

Papua New Guinea Forest Studies

Paper Three

Issues and opportunities for the forest sector
in Papua New Guinea

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Summary and findings: issues and options for the PNG timber sector

Following a short introduction on the importance of the forest sector in the PNG economy, this paper looks at three issues: i) the available information on the status and use of forest resources in PNG; ii) possible strategies to make the transition from the current volume-based approach centring on log exports towards a value-based industry focusing on the exports of (semi)-processed timber products and iii) the extent to which the current fiscal regime allows the Government to maximise revenue from the forest sector. The main findings of this paper are:

1) While the main determinants for the future of the PNG forest sector is the extent to which the industry manages to make a profit and maintain market confidence, in societal terms the importance of the forest sector in PNG lies in its development potential of bringing incomes, jobs, infrastructure and services to remote rural areas. Its contribution to Government revenue is limited and likely to decline in the coming years.

2) Actual harvesting levels are much higher than those recorded in log export statistics. Sustainable yield levels can only be calculated at concession level on the basis of forest inventory. Updated information on the status of PNG forest resources is urgently needed.

3) The PNG Forest Authority tends to overestimate the availability of resources and appears to be in the process of committing forest areas to logging which were previously deemed unsuitable. In the medium term PNG is at risk of running out of accessible timber resources and losing forestry as an economic sector if it continues to pursue the current levels of log exports.

4) In strategic terms the key question to the forest industry therefore is whether PNG is able to: i) reduce output by bringing forest operations in line with sustainable yield principles; ii) support future access to raw material through plantation development where feasible; iii) increase the value of its timber exports through downstream processing; and iv) ensure compliance with relevant laws and regulations in order to meet the requirements of increasingly demanding international markets.

5) There is a gradual increase in the production of plantation timber due to private sector investment. Access to land, however continues to be a constraint. The role of the government in this development is limited. The reforestation levy as it currently stands does not appear to lead to reforestation and may have to be increased to a level that induces the necessary plantation and reforestation activities on the part of the logging operators.

6) Downstream processing is rapidly gaining in importance, now constituting almost 25% of total timber export value. Most of this is still high-volume low-value produce, but that may shift as PNG becomes an increasingly important supplier of sawn timber. There is an urgent need to monitor export volumes of

processed timber in order to i) monitor the development of the PNG processing sector; ii) gain insight in the main trade partners and their requirements.

7) Medium to large-scale sawmills, preferably in combination with mouldings and joinery production, generate the highest returns on investment. Large scale plywood and veneer plants appear not financially viable, although a veneer mill is now operational at Panakawa. Export-orientated community-based forestry appears not viable unless subsidised in its transport, certification and marketing components.

8) PNG's plantation and downstream processing policy should be based on a strategic analysis of the economics of plantation development and downstream processing as well as the requirements of international markets. These latter demands are likely to cover aspects related to: i) the physical qualities of the exported timber product; ii) phyto-sanitary aspects related to the trade in timber and iii) issues relating to the legality and sustainability of the underlying production process.

9) The regulatory niche provided by Timber Authorities combined with the favourable financial returns on medium-sized sawmilling provide an incentive to expand the number of such operations. The PNGFA needs to look into the use of Timber Authorities and the means to better regulate their operations as a matter of urgency.

10) Due to the difficulty of auditing forest-related corporate tax submissions the Government of PNG has opted for a progressive export tax on logs which will be modified shortly in that i) an additional 8 Kina per cubic metre will be paid to the landowners and ii) the progressive tax will be replaced by a flat rate. The latter choice is unfortunate. Flat tax rates may lead to inefficient resource use and a sub-optimal collection of log export revenue.

11) The lack of transparency in the financial returns on logging, combined with the possible occurrence of transfer pricing make it difficult to draw conclusions on i) the profitability of the log export sector in PNG; ii) the distribution of costs and benefits from log harvesting and exports between government, companies and landowners and iii) the level of a 'fair' and economically efficient export tax.

12) Indications of transfer pricing are widespread and deserve to be investigated. Underreporting of volume and grade has been dealt with through the export monitoring contract with SGS. The risk has shifted to the price endorsement mechanism. It is estimated that at current export volumes underreporting by on average 10 US\$ per cubic metre of the FOB price of logs exported would lead to a loss of Government revenue of 90 million kina per annum. Underreporting by on average 20 US\$ per cubic metre would suggest a loss double that amount.

13) The risk of export transfer pricing results from: i) the lack of procedures and an objectively verifiable source of information to determine whether the FOB price suggested by exporters is in line with prevailing market circumstances; and ii) the fact that the price endorsement procedure is located entirely within the

Marketing Branch PNGFA, without a role for those Government bodies that are tasked with maximising the collection of revenue.

14) The risk of transfer pricing can be managed in several ways. The risk of *import* transfer pricing can be reduced by limiting the opportunities for forest-related tax deductions followed by a concomitant reduction of the log export tax. The risk of *export* transfer pricing through the under reporting of log prices can be addressed by i) developing a more objective means to assess international market prices for PNG logs; ii) by setting a monthly determined price on the basis of which export taxes are calculated regardless of the operators contract; and iii) by making the price endorsement procedure more transparent by subjecting it to scrutiny by an interagency committee between the PNGFA and a number of government bodies, including those responsible for revenue collection.

1. FORESTRY AND THE ECONOMY

PNG is a distinctly rural society with some 85% of the population dependent on subsistence agriculture supplemented by small cash incomes. The country has few urban centres and limited infrastructure, which hampers the development of agriculture and other rural industries as well as the provision of services to its rural population. The PNG economy depends on a small number of cash crops such as coffee, tea, palm oil, copra and coconut. It has a very sizeable non-renewable resources sector covering minerals such as gold, copper and oil. Its most important renewable resources are marine products and timber, with the latter representing around 6% of total export value, making forestry the third largest foreign exchange earner after mineral and agricultural exports.

Table 1: Value of Main Exports Commodities

	2002 actual	2003 actual	2004 estimate	2005 estimate	2006 projection
Agricultural exports	1,085	1,391	1,485	1,592	1,665
Forest products	414	416	460	512	630
Marine products	94	125	58	60	64
Total agriculture exports	1,593	1,932	2,003	2,164	2,359
Total mineral exports	4,774	5,890	6,210	7,707	7,764
Total export value	6,367	7,822	8,213	9,871	10,123

Source: GOPNG 2005c

1.1. The macro economic framework

Private investment in PNG is traditionally limited due to a number of factors. The first of these had to do with exchange rate policy adopted after Independence. Between 1975 and 1994 PNG followed a so-called 'hard Kina policy' which fixed the rate of the Kina to the US\$ dollar. With the floating of the Kina in 1994 the exchange rate has dropped from a rate of one Kina to the US\$ dollar to the current rate of about four Kina to the US\$ dollar. This drop has increased the prices of imported goods but has also improved the overall competitiveness of the country and the terms of trade for locally produced goods and services relative to those imported from abroad (FRRT, 2002).

PNG suffers from a high risk investment climate due to its vulnerability to commodity price changes. During the 1990s price drops led successive governments to run up significant deficits, requiring deep budget cuts and sudden tax increases. Bank lending rates and inflation are traditionally high at between 15 and 20%, which constitutes a serious deterrent to long-term investment. High inflation rates affected the exchange rate, increased costs and squeezed profit margins (Hunt, 2002). In recent years inflation and lending rates have come down, creating a more conducive investment climate (GOPNG, 2005).

Table 2: Key economic indicators

	2002 Actual	2003 Actual	2004 Estimate	2005 Estimate
Growth of Real GDP (%)	-1.0	2.9	2.9	3.0
Growth of non-mining GDP (%)	1.5	1.9	3.5	3.5
Inflation (%)	11.8	14.7	2.1	1.0
Treasury bill rate (%)	13.3	18.3	9.0	4.5
World Economic Growth (%)	3.0	4.0	5.1	4.2

Source: GOPNG 2006 Budget Volume 1.

The PNG economy has had a mixed growth record and was especially hard hit by the economic crisis of 1997, leading to several years of economic contraction. Since 2003 modest levels of growth have been achieved, although these are only marginally above the growth of population of 2.7 %. PNG has experienced a falling GDP per capita since the 1990s. The currently level of US\$ 622 per head, down from US\$ 1,208 in 1994, has led the country to drop from the category of lower middle income countries to join the group of least developed countries (IMF, 2006).

1.2. The costs and benefits of forestry

Forestry provides an important sector in the PNG economy contributing on average 5.1% of GDP in the 1990s. Its contribution however, has declined from 7.5% in 1990 to 4.0% of GDP in 2000. This is part of a global trend which arises from the fact that the global economy is expanding while the total value produced by the global forestry sector has not increased (FAO, 2004).

To PNG society the benefits derived from the forest sector fall in three components: i) government revenue; ii) rural jobs and payments; and iii) the provision of infrastructure and services. These benefits create a variety of multiplier effects in the PNG economy as a whole (Global-ITS, 2006a; RT, 2004). The log export tax contributes about 4% of total tax revenue. Here too there is a downward trend and there are several reasons why this decline is likely to continue (see paragraph 4.2). In addition to the log exports tax, the logging industry provides 16% of all indirect taxes largely through the General Services Tax that was introduced in 1999 (RT, 2004; 69).

Table 3: Log export revenue as share of GOPNG tax revenue

	1999 (Kina Mil).	2000 (Kina Mil).	2001 (Kina Mil).	2002 (Kina Mil).	2003 (Kina Mil).	2004 (Kina Mil).	2005 (Kina Mil).
Export tax	79	134	98	107	112	102	136
Total tax revenue	1921	2308	2294	2370	2678	3220	3493
Export tax/ revenue	4.1%	5.8%	4.3%	4.5%	4.2%	3.2%	3.9%

Source: BPNG 2006

The landowner share of logging proceeds consist of a flat royalty of K 10 per m³. Next to this absolute minimum landowners negotiate separate in kind benefits and price premiums as part of the concession negotiations. These may vary considerably, with the IFRT (2001) and NGOs arguing that royalties and premiums are often not paid in full, are not fairly distributed and contribute little to rural welfare.

The timber industry provides jobs to some 9,000 people (FIA, 2006) mostly located in remote areas where few other forms of employment exist. NGO's and the RT (2004), however, assert that these are generally lowly paid jobs which demand little training and contribute little to long- term welfare of the local population.

In addition to providing jobs, logging operators construct infrastructure as well as health and education facilities as part of the concession agreements. There is considerable debate about the quality of the infrastructure provided. The Review Team (2004) describes operator performance as under par, while Rimbunan Hijau presents a case study of its Wawaoi-Guavi logging project to demonstrate the lengths to which it goes to provide infrastructure and services to the landowners and its employees (ITS-Global, 2006a). Under the post-1991 Forest Management Agreements, companies pay for the construction of facilities but are no longer responsible for putting them in place.

Box 1: Time perspectives and sustainable development

Based on an economic assessment of the various costs and benefits of forestry in PNG the Independent Review Team (2004) arrived at the conclusion that in economic terms PNG as a whole is worse off as a result of log exports. ITS-Global (2006a) strongly resists this conclusion arguing that the Review Team understates the value of logging-related benefits.

Essentially the debate on whether the costs of logging outweigh the benefits or vice versa has to do with the time perspective used. Where the IFRT (2001) emphasises the need for development that lasts, ITS-Global (2006a) focuses its argument on the social and economic benefits provided by logging *during* the time of the logging operation. In the discussion on the benefits of road construction by forest companies, the IFRT (2001: 12) states that logging roads are not maintained and 'therefore provide little positive impact after logging', ITS-Global (2006: 19) argues that this does not imply that 'they do not deliver economic benefits after they have been constructed' (i.e. whilst logging is ongoing).

The two perspectives are not mutually exclusive and both have their supporters. Papua New Guineans desperately want development and many are willing to foreclose future options in order to get a relatively short-term improvement in their quality of life. The foreign logging operators offer them that possibility. Mr. Pruiatch, the Minister for Forests, has supported this line by arguing that the current forest rules in PNG are 'too stringent' and that the process of developing new logging projects is 'too lengthy' (PNGFA press release, 12 October 2006). Many other Papua New Guineans, organised in the Eco-Forestry Forum emphasize the need to achieve a slower but more lasting form of development. This latter view is shared by a growing number of people, timber traders and governments in consuming countries who do not want to be associated with the economic, social and environmental upheaval caused by unrestrained logging and who are reluctant to purchase timber associated with such practices.

The costs of current forest operations to PNG society fall into two components. The first constitutes the costs of running the PNGFA and SGS at some 28 million Kina per annum, which takes up a fourth of the export taxes earned (GOPNG, 2005c). The second consists of the reduction in value of PNG's forest resources at a rate of some 3.0 million m³ per year and the significant environmental damage associated with the way in which the logging industry currently operates (IRT, 2001).

1.3. Outline of this paper

In the debate on the economic future of forestry in PNG most attention focuses on the conclusions that logging was found to have little long-term beneficial impact on the country (RT 2004), and that the logging industry itself was not profitable and therefore not able to make long-term investments (FRRT 2002). In addition there is a discussion on the strategies that PNG could pursue to regain a profitable and sustainable forest industry and increase the long term benefits of forestry to society as a whole.

This paper aims to contribute to this discussion by: i) reviewing the available information on the status and use of the forest resource in PNG; ii) discussing possible strategies to make the transition from the current volume-based approach centring on log exports towards a future value-based industry focusing on the exports of (semi)-processed timber products and iii) analysing the extent to which the current fiscal regime allows the GOPNG to maximise its revenue from the forest sector.

2. RESOURCES, PRODUCTION AND TRADE

2.1. Log exports and prices

In 1992 rising world market prices triggered a logging boom which lasted until the Asian crisis of 1997 (see Paper One of this series). During the 1990s exports increased to on average 2.6 million m³ per year with peaks of 3 million m³ per year in 1994 and 1997. Government revenue from log exports reached an all time high of US\$ 480 million in 1993, while the combined timber companies managed to appropriate a windfall profit of some US\$230 million over 1993-1994 as a result of an unresponsive tax system (Duncan, 1994). Actual company profits may have been higher as there were few controls on exports until the GOPNG hired SGS to monitor exports in late 1994 (Shearman and Cannon, 2002).

Since 1997 log output has stabilized at an average of 1.9 million m³ per annum, rising to 2.3 million m³ in 2005. This makes PNG the second largest exporter of round logs in the world with most of its logs going to China, Japan, Korea and Taiwan (ITTO 2005). India is potentially an important future buyer of logs.

Table 4: PNG log production, values, and prices

Year	Export Volume M3 Mil.	FOB Export Value Kina Mil.	FOB Export Value US\$ Mil.	Average price Kina/M3	Average price US\$/M3	Plantation logs M3 mil.
1992	1.9	155	157	82	83	-
1993	2.8	471	480	168	171	-
1994	3.0	563	478	188	159	-
1995	2.4	431	325	180	135	-
1996	2.6	466	352	179	135	-
1997	3.0	496	351	165	117	-
1998	1.6	218	107	136	67	-
1999	2.0	386	152	193	76	-
2000	2.0	384	143	192	72	-
2001	1.5	283	89	182	57	-
2002	1.8	367	100	198	54	-
2003	2.0	370	109	184	54	0.22
2004	2.0	356	119	177	59	0.25
2005	2.3	405	117	176	-	-

Source: FIA 2006 & BPNG 2006

2.2. Production patterns

The granting of concessions in PNG has taken place in an east to west movement. The first operators aimed for the most accessible and high volume forests which were found in the islands region. That region subsequently became the mainstay of the PNG timber economy during the 1990s (Filer, 1997). When most concession areas in the islands region had been granted, attention shifted towards the mainland of PNG. Presently the focus lies on Gulf Province, Western Province and the two Sepik Provinces. The National Change Summary of June 2006 demonstrates the unevenness by which logging in PNG has taken place. On average, 12.6% of PNG gross forest area was logged over or converted since 1975. However, provinces like New Britain, Manus and New Ireland saw up to 47.5% of their forests logged over or converted. In contrast, Western Province and the two Sepik provinces had between 3.1 and 9.9 % of their forest area affected (See Annex I).

Operations in the western provinces are likely to be subject to higher unit costs than those in the islands region as forests are more species diverse and stocking densities lower (Shearman and Cannon, 2002). In addition, infrastructure constitutes a more significant cost factor than in the islands region. The response has been to increase the size of concessions in an attempt to gain economies of scale with concessions becoming viable log exporting projects when producing at least 70,000 m³ per year (IFRT 2001). Forest Management Agreements currently slated for development are generally not smaller than 200,000 hectares (See Table 5).

While the scale of operations is increasing, the number of operators has fallen. Figures provided by the FIA show that there were 40 active operators in 1997 against 23 by July 2003 (FIA, 2006). The ongoing consolidation of log export operations in an ever smaller number of hands throws up the question as to what extent the PNG log exports sector is ruled by the principles of economic competition.

2.3. The operable area and sustainable yield estimates

Since the late 1980s PNG has seen a debate on the nature of sustainable forest management, focusing on the size of the forest area suitable for commercial harvesting and the appropriate sustainable harvest levels. During the 1990s three separate estimates were made:

- In 1993 a Rapid Resource Appraisal (RRA) estimated a 'potential forest area' of 6.8 million hectares (Filer, 1997).
- In 1996, the PNGFA adopted the *National Forest Plan* which defined a 'production forest' of 11.9 million hectares and a 'potential production forest' of 8.2 million hectares (GOPNG, 1996).
- The 1997 Forest Inventory Mapping System (FIMS) roughly confirmed the first figure by suggesting a potential production forest of 11.5 million hectares. It, however, also defined the remaining 15 million hectares of PNG's forest estate as unharvestable due to serious physical constraints stemming from steep slopes, karsts and inundation (Filer, 1997).

The definition of 11.9 million hectares of forest area, a 40 year cutting cycle and rough estimates for the stock of merchantable timber led the PNGFA to set the sustainable yield for PNG at 4.9 million m³ per year. This figure has since been presented as the export volume that PNG could achieve without compromising sustainability. ITS-Global (2006a: 24-25) suggests an annual sustainable yield from natural forests of 3.1 million m³ on the basis of an ITTO report and concludes that because annual log exports are lower the PNG Forest industry cannot be deemed environmentally unsustainable. There are various reasons why calculating a sustainable yield by reference to national log exports is 'patently flawed' (Hunt 2002: 14):

- First, export volumes are not a good measure for the harvesting levels associated with sustainable forest yield. Actual harvesting levels are always greater than export volumes due to the fact that in PNG i) processed and plantations timber; ii) timber destined for the domestic market; and iii) timber used for subsistence purposes do not appear in the annual export figures. Processed exports stood at 220,000 m³ in 2004 (FIA, 2006), which represents a log input of some 730,000 m³ at an assumed recovery rate of 30%. The actual volume of wood removals is estimated at 8.3 million m³ (FAO, 2006: table 17).
- Second, it has to be noted that harvesting practices in PNG have been characterised as extremely careless. The draft *National Reforestation Policy* recognises this problem when it states that "the current practice in

harvesting natural forest is that of selective logging, cutting stems greater than 50 cm at breast height. In many concession areas it presents an almost clear felling of the scene after the operation” (GOPNG, 2005a: 5). Post harvesting studies have found that selective logging in PNG can lead to the death of more than 70 percent of the remaining trees in the following 10 years (Cameron and Vigus, 1993).

- Finally, the use of a single harvesting figure for the country masks the uneven spatial distribution of harvesting operations and the fact that many areas are logged in an unsustainable manner. As these forests lose their productivity they are likely to turn into fire-prone unproductive grasslands or be converted for agricultural purposes. The latter has occurred in West New Britain where large areas of degraded forest have since been converted to oil palm. The draft *National Policy on Reforestation* now defines the province as one of seven which has ‘almost depleted’ its natural forest resources (GOPNG 2005b).

The 1991 *National Forest Policy* stipulates a 40 year cutting cycle at the level of the concession and the 1998 *Forest Guidelines* provide detailed guidance with respect to the calculation of the harvestable area and the annual allowable yield. The PNGFA, however, tends to overestimate the available resource, thus setting the scene for subsequent over-harvesting (IFRT 2001, RT 2004). It is not surprising that a 2002 inventory by Shearman and Cannon (2002) found that only 18 out of 72 concessions were being harvested at a rate compatible with the mandatory 40 year cutting cycle. See table below.

Table 5: Cutting rates for 72 concessions as percentage of a 40 year rotation

Harvesting levels as percentage of sustainable cut	Number of concessions
25 %	5
50 %	6
100 %	7
200 %	25
300 %	11
400 %	5
600 %	1
1000 %	2
2000 %	4
3000 %	3
	72

Source: Shearman and Cannon, 2002: Table 5

2.4. New projects under development

With the breakdown in talks between the GOPNG and the World Bank in 2003, the PNGFA resumed its efforts to get new forest projects on stream. It has since focused on developing ten projects which received a relatively favourable assessment by the Independent Review (IFRT 2001).

Prior to the independent review, the Board of the PNGFA determined that new log export projects had to produce at least 70,000 m³ per annum. Additional conditions were that i) fragile forests were to be excluded from the FMA; ii) 10 % of the area was to be set aside for conservation and iii) that a 40-year cutting cycle was to be implemented. Of the ten projects listed above four had the potential of becoming log export projects while meeting the stipulated conditions. The other six projects would only be viable if one or more of the conditions with regard to the exclusion of fragile forests, the 10% conservation set-asides and/or the application of 40-year logging cycle was relaxed (IFRT 2001).

With these ten new projects in the pipeline for approval there are growing indications that the PNGFA is moving towards acquiring the last remaining accessible and high volume forest resources in the country. The 2005 draft *National Policy on Downstream Processing* states that of the total production forest area of 11.9 million hectares a balance of 3.2 million hectares is yet to be acquired (GOPNG 2005a:4). At the recent regional FLEG seminar in Port Moresby, Kiki (2006) of the PNGFA gave the following figures:

- Total forest cover in PNG: 39.3 million ha
- Production forest area: 15.2 million ha
- Already acquired areas: 11.2 million ha
- Areas yet to be acquired: 4.0 million ha

These latter figures suggest that the PNGFA is expanding the production area well beyond the 11.9 million hectares of production forest defined in 1996 and may be facilitating access to areas which the FIMS (1998) deemed unsuitable for harvesting due to their fragility. In maintaining the current high levels of harvesting PNG may be following the same trajectory as other countries in the region who have harvested their accessible forest resources. This had led countries such as Cambodia, Fiji and Vanuatu to mainly cover domestic consumption, while others such as Thailand and the Philippines have become net importers of tropical timber (ITTO, 2005). The lack of data on the status of the resource makes it difficult to draw firm conclusions.

The PNGFA, however, appears well aware of the possibility of future resource shortage. The draft *National Reforestation Policy* reads: 'An overview of the timber resources of PNG indicates that most of the provinces namely, East and West New Britain, Central, Milne Bay, Morobe and Madang have almost depleted their resources while New Ireland has over cut its available timber resource. The forest resource on Manus ... is about to be logged out as well. The Highlands provinces have very little natural forest remaining.... The only provinces with remaining accessible forest resources are Western, Gulf, Northern, and East and West Sepik provinces. Most of the areas of forest potential have been identified and acquired under Forest Management Agreements (FMA) and are in the pipeline for allocation for development' (GOPNG 2005b:1).

Table 6: Priority projects identified as of 2003

Project Name	FMA Size Ha	Total yield M3	IFRT assessment 2001
Rottock Bay (West New Britain)	208,000	3,150,000	Viable under relaxed conditions
April Salumei (East Sepik)	521,000	7,000,000	Viable under relaxed conditions
Cloudy Bay (Central)	148,000	2,450,000	Viable under relaxed conditions
Asengseng (West New Britain)	147,000	3,500,000	Viable
Middle Ramu block 1 (Madang)	159,000	1,400,000	Viable under relaxed conditions
Kamula Dosa (Western)	790,000	2,100,000	Viable
East Pangia (Southern H)	92,000	3,150,000	Viable under relaxed conditions
Amanab blocks 1- 4 (West Sepik)	243,000	3,150,000	Viable under relaxed conditions
Amanab blocks 5-6 (West Sepik)	297,000	3,500,000	Viable
East Awin (Western)	202,000	3,500,000	Viable
TOTAL	2,807,000	32,900,000	

Source: ITTO 2003 and IFRT 2001

Box 2: PNG Forest-related data collection

PNG is a large and geographically complex country with highly diverse forests. The availability of data on the status of its forest resources is limited. The GOPNG does not meet its obligations under the 1994 International Tropical Timber Agreement as it does not fill in the annual Joint Forest Sector Questionnaire distributed by FAO and the ITTO. This comprehensive questionnaire, which is also used by UNECE and Eurostat, collects national production and trade data on the forest and timber products sector.

The last exercise to look in to the status of the forest resource in PNG was undertaken as part of the 1997 Forest Inventory Mapping Systems (FIMS). These data have since been used and have been modified to take account of ongoing harvesting operations, but there has been no systematic attempt to update or ground truth these data. The data were nonetheless presented to the June 2006 meeting of the PNG Forest Board to serve as National Forest Inventory. The database is summarised in annex 1 to this report.

Due to the work of SGS export data with regard to the total volume of logs, species and destinations are quite good. However export data on processed timber are lacking. The SGS data are however, not systematically forwarded to the ITTO secretariat by the GOPNG thus hampering the use of the available information by ITTO in its *Annual Review and Assessment of the World Timber Situation*.

2.5. Strategies for the future

The demise of timber exports as a viable economic sector may still be some time away. However, as the remaining resources are granted there will be increasing pressure to log in less favourable areas at increasingly high costs. Already large areas of forest earmarked for logging lie in vulnerable areas that should have been excluded from forest operations (RT, 2004). The social and environmental costs of such a policy are likely to be considerable, while many of operations may by necessity have to contravene the current forest laws and regulations, generating a product that is at risk of being branded as 'illegal' on international markets.

In industry terms the key question therefore appears to be whether the GOPNG and the PNG forest industry are able to simultaneously: i) reduce output by bringing its existing and new forest operations in line with sustainable yield principles at the level of the concession; ii) increase future access to raw material through plantation development and reforestation policies; iii) increase the value of exports through downstream processing and iv) ensure compliance with all relevant laws and regulations in order to safeguard the interests of its citizens and meet the legality requirements of increasingly demanding international markets.

3. PLANTATIONS AND DOWNSTREAM PROCESSING

3.1. Reforestation and plantation policies

Plantations constitute a potentially important future source of raw material and can reduce the pressure on natural forest by growing uniform trees that have comparative advantage in downstream processing. The productivity of plantations can be high, with for example *Octomeles sumatrana* producing up to 35 m³ per hectare per year (World Bank 1990 in Louman and Nicholls 1995: 161). The plantation sector in PNG remains small. By the mid 1980's there were 58,000 hectares of tree plantations in PNG (ITTO, 2006). This area has since expanded and the most recent figures show a plantation estate of some 62,000 hectares (Kiki, 2006). This expansion has been entirely driven by the private sector as the last Government plantation dates from 1985. The main species grown are species of *Eucalyptus*, *Acacia* and *Pinus*. There are about 20,000 hectares of rubber and a small number of teak plantations.

Box 3: Plantation development in the Asia-Pacific region

A recent analysis of worldwide plantation development presented to the ITTO shows that the tropical countries of the Asia Pacific region have a total of 54 million hectares of plantation forest, which represents almost 80% of all tropical forest plantations worldwide. The main species grown are rubber (25% of total area), teak (23%), eucalyptus (14%), acacia (13%) and pine (11%). The area under plantations is growing at a rate 3 million hectares or 9.4% per year. This growth is mainly located in India, Indonesia, Thailand and Malaysia. Of the 54 million hectares currently under plantations only 46% or 26.4 million hectares can be deemed productive. In the future a surplus of low value industrial plantation timber is expected. It is expected that in the near future the tropical countries will emphasize a growth of productivity on existing plantations over a further expansion of area under plantations.

Including non-tropical producers in the Asia Pacific region doubles the total plantation area with China having 45.1 million hectares of plantations. Other producers in the region are Australia, New Zealand, Korea and Japan with much smaller areas of plantation land but generally higher levels of productivity. The area under plantations in these countries is falling as other forms of land use gain precedence.

Of key importance to further plantation development are; i) the stability and conduciveness of the overall business and investment climate; ii) the availability of land and the security of land tenure arrangements; iii) the availability of a skilled workforce and iv) supporting research and development (STCP, 2006).

The development of the plantation sector has been slow due to the fact that the economics of such investments are not favourable. Even fast growing species take eight years before they generate their first millable logs. Cash flow and the viability of long term investment has also been limited by the traditionally high discount rates. In recent years inflation and lending rates have come down making capital investment more attractive. Investors are still reluctant to invest in plantations and continue to have difficulty securing access to land. Oliver (2002) suggests that the combined use of landgroup incorporation and lease-lease back schemes such as used in the oil palm sector may offer a way forward. At a technical level plantations are prone to disease and fire (Hunt 2002).

In an attempt to increase plantation development, the draft *National Reforestation Policy* requires new logging projects to plant 500 hectares of forest per year. In addition, it intends to develop a five-year National Reforestation Programme aimed at managing existing government plantations while also establishing new commercial and community-based forest plantations (GOPNG, 2005b). Since 1990 the PNGFA has collected a so-called reforestation levy from operators, which is to be used for reforestation and regeneration activities. Operators that can demonstrate an active plantation program are exempt from paying the charge (FRRT, 2002). Most companies seem to regard paying the levy as less costly than the implementation of a plantation programme. This suggests that the levy is not achieving its objective and that it may have to be increased to a level that induces the necessary action on the part of operators. The levies are paid into a trust fund with PNGBC and are to be used for reforestation activities. Some of these funds may have been used for payments to the provinces. Whether that has led to any reforestation is unknown. The industry suggests that the PNGFA uses "too much of the levy designated to fund silvicultural investments for administrative expenditure" (Global-ITS 2006a: 25).

One option that needs to be explored is the extent to which PNG could make use of the Clean Development Mechanism to leverage financial support for plantation and reforestation activities by way of carbon sequestration. As of yet PNG does not have the institutional infrastructure in the form of a Designated National Authority to capitalise on these opportunities. While carbon sequestration may support sustainable development, biodiversity conservation and improve land and soil productivity, the extent to which countries are able to make use of this mechanism depends on issues such as i) tenurial security, ii) the transaction costs involved in negotiating and implementing carbon sequestration projects, iii) overall governance

in the country involved and iv) the institutional capacity available to develop an adequate legal framework (Jindal, 2006).

The first commitment period of the Kyoto Protocol (2008 - 2012) explicitly excludes the generation of carbon credits through activities associated with the management of natural forests. A related debate on 'avoided deforestation', however, looks into the relation between carbon uptake and the sustainable management of natural forests. This debate in which PNG is a front runner through its Rainforest Coalition with Costa Rica and others, is part of the UNFCCC negotiations on a post-Kyoto mechanism. This debate, however, is still in an embryonic stage and will become operational in 2012 at the very earliest.

3.2. Downstream processing in PNG

Downstream processing, like plantation development, has been hampered by the high cost structure of the PNG economy. In recent years, however, the processing of logs has rapidly grown in importance. Key factors here are the depreciation of the Kina, the lower discount rates that have reduced the costs of capital investment, the exemption from export taxes on processed exports and the fact that downstream processing is increasingly becoming a requirement for the granting of concessions. With the shift to a 40 year cutting cycle, the move to higher value processed exports may allow concession holders to reduce output volume while maintaining exports in value terms.

Table 7: A growing value share of processed exports

Year	Log exports Volume	Log exports Value	Volume of processed exports	Value of processed exports	Total exports Volume	Total exports Value	Value share processed exports
	m ³ Mil.	Kina Mil.	m ³ Mil.	Kina Mil.	m ³ Mil.	Kina Mil.	%
2001	1.5	283	0.19	25.3	1.7	332	8%
2002	1.8	367	0.21	48	2.0	414	12%
2003	2.0	370	0.21	46	2.2	416	11%
2004	2.0	356	0.22	104	2.2	460	23%
2005	2.3	405	0.25	106	2.5	512	21%

Source: FIA 2006 & BPNG 2006

While the GOPNG has provided an exemption from export taxes to downstream processors which constitutes an implicit subsidy for its domestic industry, it has also moved to reduce the import tariffs on timber products. Between 1999 and 2006 the duty rates for most timber products (HS items 44.01-44.07 and 44.09-44.11) have been reduced from 30% to 15%, while the rates on builders joinery and small wooded items (HS 44.13-44.21 –44.18) have come down from 40% to 25%. The highest rates of protection are accorded to veneer sheets (HS 44.08) and plywood (HS 44.12), but here too duties have come down from 55 to 40% and from 95 to 40% respectively (IRC, 2006).

The bulk of locally processed products is of low value and destined for markets in China, Japan, Korea and Taiwan. In the Pacific region Australia and New Zealand are significant purchasers of sawn timber from PNG. Australia has in value terms become the largest importer. In 2002 the EU ranked 7th in volume and 6th in value terms. However, the lack of export monitoring on processed exports makes it difficult to determine the extent to which the GOPNG is successful in its downstream processing policy.

Furthering downstream processing has long been a goal of GOPNG policy. The 1996 *National Forest Plan* foresaw the establishment of five major sawmills and two plywood factories by 2001. The August 2001 *National Policy on Downstream Processing of Forest Products* recommended a strategy aimed at prioritising resource allocation to domestic processing facilities, the phasing out of log exports in certain provinces and a 70% processing requirement on new logging concessions. The policy, however, was never endorsed by Government. In 2005 a new *National Policy on Downstream Processing of Forest Products* was drafted which will shortly be submitted to the NEC (GOPNG 2005a).

Table 8: Processed exports by volume: the top 10 destinations in 2002

Country	Export volume (M3)	Price US\$/M3	Ranking by unit price	Export value (US\$ Mil.)	Ranking by export value
Japan	98,509	50	10	4.93	3
Taiwan	39,613	175	8	6.93	2
Korea	31,397	178	7	5.59	4
Australia	18,407	386	2	7.11	1
New Zealand	10,759	350	3	3.77	5
China	6,973	162	9	1.13	7
EU	4,312	335	4/5	1.43	6
New Caledonia	2,039	335	4/5	0.68	8
Singapore	1,014	332	6	0.34	10
Tahiti	900	416	1	0.37	9

Source: FIA 2006

This policy ties the allocation of new concessions and the role that downstream processing has to play in these concessions to the availability of forest resources in the province involved. Thus the timber from concessions in provinces with limited natural forest resources will be destined for processing purposes. Provinces with moderate to large tracts of forests will be allowed to undertake 'a certain level' of log exports (GOPNG 2005a: 4 & 10). These ideas reflect a growing concern that forestry as an economic sector may be lost as a result of resource shortages. Provincial administrators share this concern and Milne Bay province has already imposed a ban on log exports in order to force the timber operator into downstream processing. Bougainville applies a similar policy.

The draft downstream processing and reforestation policies put the onus on the PNGFA rather than on the private sector. The PNGFA, however, has as much trouble accessing land for development purposes as any other investor and appears not to have been particularly effective in managing existing plantations or developing new ones. As of yet the PNGFA is not involved in downstream processing. The new downstream processing policy however, suggests that the PNGFA will establish a State Marketing Agency to promote the use of PNG timber and non-timber forest products, will provide assistance to processing companies, maintain quality control, build a database with relevant information, set up a standards committee and arbitrate the domestic market for log sales.

Box 4: Plantation and downstream processing options in PNG

There are relatively few integrated plantation and processing ventures in PNG, the main one's being i) the Jant chip plant in Madang which is fed with plantation timber from the Gogol Valley, and ii) the Bulolo plywood mill which is fed with timber from the Bulolo/Wau National Forest.

i) The Jant chipmill in Madang makes use of extensive plantations in the Gogol valley on which it has planted fast growing acacia. The arrangement is one in which the state has leased the land from the landowners under the Nary/Gogol Timber Rights Purchase and has subsequently entered into a sub-lease agreement with Jant. A subsidiary company, the Gogol Reforestation Company in which the GOPNG holds a share of 49% is responsible for commissioning the replanting of harvested blocks to landowner companies. Jant has also developed an outgrower scheme in which selected individual grow acacia on nine hectares of customary owned land, harvesting one hectare every year in a nine year cycle. The lease will expire in the coming years and it will be interesting to see if the landowners opt for a continuation of the current arrangement or opt for other forms of land use. According to Oliver (2002) the current scheme is rather cumbersome due to the intermediate role of the GOPNG and could better be replaced by a lease-leaseback scheme between Jant and the landowners.

ii) The Bulolo/Wau National Forest was established in 1952 and now consists of 12,000 hectares of government land covered by Hoop and Klinkii pine. Of the total plantation 8,000 hectares are productive, the remaining 4,000 hectares consist of unproductive land, fire breaks and reserves. The rotation cycle for the first cycle was 45 years with two thinnings but has subsequently been reduced to 30-35 year cycle for the second rotation with only one thinning. The plantation is run by 80 specialist labourers and 20-30 contract groups consisting of 10-15 casual labourers. The company does the surveying while the contract groups take care of the picketing, the line brushing and the planting. Recently however, the company has decided to do its own planting as the contract planting led to very high mortality rates. The company has until now not worked with an outgrower scheme but is looking into the option of establishing Incorporated Landowner Groups who may undertake plantation activities on customary-owned land. The Bulolo plywood mill is the only plywood plant in the country. It absorbs some 36,000 m³ of timber per year and mainly serves the domestic market, although some first grade plywood is exported. Plywood production in PNG is quite heavily protected due to 1) the exemption on export tax for processed exports and 2) the import duties of 40% on competing imports. Plans to develop a plywood mill in Panakawa as part of the Wawoi-Guavi concession have not eventuated yet.

It is difficult to see how the PNGFA, overburdened as it already is with monitoring logging operations in the country, could undertake these additional activities. It is questionable whether it should. Leaving investment decisions to the private sector allows the PNGFA to focus on its essential regulatory, monitoring and enforcement

functions with regard to the place of reforestation and downstream processing in harvesting operations.

3.3. The financial and economic viability of downstream processing

In 1993 the ITTO funded a series of Forest Industries Development Studies which included an analysis of the financial viability of seven different processing options. This analysis was made when timber prices were very high. Its financial results are summarised in the table below.

Table 9: The financial viability of seven downstream processing options in PNG

Processing model	FIRR	Rank
Small moveable sawmill	Negative	7
Centralized sawmill	55%	4
Satellite sawmill	68%	2
Dry Kilns/Treating plant	57%	3
Planer/Moulding plant	201%	1
Plywood mill	42%	5
MDF plant	24%	6

Source: General Woods & Veneers and Nawitka Consultants, 1993

A more recent assessment of processing options by the FRRT (2002) also looked at seven different options, ranging from sawmills of various sizes, an integrated small sawmill and joinery facility to large-scale export-oriented veneer, plywood and MDF plants. The team calculated the financial viability of these seven options based on the assumption that such facilities would have a lifetime of 10 years and work at a level slightly more efficient than observed in practice in PNG. This analysis regarded a pre-tax FIRR of 15% as the minimum required to attract investment, equity and loan funds. The results were as follows:

- *Portable eco-mill*: Base data were used from the WWF study (WWF, 2001). Log input stood at 330 m³ per annum with employment of six. Unlike the other models this model was based on a lifetime of 5 years as equipment would need to be replaced by then. The FIRR stands at 18% suggesting viability.
- *Small commercial sawmill*: This model is based on a band mill with an input of 2000 m³ of logs producing air-dried rough sawn timber of high value species for the Australian market. The low grade produce is sold locally. There is a crew of 14 among whom one foreigner. The FIRR came out at 22%.
- *Medium to large scale sawmill*: This plant is larger with an annual log input of 63,000 m³ and a workforce of 300 among whom 20 to 30 foreigners. The mill focuses on sawing higher quality timbers for the export market. The initial investment stands at 12 million Kina but would generate an FIRR of 24%.

- *Integrated small sawmill and joinery operation*; Initial investment stands at 7 million Kina. The plant is run with a workforce of 145 and has three foreign managers. Log input is relatively low with 10,000 m³ per year, but 40 % of this volume is used to produce high value joinery and furniture products for the export market, generating an FIRR of 28%.
- *The export veneer, plywood and MDF plants*: These plants take up at least 150,000 m³ per year of low class logs, working on a 24 hours per day basis. They have high investment costs and a workforce of several hundred to serve the export market. The FIRR of the veneer plant stands at 8% which is lower than the 15% requirement and suggest a loss on investment. The FIRR is negative for the plywood and MDF plants.

While the processing models of the FRTT were different from those developed by ITTO they show the same pattern in that i) MDF and plywood are the least viable processing operations; ii) that the viability of sawmilling operations increases with scale and iii) that a combination of sawmilling and mouldings/joinery provides the highest returns.

Table 10: Seven options for downstream processing in PNG

Processing model	Workforce	Annual log input (M ^m)	FIRR	Rank
Portable eco-mill	6	330	18%	4
Small commercial mill	14	2,000	22%	3
Medium to large sawmill	300	63,000	24%	2
Integrated sawmill/joinery	145	10,000	28%	1
Export veneer mill	500	150,000	8%	5
Export plywood mill	645	150,000	Negative	6/7
Export MDF plant	130	175,000	Negative	6/7

Source: FRRT 2002

The FRRT also did a sensitivity analysis looking into scenarios related to the increase or reduction of sales revenue, log prices, production costs and investment costs. This analysis shows that the board production remains unattractive even under improved circumstances. The sawmilling operations did much better, proving more robust with increased scale. Most attractive was the integrated sawmilling and joinery operation. These studies do not allow for a comparison on the small scale sawmilling operations as the sawmill in the ITTO study is a much larger set-up than the walkabout sawmill that the FRRT refers to (see paragraph 3.4 below).

These findings suggest that downstream processing policy has to be targeted in a strategic manner, as larger and more capital intensive operations are not necessarily the most attractive. That said, it should be noted that next to its Wawoi-Guavi sawmill, Rimbunan Hijau has also established a veneer mill at Panakawa as part of its obligations under the Forest Management Agreement (ITS-Global, 2006a).The

company is also obliged to establish a plywood mill under the terms of its contract in the near future.

Table 11: Sensitivity analysis of the four sawmilling operations

	Portable eco-mill	Small Sawmill	Medium sawmill	Sawmill/ joinery ops.
Base rate FIRR	18	22	24	28
Scenario				
sales revenue up by 10 %	29	41	34	35
sales revenue down by 10 %	6	Negative	12	22
log costs up by 10 %	16	9	18	26
log costs down by 10%	21	35	30	30
Operating costs up by 10%	10	1	15	25
Operating costs down by 10%	27	41	33	32
Investment costs up by 10%	14	20	22	26
investment costs down by 10%	23	25	27	32

Source: FRRT 2002 table 4.11

Next to the financial viability of these model processing operations, the FRRT developed a model to assess the economic cost and benefits of downstream processing. This analysis questioned whether the incomes and consumption derived from downstream processing weigh up against the loss of export revenue and the government's use of that export revenue. In an analysis based on a number of proxy estimates for consumption and multiplier effects the FRRT came to the conclusion that only the integrated small sawmill and joinery operation were economically attractive. In all other cases the value of the export tax forgone was larger than the value of the employment and other benefits derived from downstream processing. This led the FRRT (2002) to conclude that with one exception there is no economic basis for developing a downstream processing policy. Economic analyses and the policy conclusions that flow from them need to be treated with some caution as they provide an indicator of efficiency, but do not go into distribution or other 'political' issues.

The provinces, for example, may be much in favour of downstream processing. The fact that the reduction in export tax that results from the move into downstream processing is borne by the national government rather than the provincial treasury suggests that it is certainly in the interest of the provinces to ban log exports as it allows them to capture the infrastructure, jobs and incomes at zero cost to the provincial budget. Milne Bay and Bougainville have already drawn up provincial legislation prohibiting log exports on the basis of art 42 s) of the New Organic Law.

PNG might benefit from a study of the downstream processing strategies employed by Indonesia and Malaysia as well as the requirements of final markets in Asia, Australia, New Zealand and the European Union. These demands are likely to cover a range of aspects falling into three categories: i) the physical qualities of the export

product; ii) phyto-sanitary aspects related to the trade in timber and iii) issues relating to the legality and sustainability of the underlying production process.

3.4. Community-based forestry

Community-based forestry programmes have gained considerable attention since halfway through the 1990s. The idea behind these programmes is that local people gain an income by producing timber without destroying their resource base. In PNG these projects come in two types: i) large-scale ventures whereby conservation agencies bid for forest concessions and - far more commonly - ii) donor projects which provide technical assistance in sawmilling and forest management to resource-owning communities.

Models of the former type have been investigated by the Lak integrated conservation and development project in 1996 and by The Nature Conservation in the Josephstaal area in 1997-98. In the Lak case landowners preferred a logging company that had already been active in the area for quite some time (McCallum and Sekhran, 1997), in the case of Josephstaal TNC lost the bid for the concession (Mayer and Brown, 2000). The financial analysis of the Lak project shows that the New Ireland Eco-Timber project was viable only because a certain amount of carbon crediting was included on the income side (Sekhran et al., 1996). In the Solomon Islands the SWIFT initiative aimed to develop a central kiln drying, milling and marketing facility serviced by a large number of village-based producers. It however failed to establish markets for its produce (van Helden and Schneemann, 2000).

During the 1990's small-scale community-based ventures were developed in PNG by the Pacific Heritage Foundation in East New Britain and the EU funded IRECDP project in West New Britain. Such ventures are currently being promoted through the EU funded Eco Forestry Project, the Village Development Trust in Lae, the FPCD in Madang and Greenpeace in Western province. Of importance for the development of this activity in PNG was the establishment of the Eco-Forestry Forum in 2000. The Eco-Forestry Forum is made up of a number of NGOs active in the field of forestry and aims to promote the idea of eco-forestry. The Forum actively engages the GOPNG on forest policy issues and stood at the basis of the establishment of FORCERT, an organisation that supports small-scale sawmilling ventures in obtaining FSC certification.

Box 5: Certification in PNG

The recent ITTO report on *The Status of Tropical Forest Management* suggests that at least 1.5 million hectares of production forests in PNG are "considered managed sustainably and expected to undergo certification in the near future" (ITTO 2006:175). There are however, no data to substantiate this claim. NGO's consider certification the best way to demonstrate the sustainability of operations. Certification of PNG forests operations is however, still in an early stage of development with the only certification scheme active in PNG that of the FSC. The first endeavours to obtain certification in the Pacific were made as part of a number of donor supported community-based forestry initiatives in the Solomon Islands and PNG during the mid 1990's (Van Helden and Schneemann 2000). Many of these projects have since ceased operations but the issue of certification appears to have become associated with community-based walkabout sawmilling. As of 2005 some 19,215 hectares of PNG forest were FSC certified under the FORCERT group certification scheme (FSC 2006).

Although Hunt (2002: 91) calls it 'the great debate', there is in fact very little debate on the role of certification in large scale timber operations in PNG. In 1997 a national working group on FSC was established with the aim of developing PNG's own National Standards of Sustainable Forest Management. These standards have since been approved by the FSC board in Germany. It is unclear to what extent the PNG forest industry has been involved in their development. Innovision (PNG) has suggested the use of its Makapa concession in Western Province to field test the applicability of the PNG FSC standard. There are indications that the PNG forest industry may also investigate the possible use of standards such as the Australian Certification Scheme or the scheme developed by the Malaysian Timber Certification Council.

The GOPNG looks upon certification as a market driven process as it is up to the timber industry and civil society groups to satisfy market requirements. "The Government realizes that certification and sustainable forest management are gaining international prominence... [and that for] ... certain markets, forest products need to be certified as an indication that the product is derived from sustainably managed forests" (GOPNG 2005a: 25).

Walkabout sawmills require relatively little capital investment but are highly intensive in terms of training and technical support. Donors and NGOs have looked upon eco-forestry as an alternative to large-scale commercial logging and have pursued innovative models to get these operations certified. However, key operational obstacles are i) the transport of timber; ii) mechanisms that enable communities to make the initial capital investment and iii) the international marketing of low volumes of generally low quality rough sawn timber of a highly diverse species mix (Van Helden and Schneemann, 2000).

Next to these practical issues there is the question of whether such operations are financially and economically viable. The FRRT (2002) concluded that a walkabout sawmill operation with equipment replacement after 5 years generates an FIRR of 18%. This is just profitable with the sensitivity analysis showing that such an operation is particularly vulnerable to a drop in revenue (See table 8). This analysis did not include certification, marketing and transport costs. WWF (2001: 70 - chart 2) arrives at an FIRR of 34% for such eco-forestry ventures on the basis of the assumptions that i) the life of the equipment is 10 years; ii) the opportunity cost of the logs sawn is zero, iii) a royalty and producer development benefit of Kina 58 per m³ is paid to the landowning community and iv) that the costs of certification, transport and export marketing are assumed by a donor.

Without donor support, operations become negative in financial terms leading WWF (2001: 54) to conclude that "the only way it can achieve viability is by receiving an average price of K400 per m³ for its sawn timber – an increase of K70 per m³ over the average price in the analysis - and by lifting production to 250 m³ of sawn timber per year, from 150 m³." This finding is consistent with Van Helden and Schneemann (2000:19) who argue that "most indications appear to suggest that these projects need to be subsidized for extended periods of time".

In remote areas where the opportunity cost of labour is low and where there are few other opportunities community-based forestry may have a role to play in providing employment and in using an otherwise inaccessible resources. Another exception to the finding that community-based forestry needs to be subsidised may be found in

places where transport is provided due to the existence of infrastructure. Significantly lower transaction costs possibly make the enterprise more profitable. Such situations are found in West New Britain where the roads constructed by oil palm companies provide access to forest blocks. The risk here, however, is that the much higher returns on oil palm provide an incentive to move into plantations, making eco-forestry an intermediate step in the process of forest conversion.

Hunt (2002) provides an insight into this risk by comparing the net present value of community-forestry on a 1,000 hectare block with that of logging and oil palm. This provides an insight into the extent to which community-forestry is an alternative to logging for income maximizing landowners. The results show that at a discount rate of 15%, under the assumption that there is no export tax on the final product, subsidized eco-forestry is much less attractive than the interest gained from investing the logging royalties into interest bearing deposits. Oil palm beats both with a net present value three times that of logging. Where oil palm follows logging the net present value is the combined value of both, providing 8.5 times the benefits derived from donor sponsored community-forestry.

Table 12: Financial benefits to a community with 1,000 hectares of forest

Alternative	Net Present Value in US\$ per hectare
Unsubsidised community-forestry	7
Subsidized community-forestry	72
Logging proceeds invested	147
Oil palm	464
Logging followed by oil palm	611

Source: Hunt 2002: table 4.3

This type of analysis focuses on the financial returns and does not include the whole range of subsistence, cash and environmental values that are lost as a result of the conversion of natural forests into oil palm. An economic analysis of small scale sawmilling by WWF (2001) which factors these values in by including an income component for ecosystems services retained and climate change avoided arrives at an Economic Internal Rate of Return of 129%. These benefits however are global in nature and are therefore likely to only partly feature in the decisions that landowners make with regard to the use of their forest resource.

In 2004 the GOPNG developed a so-called National Eco-forestry Policy as part of the EU funded Eco-Forestry Program. This policy goes into possible role of eco-forestry in PNG, calls for a means to register walkabout sawmills and monitor their operations. The policy also calls for the establishment of a separate eco-forestry division within the PNGFA (GOPNG 2004).

3.5. Medium sized mills working under Timber Authorities

While the NGOs and the forest industry have been locked into a highly charged debate on the future of large scale logging and the worth of eco-forestry as an alternative, it appears that an intermediate and much less regulated form of forest exploitation may be developing in the niche between export-orientated logging concessions which produce some 70,000 m³ a year and the community-based sawmills that produce 150 m³ per year.

In recent years the discussion on the regulatory framework has focused on the large scale log exporting operations and the procedures by which the PNGFA acquires the resource and finds an operator to harvest it. Small scale operations such as the community-based eco-forestry operations described above remain largely unregulated. Between those two extremes there is the Timber Authority, a license by which - often local operators - can obtain permission to harvest timber resources. Timber Authorities cover different types of harvesting operations, the most commonly used ones being the domestic processing Timber Authority, the road line clearing Timber Authority, and the Timber Authority used to clear land for agricultural purposes. The first allows for an annual harvest of up to 5000 m³ for the purpose of domestic processing, while the latter two allow for land conversion in relation to road building or agricultural activities. The requirements for Timber Authorities are much less stringent than those for large log exports projects and the National Forest Service generally has little oversight of the harvesting operations that take place.

Under a domestic processing Timber Authority, logs are not meant to be exported, but in the absence of a chain of custody for both logs and processed timber there are few means to prevent this from happening. In addition, it appears that this level of harvesting operations in combination with sawmilling has the advantage that it is relatively attractive in financial terms. The combination of relative high financial returns and little oversight has led to a flurry of Timber Authority applications with the PNGFA in recent years. Rather than focussing on the relatively small eco-forestry operations it would appear that the PNGFA would do well to intensify its oversight over Timber Authority- based operations.

4. FORESTRY AND THE FISCAL REGIME

4.1. An implicit understanding

Papua New Guinea's fiscal regime with regard to forestry appears to rest on an implicit recognition of the difficulty of auditing corporate tax submissions of the log export sector and acceptance of the fact that this generally enables companies to avoid paying corporate income tax. Curtin (2004: 12) suggests that even the World Bank, although usually not in favour of export taxes, accepted the special case for an export tax on logs in PNG 'on the grounds that the country's Internal Revenue Commission was not capable of collecting corporate taxes from log exports'.

An analysis of income tax paid by logging companies by the Government-commissioned Bogan taxation review showed that of the 27 companies responsible for almost all PNG log production 14 had not paid company taxes for several years and that tax arrears over the last couple of years exceeded taxes paid by almost two

to one (Bogan, 2000:29; Hunt, 2000a; 18). In response to this situation and in order to at least capture some revenue from log production the GOPNG imposed a log export tax. The level of this tax rose sharply in 1994 leading logging operators to argue that it was excessive. There are indications that the industry may have run at a loss between 1998 and 2002 (FRRT, 2002; Hunt, 2002).

Economic theory suggests that companies that do not make a profit eventually go out of business. In the case of PNG, timber companies that have apparently not made profits are finding the funds to diversify into a range of other businesses (ACF-CELCOR 2006: 23). Non-governmental organisations therefore conclude that profits must be made outside the official accounts, and that the best way to explain this anomaly is through the mechanism of transfer pricing (Brunton, 1998; Greenpeace, 2000, The Australian, 2006). The Bogan taxation review (2000: 29-30) reported to Parliament along the same lines, stating that there was “some evidence” of undervaluation and that “IRC officers claim the Commission has not enjoyed success in taxing logging companies because of transfer pricing”. This “would explain how logging companies are continuing to operate even under increased export tax rates”.

This suggests that next to the environmental and social costs associated with log exports, PNG has incurred substantial losses in revenue as a result of transfer pricing (See Box 6). The lack of transparency in the fiscal system with respect to logging operations make it difficult to draw conclusions on the profitability of the log export sector, the distribution of costs and benefits from logging between operators, government and landowners, thus preventing a transparent debate about what a ‘fair’ and economically efficient tax level might constitute.

4.2. The export tax on logs

Export tax levels went up considerably in 1994 when it became clear that logging operators were earning significant windfall profits as a result of high international log prices. Since then the GOPNG has levied a progressive tax on the FOB price of exported logs. When PNG floated the Kina in 1994, depreciation led to an increase in the average effective tax rate through a process of ‘bracket creep’. As a result, the average effective rate, which stood at 33.1 % in 1994 went up to 36% in 1996, dropping in 1998 to regain a level of 33.6 % in September 2001 (FRRT, 2002; 19).

While this level of taxation was affordable during the price boom in 1994 and 1995 it appears to have pushed the industry into losses from 1997 onwards (FRRT, 2002; Hunt, 2002). To counter the effects of further depreciation the industry requested the Treasury in August 2002 to define the export tax in US\$. This request was honoured and the tax schedule was converted to US\$ dollar rates at the Kina rate applicable at that time. However, the assumption that the Kina would continue to depreciate proved wrong and with its subsequent appreciation the average effective tax rate on logs continued to rise. The industry has since been given a small tax reduction leading to the tax schedule presented below. A calculation on the basis of SGS figures (SGS, 2006) suggests that the average effective tax rate for 2006 stands at about 33.2%.

Table 13: Export duties related to log exports

Export Item 44.03		Remarks	
Timber logs and poles in the rough (other than of plantation logs or sandalwood), whether or not stripped or bark or sapwood, or roughly squared (i.e. Not downstream processed e.g. sawn timber).		The export of balsa, black bean, cordia, ebony, rose wood , teak and all conifers is banned.	
Rate			
When FOB price per m3 exceeds	and is smaller then	Export Tax/m3 equals	
0	US\$22.60	P x 0.0950	
US\$22.60	US\$27.60	P x 0.2375-US\$ 3.22	
US\$27.60	US\$32.63	P x 0.4275-US\$ 8.46	
US\$32.63	US\$37.65	P x 0.4750-US\$ 10.01	
US\$37.65	US\$50.20	P x 0.5225-US\$ 11.80	
US\$50.20		P x 0.6175-US\$16.57	
Export Item	Class of Goods	Rate	Remarks
44.03	Plantation Logs	Free	
44.03	Sandal Wood	15%	

Note: P = FOB price in US\$/M3

As of 1st January 2007 the export tax on logs will be revised. The most important changes will be i) that the current progressive tax will be replaced by a flat percentage rate of 28.5% and ii) that an additional 8 Kina per cubic metre, a so-called 'log export development levy', will be paid out to the landowners in addition to existing royalty payments. There will be no taxes on the exports of plantation logs and processed timber products. In taking these measures the GOPNG reduces the tax burden on the industry, and provides a greater share of the monetary benefits derived from the use of the forest resource to the landowners. The Government share of forest related payments will be reduced accordingly.

The decision to put in place a flat tax at a percentage of FOB prices runs counter to the advantages of the more suitable progressive export tax which optimises the efficiency of resource use and the collection of government revenue. A flat tax at say 29% percent of FOB prices has two effects. Firstly, low value species of say US\$ 35-45 per m³ which are currently taxed at a rate between 21 and 26%, will now be taxed at the higher rate of 28.5%, leading to a situation where low value trees that are currently being harvested may be left behind in the future. This may appear good news from an environmental point of view, unfortunately harvesting practices in PNG are such that many remaining trees do not survive logging operations (Cameron and Vigus 1993). Where trees survive, the enrichment of logged-over forests by the remaining low value species may compromise the future composition and value of PNG's forest and thus increase the incentive for forest conversion in the longer run. The second effect is that the GOPNG foregoes revenue on the higher value species as the average effective tax rate on these high value species drops from say 50 to 28.5%. A progressive tax taxes low-value species at a lower rate and high-value species at a higher rate, optimising both resource use and revenue.

The 'log export development levy' will apply to all exported logs under HS 44.03 of the Customs Tariff Act 1990 with the exception of plantation logs. The levy will be paid by exporters together with the export duty and will be placed into a trust account established by the Minister of Finance and administered by a Log Export Development Levy Committee consisting of the Secretary of Finance or his nominee; the Secretary for Planning or his nominee and the Managing director of Forest Authority or his nominee. The question is to what extent this committee is subject to checks and balances and able to make sure that these funds reach the landowners. Experience with the reforestation levy suggests that funds collected for a specific purpose do not necessarily get spent on that purpose.

In addition, it has to be noted that the decision to reduce export taxes on logs provides a disincentive to downstream processing and is thus inconsistent with the GOPNG policy in this regard. PNG could support downstream processing by either increasing the export tax on unprocessed products such as logs and/or by waiving the export tax on processed produce. To both reduce the export tax on logs and waive the export tax on processed timber products appears incoherent, as it reduces the incentive to move into downstream processing. It is also remarkable that landowners who provide access to their land for plantation activities do not benefit from the 8 kina per cubic metre log export development levy thus also reducing the incentive for plantation development. All in all the recent tax change appears inconsistent with the stated objectives of PNG forest policy.

There are a number of indications which suggest that log export revenues are going to decline in the near future. The first reason is the mentioned revision of the log export tax which will lead to a drop in the effective average tax rate and a reduction in Government Revenue. The second reason has to do with the increasing share of tax-exempt plantation logs currently thought to stand at 10% of the total log export volume (FIA 2006), and the expansion of tax-exempt processed exports as share of total exports. Currently some 250,000 m³ of processed exports are being produced, representing a log input of some 830,000 m³ at an assumed recovery rate of 30%. As processed exports take off, log exports and therefore Government revenue are likely to fall. The final reason has to do with the position of the Provinces. As these do not benefit from the export tax on logs they are increasingly likely to opt for a ban on log exports in the interest of local downstream processing, thus depriving central government of log export related revenue. Another important factor that may play a role in the level of revenue collected from log exports is the extent to which the GOPNG manages to prevent transfer pricing.

4.3. The debate on transfer pricing

Transfer pricing in relation to the forest sector gained prominence with the Barnett Inquiry of 1989 (Barnett, 1992). Broadly speaking transfer pricing consists of tax evasion by under-declaring FOB export values or by overstating tax deductible CIF import values. In both cases companies avoid paying part of the import duties or export taxes while simultaneously transferring the value of the avoided tax to their parent country. In both cases the country where the practice takes place suffers a loss of revenue (FRRT, 2002).

Import transfer pricing usually takes the form of overstating i) the volume or quantity of tax-deductible products and services; ii) the quality or grade of these tax-deductible products and services or iii) the CIF value of these goods and services. These same mechanisms also apply to in-country tax deductible expenses. Their combined aim is to write off tax-deductible expenses to the extent that the company reports an annual loss and does not pay income tax. Mechanisms by which the forest sector may artificially inflate tax-deductible expenses on imports are: i) by overstating the volume or quantity of imported tax-deductible goods and services by for example having various companies lodge depreciation over the same piece of imported equipment and ii) by overstating the quality or value of imported goods and services by for example importing used equipment while valuing it as new or by overstating its market value. Companies that make a loss need to balance their books in order to restore equity. One way to do so is to post a loan with the parent company abroad. If these loans are listed to go to tax-deductible investments, the interest payments on these loans may again be deducted. By creating fictitious loans it is thus possible to rebalance the books while exporting profits to the parent country in the form of fictitious and inflated interest payments.

It is important to note that without tax deductibility the possibilities for import transfer pricing would be much smaller. Division 11 on Timber Operations of part III of the PNG *Income Tax Act* provides generous deductions on capital works such as land, ports, access roads, housing and other structural improvements as well as health, educational, law and order, recreational, fire fighting, civil administration and other facilities provided to both employees and their dependents. These provisions are obviously highly relevant to the PNG forestry sector as they allow for the deduction of expenses for infrastructure and services provided under the terms of the FMA. Here too it is possible to overstate the number of kilometres of logging road constructed and/or value its construction at a grade higher than it was actually built.

Combating such practices requires the Internal Revenue Commission to physically inspect tax-deductible goods and services and to verify the value on invoices against actual market prices. In addition, it requires the Bank of PNG to verify that loans lodged in corporate tax returns reflect actual financial transactions. The National Forest Service is tasked with auditing the quality of infrastructure and capital works in logging concessions. However, the extent to which the service is already overburdened makes it questionable whether this constitutes a real threat to companies that inflate the value of the capital works constructed.

Export transfer pricing is the mirror image of import transfer pricing and takes the form of underreporting i) the volume of exports; ii) the quality, species mix or grade of the products and iii) the FOB price of the export product. Its aim is to artificially reduce the level of corporate income in order to minimise export taxes.

From the end of 1994 onwards the GOPNG dealt with the practice of underreporting on volume and species by employing the services of SGS. This appears to be effective as ITTO's annual review of trade discrepancies found that the difference between log exports volumes to China recorded by PNG and log imports from PNG recorded by China was only 2% (ITTO, 2005). There is still room for improvement as PNG export statistics to most other countries, with the notable exception of Japan, show higher import volumes from PNG than exports volumes recorded in PNG itself. Remarkable

is the poor reconciliation between Indian and PNG records and the fact that Thailand and the Philippines show imports of PNG logs, but PNG does not record any log exports to these countries at all.

Box 6: Log-related transfer pricing in 1979

Export transfer pricing is not new to PNG. Already in 1980 the PNG Law Reform Commission produced a report on transfer pricing in the log exports sector: “Timber and fish exports stand out clearly as the major problem areas presently known. The examples are not confined to pricing manipulations but also cover quantity and quality misdescriptions... Although no estimate of earnings and losses has been made in respect of Papua New Guinea’s timber exports, some appreciation of their extent is possible by reference to recent marketing developments and by a comparison of annual F.O.B. values for log exports. In June-July 1979 an independent Papua New Guinean timber operator broke the Japanese marketing monopoly over Papua New Guinean logs by selling directly to Korea, and thereby received almost double the previous price for his logs. As a result of this marketing breakthrough, Papua New Guinea’s guideline minimum export log prices were raised, in some cases, by almost 100%” (1980:10).

Table 14: Direction of trade by volume of logs for PNG’s main trading partners

Importer	Imports from PNG m ³	PNG Exports m ³	Discrepancy m ³	Discrepancy %
China	1,314,056	1,287,767	26,289	2.0%
India	125,649	20,121	105,528	84.0%
Japan	319,000	342,063	-23,063	-7.2%
Taiwan	48,381	40,243	8,138	16.8%
Korea	171,000	160,971	10,029	5.9%
Thailand	25,718	0	25,718	100.0%
Philippines	35,019	0	35,019	100.0%

Source: ITTO (2005) table 2-1

While underreporting by export volume may warrant continued vigilance, it is clear that the bulk of the risk of transfer pricing lies with the possibility that the FOB price reported for the purpose of export tax calculations is lower than that actually received. The most important recent indications for this form of transfer pricing are:

FOB export and CIF import discrepancies: The FRRT (2002; 11) conducted a comparison of export and import prices and found ‘some unexplained and substantial’ discrepancies between the FOB export prices declared in PNG and the CIF import prices in China, Japan and Korea. Hunt (2002b) is less circumspect: “The nature of apparent contemporary transfer pricing is a deliberate understatement of FOB invoiced prices in PNG by the private harvesters – on which the log export tax is based – followed by the full realisation of FOB log value in Japanese wholesale markets. The FOB values transacted in PNG are substantially lower FOB prices

quoted in Japan". The Bogan taxation review (2000), the FRRT (2002) and the RT (2004) all recommended further investigations. None were undertaken.

Unexplained variance in export prices: Recent data by SGS show that there are unexplained differences in the FOB prices posted by companies requesting PNGFA permission to export logs from PNG. In August 2006 *callophyllum* logs exported by Rimbunan Hijau were valued at US\$95 per m³, while its competitors stated they were receiving between US\$65 and US\$85 per m³ (SGS, 2006). It is difficult to see why in a competitive market where companies tend to try and maximise profit, some exporters would be prepared to settle for a price that is up to US\$ 30 lower per cubic metre than that received by their colleagues. A recent newspaper article in the Australian suggested that PNG export prices for key timber species were falling due to under pricing at a time that international prices for these same species were increasing (The Australian, 20 July 2006). It is however, not easy to draw conclusions from these findings as the timber trade is a complex market and as prices received may vary depending on the volume supplied. PNG forests are very species diverse, which constitutes a distinct marketing problem. Large players are better equipped to deal with this diversity by putting together shipments of certain species. In addition it has been suggested that companies may cut prices depending on the log grades and that oligopolistic buyers may be able to depress prices.

Direction of trade by value analysis: Another approach to transfer pricing is the direction of trade by value analysis which assumes that one countries' exports are another countries' imports and thus that the total export value of a country should be more or less similar to the sum of the imports from that country by its trade partners. While imports reported by one country do not necessarily coincide exactly with exports reported by its trading partner due to the differential between FOB export values and CIF import values, differences in inclusions/ exclusions of particular commodities or issues of timing, serious gaps between export and import values provide a possible indication of transfer pricing.

A direction of trade by value comparison for timber exports under HS 44, based on the FOB export values as registered by the Bank of PNG and the CIF imports from PNG as registered in the United Nations Commodity Trade Statistics Database (COMTRADE) for the years 2002 – 2005, suggests that the sum total of timber imports from PNG registered by its main trading partners is more than twice that of the log export value registered in PNG. While part of this discrepancy can be explained by the difference between FOB and CIF prices, a differential of this size warrants further investigation. The findings summarized in table 15 also suggest that the difference between the value of FOB exports and CIF imports has been growing over time.

Table 15: Direction of trade by total export value under HS 44

Year	Value PNG exports (Kina millions)	Exchange rate US\$/Kina	Value PNG exports (US\$ millions)	World imports from PNG (US\$ millions)	Ratio imports/exports
2002	414.1	0.2573	\$106.55	\$215.45	2.02
2003	416.0	0.2816	\$117.15	\$254.46	2.17
2004	459.5	0.3101	\$142.49	\$331.51	2.33
2005	476.3	0.3224	\$153.56	\$370.20	2.41

Source: BPNG 2006 tables S41 and S42; UNSD-COMTRADE 2006

It appears that the above mentioned indications of possible transfer pricing constitute reason for the GOPNG to set up an interagency team consisting of the PNGFA and those government bodies responsible for fiscal policy and for collecting revenue such as the Treasury and the Internal Revenue Commission. The aim of such a team should be to investigate the extent to which such practices take place and how they can be avoided as the potential loss of Government revenue is very significant (see box 7).

Box 7: The size of potential losses to transfer pricing

The World Bank has noted that one of the main costs that results from a lack of transparency and government control over the forest sector is the loss of revenue. The Bank estimates that all producer countries combined lose between US\$ 10 to 15 billion dollar per year in revenue. This money could have been used for education, infrastructure and health services. The possible loss of revenue from transfer pricing in the PNG log exports sector is large and the 2004 review of ongoing projects concluded that the financial incentive for underreporting is substantial (RT 2004; appendix 8; 13). A simple sum shows the following:

In 2006 average log export prices as of August stood at US\$ 62 per m³ while PNG is expected to export some 2.4 million m³s of logs (SGS 2006:6-5 & 13-1). If transfer pricing depresses FOB prices by 10 US\$ per m³ this would lead to a loss of 24 million dollars or almost 90 million Kina in Government Revenue. Under reporting of on average 20 US\$ per m³ would trigger a loss of 180 million Kina. These figures are not unusual. The Bogan taxation review (2000: 29) suggests underreporting in the order of 25%, which suggests a loss of US\$ 20 per m³ at current prices. Hunt (2001:6 & Table 4), estimates the loss in GOPNG revenue that resulted from transfer pricing in the 1999 log trade with Japan between 26 and 52 million Kina. A recent newspaper article in the Australian of 20 July 2006 suggested that the losses due to underreporting could amount to A\$ 100 million per year.

For comparisons sake: the 2006 recurrent budget for the PNG Department of Health stood at 111 million Kina (GOPNG 2006 Budget Document Volume 2: Part 1 page 404).

4.4. Log exports procedures

The current export tax system was introduced partially in order to ensure that a fair share of the revenue from the harvesting of PNG's forests goes to the GOPNG and the people of PNG. As a result elaborate exports monitoring procedures have been developed. The Internal Revenue Commission (IRC) as the administrator of the *Income Tax Act* and the *Customs Act* has control over all goods until cleared for exportation. Item 31 of the schedule attached to the *Customs (Prohibited Export) Regulation* requires customs to grant permission for the exportation of timber products. If such goods are exported without permission, the exporter may face prosecution. Item 32 of the same schedule bans the exports of balsa, black bean, cordia, ebony, rosewood, teak and all conifer logs. These species may only be exported in processed form.

The operations of the Internal Revenue Commission flow from the policies developed by other relevant government agencies. Thus policy issues related to the exports of forest products are determined by the PNGFA, while issues related to tax levels are determined by the Treasury. The execution of the actual log export procedures falls under the responsibility of the PNGFA, the Department of Trade and Industry and Customs. SGS monitors the volume of log exports that are transferred onto the ship in order to prevent underreporting and provide the necessary data that allow the State of PNG to collect the tax to which it is entitled. However, the monitoring provided by SGS does not say much about whether the volumes harvested are in line with sustainable yield principles at the level of the concession. Doing so would entail setting up a chain-of-custody all the way back to stump and off-setting harvesting records against a pre-harvest inventory. Such a mechanism may likely become a condition for exports to more discerning timber markets.

The whole export procedure consists of three elements and is laid out in the Procedure for Log Exports (PNGFA 1996). The first element deals with obtaining PNGFA endorsement of the price by which the exporter wishes to sell the product, the second with the acquisition of an export permit and an export license that allows the operator to take the logs out of the country, and the third with the monitoring and control procedures of the SGS, PNGFA and Customs in terms of checking the volumes and species distribution prior, during and after ship loading.

As the exporter negotiates the sale of the logs to his overseas buyer he needs to obtain price endorsement from the PNGFA. He does so by providing the details of the shipment, including information on the species or species groups, the proposed volumes by species and species group and the negotiated prices to the Marketing Branch of the PNGFA. Once the Marketing Branch of the PNGFA endorses the price per species or species group, the exporter forwards an application for a Log Export License to the PNGFA. The Minister for Forests writes to the Department of Trade and Industry with the request to issue an export licence. It is remarkable that the Minister is involved in what is essentially a recurring administrative procedure. This suggests that the approval of individual export permits is a matter of considerable political weight. His day-to-day involvement in securing export licenses has made the Minister a target of allegations of personal involvement in the under pricing of log exports (Masalai-i-Tokaut, 2004).

Once the Export License has been processed by the Department of Trade and Industry the PNGFA issues the Log Export Permit which allows for pre-shipment inspection by SGS and the loading of the ship. SGS subsequently issues an Inspection Report which together with the Export License, the Log Export Permit and the shipping documentation allow Customs to give final ship clearance. The SGS inspection report is used for the calculation of export taxes. After the sale has been made the exporter is expected to send the sales documentation to SGS. SGS then reconcile it with the figures on the export permit, providing IRC with the opportunity to levy any outstanding export tax that may result from a discrepancy between the actual sales figures and those provided during the price endorsement process.

4.5. Possible steps against transfer pricing

Import transfer pricing may result from i) the generous tax deductible opportunities provided to the log export industry under the income tax act and ii) the difficulty of auditing such expenses. The result is a fiscal regime based on the payment of little or no income taxes by logging operators and high taxes on log exports. One rigorous way of dealing with this situation would be to limit the opportunities for tax deduction by the timber sector.

Doing away with Division 11 on Timber Operations of part III of the PNG *Income Tax Act*, for example, would have the effect of simplifying the auditing of corporate tax returns while increasing the cost of providing rural infrastructure. This increased cost to the logging operators could be dealt with by a further reduction of the log export tax, which would in turn also reduce the incentive for under reporting of the FOB price. Obviously a decision to reduce export taxes could only be taken after it is clear that the operators involved had increased their payment of income taxes. Such a step would have no impact on the provision of infrastructure in remote rural areas as the provision of infrastructure and services is part of the contractual obligations of the logging operator under the Forest Management Agreement. The result is a cost neutral change which could improve the financial transparency of the logging sector in PNG.

The previous sections have shown how the risk of export transfer pricing is mainly related to the price setting mechanism in place. Underreporting on export volumes and the species mix has effectively been dealt with through the SGS contract. The price endorsement mechanism, however, appears to lack institutional checks and balances in two ways.

In the first place the Marketing Branch of the PNGFA does not have a set of procedures and an objectively verifiable source of information to determine whether the FOB price provided by the exporter for his shipment is indeed in line with prevailing market circumstances. The Marketing Branch may contact the exporter when the FOB price provided is thought to be too low and ask the operator to renegotiate the transaction, but there are no objective measures in place to determine when the price of a shipment should be singled out for further inspection and discussion.

In the second place it is remarkable that the whole price endorsement procedure is located within the PNGFA, without a role for the Government bodies tasked with the

collection of revenue. The key objective of the PNGFA is to regulate the industry, which generates a different set of considerations than those at play in the Internal Revenue Commission or the Treasury. Given that the potential revenue losses as a result of under-reporting are considerable one would expect an institutional arrangement that weighs the different interests of the GOPNG as a whole, rather than only those related to the log export industry.

A simple means to deal with this would be to set a monthly log export price per species or group of species that would apply for the purposes of determining the level of export tax. This level could be determined by deducting the costs of freight and insurance from the CIF prices recorded at the main destinations for PNG logs. Export tax would have to be paid as a percentage of this determined price, regardless of the actual contract negotiated by the exporting operator. A key issue would be that the determined price is set in a transparent manner between the PNGFA and a number of government departments and bodies, including those responsible for revenue collection.

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ANNEX 1 National Change Summary 1975 - June 2006

Province	1975				Change 1975-2006		2006		
	Area ha	Gross Forest Area ha	Adjusted F. Area Ha	Gross Volume M3	Logged over/converted ha	Percentage %	Gross Forest Area ha	Adjusted F. area ha	Gross Volume M3
Western	9,845,211	6,675,886	5,636,321	173,793,387	513,126	-7.7%	6,162,760	5,168,873	161,400,882
Gulf	3,480,065	2,659,466	2,406,954	81,581,542	201,987	-7.6%	2,457,479	2,220,752	76,353,601
Central	2,987,176	2,015,499	1,882,106	87,998,058	279,689	-13.9%	1,735,810	1,640,295	77,691,168
Milne Bay	1,426,403	1,080,043	856,152	29,801,966	170,654	-15.8%	909,389	735,323	25,613,276
Northern	2,277,222	1,726,697	1,571,385	68,734,506	172,854	-10.0%	1,553,843	1,439,135	62,188,786
Southern Highlands	2,574,829	2,009,059	1,904,514	92,764,204	133,307	-6.6%	1,875,752	1,817,608	87,875,533
Enga	1,182,384	750,447	723,152	46,084,734	33,856	-4.5%	716,591	696,010	44,458,457
Western Highlands	914,120	509,212	453,805	26,502,534	95,192	-18.7%	414,020	393,403	23,326,118
Simbu	613,361	393,925	368,183	20,010,483	42,456	-10.8%	351,469	342,253	18,653,153
Eastern Highlands	1,120,510	558,840	530,453	34,868,350	21,679	-3.9%	537,161	512,960	33,687,670
Morobe	3,393,295	2,210,027	2,030,230	109,407,586	246,961	-11.2%	1,963,066	1,825,254	98,152,651
Madang	2,909,527	2,115,612	1,634,487	71,693,966	216,101	-10.2%	1,899,511	1,491,483	66,046,996
East Sepik	4,381,318	2,103,292	1,886,741	74,839,655	66,098	-3.1%	2,037,194	1,834,898	73,485,575
West Sepik	3,605,390	3,236,371	3,037,119	116,037,873	320,629	-9.9%	2,915,742	2,764,154	105,901,759
Manus	215,029	149,481	105,532	6,250,506	69,624	-46.6%	79,857	59,616	3,819,811
New Ireland	961,034	792,057	728,191	22,466,214	360,024	-45.5%	432,033	400,061	12,187,140
East New Britain	2,045,590	1,312,579	1,223,483	44,465,773	328,642	-25.0%	983,937	936,682	33,511,353
West New Britain	1,534,365	1,814,977	1,696,112	51,848,833	861,528	-47.5%	953,449	921,434	27,083,787
North Solomons	943,273	708,297	566,349	22,287,655	0	0.0%	708,297	566,349	22,287,655
Total	46,410,102	32,821,767	29,241,269	1,181,437,825	4,134,407	-12.6%	28,687,360	25,766,543	1,053,725,371

Based on FIM data submitted to the National Forest Board in June 2006

Adjusted Forest Area = Gross Forest Area minus disturbed areas and the non-forest proportion of mapped FMAs.

Percentage change 1975-2006 = area logged over/converted as share of Gross Forest Area 1975

2006 Gross Forest Area = 1975 Gross Forest Area minus logged over and converted areas