

ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY II

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**PAPUA NEW GUINEA FORESTRY OUTLOOK
STUDY**

by

Papua New Guinea Forest Authority



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

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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:

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EXECUTIVE SUMMARY

Papua New Guinea's (PNG) forests and forestry have played an important role in the livelihoods of the people of the country for many years. Forests have provided a source for food, fruits and nuts, building materials, medicinal plants, habitats for refuge and a wealth of other services.

Increasingly throughout the years, and more so since the end of the Second World War, forests in the country have been exploited for their wood products, more particularly the timber. While still maintaining the main role of sustaining the livelihoods of rural people, forests have increasingly become the main source of revenue for the people (landowners), the Government and the timber industry.

There are many factors that have impacted on forests and forestry, but the key ones are the increasing population and people's demands for development – due to lack of basic goods and services in the rural areas where most or all the forests are found. The increasing numbers of people need to be fed and hence more forests are being cleared each year, through shifting cultivation, to make gardens for food.

Forests are also seen by many people as a means to bring development to their undeveloped or lesser developed communities – development in the sense of cash income, infrastructure, and basic services, especially health and education. These developmental needs often force landowners to seek Government assistance to bring in timber companies to harvest the trees in their forest. In return, landowners earn an income through timber royalties, employment, create access to urban areas through roads, jetties, or airstrips, and are able to access health and education services and other basic services that are generally non-existent in rural communities.

The system of land and resource ownership in PNG is unique and the natural forests that grow on it is owned by tribal communities in clan groups. This age-old arrangement is not expected to change, although there is an emergence of fragmentation within clan groups where individual families are demanding to be recognized as separate landowners despite being members of the same clan.

Forests have been – and continue to be – one of the main earners of foreign exchange for the Government and the country. Forestry continues to play a significant role in the economic development of the country; being among the top 3 sectors in terms of its contribution to the economy. It provides direct employment to over 10,000 people, mostly in rural communities, constructs infrastructure such as roads and bridges, and provides a source of income through timber royalties to people, and other developmental levies.

Presently there is estimated to be about 29 million hectares of forested land remaining in the country. This is a decline from the 33 million hectares estimated in 1975. The loss of some 4 million hectares over a 30-year period is partially attributed to shifting cultivation, conversion of forested lands to agriculture, logging, urban development, infrastructure development, mining developments, and various natural disasters.

The area and number of timber concessions had increased over the years from an area of a little over 1,000 hectares in 1940 to over 11 million in 2009. The forest resources in many of these concessions have been almost exhausted in terms of their resource base. The concessions played the important role of acting as “vehicles” for immediate development.

Timber Concessions that have been acquired since 1991 are intended to facilitate sustainable forest management (SFM), therefore a 35-year cutting cycle has been inbuilt into the

currently executed Forest Management Agreements (FMAs). This is envisaged to be increased to a 40-year cycle and longer if new research establishes that the cutting cycle for PNG's diverse forest could be longer.

Currently, the biggest threats to forests and forestry are: the growing population; the national agricultural plan (which is predicted to create significant conflict in land use); the influx of potential investors in bio-fuel projects; the growing trade-off of forests for infrastructure development; and the increasing needs of the rural people for a source of income to meet the costs of basic goods and services through such initiatives such as carbon trading.

Forests in 2020 (based on past trends) are predicted to decline in area, but not significantly. Most of the forest concessions have been logged, however, due to the selective nature of logging, it is predicted that forest cover will still be maintained except for some where large-scale conversion has taken place to cater for agricultural plantations. As and when the reforestation plan is implemented, there will be an increase in the area of forest. This is possible before 2020.

The forest industry will continue to contribute to the economic development of the country and provide a source of income and other related goods and services to the rural majority of the population. Of the many timber companies that were operating from the 1980s to early 2000, only a handful of companies will continue to operate into the future. Many are shutting down operations due to lack of adequate forest resources in the concessions and the ever-increasing operational costs due to often remote locations and the financial crisis currently being experienced globally. In order for those that remain to continue to operate, enabling conditions have to be created by the Government.

Round wood log exports, which are the primary forest products currently being produced in the forests and exported are expected to decline as timber concessions exhaust their merchantable forest resources and the ban on 'round log export' comes into effect as of 2010. More onshore processing and value adding are expected into 2020, but here again the Government will have to provide incentives and enabling conditions for this to happen.

Utilization of forests as a source of energy is already running into problems, especially in the Highlands region, where there are fuelwood shortages for cooking and heating in the villages. In the future, community- and individual-planted tree farms and woodlots will play a major role in the supply of fuelwood to people.

Conservation of forests for their biological significance has not been widely undertaken as there have been no direct benefits to landowners. Similarly, the protection of forests for other environmental functions such as watersheds, soil conservation, recreation and so forth has been negligible. With more awareness and education, the landowners in the future will have greater appreciation for the other services of forests and thus the future should see an increase in areas under either conservation or protection.

The social functions of the forests, especially in terms of income generation, will continue to be an issue in the future. With the phasing out of many large-scale logging operations which provided the means of income to landowners, more and more small-scale portable sawmilling is being encouraged by the NGO community. This is intended to sustainably manage the forests and sustain people's sources of income. Their viability will depend on their locations as operational costs, especially the costs for fuel to run machinery and for transporting the products to markets, are increasing every year.

There is a good future for other ecoforestry-related activities that will ultimately contribute to the social well being of rural people. The potentials of non-wood forest products (NWFPs) will need to be researched and developed to enable these products to be harvested and sold.

Ecotourism activities taking place in forests have a large potential, but are hindered by lack of basic infrastructure (access), and the prevailing law and order situation in both urban and rural areas.

PNG as a country is mindful of the growing concerns over climate change and as such is championing the cause of Reduced Emissions from Deforestation and Degradation (REDD) and reduced emissions from deforestation (RED). Together with similar nations with large tracts of remaining tropical rainforest it is part of a coalition of rainforest nations that have come together as a force in the UN's Framework Convention on Climate Change (UNFCCC) negotiations. Climate change mechanisms seem to be the best option that by default will reduce the rate of deforestation and degradation in the country.

Global issues will affect PNG, as they do all other countries. The demand and supply of wood and wood-based products will affect the markets on which PNG relies as a source of revenue. Price fluctuations of commodities will affect the output from the sectors that produce the product. Growing demand for bio-fuels alone is already posing a serious threat to existing forests in the country.

In order to create a better future it is the responsibility of the Government to properly address the basic needs of its people and especially those of forest-dependent communities. Meeting these needs is presently a major contributor to deforestation and loss of forest cover in the country.

Policies and institutional changes will need to take place. Similarly, while technological changes cannot be imposed, they can be encouraged. The country will continue to engage in global collaboration such as the UNFCCC, the UN Convention on Biodiversity (CBD), and so forth. A number of policies with regard to forestry have been developed and upon endorsement by the Government are intended to improve on forestry practices to ensure that the country's forest resources are developed to improve the well being of its people.

The Government has in place a medium term development strategy (MTDS) 2005-2010, which aims to foster sustainable improvements in the quality of life for all PNG citizens by promoting economic growth and social development.

Acknowledging that forests and forestry play a very important role in the social and economic development of the country, the Government will need to create an enabling environment for investments in forestry both in terms of public and private sector investments. For this to happen, there has to be political stability which is now improving in PNG. Education and awareness among the people are important and contribute to society's development – not only with regard to forests and the environment, but also taking into account education and awareness of diseases such as HIV/Aids which if not addressed will lead to serious problems in the future.

A better future can be created for forests and forestry if there is constructive engagement by all stakeholders that ultimately leads to an improvement in the livelihoods of the people of PNG.

1. INTRODUCTION

This Forestry Sector Outlook Study for PNG has been prepared in response to the initiative by the Asia Pacific Forestry Commission (APFC) and the Food and Agriculture Organization of the United Nations (FAO). It is intended to update the last study that was concluded in 1998 by all member countries and in doing so assess the probable scenarios for forests and forestry to the year 2020.

PNG is one of the largest island nations in the Asia-Pacific region. It shares a common land boundary with Indonesia to the west and a common sea boundary with Australia to the south and Solomon Islands to the east. The country is blessed with an abundance of forest resources that span a wide landscape, as rugged as any in the world. From the coastal flats to the high mountains, forests can be found. PNG is regarded as a highly diverse country in terms of its culture, its landscapes, and its biodiversity.

Forests have contributed significantly to the economic development of the country since the end of the Second World War and continue to do so. For decades, forests have been the source of livelihood for the tribal people of the country. Forests provided goods and services and have been an integral part of people's existence. In the 21st century the forests are increasingly under threat as populations increase and economic incentives lure the tribal owners away from their practice of forest dependence – to modern lifestyles with high demands for goods and services.

This second outlook study comes at a time when the world is becoming increasingly concerned about forests in light of global issues such as climate change and changing environments that are affecting the livelihoods of millions of people in both developed and, especially, developing countries. PNG is no exception as it is experiencing the effects of climate change and rising sea levels. Some of its small islands and atolls are experiencing this threat.

PNG together with other similar nations is leading the Coalition of Rainforest Nations in its endeavour to have avoided deforestation included in any climate change dialogue. There now seems to be some positive signals ahead after the UNFCCC Bali COP 13. This is where the forest and the forestry sector will be at the forefront in contributing to global climate change mitigation efforts.

At a time when global issues are affecting even the furthest and remotest parts of the world, PNG has to continue to actively engage in global dialogue on issues of international importance such as climate change, biodiversity, desertification, and water.

Other issues that will also be highlighted in this study include the main drivers of deforestation, the main service functions of the forests, land, wood and non-wood products, and tenure systems.

As we move forward towards 2020, the lessons of the past should be used to guide our future. A compromise needs to be made between the different demands that are being placed on our forests. Policies have to be changed where necessary and adopted, so that they will ultimately be beneficial to people, the forests and their environment, and the country as a whole.

This study looks at the current state of forests and forestry in PNG and what will influence their future. It goes on to outline the probable scenarios and their implications that may be seen in 2020 and how PNG as a country could create a better future for its citizens and forest management. It concludes with a summary and conclusions.

2. CURRENT STATE OF FORESTS AND FORESTRY IN THE COUNTRY

Trends in forest resources

Extent of forests

PNG has a total land area of 46.2 million hectares. A number of estimates have been given for the total forested areas in the country. For example in 1975 it was estimated that a total of 33.667 million hectares were covered with forests and this was reduced to 29.4 million hectares of which 25.2 million hectares were still intact in 2005 (FRA, 2005). In a recent report, Shearman et al. (2008) reported that the total forest area in 1972 was 33.227 million hectares and this was reduced to 28.2 million hectares of which 25.3 million hectares were still intact in 2002. The Government agency responsible for forestry, the Papua New Guinea Forest Authority (PNG FA) estimates the forested areas to be 29 million hectares with 24 million hectares still intact.

Some of these reports have also given differing percentages for annual deforestation rates per year; 0.5 percent (FRA, 2005) and 1.41 percent (Shearman et al., 2008). Due to these differences, there is a need for PNG's forest area to be further verified using such technology as remote sensing.

In 1975, PNG had a total forest cover, based on an assessment using aerial photography, of 33.065 million hectares of forest. These assessments were done under the colonial administration of the Australian Government, with CSIRO heavily involved in carrying out natural resource surveys in PNG.

There was not much heavy demand placed on the forests to meet the country's developmental needs during the early 1960s and 1970s. Hence the decline in forest cover during that period was much lower than in the mid-1980s to 2000. A rapid decline in forest cover took place between the mid-1980s due to an increase in global and especially regional demand for round wood logs as well as the demand for food due to increase in population.

While PNG has reported having a forest cover of between 28 and 29 million hectares, these figures have still to be verified using remote sensing. Expert opinion is that there is more forest area than has been reported, since forest losses were reported based on the area of forests that were under production, but which were being selectively logged (rather than cleared). Hence in terms of forest cover, the areas still under forest should be greater than calculated considering the fact that many of the logged over areas have not been converted to other land use such as large-scale agriculture.

PNG has reported a growing stock of some 1.035 billion m³ of wood of which approximately 50.7 percent is designated for wood production and other commercial use. From other woodlands it was reported that there were some 4.474 million hectares though no growing stock estimates were provided as data were lacking on these areas (FRA, 2005).

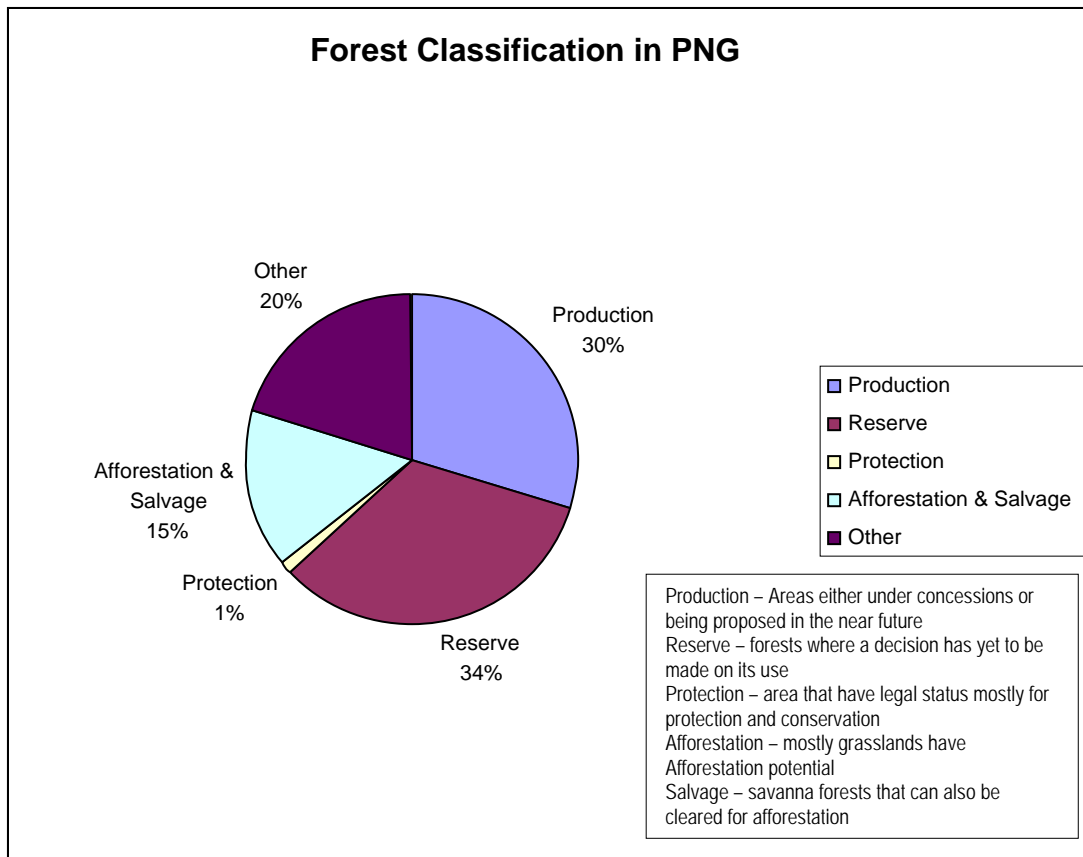


Figure 1. Forest classification based on the National Forest Policy

Source: Draft National Forest Plan, 2008 (2nd Edition).

Regional differences

There are four distinct regions in PNG: the Momase Region (also referred to as the Northern Region) located north of the central mountain ranges (4 provinces), the Southern Region located south of the above mountain ranges (5 provinces), the Highlands Region located in the hinterland of the country (5 provinces) and the New Guinea Islands Region that comprises the large islands offshore of the main island of New Guinea (5 provinces).

In terms of forest cover, the Northern and Southern regions of the country currently have the most forested areas, followed by the Highlands and the New Guinea Islands.

In terms of timber concessions and production forest areas, the Southern Region leads the three regions followed by New Guinea Islands, Momase and the Highlands. The Highlands Region has far fewer timber concessions largely due to the difficult terrain that, by its very nature, prevents logging operations from being commercially viable.

The logging operations that are taking place especially in the Southern, New Guinea Islands and Momase regions have contributed significantly to the partial loss of forest cover. This is not to say that there is total deforestation, but rather that there has been significant disturbance to the original forest cover that would reduce and degrade it.

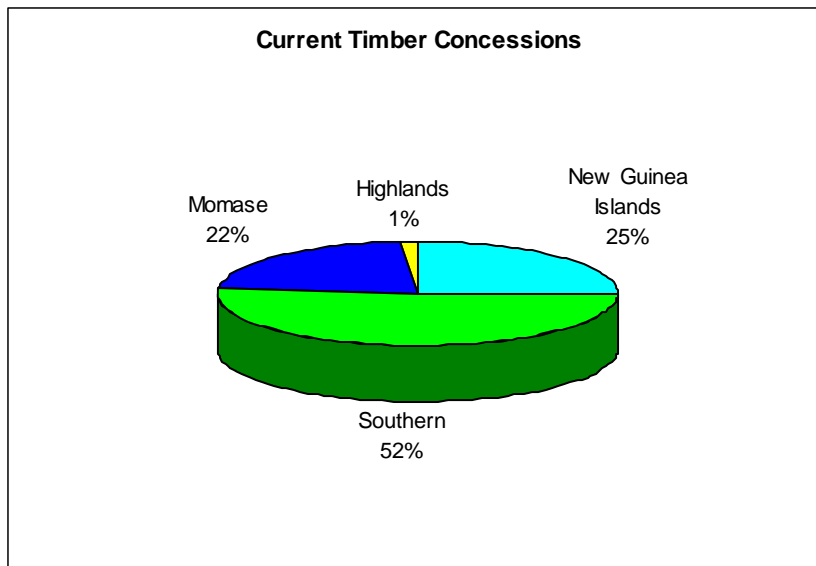


Figure 2. Distribution of current timber concessions in PNG

Source: Forest Acquisition Booklet (PNG Forest Authority Updated December 2007).

The Momase and Southern regions have the largest remaining commercially viable timber areas, which are increasingly being earmarked for logging operations as per the Provincial and National Forest Plans. It is envisaged that these Plans will be endorsed by Parliament in 2009.

Forest ownership

In PNG, the forests and the land that they grow on are owned by the people through their tribal clan groupings. This amounts to approximately 97 percent of the land being owned by the tribal groups. There are very few Government-owned lands or forests. There has not been any change in ownership and none is expected within the near future, or up to 2020 (the scope of this report). Land and forests will continue to be owned by the clan groups.

Increasingly, landowners want forest development to take place to facilitate their access to basic goods and services. Hence, pressure is being exerted on the Government to acquire the timber areas and place them on tender to attract developers. Most, if not all, of the forest developers are foreign-based companies from the Asian region. Landowners regularly take it upon themselves to seek out potential developers and then approach the Government to endorse their developers. This often ends up in conflicts among landowners themselves, and also creates conflicts with processes to impartially select developers of timber concessions.

In order to facilitate development of any forest area especially through logging operations, the *Forestry Act 1991* (as amended) stipulates that the rights over timber resources must be willingly transferred by the landowners to the State. This is undertaken by applying the provision of the Act that relates to a Forest Management Agreement (FMA). This agreement is for a period of 50 years.

Under the repealed *Forestry Act Chapter 216* provisions, the acquisition of timber rights was referred to as a "Timber Rights Purchase" (TRP). The State would negotiate with the landowners for the transfer of timber rights to the State who would then advertise and negotiate with interested project proponents to develop the area. Ultimately a single developer was selected and allocated the timber concession by way of a Timber Permit (TP), which may have included a Project Agreement.

Under the *Private Dealings Act Chapter 217*, (also repealed), landowners could deal directly with the proponent to develop a timber area. The State was not a party to these dealings, hence the term “private dealings”. This arrangement was often openly abused by the developers and the State and its Forestry Department Officials had few legislative powers to intervene on behalf of the tribal owners.

Since the coming into force of the new *Forestry Act 1991*, both of these Chapters have been voided and replaced by FMAs.

There are also other legal means to harvest timber from customary owned lands, i.e. through the allocation of a “Timber Authority” (TA), as provided for in the *Forestry Act 1991* (as amended). This is mostly for a short-term period (annual) and restricts the harvestable volume to 5,000 m³ annually. In most cases, the timber harvested is only for domestic processing. However, in the case where the TA is for an agriculture project or road line clearance, where a Forest Clearance Authority is issued, the timber is exported.

In all there are three main categories of TAs: domestic processing, road and infrastructure construction, and agricultural purposes. Selection logging is done in the first TA while clear felling is practiced in the second and third categories.

Production forests

The first record of the Government purchasing timber rights from native customary owners was in 1940, when a small area of forest of 1,519 hectares was acquired by the State. Since then, there was a gradual increase up till the 1980s. This rose sharply in the 1990s due to the change in the Forestry Act where large forest areas were acquired under the FMA concept. The acquisition of forest concessions however has declined since 2000 to date.

Table 1. Areas acquired as timber concessions in 10-year intervals

Period (year)	Area (ha)
1940s	1,519 -
1950s	78,625
1960s	1,551,521
1970s	905,921
1980s	2,063,654
1990s	5,841,952
2000s (to date)	751,231
Unknown dates	166,730
Total	11,360,812

Source: Forest Acquisition Booklet (PNG Forest Authority Updated December 2007).

The decade in which the largest areas were acquired by the Government or brought into production under the prevailing laws was in the 1990s, when a total of 5.8 million hectares was acquired by the Government and readied to be brought into production.

It should be noted that areas brought into production do not include all areas that were acquired by the State and readied for wood production. Most of these areas have commenced timber harvesting, but there are some that have either been cancelled or the status is still being sorted out.

Timber concessions nevertheless are gradually decreasing yearly as their term expires. At present about 9.4 million hectares are remaining. By 2020, about 8 million hectares will be left if no new timber concessions are acquired between 2010 and 2020. Most timber concessions will expire between 2050 and 2049. Table 2 shows the trend in which timber concessions will expire.

Table 2. Timber concession expiry trend

Period	Area (ha)
1980-1989	98,720
1990-1999	327,826
2000-2009	2,057,401
2010-2019	870,907
2020-2029	1,142,223
2030-2039	575,510
2040-2049	4,539,406
2050-2056	751,231
2056+	0
Local Forest Areas (LFAs) ¹	997,588
Total	11,360,812

Source: Forest Acquisition Booklet (PNG Forest Authority Updated December 2007).

SFM in PNG

The PNG National Forest Policy stipulates as its main objective the “management and protection of the nation’s forest resource as a renewable natural asset”. It further goes on to state that “.... the forest resources of PNG shall be managed in accordance with government programs embodying the principles of sustained yield management” (Independent State of Papua New Guinea, 1991: 4,6).

The current forestry law (*Forestry Act 1991* as amended) and its Forestry Regulations and various procedures that have been developed including the PNG Logging Code of Practice, Planning Monitoring and Control procedures, etc., are intended as tools to address and promote SFM.

PNG is doing its best to ensure that logging companies conform to the SFM tools that have been developed for the country. One of the continuing problems for the PNG Forest Authority (the main Government agency mandated to manage the forests) is that often it does not have adequate resources (in terms of finances and logistical support) to properly monitor and regulate compliance by the timber companies.

Since 1991, selection logging has been the only form of logging permitted in the newer timber concessions that have been secured under FMAs with landowners. This allows for selective logging that is geared towards SFM.

In order to manage forest resources on a sustainable basis, all new timber concessions acquired by the State are for 50 years. This is intended to ensure that there is a second crop after the first 35 years of operation. The efficacy of this selection system has yet to be fully evaluated, as the earliest acquired areas under the FMA concept have not yet expired.

Besides the Government, the NGO community is also actively promoting SFM within rural communities that depend on the forests. A number of NGOs operate in the country and promote the use of small portable sawmills and good SFM practices. They contribute to providing education and awareness that often the PNG Forest Authority is unable or limited in doing. NGOs are also taking the lead in Forest Certification where the Government has maintained a neutral stand on the issue.

¹ LFAs have no expiry dates (refer to section on Forest Ownership).

Economic viability of forest management for wood production

There are many key factors that affect the economic viability of the forests of PNG. These include, but are not limited to the following:

- *Global and regional market forces.* The demand and supply of wood and wood products including pricing has an impact on the economic viability of forest management. High demand coupled with high prices, especially for round wood logs, encourages forest operators to produce more wood – sometimes at the expense of good management practices. The economic crisis of 1997 saw log prices plummet, forcing many logging operators to close business. It also led to significantly lower foreign exchange earnings for the country.
- *High species diversity.* The highly diverse species mix in PNG's natural forests can pose certain operational problems. Forest-based industries are often not able to meet their market quota for a desired species and sometimes have to gather logs from different operation points in the country. In many forest concessions, no single species constitutes more than 5 percent of the total growing stock. This leads to large volumes being exported in mixed species parcels, thereby fetching lower FOB prices, especially in Asian markets.
- *Low stand density.* Forests in PNG have a lower stand density in comparison to other countries in the Asia region. This increases operational costs to extract timber and requires that larger areas be harvested in order to meet market commitments. Extraction of smaller size logs is often resorted to, which ultimately impacts the prices received in the export markets and, more importantly, the sustainability of forest management, considering that the trees that have been removed would have constituted the crop in the second cutting cycle.
- *Remoteness of timber concession areas.* This creates a concern for logging operators as they have to pay higher costs for mobilizing and supplying goods and services to the logging sites. In addition, the remaining forest areas that have potential for forest logging operations are located even further from established urban areas with little or no road or other forms of access. To access these resources would require much capital input from the proposed developers.
- *Increasing cost of fuel.* This has been estimated by some industry sources to constitute more than 50 percent of the operational costs for some projects.
- *Lack of enabling environment by the Government.* This includes issues such as current tax regimes, incentives to improve downstream processing, adequate resource supply, resolution of landowner disputes, and so forth.

Overall state of the forest

Forests in PNG have played a significant role in the economic development of the country and will continue to do so for the next decade. Unfortunately, there are fewer areas now that are available for logging operations. Most, if not all, of the areas located close to urban areas have been taken up as timber concessions leaving mainly very remote areas that have yet to be developed. These are not only remote, but located in mountainous areas with high slopes that will restrict extraction of timber.

PNG has been very fortunate as there have not been any serious effects from pests and diseases in its forests, although there have been some reports of diseases and pests in its plantations. Fires have been a problem but confined mostly to the Western Province only even

though there is no real statement of the areas that were burned in 1997. It was also during this period that a large portion of the pine plantations were destroyed. Other natural disasters as a result of high rainfall brought about by cyclones and resulting in heavy flooding and destruction of forest have been experienced in some provinces of PNG recently.

The main key issue in undermining SFM in PNG is compliance by the timber industry to forestry laws, regulations and procedures. Destruction of residual tree crops and the unwarranted damaging of soils and saplings through large disturbance are some factors that will affect sustainability.

Furthermore the ongoing landowners' attitudes of conflicting interest in land use after entering into forest management agreements and their own internal conflicts relating to landownership pose threats to SFM.

Wood and wood products

Current level of production and consumption of wood and wood products

PNG has been a net exporter of wood products for many years while its domestic consumption is low. Round wood log exports have been the main export commodity, with about 90 percent of its harvested timber volume exported as logs.

Within the four regions of the country, the New Guinea Islands Region has been the region with the highest production of wood and round wood log exports and continues to maintain that position. This is attributed to the fact that there are far more logging projects in the region with substantial logging quotas, due to the better forest types with higher stand densities than other regions of the country. Most, if not all, of the accessible forests in the Islands Region have been acquired and allocated for wood production, leaving only a few areas that, due to their topographically difficult nature, remain untouched.

The Southern Region has been the next highest producer of round wood logs and forest products. Though having fewer timber concessions, the concession areas are larger ranging from 100,000 hectare blocks to over 300,000 hectares.

The Northern Region is the third highest producer of round wood logs. There are fewer logging companies operating in the region compared with the two higher-producing regions in the country.

The Highlands Region does not have any major logging operations due to the physical nature of the region where access is a problem. There is only a handful of small sawmills operating, which rely on a small volume of log harvest. Most of the trees harvested are converted into sawn timber for domestic consumption. There is a number of portable sawmills operating in the region, however records of their production and operational areas are often sketchy.

Table 3. Round wood production (2001-2006)

Year	Volume (m ³)	Royalty PGK ²	Tax (PGK)
2001	2,514,525.317	24,317,138.09	1,215,856.91
2002	2,226,909.246	21,674,313.81	1,083,715.69
2003	2,136,059.455	21,572,603.79	1,078,360.19
2004	2,776,918.000	28,348,157.00	1,417,407.85
2005	2,832,162	27,465,254.00	1,337,738.00
2006	3,632,707	37,056,251.00	1,848,086.00

Source: Internal PNGFA Annual Reports by Field Services Division.

² Exchange rate as of 4 March, 2009, US\$1.00 = 3.06 Papua New Guinea Kina (PGK).

State of the forest industry

The forest industry is considered by the Government as a major player in the economic development of the country. There are about 25 foreign-owned logging companies operating in PNG, the majority coming from Malaysia. Most of these companies are connected in the sense that they are owned by one large conglomerate, but operating under different company names. One particular company controls close to 45 percent of all logging and log export operations in the country, and is one of the five companies that together control over 80 percent of the log export market.

Over the past two decades, the number of companies operating in forest and wood-based industries has declined – from an early count of more than 40, to about 25. This decline has largely been a result of diminishing timber resources that are available to sustain these operations. Many of the operations that commenced in the 1970s and 1980s and even 1990s have been forced to close as they were not harvesting wood at a sustainable level. Some companies are now re-entering logging coupes so as to sustain their operations. Others are involved in salvage operations where the landowners have indicated an interest to convert their lands to agricultural projects.

Most of the companies are involved to a large extent in harvesting and export of round wood logs, with less than 10 percent of the annual log quota being processed onshore. The country has only one chip mill, two plywood mills, five major sawmills, and two veneer mills. Apart from these mills, a small volume of sawn timber is processed domestically into furniture.

The technology used in the timber industry is varied, but in general not sophisticated. There have been some investments in new technology, especially in downstream processing plants such as ply mills, veneer mills, and some sawmills. Much of the equipment is recycled, especially the logging equipment used for harvesting and transportation of logs.

A few furniture-making companies have some level of sophistication in the machinery in place, however, the bulk of the companies involved in the timber industry does not employ very high technology. This is partially a result of the relative low wage structure that enables companies to operate without any real need to mechanize their operations with high technology.

Trade in forest products

Most of PNG's trade in forest products is mainly in the form of round logs for export to countries such as China, Japan, India, Viet Nam, Republic of Korea, Malaysia, Philippines and Taiwan, P.O.C.. This is followed by exports in woodchips, sawn timber, plywood, and veneer. Small amounts of furniture have been exported. Table 4 summarizes round log export between 2007 and 2006.

PNG has over the years also been importing forest products, mainly finished products as in household/office furniture, building materials, and other products such as laminated timber for construction. All of PNG's paper requirements are imported.

Table 4. Round log export 1997-2006

PNG summary				
Yr	Volume (m ³)	FOB US\$	FOB PGK	DUTY (PGK)
1997	3,006,156	351,118,626	496,144,900	153,869,971
1998	1,616,566	106,881,751	218,083,656	47,063,826
1999	1,983,853	151,952,895	385,572,126	100,629,210
2000	1,992,526	143,705,096	383,746,253	135,877,275
2001	1,556,220	89,393,441	283,089,897	95,770,091
2002	1,853,550	99,750,854	367,043,757	112,692,564
2003	2,015,208	109,035,316	369,556,782	111,247,250
2004	2,012,136	118,973,031	355,660,115	104,208,412
2005	2,282,414	138,593,357	405,370,832	129,997,020
2006	2,638,296	170,283,576	489,463,821	168,370,911

Source: SGS reports various years.

Tax paid on log exports ranges from a low of 20 percent to a high of 35 percent and on average is about 30 percent per year. Export duty tax varies depending on the volume and species of logs exported and is paid to the Government's Internal Revenue Commission and not to the PNG Forest Authority. Table 5 summarizes the duties collected from forest products.

Table 5. Forest produce exports including round logs: 2000 to 2004

Volumes and value of other forest products in millions of m ³ and US\$										
Product	2000		2001		2002		2003		2004	
	Vol.	Value	Vol.	Value	Vol.	Value	Vol.	Value	Vol.	Value (US\$)
Logs	1.993	143.70	1.566	89.39	1.853	99.75	2.015	109.03	2.012	118.973
Sawn timber	0.045	13.92	0.04	15.34	0.042	14.36	0.022	12.39	0.047	12.417
Plywood	0	0	0.001	0.004	0.018	0.011	0.006	1.49	0.004	1.494
Veneer	0.033	5.69	0.068	0.011	0.072	0.012	0.068	11.80	0.059	11.803
Woodchips	0.001	0.03	0.097	3.83	0.097	4.55	0.127	2.68	0.052	2.68
Balsa wood	0.003	1.26	0.002	0.91	0.003	0.91	0.004	10.04	0.004	1.004
TOTAL	2.075	164.62	1.774	109.50	2.085	119.61	2.242	147.45	2.178	148.371

Source: Internal PNGFA Records.

Tables 4 and 5 show that there was a decline in the quantity of exports from 1997 to about 2002 and then an increase from 2003, exceeding 2 million m³, but still below the 3 million m³ levels of 1997 and previous years.

The slump in exported volume in 1998 was a direct result of the economic crisis in the Asia region, forcing many companies to close their operations. These closures resulted in lower volumes of timber produced and exported.

Key trends

Over the past 20 years, PNG has been exporting about 90 percent of its total log harvest of a little over 3 million m³. Domestic processing has consumed the remaining 10 percent though statistics are sketchy. This trend of minimal onshore processing has not seen any improvement over the years and change does not seem to be likely in the near future.

The Government has drafted a Domestic Processing Policy that may pave the way for further wood product processing onshore, but there is concern in the industry that the policy offers no real incentives.

Domestic consumption of wood products, particularly sawn timber, has been low and while actual statistics are often lacking, growth in the building industry and mining and petroleum industries has seen some increase in domestic use of sawn timber products. Furthermore, the building of more permanent homes in both rural and urban areas has seen some increase in domestic consumption of timber.

Wood as a source of energy

Many PNG citizens (over 80 percent) live in rural areas and depend on wood for their energy requirements, especially for cooking and heating. Even for the remainder of the population living in urban areas, wood continues to be an important part of their cooking and heating needs. With increasing costs of electricity and cooking gas (LPG), many urban populations resort to wood for their energy requirements. The end result is that forests close to urban areas, such as the capital city of Port Moresby and other cities and towns, are being cut and sold as firewood in local markets either in the city or on the fringes of the city.

Currently, in the Highlands Region of the country, there is a problem with scarcity of wood supplies for heating and cooking. Extension programmes by the Government to encourage people to plant trees and woodlots in the early 1970s and 1980s have largely been abandoned, thereby resulting in less wood being available for domestic purposes.

Apart from domestic use of wood as a source of energy for cooking and domestic heating, wood is also used in the agriculture sector, especially for hot air drying of copra, tea, and other agricultural commodities.

Up to now there have been no policies or regulations in place to address the use of wood as a source of energy.

Non-wood forest products

A number of NWFPs are utilized in the country. The most significant has been eaglewood, also known as agarwood (*Gyrinops ledermannii*), which has been exploited by local landowners with the help of foreign buyers. The eaglewood in its raw form is exported to overseas markets particularly in the Asian region.

The other main commercial NWFP is resin from *Melaleuca* spp., but this is mainly confined to the Western Province of PNG, as the species occurs only in drier savannah forest types in that province.

Rattan used to be a significant NWFP from the forest that was harvested, treated and exported in raw form, mostly to Asian markets. Since the end of the 1980s, this has ceased and rattan does not figure significantly as a source of income for rural people.

Records and data on the quantity and value of NWFPs have not been adequately captured, hence it is impossible to report on them with any degree of accuracy.

No systematic inventory of NWFPs has been undertaken. There has been some *ad hoc* work done by the NGO community, particularly in respect to eaglewood. In general, PNG lacks a database for planning the management and harvesting of these products.

Some effort was undertaken between 2005/2006 to work with eaglewood and to come up with prescriptions for its management but since then there has not been any major management plan implemented for this product.

Service functions of forests

Forests are universally known to provide a multitude of service functions for the people who live in and outside the forests. In PNG, forests are very important as they are the physical assets that provide the main livelihood for the bulk of the population.

Significance of forest-based recreation

The use of forests for recreation is not significant in PNG. A number of national parks was established in the early 1960s and 1970s, but their maintenance and upkeep has not been sufficient to attract local or overseas visitors.

Issues relating to internal law and order problems and the remoteness of these national parks have discouraged people from using these areas.

The only area of any significance is the Kokoda Track which is famous for its World War II history. Many tourists, especially from Australia, walk the track as a form of recreation and in some instances, as an endurance test for hikers.

Urban forestry

There is presently almost no urban forestry in the country. If botanical gardens can be considered as urban forestry, then there are only two in the whole country. These are the National Botanical Gardens situated in the capital city in Port Moresby and the Lae Botanical Gardens located in Lae City on the northern side of the country.

Smaller parks are found in some main cities and towns, which have also taken initiatives to plant trees along their streets. This is more for beautification than for the use of the wood.

Home gardens are becoming popular in many urban areas and especially in settlements within and near cities. The trees planted are a source of fruits and nuts, as well as providing firewood for the people.

Forests, water, and cultural values

The role of forests in protecting watersheds has generally been recognized in traditional PNG culture and forests in river catchments have not been disturbed in many traditional communities in the country for many years. Forests have also been recognized and respected as providers of other goods and services.

Respect for forests, especially those present in watersheds, is partially embedded in the spiritual and cultural norms of the tribal people. These forests are thought to be places where the spirits dwelled and hence have often been left alone. Fear of enemy tribes also restrained many communities from venturing into water catchment areas, as they are often isolated areas.

The Government having recognized the significance of catchment areas has ensured that they are protected. In particular, the forest policy, forestry laws and regulations and operational manuals such as the PNG Logging Code of Practice provide specific guidelines on their protection. The Environmental Act also makes provisions for the protection of catchment areas.

Conservation of biodiversity

PNG is a signatory to the Convention on Biodiversity and the Department of Environment and Conservation is mandated to deal with matters relating to biodiversity. To date, 3 million hectares of forests have been designated as protection areas, but the area actually gazetted under the laws of the country amounts to a little over 500,000 hectares. These include areas considered as Wildlife Management Areas (WMAs) declared under the Wildlife Act.

In terms of actual management of these areas, there are problems as the Department of Environment and Conservation has not been adequately resourced with sufficient financial or human resources to carry out effective management practices. Consequently, NGOs have taken on most of the responsibility of “managing” these WMAs.

Forests and climate change

PNG is a signatory to the UNFCCC and also to the Kyoto Protocol and plays an active role in climate change dialogues internationally.

It is only recently that the role of forests in climate change has been recognized due to international awareness and attendance at international forums. The PNG Government having recognized this is now championing the issue through the Coalition of Rainforest Nations to contribute to mitigating and adapting to climate change.

The Government has also progressed work to develop a carbon trading policy and the current Forest Minister has made it clear that he wants to see in place a carbon trade policy specifically for forestry.

Other initiatives are being pursued by the Government to address climate change such as designating potential CDM Project areas in the Provincial and National Forest Plans.

Presently the country is following issues relating to climate change closely and especially REDD and avoided deforestation. It has formally created a Climate Change and Environmental Sustainability Office under the directive of the Prime Minister in 2008.

Various NGOs have also taken up the cause and have begun consultations on how rural communities can best venture into the carbon trading market using their forests.

Policy and institutional framework

General trends regarding forest policies and legislation

A National Forest Policy had been in place in PNG since 1991. Based on this Policy a number of other policies have been drafted, but have yet to be sanctioned by the Government. The following policies are notable:

1. Downstream Processing Policy
2. Reforestation Policy
3. Eco-forestry Policy

In taking office under the current government, the Forest Minister has noted that climate change is a global issue and has issued directives for the formulation of a carbon trade policy specific to the forestry sector. Work on this policy commenced in 2008. It is envisaged that it will be completed in 2009 and will complement other policies in relation to climate change as developed by the Office of Climate Change and Environmental Sustainability (OCC & ES).

In line with the National Forest Policy, PNG has in place a major item of forestry legislation, the *Forestry Act 1991* (as amended). This is supported by the Forestry Regulations 1998.

Recent policy changes that have impacted forests and forestry

As yet, the new policies have not impacted on forests and forestry as they have yet to be sanctioned by the Government. If and when this happens, there will be impacts such as the phasing out of round wood log exports and increased onshore processing under the downstream processing policy.

Under the Reforestation Policy it is anticipated that more areas will be brought under forest plantations and also more areas managed through silvicultural treatment of the selectively logged over forests, commonly referred to as “reforestation naturally” in PNG.

The Eco-forestry Policy is anticipated to promote the utilization of trees through portable sawmilling and value adding. Furthermore it is aimed at promoting other means of using the forests and dissuading large-scale industrial logging operations. Some of the policy directives in this complement the downstream processing policy.

Institutional arrangements for forest management

PNG has sound institutional arrangements for the management of its forest resources, with the Ministry for Forest and its administrative arm being separate from other government ministries and departments. The PNG Forest Authority was established in 1993 and unified the 19 fragmented Provincial Forest Departments into a single unified forest service to manage the forest resources of the country.

At one point in time, during the 1980s, the Government’s forestry functions were decentralized to the 19 provinces, but after a major enquiry into the forestry sector in 1989, the enquiry recommended strongly to establish a unified forest service, hence the creation of the PNG Forest Authority in 1993 with a National Forest Service (NFS) that administers the functions of the PNG Forest Authority.

The present organizational structure of the PNG Forest Authority is shown in Figure 3.

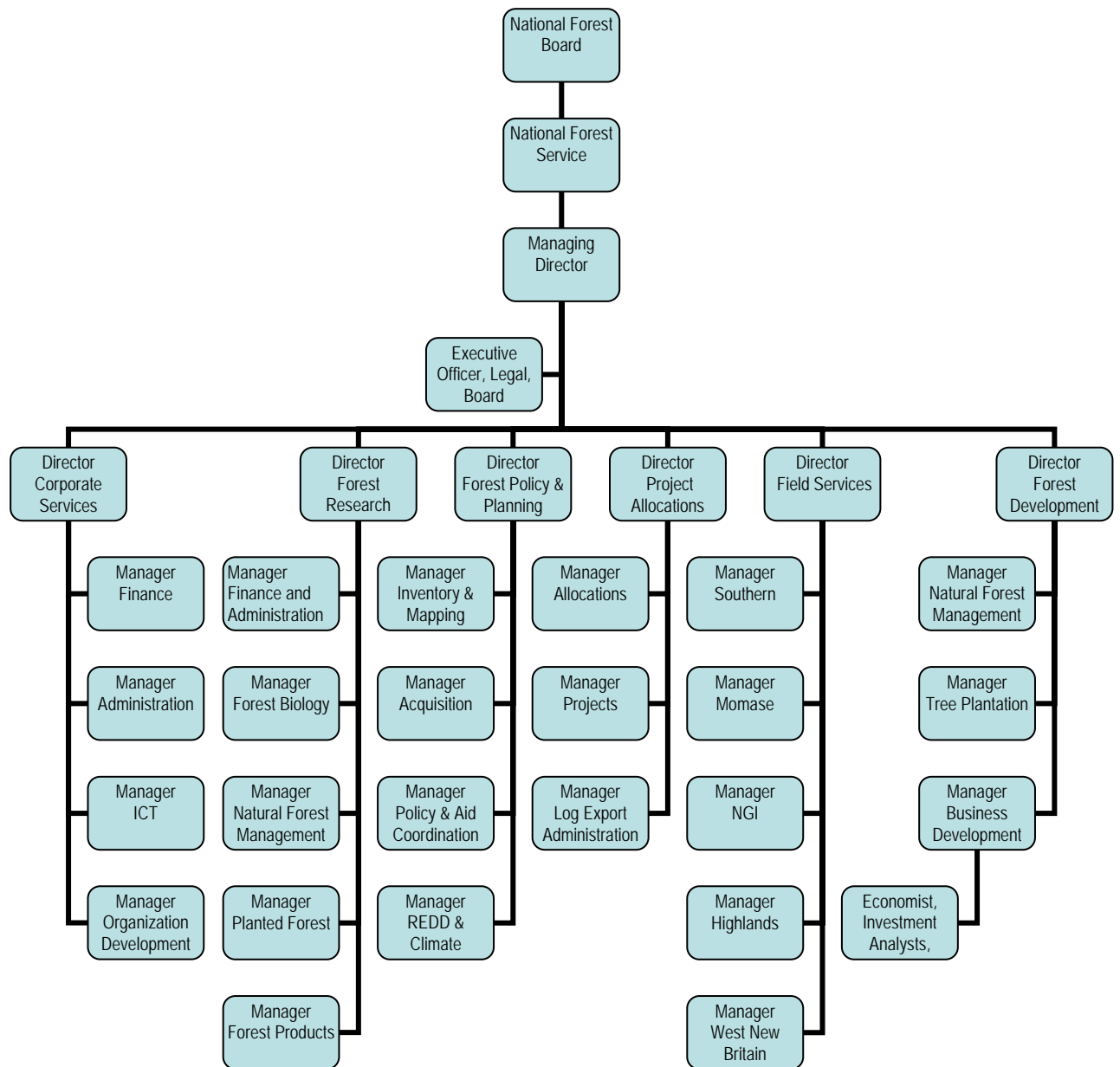


Figure 3. Forest authority organizational structure 2008

This Organizational Structure was approved at the end of April 2008 and is now in effect. The restructure compared to the former structure has abolished the office of the General Manager and merged the Office of Director, Policy, into the Policy and Planning Directorate and also merged the Directorate of Finance and Corporate Services into a single Corporate Services Directorate. Two directorates have been renamed, firstly, from Resource Development to Project Allocations, and secondly from Forest Management to Forest Development.

The role of the Government as a regulator – and that of the private sector as the agents responsible for wise utilization of the forests to contribute to the economic development of the country – is generally clear.

Under current arrangements, the Forest Minister does not have any direct control over the normal administration of the PNG Forest Authority and its National Forest Service. It is the National Forest Board that runs the affairs of the Forest Authority. In this way there is no direct political influence on decisions relating to the awarding of timber projects. This

structure results from the major forest enquiry in 1987/1988 that found that there was much abuse of political power by those responsible at that time.

State of research and education in the forestry sector

Most research in forestry is undertaken by the Forest Research Institute, which is a directorate of the PNG Forest Authority and not an independent organization. This institute is located in the city of Lae, in the Northern Region.

Generally the state of research is good, but much more could be done if there were additional resources (funds, manpower) injected into the Institute. Over the past decade, the absence of any increased level of funding has seen a decline in basic research infrastructure and an exit of staff with postgraduate qualifications.

The Forest Research Institute has been working closely with international collaborators such as ACIAR, JICA, ITTO, and other individual privately funded research organizations over the past several years. More recently, it has collaborated with the Joint Research Institute based in Germany to undertake studies relating to biomass and carbon.

Forestry training is provided within the country. This is undertaken at the Papua New Guinea University of Technology (PNG Unitech), which also happens to be the only university within the Pacific region offering tropical forestry science degree. PNG Unitech also offers Diplomas in Forestry from the Bulolo University College (BUC) and Trade Certificates in various wood processing skills from the Timber and Forestry Training College (TFTC). Forestry-related postgraduate degree studies are also offered by PNG Unitech and the University of Papua New Guinea (UPNG).

In more recent times, further training, especially postgraduate studies, has usually been undertaken abroad and mostly in Australia and a few courses in Europe, Japan, New Zealand, and the US. All of this overseas training is made possible through scholarships from the governments of the countries concerned.

Key issues and an overview of the overall state of forest and forestry

Some of the key issues in forestry for are:

1. *Traditional forest owners' increasing needs and aspirations for development:* Due to the lack of development taking place in rural areas and the deteriorating state of basic services such as health, education, and general infrastructure, the people are being forced to trade their forest resources to enable them to earn an income and have access to goods and services that their urban counterparts enjoy. In recent times, pressure has been applied on the Government through local leaders and politicians to engage logging companies that will harvest the timber, pay royalties, and make roads to try to better the livelihoods of rural people.
2. *Expanding populations:* Increasing population is contributing to the decline in forested areas in some parts of the country that have higher population densities. Much of the loss is due to shifting cultivation for subsistence gardening.
3. *Government emphasis on forestry sector for economic development:* Since the Asian economic crisis in 1997/1998, which had subsidiary effects on PNG, the Government has placed much emphasis on forestry to help the economy of the country to recover. This has led to what are known as forestry "impact projects", which are intended to generate foreign exchange earnings.

4. *Global climate change and carbon trade:* This is being followed closely by the Government and as yet has not impacted much but is expected to do so in the future.
5. *Increasing prospects for industrial agro-forestry businesses:* With the influx of potential investors especially from the Asian region in the agro-forestry business, especially bio-fuels, this will likely set the stage for large-scale conversion of forests to bio-fuel plantations.
6. *Resourcing of Government institutions:* This has been an ongoing problem for the agencies concerned, especially the Forest Authority and the Department of Environment and Conservation. Due to the lack of adequate funding, agencies cannot adequately monitor and manage the activities of logging companies and others involved in the forestry sector. In fact, a significant threat may be posed by portable sawmill operators, but very little data exist to qualify and quantify the area, volume and value of forest being subjected to this activity.
7. *Coordinated land use planning:* The absence of any real coordinated national land-use planning, including development of land-use polices, is an issue. With the implementation of the national agriculture plan, this is a significant threat to forest cover either for production on an SFM basis or for other environmental services.

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

PNG society is changing from a traditional society based on traditional culture and norms to one that is increasingly adopting western styles of living and conducting business. In doing so, the needs and wants of society are quickly changing and have to be satisfied. Among basic needs for the mass of the rural-based population are better education and health services.

In order to satisfy needs and wants, cash is needed and many people being rural dwellers do not have ready cash. But, they do have forests, and forests can be converted to cash. Hence, there is a tendency to approach the Government to facilitate the development of their forests to enable them to derive an income that will be used to meet their needs and wants.

Demographic changes

According to the preliminary census figures for the year 2000, PNG's population was just over five million. Eighty-five percent of the population lives in rural areas. Population densities range from one person per square kilometre in remotest areas to over 500 persons on some small islands. Land shortages are increasingly common where the population density exceeds 100 persons/km².

Between 1980 and 2000, the average growth rate was 2.7 percent per year. The total population has doubled over the last 30 years and is expected to double again in the next 30 years. By 2020, the population is expected to increase to 8 million. Figure 4 highlights the distribution of population through PNG by regional groupings.

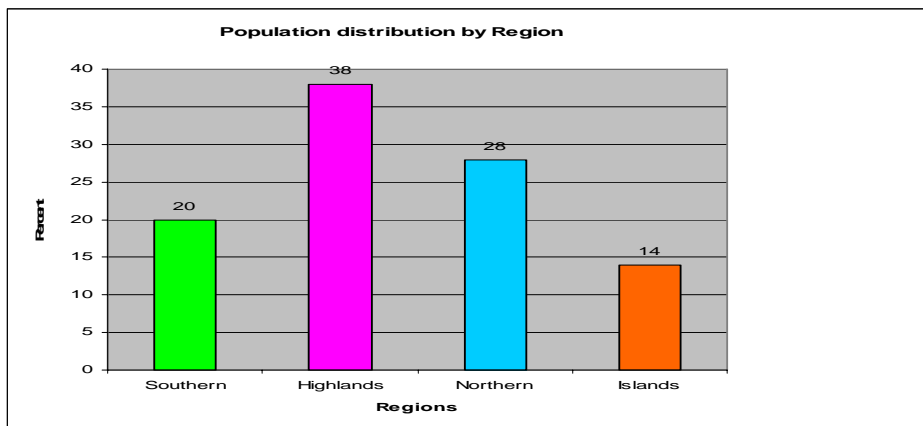


Figure 4. Population distribution by regions in PNG

Source: Papua New Guinea 2000 Census.

This increase in population will obviously put pressure on all the natural resources, including forests. Rising populations will need to be fed and in order to do so more natural forests will likely have to be cleared, mainly through shifting cultivation. Forested areas that were in the past left untouched, such as the catchments, will be increasingly threatened to make way for food gardens.

Urban migration is on the increase, with many people leaving their village settings to move to urban areas such as towns and cities. This urban drift is the net outcome of lack of or deteriorating services in rural areas and lack of infrastructure – especially roads, bridges, and airports – to provide ready access to services; and most importantly, lack of employment.

Political and institutional environments

There are many actors in the forestry sector including the Government and its bureaucracy, the land and resource owners (i.e. communities), the private sector, civil society, and donor governments and agencies. Each has played a role in shaping the forests and forestry in the past and will do so in the future.

In terms of governments, there has been a somewhat stable democratic government in place since Independence in 1975, despite changes in its make-up. Its main policy on forestry has remained the same since 1991, and is not expected to change much; although with growing concerns about climate change the revision of the National Forest Policy will capture opportunities and challenges.

Landowners, the people who own both the land and the forests that grow on it, are truly the key players in the forestry sector. While this is so, there are many doubts as to whether they truly benefit from the use of the forests that have been utilized for industrial wood production. PNG has a unique system of landownership whereby the land is not owned by the Government, but by customary tribal communities in clan groupings as opposed to individual ownership. Without their consent, no forestry operations can take place on the land. Consequently, the Government and the PNG Forest Authority are clearly bound to respect the wishes of the people.

Landowners have become increasingly better educated and better informed about issues relating to forestry and the environment. In the past, many timber projects in the country have come and gone without much long-term tangible benefit for the resource owners. However, this situation is changing and in the future better educated members of the landowning groups will be more engaged in project negotiations and other general issues relating to forestry and the environment.

Civil society organizations have been playing a role in the forestry sector but not for as long as the other players. There are a number of NGOs both domestic and international, church groups, women's groups, and others who are increasingly contributing to the education of the tribal people about the true value of their forest resources. Many of the NGOs engage in promoting alternate timber harvesting using portable sawmills that are intended to harvest timber sustainably and also to trade their products for higher prices. Others are involved in promoting forest conservation and ecotourism. Civil society organizations will continue to play an important role in the forestry sector.

Since the early 1950s, the private sector has been playing an important role in influencing the forestry sector. Over the years there had been a steady increase in the number of logging companies operating in the country. However, this has steadied since the late 1990s and is not expected to increase. Most of the companies now operating in the country are subsidiaries of existing major players.

Economic changes

Forests and the forestry sector have been contributing significantly to the overall economic development of the country. During the past 20 years, the forestry sector has contributed to increases in GDP along with the mining and petroleum sectors, the fisheries sector, and the agriculture sector. As mining and petroleum are non-renewable sectors, forestry will be increasingly at the forefront in the coming years, together with fisheries and agriculture.

The forestry sector, and specifically SFM, will face major challenges and competition with the agriculture sector. With the implementation of the PNG National Agriculture Plan, there

will definitely be many land-use conflicts between forestry and agriculture. The absence of any inter-sectoral land-use planning in the country will make conflict between competing land uses inevitable. This is something that will need to be addressed urgently so that forestry, and specifically SFM, and its continued contribution to the economic development of the country can prevail.

The forestry sector has been one of the country's biggest employers, especially in the rural sector. It employs about 4.7 percent of the total work force (National Statistics Office, 1998). Forest-based industries have created job opportunities for more than 20,000 people, with many more people employed in spin-off businesses. This trend will continue into the future as the Government embarks on major forest plantation development. This should maintain sustainability and hence employment in the forestry sector.

In PNG, basic services to the rural sector have deteriorated in the past 20 years. These include health and education services. Furthermore, there has been deterioration in road infrastructure that enabled rural people to have access to goods and other services in urban areas. This has resulted in increased urban migration by rural people including increase in so-called "settlements", either within towns and cities or on their fringes. It is anticipated that the new Agriculture Plan will, among other things, discourage urban drift and promote more rural development. In doing so, infrastructure and other basic services can be improved over the coming years.

There will be a significant impact on SFM as many more forested areas will be brought into agricultural production. There will be competition for land use as mentioned above. The end result will be loss of forest cover as agriculture will dominate land use.

As the population increases, there will be increasing demand for wood products as a source of energy in the country. The demand for wood for cooking (especially) will be a significant issue for urban areas, however it will not be significant in most provinces where wood is in abundant supply and has never been a problem. Traditionally, charcoal has not been produced, nor are there any major industries using charcoal in the country.

Technological changes within and outside the forest sector

Technological changes are bound to impact on forests and forestry. A classic example is the increasing demand for bio-fuels. This is leading to an influx of potential investors into the country with project proposals that are getting a good degree of political support for the conversion of existing virgin forests into oil palm plantations. In reality, the country has yet to see any genuine new investor in the oil palm industry, aside from the current established palm oil companies that have a long standing in the country. Many of the potential investors seem to be only after the logs from the forest with the pretext of oil palm development.

Environmental issues and policies and their impacts on the forest sector

There is a growing concern about the environment. This has been generated by the increased awareness of people through improved education, awareness raising efforts by NGOs and civil society groups, and Government institutions acknowledging that environmental issues are important and need to be addressed. Increased concern for the environment will no doubt impact on how the forestry sector is expected to perform, while at the same time contribute to the economic and social development of the country.

Of key importance to biodiversity conservation is the current loss of habitat due to increased logging activities and with proposed new timber concessions to be brought into production.

Summary of key factors that are likely to impact on forestry in the next 20 years

There are many factors that will impact on forests and forestry within the next 20 years. Some that will impact greatly on the forestry sector in PNG include:

- a) Social well being of the people
- b) Economic development of the country
- c) Government policies
- d) Good governance issues
- e) Global issues, specifically climate change and biodiversity conservation
- f) Regional and global demands for wood and wood-based products and services

4. PROBABLE SCENARIOS AND THEIR IMPLICATIONS

This chapter explores possible scenarios for social, economic, political and institutional development in the country.

PNG's vision in its Medium Term Development Goals is to ensure that the country prospers and is able to meet the needs of its people and their aspirations for social, economic, environmental and political development. More specific to forestry and the environment is Millennium Development Goal 7 – to ensure environmental sustainability.

In order to explore the different scenarios it is necessary to highlight the main or key drivers that will have an effect on forests and forestry in PNG into 2020. These are:

1. Increasing population
2. Increasing demands for cash income to meet the costs of basic goods and services
3. Infrastructure development
4. Overall national economy
5. Regional and global wood demands
6. Global climate change and other environmental issues

Social development

Population growth in PNG was predicted in the 2000 National Census to be 2.3 percent per annum. This will have both direct and indirect effect on forests as well as negative and positive effects.

The increasing populations will need to be fed and an important direct effect is that forests will be cleared through shifting cultivation. In PNG about 90 percent of its people live in rural areas and are dependent on shifting cultivation for food. Where natural forests are scarce or further from the village communities, forest fallows will be shortened and thereby never left to revert back to any form of forest.

Alternatively, if there is a decrease in the population (which is most unlikely by 2020), the opposite effect will take place where less areas of natural forest will be cleared through shifting cultivation.

The other important effect that an increasing population will have, especially in rural areas, will be to increase the demands for cash incomes from the forest resource to enable people to pay for goods and services.

Social development encompasses many sets of factors, but the social well being of the people in terms of basic health and education is of primary importance.

With the current trend in the provision of health and education services in the country, the future to 2020 does not indicate there will be any dramatic change. Rather many commentators predict a worsening situation in respect to these two elements given current levels of government funding.

Since access to these two main elements of social development is not predicted to improve, the implications are that people, and especially rural people, will be forced to look at alternative means to treat their health problems and also to educate their children. This will likely mean accessing these services from private sector providers, and this will be costly, but there will be no alternative.

The implications are that those with rich forest resources will trade in their timber rights to enable timber harvesting to take place and income can be generated and paid as royalty to them. From this income they will then be able to meet the costs of health and education, and other consumer goods, for their families.

Employment is another important social factor in forestry. With employment income, people can buy goods and services to improve their standard of living. The forestry sector provides many jobs in PNG, especially for the rural people. Furthermore it indirectly provides employment to many other service providers, such as transport operators, shops, shipping, local market producers, and so forth.

Infrastructure development and maintenance in terms of roads, bridges, jetties, and airstrips are important features of a country's development to enhance both social and economic development. Over the years there has been a lack of new infrastructure development especially in rural areas. Maintenance of existing roads and bridges has been below standard or non-existent.

Given this situation, and the increasing needs of rural people to access goods and services in urban areas and markets to sell their produce, people are looking to forestry-based operators to provide this basic infrastructure. Hence pressure is being applied on government agencies to facilitate logging projects so that the logging companies can build the roads and bridges that government has otherwise failed to provide or maintain.

Economic development

PNG, as a developing nation, depends heavily on its natural resources for foreign exchange earnings. It has in place a Medium Term Development Strategy that, among other things, is intended to bring about economic growth.

The Forestry Sector has contributed significantly to the economic growth of the country and will continue to do so. This contribution is largely through the export of round wood logs by timber-based companies.

Looking to 2020, forestry will likely maintain its current volume of round wood log supply at about 2-3 million m³ per annum, thereby bringing into the country much needed foreign exchange revenue.

Whether or not there will be an expansion in the economic contribution of the forestry sector to the national economy will depend on a number of factors and these include:

1. Adequate supply of raw materials (wood)
2. Costs of fuel and shipping
3. Labour costs
4. Incentives to industry participants in the forestry sector
5. Creation of enabling conditions by the Government
6. Global wood and wood product prices
7. Landowners' willingness to enter into FMAs
8. Avoiding deforestation for carbon trading
9. Reforestation/afforestation of other degraded land to mitigate climate change effects as well as to trade carbon

Given the current situation, there is expected to be no real expansion in the forestry sector in its contributions to the national economy. Of the above elements, rising fuel prices alone are posing a threat to most forest-based industries and many may have to close. In most cases in

PNG, fuel has to be brought into rural areas, where the bulk of the forestry projects are located, and may comprise close to 50 percent of all operational costs.

Assuming that market prices remain stable, there will be no growth in the forestry sector. However, if prices increase, then forestry will continue to be a major player in the economy of the country.

Furthermore, the Government has a role to create enabling conditions if there is to be any growth in the forestry sector. Observers in the forest industry argue that this is not being done and hence the full potential of the forestry sector's contribution to economic development is not being tapped. If enabling conditions or environments are created by, for example, lowering tax margins, removal of import taxes on downstream processing equipment, and so forth, then the forestry sector contribution to economic development can be significantly increased.

The worse case scenario might be that if the Government is able to convince landowners to maintain their forest for carbon trading, the timber industry and the principle of SFM in the country may be in jeopardy.

Political development

Assuming that the current government is allowed to run office for yet another 5 years, there is expected to be the same level of importance placed on forestry as a significant contributor to the national economy, but through carbon trading. There may also be a shift from round wood log exports to more downstream processing and value adding.

Furthermore, there is now more focus on global climate change and this may see more tropical rainforest being acquired and managed as carbon projects and an increase in reforestation to capitalize on global carbon markets. Assuming that mechanisms encouraging REDD materialize, this will see a decline in areas being converted to other land-uses – provided the financial returns are more attractive than from normal logging practices.

Institutional development

Since Independence in 1975, PNG has developed appropriate institutions to facilitate and cater for its overall development. Over the past decade, many of these institutions have not been adequately funded to implement their core functions. The PNG Forest Authority, since its inception in 1993, has had a declining budget allocation despite the fact that the forestry sector that it is entrusted to manage and regulate contributes significantly to the private income, foreign exchange and Government revenues of the country.

The Forest Research Institute, which is a directorate of the PNG Forest Authority and the only tropical forest research institute in the Pacific region, has also not received any meaningful level of funding from the Government to progress its forest research goals. It operates on a small budget that has been supported by collaboration with foreign donors and partners.

In addition, educational institutions offering courses in forestry, including technical training, have also not been adequately funded to provide high quality training in the forestry sector.

It is not always funding issues that matter, but also the good governance of these institutions. Commentators speculate that the Government, while giving little funding to its institutions to manage their affairs, is demanding too much from them. Furthermore, the Government is seen by many as interfering in the management of its institutions' affairs.

5. WHAT WE MAY SEE IN 2020

Forest resources in the next two decades

Forest cover

The forest resources of PNG are currently estimated to be some 28-29 million hectares. They are expected to continue to play a significant role in the overall economy, when the current mining and petroleum booms fade away. Together with the agriculture and fisheries sectors, forestry will be depended on to bring foreign exchange into the country.

Forest cover is expected to decrease due to a number of reasons, besides the overall economic pressures, and these are summarized as follows:

a) *Increasing populations* – with an increasing population, particularly in rural areas, more natural forest will need to be cleared through shifting cultivation to feed the increased numbers of people.

b) *Increasing demand for basic goods and services* – rural people want access to basic goods and services such as health and education, which often come at a cost to them. The only option they have is to sell their forests through timber concessions to receive timber royalties when logging takes place. Using the monies from the royalties, they can then pay for goods and services.

c) *Demands for infrastructure development* – many rural communities that are located near abundant forests are often very isolated and far from urban areas, where goods and services are available. Hence, landowners pressure the Government to acquire their forest areas for timber harvesting, which then paves the way for roads, bridges, jetties, and even airstrips to be built by the timber company. This infrastructure ultimately enables rural people to travel to urban centres to trade.

d) *Land conversion to agriculture* – there is a National Agriculture Plan and, in line with it, much forested areas stand to be converted to agricultural lands. As and when the above plan is implemented, there stands to be major conflict in land use between forestry and agriculture and forestry may eventually be confined to areas with very low populations.

On the other end of the spectrum, there is a possibility of seeing some increase in the area under forest cover if, and when, the Reforestation Policy is endorsed and funded by the Government. Based on past trends – where funding for reforestation has usually been always inadequate – there is no guarantee that this will happen.

Change in area under production and protection

Presently there are more than 22 million hectares of forest that have been identified as having production potential. From this total, 9.4 million hectares have been acquired by the State from the customary landowners and designated for timber production. Many of these are current timber concessions that have either been logged out, continue to be logged, or are yet to be logged.

A further 12 million hectares have yet to be acquired by the State from the customary landowners. These forests have been designated for future production. The remaining 3 million hectares may not be used for production due to their locality in difficult terrain areas.

Statistics on the total area under protection are unreliable. Many of the current forested areas are located in rugged terrain conferring a de facto protection status to the area. Presently, more than half a million hectares have been officially declared as conservation areas including both forest and non-forest areas but not marine environments.

With the future considerations of climate change and carbon trading there are significant prospects that more areas will be brought under protection status so as to capitalize on carbon trading from these forests.

The area of forest in PNG that is being brought under SFM was increasing until 2006. In the past, timber concessions were acquired and did not have sufficient conditions attached to them to enable SFM to take place. Now, under the FMAs, there are provisions for SFM. From 1995 to 2006, a total of over 5.5 million hectares has been acquired under FMA arrangements.. It is envisaged that there will be no significant increase in the FMA areas by 2020 due to the PNG's international commitment on REDD.

In terms of growing stock, there is not enough research information available to make predictions, especially in the natural forests. There is a strong possibility that there will be an overall decline in growing stock as new timber areas come under timber harvesting. However, this decline may be compensated by increases in plantation development.

Currently, the annual allowable cut – based on timber stocks that have been secured under some form of legal agreement through the process of FMAs – is estimated to be three million m³. Due to forest clearing for proposed roads and/or agro-forestry projects, the expected log harvest in 2008 was about 7 million m³ and when other similar projects come on-stream, the volume of log harvest is expected to reach 9 million m³.

PNG is presently pursuing talks with developed countries to engage in REDD as a means of mitigating the effects of climate change. This will have a major bearing on how and what role the natural forest will play in the future.

If a scenario develops where talks about REDD and other issues such as payment for environmental services (PES) do not materialize, then one would expect in the coming years that the current rate of deforestation and forest degradation would continue and even increase.

On the other hand if climate change mitigation through mechanisms being considered under REDD is successful, there is a high probability that the current rate of deforestation attributed to land clearing for agricultural projects (emerging bio-fuel crops) will be affected. This will only work if the financial return to the landowners is better than that from harvesting timber products. Forest owners will then appreciate the fact that there is another alternative for the use of their forest and one that is more profitable.

Wood and wood products

The production of wood and wood products is expected to increase as mentioned above in relative terms to the total log harvest. Domestic processing of wood is expected to increase when the Government policy on domestic processing in forestry is endorsed and implemented by the Government and the private sector. In the next two decades the country expects to see more exports of finished processed products, with a reduction in the volume of round wood logs leaving the country.

Consumption, especially of sawn timber and other furniture products from wood, is expected to grow steadily and could increase markedly as the economy has been predicted to improve, with the building industry expected to boom.

Consequently, it is expected that exports of round wood logs will decrease and there will be an increase in the export of processed products such as sawn timber, plywood, wood chips, and furniture, including carbon. These are the main processed products that have been exported up to now. There is no foreseeable expansion to other finished products such as pulp and paper, or fibre board.

In terms of wood-based industries the outlook for 2020 is that many of the timber harvesting companies in the country will not be able to sustain themselves in terms of wood supply and hence will be forced to close. This is specifically for those that operate in small concession areas and depend entirely on the natural forests. Companies that have established their own plantations will sustain themselves in terms of wood supply. A small number of timber companies will remain in operation and they will have bigger concession areas and therefore can sustain their wood requirements. Even so, these companies will need to consider establishing their own plantations.

PNG does not play a significant role in the global trade in timber and timber products, however it does so on a regional scale in the Southeast Asian region. With many countries in Southeast Asia now having in place (or considering putting in place) decrees or policies encompassing logging bans or log export bans, wood products manufacturers are increasingly looking to PNG as a major supplier of tropical hardwood logs. There is a high probability that PNG will continue to be a major exporter of round wood logs from the Pacific region to Southeast Asian markets.

Wood as a source of energy

Wood energy is increasingly becoming an issue especially in the Highlands Region where the bulk of the population lives. In most parts of PNG, wood provides energy for cooking and heating and much more wood is used in the Highlands for heating than in the coastal regions.

What may occur by 2020 is an increase in tree planting in the Highlands to cater for the fuel wood needs of domestic households and possibly some local sales. The Government may take a more active role in assisting people with distribution of tree species, as it has done in the past.

Besides this, the other sector that uses wood as a source of energy is the agriculture sector for drying such produce as copra, cocoa beans, and rubber. For the agriculture sector that uses wood as a source of energy, the outlook to 2020 is such that it will be able to cope with its wood supply and no additional burden will be placed on the remaining natural forests. Some fuel wood plantations will need to be established to cater to energy requirements.

Future for non-wood forest products

PNG has huge potential for NWFPs however this has not been fully explored and tapped into. The main products that have been developed in small projects and in small quantities have been eaglewood, sandalwood, resins, and gums. The future of NWFPs is dependent on the current policies on ecoforestry that are being developed by the Forest Authority.

The natural forest is becoming an area of interest in bio-prospecting, with a growing number of researchers exploring the potential of some of the plants in the forest that can be used for medicinal purposes.

Service functions of forests

Forests the world over are known for their service functions, besides the wood products that are derived directly from them. In PNG, these service functions have always been taken for granted, while timber production has been at the forefront of all development. As we move towards 2020, the people, especially those who live in rural areas are becoming more educated and beginning to appreciate the full value of services from their forests.

The increased awareness raising activities by NGOs and other civil society groups in the country have played a significant role in making people fully aware of the service functions of their forests, as a counterpoint to merely timber harvesting.

The service functions of forests in the future will be threatened due to pressures that will be put on them from other land uses such as agriculture. With the current government's National Agriculture Plan set to be implemented, this will compete with retaining the forests for the services they provide.

Increasing populations will also put pressure on forests and their service functions. In order to feed the increasing population, more forested land will need to be cleared and even high slope areas will be farmed, thereby opening up greater potential for landslides, more flooding, topsoil erosion, and so forth.

In terms of recreation, there are many potential areas that could be developed, but the prospects do not look bright. Unless the issue of security (law and order) is dramatically addressed by the Government, not many people will enter the forest for recreation. The country has some excellent walking tracks that can be very challenging, but these are under threat due to the law and order situation.

Despite the fact that the country has some unique wildlife, especially birds, in terms of wildlife management, the prospects to 2020 do not look promising based on current funding levels for the Department of Environment and Conservation. Many of the bird species – such as the Papua New Guinea Bird of Paradise that is unique to the island of New Guinea – will be under threat as their forest habitat will be encroached for logging and other land uses.

Future prospects for urban forestry are promising, as this is a topic that city and town planners are beginning to take into consideration during their planning stages. The capital city (Port Moresby) has no facilities such as parks and gardens and this will need to be addressed. In the country's second city (Lae), there is a large botanical garden that has not been properly managed due to shortages of funding. The prospects for returning it to its previous status look good, as urban authorities have recognized its importance and it is anticipated that before 2020, the gardens can be fully developed. For most other centres, the onus will be on the town planners to incorporate urban forestry into their plans.

Managing forests for their biodiversity does not seem to be implemented any better than managing for wildlife, as the Government's Department of Environment and Conservation has not been adequately funded over the past decade and the prospects for improvement do not seem bright to 2020. In the event that the funding situation would improve, there are many areas that have been earmarked as potential conservation sites throughout the country. Further work can then be progressed to bring them into declared area status, thus enabling management for biodiversity.

PNG has been in the forefront of climate change negotiations on REDD and is championing the cause together with the coalition of tropical rainforest nations. In doing so, PNG would like to see tropical forest countries with low greenhouse gas emissions be compensated financially or in kind for slowing their deforestation rates.

Recognizing the fact that forests are carbon sinks, PNG is developing a national climate change policy that will also take into consideration carbon trading issues. The PNG Forest Authority and the Office of Climate Change and Environmental Sustainability are working on developing appropriate guidelines on Carbon Trading Policy for forests, due to global interest in investments in this sector.

Social functions of forests

Forests will continue to play an important role in people's livelihoods, especially of rural people. Forests will continue to provide some form of employment for rural people and to provide a source of income to meet the costs of basic goods and services.

More and more people are now capable of buying portable sawmills and this will hopefully lead to more sustainable management of their forests and provide direct employment to the members of the community that they operate in. The products from these portable sawmills are increasingly being sold for higher prices than stumpage prices offered by large logging companies, who pay timber royalties based on a fixed Government stumpage value.

Furthermore, due to the increased awareness created by NGOs and civil society groups, there is a trend towards ecoforestry activities that is expected to grow. With more research intended to focus on NWFPs, and markets for them, it is anticipated that NWFP development will contribute to the cash incomes of the people and to their general well-being. Many of the younger members of the communities are expected to remain in their villages and meaningfully engage in these ecoforestry activities, rather than migrate to urban areas in search of work.

The Government, in recognizing the fact that the development of rural areas is important, has committed a lot of money in its development budget towards the rural sector. In combination with the National Agriculture Plan, the Government hopes to stimulate growth in rural areas that, for the past decade, have seen the agriculture sector stagnate.

There is not expected to be any major shift in the pattern of land and forest ownership. Forests will continue to be owned by the people in their clan and tribal groupings. One possible shift would be the fragmentation of landownership from clan groups to individual members of clan groups. Such a shift might be precipitated by disputes arising among clans in respect to timber royalties paid under current forest management agreements.

An overview of the future of the country's forests and forestry in 2020

Forest resources

The future of forests and forestry for PNG looks good. In terms of forest resources, there is expected to be a decrease in the natural forested area, however this will be offset by an anticipated increase in the area of plantations.

As we move towards 2020, many of the remaining accessible forest areas will have been acquired as concessions, but still leaving many areas throughout the country where the natural forest will be intact. This is mainly by virtue of the fact that many forests grow on steep areas or deep swamps that are physically inaccessible for logging operations or otherwise too costly to extract timber from.

The biggest threat to forestry, and especially SFM, will be from the agriculture sector, which is set to increase due to heavy Government fund allocations as a development priority. Large

areas of forested land are expected to be cleared and converted to agriculture that is primarily aimed at producing for export markets.

In terms of wood production, the situation, based on past and current trends is that the timber harvest volumes will increase due to large additional volumes coming from conversion of lands from forests to agriculture or for infrastructure development. Furthermore, an increase in the number of portable sawmills will also add to the increased harvesting. However, the timber harvest is not expected to exceed 8 million m³. Despite the fact that there are 10 new forestry projects that will be fully operational by 2020, the volume of log harvest from them will not see any significant boost in overall log volumes, because in many of the older timber concessions the forest resources have been depleted.

Trade in wood products (round wood logs, processed wood products) is expected to increase, but not significantly, with the coming on-stream of about 10 new forestry projects. Again, the limited increase is because many older timber concessions that have been developed as projects will have exhausted their timber resources and will be forced to close down.

One of the biggest strengths in forestry in PNG is that the land and the forest resources are owned by tribal clan groups and it is impossible to engage in any activity, whether in forestry or otherwise, without their consent. In addition to this, the current forest law (*Forestry Act 1991* [as amended]) and current forest policy and regulations are geared towards SFM for the well being of present and future generations.

These factors combine to ensure that there is no wholesale destruction of the natural forests, thereby controlling the rate of deforestation in the country. Any “illegal” forest clearing on a massive scale could only be done with complicity and the approval of landowners and, furthermore, the export of products from the forests cannot take place without appropriate authority being issued by the Forest Authority.

One of the main opportunities for the forestry sector is the growing concern over global climate change. PNG hosts one of the few remaining major tracts of rainforest in the world and there is vast potential for natural forests to be used as carbon sinks. As we move towards 2020, there is growing awareness that logging and other forms of timber removals are not the only way to earn income for rural people. If and when mechanisms are fully developed for using natural forests as carbon sinks, this will create a huge opportunity for conservation of forests to sequester carbon.

There are many weaknesses that have to be overcome to ensure that the future of forestry for PNG is one that is truly based on SFM. These include more education and awareness building among the tribal communities to enable them to make better-informed decisions, adequate levels of resourcing in terms of funding and manpower for Government institutions responsible for forestry, and most importantly, overall good governance at the political level.

6. HOW COULD WE CREATE A BETTER FUTURE?

Responding to changing societal needs

It is in every nation's interest to create a better future for its people and PNG is no exception. Societal needs have changed over the past three decades since Independence. The basic needs of the rural population have changed. They want to have better education and health facilities and to have access to good infrastructure to enable them to travel into urban areas to conduct business including selling and buying goods and services. Populations in rural areas are also increasing, partially due to better health facilities. However, many still need to be fully stocked with basic drugs and staffed by more health workers. This increasing population will put pressure on the forests.

In response to changes in society's needs, the current policies and laws need to be reviewed to better cater to people's demands. However, policies and legislation also need to recognize that the Government has a responsibility, not only to the current generation, but also to successive generations.

Partnerships need to be developed and strengthened between the Government and NGOs and civil society groups to contribute to improving the livelihoods of rural people. Education and awareness are two important factors that will enhance people's capacities to make better-informed decisions on forests. In a country where the literacy rate is quite low, many landowner decisions have been influenced by a few educated elite who reside in urban areas; these decisions have not always been beneficial to the majority of landowners.

A better future can be created if the Government endeavours to meet the basic needs of the people such as health and education, improves rural infrastructure such as roads and bridges, wharfs and airstrips, and facilitates general development in rural areas, rather than relying on the forestry sector alone. An integrated land-use development policy that combines forestry and agricultural planning is one viable means of ensuring that there is sufficient wood supply for people in the future.

Policy changes within and outside the forestry sector

Many policies are currently being drafted or reviewed and it is important that they are done in consultation with the people that will be affected, both directly and indirectly. In PNG, forestry is known as a rural industry and any new or revised policies have to take into consideration the wishes of the people. Policies that have been prepared in isolation often do not get the support of the very people they are intended to benefit.

A number of forestry policies are being developed in PNG including the reforestation policy, the ecoforestry policy, and the downstream processing policy and, more recently, work has commenced on climate change and carbon trading policies. As and when these policies are fully endorsed by the Government, the country may see a shift from large-scale commercial forest exploitation to smaller projects that will be more beneficial to people and the environment. Large-scale commercial forest exploitation would then be confined to the FMA areas where SFM is a prerequisite for operations.

Policy changes outside the forestry sector will also impact on forests and forestry. For example, policies relating to food security and the National Agriculture Plan, any new policy relating to biodiversity, climate change etc could create a conflict over land use in the country.

Too often, these policies are being drafted in isolation; solely by the key institutions that are mandated by the Government to do so. A way to improve in the future would be to review the functions of the various Government agencies and committees that exist to ensure that proper national planning is being carried out. Conflicts in potential land uses could then be identified early on and resolved. In essence the formation of a Land Use Planning system would be the way forward.

Institutional changes

In order for the policies that are being developed to be implemented, institutions need to make appropriate changes. As many of the institutions tasked with managing the future of forests and the environment are Government institutions, the Government has to ensure that they are adequately resourced. The current low levels of funding and human resources will need to be increased to levels where these institutions can perform effectively.

Furthermore, the manpower in these institutions needs to be further trained to be able to better deal with the growing number of issues concerning forests and the forestry sector. Research and development has to be at the forefront of institutional capacity building as there are issues – such as carbon stocks, carbon trading, lesser-known timber species, medicinal plant species, and other aspects – that have yet to be fully explored, developed and commercialized. Forests provide a wealth of other services and the country needs qualified experts who are able to qualify, quantify, and market these services.

Educational institutions that provide training for students in forestry and related environmental fields of study will need to be adequately funded by the Government. Furthermore, the curriculum being taught may need to be reviewed in light of increasing global concerns over societal development, the environment, and specifically, climate change.

Technological changes

Technological changes are taking place every day that impact on forests and forestry. The country as a whole needs to explore them and import appropriate technologies to enable efficient development of all the sub-sectors in forestry. Wood processing machinery for downstream processing of wood has to be imported or even developed in the country and geared, not only for processing for export markets, but for domestic markets as well. Many of the current sawmills in the country are using older machinery, and they will need to look ahead and refit so that recovery is higher with less wastage. They may have to explore the use of waste wood to produce such material as charcoal, or for energy co-generation, or other end products.

Woodchip, plywood and veneer mills must start to consider importing new technology, not only to improve the quality of their products so as to fetch better prices, but to address issues of pollution and PNG's contribution to climate change and global warming.

In order for the above to happen, the Government will need to review current policies and seek to create enabling environments for the industries to embrace new technology. These might include, but are not limited to removal of import duties on machinery intended for down-stream processing, reducing tax on exports etc.

Institutions that are empowered to manage the forestry sector need to adopt new technologies such as remote sensing: While remote sensing is not entirely a new technology in the global sense, many developing countries such as PNG and especially the PNG Forest Authority have to embrace this technology to enable it to properly monitor the forests and the changes taking place, in order to guide good policy formulation.

Regional and global collaboration

It is important that PNG continues to cooperate globally, regionally, and even at the sub-regional level in matters relating to forestry and the environment. Being signatory to many UN conventions and treaties, it is only proper that PNG honours and contributes meaningfully to them.

The most important conventions that affect forests and the forestry sector are the UN UNFCCC and its associated Kyoto Protocol, and the UN's CBD. PNG has to collaborate to ensure that greenhouse gas emissions from deforestation and degradation are kept low and also that it can participate meaningfully in climate change mitigation and adaptation programmes.

PNG needs also to collaborate with regional and global partners to ensure the issue of illegal logging is adequately addressed and arrested so that financial losses to the people and the country are minimal.

Overall priorities and strategies

The country's overall forestry priority is to ensure, among other things, the wise management of its forest resources for the collective benefit of present and future generations. That is enshrined in the National Forest Policy and also the Constitution of the country.

Over the years, the Government has also put in place various development strategies, the latest being the Medium Term Development Strategy 2005-2010 (MTDS 2005-2010). The ultimate goal of the MTDS 2005-2010 is to foster sustainable improvements in the quality of life for all Papua New Guineans by promoting economic growth and social development.

In the forestry sector, the Government has developed a number of policies that have yet to be endorsed. These include the reforestation policy, ecoforestry policy, and the downstream processing policy. Based on the current government's initiative a new policy is being developed specifically to cater to climate change and carbon trading.

Furthermore the National Forest Plan is being reviewed and revised to plan for the sustainable management of the country's forest resources. It encompasses, among other things, a forest development programme that is based on the 19 provincial forest plans. Global issues, such as potential for climate change mitigation through CDM projects and REDD-based projects have been taken into account in the Plan. This is indicative that the country, as a whole, is concerned about the changing climate.

Investment requirements

Investments in the forestry sector can be increased, provided that the Government creates an enabling environment for forest-based industries. An enabling environment includes such things as addressing institutional inefficiencies (political and bureaucratic), removal of high tax regimes, providing incentives for downstream processing, and ensuring long-term resource supply for established forest-based industries.

7. SUMMARY AND CONCLUSIONS

Key conclusions

In summary, the outlook for forest and the forestry sector to 2020 in PNG is one in which the sector will continue to grow in importance and provide for the economic and social well being of the people. The challenges from climate change mitigation and adaptation processes will also impact on the forestry sector in the country.

The country will see some decline in overall forest cover due to forest conversion to agriculture, and shifting cultivation due to the growing population. On the other hand, as timber concessions are now geared for SFM, it is expected that the forest cover and timber stocks in the timber concessions will be maintained. With the implementation of the reforestation policy, there is expected to a balancing effect, with plantations helping to offset and arrest the decline in forest cover.

One of the biggest threats to forest cover in the country is expected to be from the National Agriculture Plan that, when implemented in full, will see the conversion of forest lands to agricultural lands.

Production of wood and wood products is anticipated to increase slightly, but not significantly. This anticipated increase would be a result of more wood being harvested from newly allocated timber concessions and from areas designated for agriculture under the National Agriculture Plan. The increase would also be from forest clearance for road and other infrastructure development. Wood products would increase in line with the Government policy directives of increased domestic processing of wood to finished products.

In 2020, it is anticipated that annual round wood log export volumes will stabilize at about 3 million m³, with a small increase in domestic processing of wood.

Wood as a source of energy, specifically for heating, will continue to be a problem in the Highland Region where the majority of the population of the country is based. The outlook is such that more short rotation trees will be grown in the Highlands and more extension work done in tree farming and agro-forestry systems.

It is the intention of the Government to increase the area of plantations in the country and its current draft reforestation policy is geared to address this. There are vast expanses of grasslands, where species trials over the past 30 years have proven that commercial tree species can be grown. All that is needed now is for the Government to fully endorse and finance the reforestation policy initiative.

NWFPs will become important in the future. Their potential exists, but has not been fully explored. With more cooperation and inputs from both the Government and civil society groups, research can be undertaken and, most importantly, markets established. Prospects look good in the future.

The service functions of forests are increasingly becoming appreciated by communities and forest owners, due largely to the work of NGOs and civil society groups. Even so, some of the key service functions will be threatened through conversion of forests to gardens to feed the increasing rural populations, logging, and other land uses that remove forest cover and impact on forest habitats.

With the current issues of climate change and carbon trading from forests, there is some hope into 2020 for the conservation of forests and thereby wildlife habitats, but progress in

implementing projects has to be made very quickly. There are positive indications already after the Bali UNFCCC meeting that are in itself positive signals for the conservation of forests not only for carbon sequestration but also for other environmental services. In this respect the future looks bright.

In terms of social functions, forests and the forestry sector will continue to provide employment for the bulk of the rural people of the country. Unless a forest-based industry is sustainable, the benefits associated with timber harvesting will be short-lived. There may have to be major shifts in Government policies to ensure that forests continue to contribute to the social development of the country.

The forest and the forestry sector have long-term economic viability, but there needs to be more dialogue between all the stakeholders, especially between the Government, industry, and the landowners. The Government will need to create “enabling environments” such that wood-based industries can continue to contribute to the economic and social development of the country.

A better future can be created for the people of PNG, where the forests can be seen to be contributing meaningfully to the betterment of the lives of people, the majority of whom live in rural areas. PNG does not anticipate equaling or surpassing the developed world in terms of forest management or other development, but needs to ensure that its people are fed and have access to basic goods and services.

As we look to 2020, there is more follow-up work to be done. Current Government policies will need to be reviewed taking into consideration the well being of the people and international issues including climate change. Experiences from resource-poor countries have to be studied and corrective actions taken so that PNG does not face a similar future as some of its neighbours, which have hardly any forest cover left.

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