maintain rural village properties including farms through other members of extended families who are remaining behind. And while relocating to urban areas for educational and employment purposes, families maintain their links to their original villages and return to them regularly during long week-ends, on special village occasions, school holidays and other similar breaks from employment. In essence, because the cultural links to villages and chiefly titles define a family's identity, the move to an urban location does not indicate an intent to leave permanently. The links which include rights to chiefly titles and customary lands are highly valued and migrating households continue to contribute to activities of their home villages in order to maintain their rights to them.

Environmental changes related to climate change and the increasing frequency and intensity of cyclones predicted for Samoa (Salinger et al. 2005), point to the growing vulnerability of populations in coastal and low-lying areas. In response to these risks, both in terms of coastal asset management and security for local populations, the Government is encouraging relocation of coastal populations and infrastructural assets to elevated inland areas, including areas currently under secondary forests (PECL/BECA, 2005).

The strong links between tourism and pristine environments including forests and mangrove ecosystems is also reshaping attitudes and perceptions of pristine forests and mangroves. For villages such as Saanapu, which generates income from its mangrove-canoe tours, mangrove ecosystems have a real economic value. Where these emerging values translate into actions, protection of sensitive ecosystems such as mangroves and other forests is made easier.

The political and institutional environment

The government of Samoa: Policy making in Samoa is highly centralized in the Samoa Cabinet and its powerful Cabinet Development Committee. All policy issues such as those identified by Ey (2004) for resource pricing, land lease administration, issuing of logging licenses, forest administration etc. are ultimately approved at this level. The cited example of a Logging Ban policy that was reversed following pressure from customary landowners is indicative of the highly politicized nature of resource policy making in Samoa.

Ongoing efforts by the Cabinet and the Government to find ways to unlock the potential in customary-owned lands for economic development will have far-reaching and adverse consequences for land use and deforestation if they are not accompanied by policies safeguarding environmental values.

The Forestry Division, Ministry of Natural Resources, Environment and Meteorology: The Forestry Division (FD) and the MNREM remain the most significant players in promoting sustainable forest management in the country. With its new location as part of MNREM, the FD is now in a better position — because the same Ministry has responsibility for water resources and lands — to influence the review of its legislation and to promote a truly integrated approach to resource management.

There are compromises to make when dealing with multiple objectives, particularly between their production and protection functions, but there are also clear advantages in achieving greater integration with water resources, and national parks and reserves.

Earlier discussions of the Forest Resource Management Bill point to a more pro-conservation pro-protection shift in the Ministry's outlook on natural resources management, and this is likely to impact on the FD's direct involvement in forest production.

Ministry of Agriculture (MoA): Agriculture will continue to be the predominant land use in Samoa, and food security a high priority of the Government. The significant role agricultural expansion plays in deforestation suggests that the MoA has a responsibility to bear in curbing it. As the main 'beneficiary' of deforested areas, the MoA should promote sustainable land-use practices to protect and prolong soil productivity to reduce the need to clear new forest areas. It should also promote multiple cropping systems including agroforestry in, for instance, erosion-prone areas both to minimize erosion as well as to contribute to rebuilding the forest and tree resources of the country.

Collaboration with the FD is necessary to share resources and expertise in support of the community forestry initiatives now in the pipeline.

The avowed reinvigorating of the agriculture sector (Minister of Finance 2007) will have impacts on land-use allocation at the village level, and possibly increased deforestation.

The forest industry: While there are five reported portable mill operators, the two largest are the most important players (Blue Bird Lumber and Strickland Brothers). Both are in the twilight of their wood processing operations, unless market acceptance of coconut timber for house construction makes an about turn. It is likely that these two will remain interested in the existing plantation resource. Blue Bird Lumber is also known to have bought the teak plantation at Aopo from this village, with an eye to managing it for future processing.

Local communities: Village councils of chiefs have traditional authority over communal forest lands and are therefore able to influence the allocation of user rights amongst village members. They also pass by-laws for resource management purposes such as bans on cutting of trees on erosion-prone areas and riverbanks, replanting of trees along vulnerable coastal

areas etc. For villages with large areas of land under forests, many are known to have entered into arrangements with logging companies to mill their timber, circumventing the legal requirement for forest licenses under the Forest Act 1967. This practice remains to this day including those under which Blue Bird Lumber and Strickland Brothers are logging in Salelologa.

Villages with strong conservation ethics (for instance Uafato, Fagaloa and Savaia Lefaga) are also known to have declared tracts of forests as protected and imposed on these forests permanent bans of logging and seasonal bans on hunting and shooting of bats and pigeons. They can be a force for positive forest conservation and development if properly harnessed.

Individual households and farming families: The traditional way of acquiring user rights to village communal land is normally through clearing of the forests on it. Unbroken cultivation of such lands by successive generations of the same family effectively results, by default, in their acquisition of user rights to that land. Rights are maintained unless, for some wrongdoing, they are evicted from the village by a decision of the Village Council. In this case, the land returns to being communal land and is available for someone else to clear and use. The importance of individual households lies in their potential as a target group for the development of woodlots on customary owned lands. They represent a quasi-private landowner with user rights to lands that can be planted with trees for sawlogs.

Overall trends/ tendencies in governance: Overall, while the Cabinet is capable of reversing policies where negative political fallout is perceived imminent and intolerable, MNREM remains the main driver of policy changes within the forestry sub-sector. These trends have been discussed earlier — a greater involvement of the private sector and landowning families and villages in the development of the forest resources, a more holistic and integrative approach by MNREM to land, forests and water resource management, with emphasis on protection and conservation.

Economic changes

Samoa's economy has been growing steadily averaging 3.2% over the period 2002-2006, with real annual GDP growth conservatively estimated at 3-4% for 2007-2008 (Minister of Finance 2007). So much so, the UN-ECOSOC's Committee for Development Policy (CDP) recommended that Samoa should graduate from LDC status (CDP, April 2007; UNDP, 2006) after the year 2009. The recommendation is based on Samoa's growing GDP per capita, and improving human development index.¹⁶ This growth is reflected in livelihood changes, one of which is a notable percentage increase in the number of wooden buildings reported in Samoa's 2001 Census (Faafeu-Taaloga, op cit). With further GDP growth estimated for 2007-2008 (op cit), this trend should continue in conjunction with an expected upward trend in timber imports.

The imminent loss of Samoa's LDC status will mean the end of access to concessionary loan finance from the IMF and World Bank and its agencies that have been financing much of Samoa's current infrastructural program. Samoa's dependence on these facilities for financing its development program may ease off as a result, with increased dependence on locally sourced budgetary resources such as increasing taxes and tariffs on incomes, government services, and on imported goods and services.

¹⁶ Samoa argued against graduation from LDC status by saying it is still economically vulnerable due mainly to structural impediments such as its geographic position and based on environmental issues which cannot be mitigated. In spite of this argument, the CDP decided that Samoa would graduate from LDC status (EcoSoc-Asia Pacific, 2007).

There are no explicit references in Samoa's development plan to the possible implications of this withdrawal or to mitigating strategies. However, consistent high-level rhetoric on the need to boost the performance of under-performing sectors, particularly agriculture, and to fully realize the potential tourism offers, suggests a conscientious effort to improve economic stability and resilience. Any impact of this on forest resources, particularly those on customary lands, may therefore result from efforts to boost agriculture and to make available unused customary lands for tourism ventures. On the other hand, the already significantly depleted merchantable forests suggest that the impacts of these sectors will be insignificant.

The needed boost in agriculture is not so much in terms of household food security, but more in terms of agricultural exports. However, Samoa has a limited range of exportable crops outside of *nonu*, copra and drinking coconuts. The *mamala* (*O. nutans*), if research currently underway in the USA confirms its potential for HIV/AIDS treatment, offers hope but this is not likely to happen any time soon. Similarly sandalwood (*Santalum* spp.) offers export potential once the FD is able to overcome current propagation and seed germination problems.

The high priority on increasing exports to complement remittances, tourism and the few other existing exportable commodities, would suggest an interest in production of world class quality species of mahogany, teak and tava (*P. pinnata*) that Samoa is capable of producing. On this basis alone, investment in forest plantations should be given serious consideration.

Impact of globalization

Globalization's impact on forestry is limited, in part because of Samoa's geographic isolation and in part because it is not a timber exporter. As an importing country, however, New Zealand is likely to remain its main exporter with its surplus of quality timber, close geographic proximity and a large Samoan migrant population. Until such time when Samoa's plantation resource is marketable, globalization's impact on Samoa's trade in wood products would be limited to the status quo.

Technological changes within and outside the forestry sector

In the early 1960s and early 1970s, the advent of chainsaws had a significant impact in facilitating agro-deforestation in Samoa. In much the same way, low-cost portable mills have enabled sawmilling companies to exploit forests of low densities previously considered non-merchantable. Logged-over areas that were previously left for later harvesting are now logged earlier than desired.

In sawmilling, tungsten carbide toothed saws are enabling the milling of high density wood previously avoided. High silica content coconut timber in particular is an example with important implications for Samoa. With the depletion of native forests, and the abundance of matured coconut stems, this technology is important to reducing milling costs and making coconut milling financially viable.

Environmental issues and policies and their impact on the forestry sector

Loss of biodiversity is a major environmental and forestry issue. There are several unique ecosystems that are under threat such as mangrove forests, wetlands and coastal forests. Whilst these may not have direct impacts on timber production, they pose a threat to overall ecosystem health given the inter-linkages of ecosystems in nature.

A threat with more direct implications for forests is the dwindling numbers of many bird species and flying foxes that play important ecological roles in the dispersal of forest tree seeds. Natural forest regeneration depends on these species and their dwindling numbers due

to habitat destruction should be a concern. Likewise, highly invasive vines (e.g. *Merremia peltata*) are degrading many secondary forests.

On the positive side, the increasing popularity of many ecologically sensitive forests such as mangroves as ecotourism destinations is providing an incentive for their conservation by many communities.

In terms of environmental policies, the emphasis shown by MNREM on expanding the protected area network has been discussed elsewhere in this paper. The Planning and Urban Management Agency (PUMA) Act 2004, which includes a requirement for environmental impact assessment for development projects is giving planners the opportunity to influence the design of projects to minimize the degradation of local environments including forests.

Impacts of climate change and natural disasters

The two cyclones during the early 1990s — Cyclone Ofa and Cyclone Val — not only devastated Samoa's forest plantations and native forests, but also significantly embedded in policy makers the notion of forest plantations as an extremely high risk investment option. The findings of an NZAID-funded review of Samoa's forestry development project (Ernst & Young 1996) reaffirmed this view, estimating one cyclone in every seven years or four cyclones within a 30-year rotation. NZAID phased out its assistance programme for forestry in Samoa following this review.

The increasing frequency and intensity of cyclones associated with global warming and climate change is reflected in recent projections by Salinger et al. (2005). Salinger predicts 1.3 cyclones will hit the Samoa islands, annually, which is a higher frequency of cyclones than that estimated by Ernst & Young (op cit). There is, however, something to be said about the reliability of cyclone prediction models given the fact that since 1991, Heta (2004) remains the only cyclone to have visited the Samoa Islands.

The fact remains that perceptions of risk associated with cyclones does affect decision-making on resource allocation to the forestry sector. For its part, the Forestry Division must demonstrate that this risk is manageable with the careful selection of windfast species, proper planting alignment, selection of less exposed sites and the increasing use of windbreaks.

National development priorities

There is a clear national priority on refurbishing the agriculture sector. It is unclear as to what strategies are to be employed but, in terms of land use, the priority will likely lead to increased land clearing for livestock and crops. The already depleted state of the native forest resource suggests that the added impact on deforestation will be insignificant. More telling will be the impacts on allocations of budgetary resources. Forestry activities will not likely receive the same funding support increases as are likely for agriculture.

Consultations for this report revealed plans for initiating a community forestry project with AusAID funding, to encourage private planting of forest trees in combination with short-term agricultural crops.

Perception of risk in investment in forestry

Samoa's previous significant investment in plantation forestry was decimated by two tropical cyclones in the early-1990s a few years away from maturity. Since these events, the perception of forest plantations as a high risk investment has remained. There is general recognition that a forest resource to support local demand is necessary, but neither the Government nor its traditional donors (AusAID, NZAID) seem interested. Only in 2007 was

there interest expressed by AusAID in forestry using a community-based approach to promote small woodlot replanting. It is a low risk approach in financial and silvicultural terms. Investment capital is not compounded over the entire tree rotation because short-term crops are in the mix. Small-sized tree plots are also more easily buffered by strong winds.

8. PROBABLE SCENARIOS AND THEIR IMPLICATIONS

Samoa defines its vision of the future as “improved quality of life for all” (GoS 2005). Its focus for 2005–2007 is centered around the theme of “enhancing people’s choice” emphasizing the importance of enhancing access of people to opportunities for self-development. Its Strategy Statement noted that the achievement of the vision relies on the effective implementation of priority strategies to achieve a thriving and profitable private sector, a strong and diversified agricultural sector; a dynamic and sustainable tourism industry, a coherent, stable and entrepreneurial community, and an efficient education and health sector.

The vision for Samoa forestry for the next 20 years may be pieced together from the various views and ideas emerging from the Forest Resource Management Bill 2007 and consultations undertaken. The emerging picture is one more concerned with how the existing resource is to be managed — an integrative and holistic approach heavily skewed towards environmental conservation objectives — and less on how to deal with the imminent depletion of the country’s merchantable forests, the inevitable 100% dependence on imported timber for general construction, or even where resource re-development might occur. Where there are ideas on resource re-development, i.e. replanting, the prevailing view is for this responsibility to be taken over by the private sector.

Rationale for scenario definition

Scenario definition allows the concretizing of trends from the recent past and the present, into a snapshot of the forestry sector in a pre-determined point in the future. This projection of the future is a valuable approach if based on sound facts about the present and a good understanding of trends extending from it. A clearly defined scenario provides an opportunity for planners and policy makers to ponder over whether this scenario is consistent with the espoused vision and whether or not there is a case for interventions to enhance and improve it. This is the rationale for which the scenarios are defined and examined in this report.

Elements (parameters) used in defining scenarios

Future scenarios are based on a realistic extrapolation of the present, based on trends now emerging and present realities that are likely to continue into the future. For Samoa, there are two main areas — production and protection forestry and within these areas, the following are desired elements. For production forestry (i) the forest resource picture likely to emerge from current trends, and a desired resource situation based on Samoa’s future needs; (ii) the manner by which the envisaged resource will be created and managed; and (iii) the shape and structure of the industry best suited to process it. For the Protection Forestry scenario (i) the remaining priority needs for protection taking into account the existing situation and (ii) the manner by which these priority needs will be pursued.

The business-as-usual scenario

Production forestry

Native forest logging: Over the next 20 years, the native merchantable forest will be depleted, most likely within five years. Some extra harvesting will likely come from the Aopo-Sasina forest currently inaccessible due to internal village disputes. A likely feature of this scenario is the persistence of two or three small portable mills operating on a private hire basis and moving between agricultural lands to mill remnant trees.

Plantation forest harvesting: Logging of plantations (on any sizable scale) will begin around 2021 when 1991 plantings will reach millable diameters. This resource is largely at the Cornwall Estate on western Savaii.

Forest resource development: The Forestry Division will withdraw from plantation planting with the existing plantations “reserved” as has been advocated by the Ministry (Tuuu/Sesega, July 2007; pers. comm.). Community and household woodlots will be actively promoted as part of an AusAID project, throughout Savaii and Upolu islands. Meeting annual planting targets is likely to be challenging as the barrier of short-term profit maximizing behaviour will be persistent and difficult to overcome.

Wood processing: Sawmilling will continue at declining volumes until it is no longer viable when the resource input is insufficient. The sawmilling industry will evolve further into a handful of small portable mills operating on remnant trees in conjunction with land clearing for agriculture. Coconut milling will continue, but on a smaller scale, for furniture making.

Trade in wood products: Current trends will continue with virtually all of Samoa’s sawntimber requirements for general construction purposes being imported, mainly from New Zealand, with small amounts from Australia, the USA and Fiji. Trade in composite wood products will continue with today’s increasing trend continuing. Changing lifestyles, increased income and remittances, and higher aspirations will mean increasing demand for sawntimber and other wood items for home construction.

Protection forestry scenario

Protected area network: There will be further additions to Samoa’s protected area system, all on Government lands and upland areas of little or no interest to villages. Some of the parks will remain paper parks, e.g. Mauga-o-Salafai National Park, but this is probably a better way of protecting their existing pristine condition. The areas of high conservation value identified in the NBSAP will offer the main challenge for protection, and will require the cooperation of villages and customary landowners before protection is possible. If anything, these are likely to be degraded, if not progressively lost, in value for conservation purposes.

Forests for recreation: Expect a significant increase in visitation and use of parks and reserves over the next 20 years, building on current trends in local usage. An increasingly urban population will find value for recreation in reserves and parks. The continuing growth of tourism will be an important contributor to parks and reserves use.

Forests for water resources: Water resources management will move up the pecking order of priorities within MNREM and the Government, simply because it is still presently undervalued and increasing water scarcity will raise awareness and appreciation at Government and public levels. Greater efforts will be made to protect key watersheds and to rehabilitate them through replanting, riverside protection and other measures.

Probable shifts and alternative scenarios

A change to the Government’s current view of a smaller role in forest plantation development is not likely to emerge. However if it is to happen, it will be because of several years of underachievement by the community forestry approach. Therefore, any likely increase in forest replanting will only have some benefit in the longer term, with the immediate future for wood supply a *fait accompli*.

Furthermore, the growing role of *M. citrifolia* as a cash crop and the possibility of *O. nutans* and sandalwood (*Santalum* spp.) emerging as important export crops may significantly

undermine interest in tree planting for sawlogs. If this happens, the unfolding scenario will be more dismal from a future wood production viewpoint.

9. WHAT WE MAY SEE IN 2020

Forest resources in the next two decades

Samoa's forestry in 2020 is as described in the business-as-usual scenario. Native merchantable forests will be completely logged, with the remaining part in Salelologa and Aopo/Sasina the last to go within five years. The forest cover will continue to diminish but at a slower rate because there is not much left and a fair amount of the remaining high altitude forests have been locked up by new national parks, managed watersheds, conservation areas and reserves.

While protection forests will therefore increase in area, production plantation forests will progress, but in small tentative steps. Privately owned woodlots will increase in number, mostly in small-sized lots, but competition from other more lucrative short-term crops, including *nonu*, will blunt planters' interest and limit areas planted.

The existing plantations will be harvestable by 2021. The volumes will not be significant because of the low levels of planting since 1991. Based on existing plantings, a sustained yield harvest will be possible with an annual allowable cut of about 59 ha of mahogany and other mixed species (or 8,800 m³ of sawlogs) from the Cornwall Estate.¹⁷ This level of annual harvest is not large enough to attract any significant investment in sophisticated wood processing. Consequently, there is a risk that high valued plantation logs will end up being processed inefficiently thereby compromising their potential value.

Wood and wood products

In 2020, over 95% of sawntimber will be imported. For composite wood products, this will be 100% imported. There are no exports of timber and no local timber industry to speak of. Quality coconut timber furniture may find a local market in hotels, resorts and offices, but will struggle in export markets that will likely be dominated by cheaper Asian exports.

Wood as a source of energy

Wood as an energy option will also diminish in demand due to changing and more modern lifestyles. Traditional methods of cooking using stone ovens will remain, but the overall demand for wood as fuel is not expected to rise above current levels.

Future of non-wood forest products

Mamala (*Omalanthus* spp.) offers promise as an export crop for pharmaceutical products, but much research is required before this species' future is clearer. It will be a bonanza for Samoa when it does. *Nonu* (*Morinda* spp.) will continue to be a dominant export crop.

Service and social functions of forests

The service functions of forests have been discussed earlier. Today's increasing trend will continue into the future as the value of forests for recreation is appreciated more. Parks, reserves and pristine ecosystems in conservation areas will be more frequently visited and popular with foreign tourists and locals alike.

In terms of biodiversity conservation, the expanded protected area system of parks, conservation areas and reserves will ensure the protection of rare ecosystems, habitats for

¹⁷ Any merchantable volume from Togitogiga (Upolu) is considered too little to warrant anything but a small portable sawmill similar to those currently operating.

threatened endemic birds and watershed values. Several sites of high conservation value need to be protected, but this will be challenging within customary lands. It is an area wherein MNREM should be proactive. The growth expected in tourism may generate opportunities for ecotourism that may facilitate their protection, and government agencies (MNREM, Samoa Tourism Authority) should be quick to seize and make the most of those that may arise. Some of these unique ecosystems are likely to degrade beyond reversible thresholds and become extinct.

The issue of carbon sequestration and carbon trading will continue to be topical but Samoa's small size makes this proposition difficult. A Government-driven whole-of-Samoa approach is a possible strategy. There is a lot more to be learned and a wait-and-see approach is most prudent.

10. HOW COULD WE CREATE A BETTER FUTURE?

A case for greater government involvement in plantation forestry

A better future for Samoan forestry is a matter of viewpoint and purpose. A sustainable flow of the broadest range of services and products from forests is most desirable. For production forestry, this report proposes that a better future is one wherein Samoa's comparative advantage in producing quality hardwood timber is utilized fully to offset its significant timber import bill and achieve parity in value terms in its timber trade. This industry will also generate other socio-economic benefits in its rural areas and diversify its economic base further. For protection forestry and forestry for social services, Samoa's achievements to date point to improved security for values such as ecosystem services and functions, water, biodiversity, soil quality and general environmental health. The challenge for protection is to maintain and build on this.

Why production forestry? Because the potential is there and for a small island nation with few options, it makes sense. All the economic disadvantages associated with Samoa's geographic smallness and isolation are seriously compounded by its extremely narrow economic base, with foreign reserves earned largely from tourism and remittances, and to a lesser extent, fisheries. Despite its potential, agriculture has been underperforming consistently over the last decade for a range of reasons. Forestry is a minor player, but with great potential with the range of high quality species it can produce.

If Samoa is to achieve a sustainable flow of timber for local consumption and exports, how can this future be achieved? As suggested earlier, Samoa needs to invest in reforestation on a larger scale than it does at present, using both the plantation and community forestry approaches. By itself, the community forestry approach is inadequate. It will not establish in sufficient time a resource estate large enough to sustain a sufficiently sophisticated industry that is needed to optimize returns on Samoa's high quality timbers. The two-pronged approach would provide this, and the Government has, in the Cornwall Estate, the necessary land area to realize this. Together with smaller privately owned and managed woodlots, Samoa forestry will be in a position to contribute to expanding the country's economic base, and hence its future economic stability.

The institutional arrangements required to achieve this vision are, by-and-large, provided in the proposed new Forest Management Bill. Its proposed emphasis on an integrated approach to the management of land, forests and water resources should be pursued with commitment, as well as flexibility and sensitivity, recognizing that different forest values will inevitably exert dominance in some areas more than others, by virtue of physical attributes and biogeography. In the overall context of land management, a balanced approach based on recognition that forests have multiple roles and functions, is important.

On the regional and international front, Samoa's active participation in regional and global forums on issues impacting on the use of forests is likely to continue. Climate change, biodiversity conservation and the Extended Program of Work on Forest Biodiversity are amongst the issues engaging both representatives of Government and civil society (Mataese/Sesega; July 2007; pers. comm.). Close monitoring of issues such as carbon trading and intellectual property rights are particularly relevant given Samoa's potential in both areas and, in the case of the latter, the wealth of knowledge in traditional medicine that is linked to *mamala's* (*Omalanthus* spp.) potential as a significant pharmaceutical commodity.

Overall priorities and strategies

Samoa's priority in forestry is in resource redevelopment in both plantations and woodlots. Such is the drastic nature of the country's resource situation that a major up-scaling of planting targets is urgently necessary.

Watershed protection is another priority but one wherein Government commitment is assured and direction clear. The critical need — going into the future — is the ability of technical officials to implement management plans, particularly when challenged by customary land issues. Key activities are in capacity building and training, and replanting of vulnerable areas.

The expansion in the protected area system is the major success of the last ten years. However further work is needed to bring ecosystems and habitats of national and global significance under conservation management. The purpose of national parks is to protect representative samples of ecosystems and species that make up Samoa's natural heritage. This is the next challenge for Samoa's protected area system.

11. SUMMARY AND CONCLUSIONS

The outlook for Samoa's forestry consists of major challenges within the production forestry sub-sector where the imminent depletion of natural forests will leave a gap in supply that replacement plantation forests are unable to replace in time. Samoa will remain a net deficit importer of forest products for the foreseeable future unless a significant change in policy towards forest plantations is made soon. Effort to replenish depleted forests with community plantings is insufficient and will by itself generate low volumes that will most likely only perpetuate a low-technology and inefficient forest industry such as that existing today. It would be a shameful way to waste the potential inherent in the timber species that Samoa has and can easily produce. Thus a business-as-usual approach to forest creation is irresponsible and short-sighted.

Forest protection is a making good headway with an expanded protected area network, protected and managed watersheds and community based conservation areas. There is a commitment to an integrated and holistic approach to resource management that is refreshing and encouraging. The institutional framework under which water, land and forest resources are placed under one agency provides a promising platform for an effective integrative approach to resource management. The challenge is in making it happen by providing MNREM with the needed technical capacity, additional staff and budget.

12. RECOMMENDATIONS

1. Samoa's vision for production forestry needs to be better clarified. Assuming Samoa is interested in using its comparative advantage in the production of highly demanded and marketable timber species to achieve some parity in value terms in its timber trade, the vision should define the size of a forest estate that should be established, timelines, the products to be produced and a glimpse of the type of industry it should be encouraged to process it.
2. Samoa and its development partners must also get over the psychological scars of Cyclones Ofa and Val and reassess the risks of cyclones that has since stigmatized investments in plantation forestry.
3. Samoa should immediately increase its focus on plantation forestry development. The national planting target currently at 100 ha/yr should be increased to 400 ha for the next ten years. Cornwall Estate should be fully replanted as the core of the forest estate for a future sawmilling wood industry.
4. Samoa's protected area system should look to including areas of high conservation value previously identified in the Samoa NBSAP.
5. The integrated approach to the management land, water, and forests should be facilitated and supported.

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14. ANNEXES.

Annex 1. The protected area system of Samoa — national parks and reserves

| National parks | Location | Establishment date | Total area |
|-----------------------------------|--------------------|---------------------------|-------------------|
| O le Pupu Pue National Park | Togitogiga/Upolu | 1978 | 2,800 ha |
| Lake Lanotoo National Park | Afiamalu/Upolu | 2003 | 1,050 ha |
| Mauga o Salafai National Park | Vaiaata/Savaii | 2004 | 6,944 ha |
| National Reserves | Location | Establishment date | Total area |
| Mulinuu Mangrove Reserve | Mulinuu | 2003 | 6 acres |
| Mataututai Reserve | Mataututai Reserve | 2002 | 0.25 acre |
| Aoole malo Reserve | Vailele | 2001 | 20 acres |
| Faavaileatua Reserve | Mauga o Vaea | 2001 | 2 acres |
| Taumeasina Reserve | Taumeasina | 2000 | 6 acres |
| Vaitele East and West Reserves | Vaitele | 2000 | 2 acres |
| Apia Central Recreational Reserve | Elelefou | 2000 | 6 acres |
| Vaigaga Reserve | Vaigaga | 2000 | 1 acre |
| Magiagi Reserve | Magiagi | 1999 | 0.50 acre |
| Vaimoso Reserve | Vaimoso | 1999 | 0.25 acre |
| Fuluasou Botanical Garden | Fuluasou | 1999 | 20 acres |
| Palolo Deep Marine Reserve | Matautu-tai | 1979 | |
| Samoa National Botanical Garden | Vailima | 1978 | 30 acres |
| Togitogiga Recreational Reserve | Togitogiga | 1978 | 2 acres |
| RLS Historic Reserve | Vailima | 1958 | 1 acre |
| Mt Vaea Scenic Reserve | Vailima | 1958 | 220.3 acres |
| Sinave Reserve | Apia | 2006 | 1.4 acres |
| Lotosamasoni Reserve | Malifa | 2007 | 1.5 acres |
| Proposed site | | | |
| Salelologa Reserve | Savaii | 2003 (proposed) | 100 acres |

Annex 2. List of people consulted

1. Tuuu Dr Ieti Taulealo, Chief Executive Officer, MNREM
2. Nanai Tony Leutele, Assistant CEO, Forestry Division, MNREM
3. Aukuso Leavasa, Principal Planning Officer, MNREM
4. Muaausa Pau Ioane, Chief Forest Draughting Officer
5. Suluimalo Amataga Penaia, Assistant CEO, Water Resources Division
6. Tolusina Pouli, Chief Research Officer, Forestry Division, MNREM
7. Maiava Veni Gaugatao, Principal Forest Officer Savaii, FD, MNREM
8. Toni Tipamaa, Principal National Parks Officer
9. Faamausili Andrew Ah Liki, Managing Director, Blue Bird Lumber
10. Joe Strickland, Managing Director, Strickland Brothers Ltd
11. Rob Willis, Managing Director, MD's Big Fresh Ltd
12. Lou Schwalger, Managing Director, Schwalger Sawmills
13. Mr Graeme Powell, Consultant
14. Roger Toluaga, Ministry of Commerce, Industry and Labour.
15. Fiu Mataese, Ole Siosiomaga Society Inc.
16. Dr Walter Vermullen, METI
17. Tuuuau Letaulau, Forestry Division, MNREM
18. Sailimalo Pati Liu, A/CEO, Division of Environment and Conservation, MNREM
19. Leoo Polutea, Principal Officer, Mapping Division, MNREM
20. T Seuao, Bluebird Lumber
21. Dion Ale, O le Siosiomaga Society Inc.
22. Pouvave F, Village Mayor, Tafua-tai, Savaii
23. Uliese Strickland, Strickland Brothers Ltd
24. Saleimoa Vaai, Auala, Savaii
25. Sesilia Schwalger, Patamea Plantation, Savaii
26. M L Schwalger, Patamea Plantation, Savaii
27. Siakisone Taleni, Principal, Vaiola College Savaii
28. Leuta Luamanu, MWCSO/DFW, Savaii Office
29. Talua Ami, MWCSO, Savaii Office
30. Siaso Gale, Tree Planter, Vaisala, Savaii
31. Pipi Mutia, Salelologa, Savaii
32. Tiatia Matootua, Gataivai, Savaii
33. Ieti Ioane, Ministry of Agriculture, Savaii Office
34. Savea L, Satupaitea, Savaii
35. Tito Alatimu, Forestry Division, Savaii MNREM
36. Olevia Peseta, Forestry Division, Savaii, MNREM
37. Niualuga Evaimalo, Forestry Division, MNREM
38. Faumuina, M. Papa Palauli, Savaii
39. Faasoa Naumati, MAF, Savaii
40. Totive, MAF, Savaii
41. Lilo Ami, Faasao Savaii Conservation Society.

Annex 3. New Zealand exports of sawntimber to Samoa 2002-2007

| Quarter Ended | Quantity (m ³) | Value (NZ \$000) |
|-------------------------------|-------------------------------|---------------------|
| 30 March 2002 | 1,269 | 554 |
| 30 June 2002 | 1,578 | 712 |
| 30 September 2002 | 1,421 | 621 |
| 31 December 2002 | 2,188 | 982 |
| 31 March 2003 | 1,238 | 490 |
| 30 June 2003 | 1,663 | 704 |
| 30 September 2003 | 1,487 | 608 |
| 31 December 2003 | 2,332 | 954 |
| 31 March 2004 | 2,068 | 931 |
| 30 June 2004 | 2,936 | 1,268 |
| 29 September 2004 | 3,641 | 1,674 |
| 31 December 2004 | 3,647 | 1,830 |
| 31 March 2005 | 1,978 | 888 |
| 30 June 2005 | 3,648 | 1,480 |
| 30 September 2005 | 4,919 | 1,991 |
| 31 December 2005 | 6,635 | 2,833 |
| 31 March 2006 | 2,341 | 977 |
| 30 June 2006 | 2,146 | 869 |
| 30 September 2006 | 5,397 | 2,380 |
| 31 December 2006 | 4,926 | 2,210 |
| 31 March 2007 | 3,043 | 1,340 |
| 30 June 2007 ^P | 5,072 | 1,946 |
| 30 September 2007 | 7,740 | 3,049 |
| 31 December 2007 ^P | 4,810 | 2,488 |

Source: Courtesy of Chris Brown, FAO Bangkok, 2008.