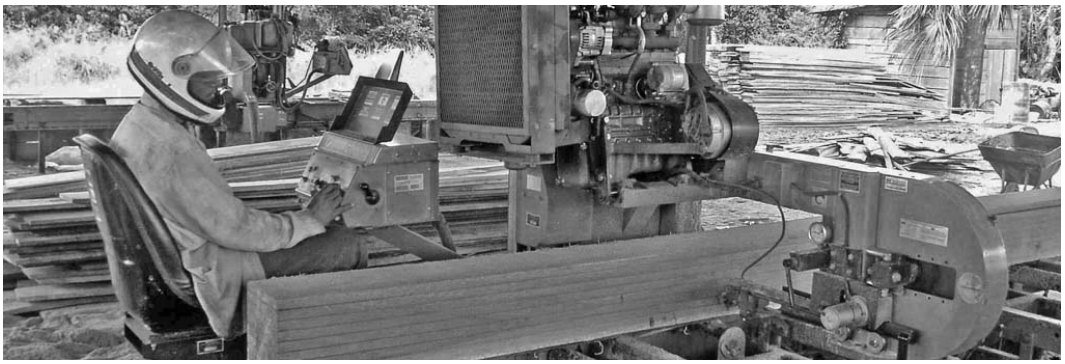
Discussion paper

Raising forest revenues and employment

Unlocking the potential of small and medium forest enterprises in Guyana



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Small and medium forestry enterprises for poverty reduction and sustainability

Most international attention in forestry has been given to improving the conditions for large-scale or micro-scale forestry, and much less to the 'messy middle' - which produces a high proportion of forest products and involves huge numbers of people. Ways need to be found by which small and medium-scale forestry enterprises (SMFEs) can better contribute to reducing poverty and improving the prospects for sustainability.

IIED, with partners in Uganda, South Africa, India, Brazil, Guyana and China has been investigating these issues. Country diagnostics show that the SMFE sector is of major significance for livelihoods in these countries – the net effect of myriad small players represents a substantial part of local economies. Yet, these are largely invisible economies, and policy and programme developments almost completely ignore the SMFE sector. Raising the sector's visibility such that its impacts can be better assessed, and then going on to explore how the positive links to sustainability, livelihoods and poverty-reduction can be enhanced, is a major challenge to which this initiative seeks to rise.

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Acronyms and abbreviations

Bd/Ft	Board feet
CARICOM	Caribbean Community and Common Market
DANIDA	Danish International Development Assistance
DFID	Department for International Development
EIB	European Investment Bank
EM	End matched
EU	European Union
FLEGT	Forest Law Enforcement, Government and Trade
FPA	Forest Products Association
FTC	Forestry Training Centre
GAIBANK	Guyana Agricultural and Industrial Development Bank
GFC	Guyana Forestry Commission
IIED	International Institute for Environment and Development
ITTO	International Timber Trade Organisation
KD	Kiln dried
SDC	Swiss Agency for Development and Cooperation
SFM	Sustainable forest management
SFP	State forest permission
SMFE	Small and medium forest enterprise
SPWP	Secondary processed wood product
TSA	Timber sales agreement
WCL	Woodcutting lease

Executive summary

Globalisation presents new challenges to forest business in Guyana. Knowing how to compete in the global market place is critical to the success of any forest strategy. Modern concepts of marketing are all embracing. For forestry, they address all aspects of the value chain from the forest to the final end user. Inherent in such concepts is the idea of matching resources. For Guyana's forests, this means matching a diverse timber resource – low in volume per unit area – through appropriate technology and suitably sized enterprises, to corresponding markets, either existing or created.

The current Government of Guyana approach to forest land allocation is leading to a collapse in forest-based employment and revenues retained in country. Large concessions, held by a few large local or foreign investors, are inherently inefficient and heavily indebted. They have laid off workers. They have shipped out logs instead of value added product (making a fraction of potential processed value).

Given the poor nature of Guyana's soils and slow growth rates of the forest, large, capital intensive logging operations exhibit marginal or negative profitability. The situation is compounded by poor sawmill conversion efficiencies (in both volume and grade recovery). Limited value is being added (at most, low quality tongue and groove flooring from green wood). The result is a concentration on volume rather than value, with little attention to niche markets. Without a plan for value added marketing, the industry now claims that it is more profitable to sell logs than convert them to sawn lumber. Yet this exposes the sector to the vagaries of commodity markets.

Guyana's forest resources should be allocated to derive the maximum sustainable benefits for its people. They should not be considered a disposable asset, bartered on the table of short-term gains and individual greed. Given that SMFEs with 26% of the allocated forested land pay 50% of the revenues of the Guyana Forest Commission (GFC) and employ 75% of the people in the sector, the situation begs for a shift in emphasis. The challenge is to match newly emerging SMFEs and their modern technology to more rewarding, but consequently more demanding and complex export markets. Guyana's forest industry must adapt or face impending failure.

If all the large concessions were broken up and rebuilt around new portable technology, annual royalties would be nearly G$300 million (US$1.5 million) instead of an indebtedness of G$270 million (US$1.35). If the 1,325,000 ha of state forest permission concessions were added to this equation, a further G$92.7 million (US$463,500) would be added in royalties giving a grand total of G$392 million (US$1.96 million). Consider that total royalties received by the GFC in 2002 on a total volume of 328,546 m^3 of logs and lumber were just over G$125 million (US$625,000). Simply by changing the method of how Guyana's forest is harvested it will be possible to more than triple the initial revenues to the state. There will also be substantial gains in employment.

1. The global context

1.1 Globalisation – opportunities and threats

The world population continues to grow. At the same time, the global economy is growing and becoming more connected. Furthermore, increases in production have been outpaced by increases in international trade and investment (Khor, 2000; Maddison, 2001). The ease, speed and volume of information flows grow even faster than trade and investment. Irrespective of whether the gap between rich and poor is growing or shrinking (see Nordström, 2000 or Melchior, 2001), our growing global proximity now makes it more apparent. Everything is increasingly linked to everything else (Crook, 2001). People are increasingly aware of the inequities that exist and who is responsible for them.

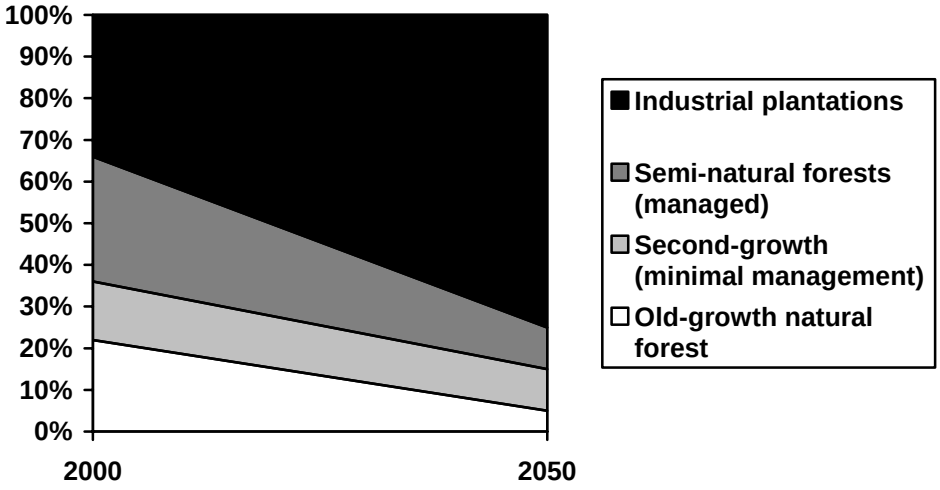
There have been many recent analyses of the interaction between globalisation, trade and forestry (Barbier *et al.*, 1994; Kaimowitz, 1999; Sizer *et al.*, 1999; Rice *et al.*, 2000; Bourke & Leitch, 2000; Macqueen *et al.*, 2003; Bowyer, 2004). These have mapped out the links between policies affecting the freedom of trade in products such as logs, sawn timber and secondary processed wood products and the impact on the forest. Hyde (2003) drew attention to the fact that the impacts of trade would differ for different countries. For countries with abundant natural resources free trade is likely to result in continuing extraction at the frontier. At the forest frontier, strict sustainability is both unprofitable to adopt for low-value products such as logs or sawn timber and difficult to enforce. Opportunities for rent seeking are high in such cases.

Globalisation is not restricted to technology and trade – it also involves the spread of ideologies. The notion that development equates with maximum economic growth has spread through forest departments that formerly valued the environment and social capacity more highly. Sustainability has become a casualty. The increasing demands placed upon the environment are generating alarm. The Millennium Ecosystem Assessment found that 60% of the ecosystem services needed for our survival are being degraded or used unsustainably (Reid *et al*., 2005). Global climate change and biodiversity loss have become subjects of international concern (Thomas *et al*., 2004). More than half of the world's original forest area has been lost. Forests continue to be lost at roughly 0.2% per year (FAO, 2003). Forest degradation is also generating concern.

1.2 The dynamics of the international timber trade

Large increases in global population, production and trade since the mid 1980s have surprisingly left the total production of industrial wood relatively unchanged at around 1.5 billion m^3 (Sedjo, 2001). The relatively steady increase between 1960 and 1980 led many to predict continuing global consumption – but these predictions proved unfounded. Reasons for the recent stagnation include the substitution of wood with other materials, the growth in global recycling and the maturation of heavy wood-demanding economies (e.g. the USA, EU and Japan). Yet, while total production has remained relatively constant in recent years, there are changes in the origin and composition of production (Figure 1).

Figure 1. Estimated current and forecast industrial roundwood supply by forest management situation (% global harvest)



Source: based on Sedjo (1999)

Historically, most wood has been sourced from natural forests. However, a major continuing trend in forestry is the gradual replacement of timber from natural forests with timber from plantations (Figure 1).

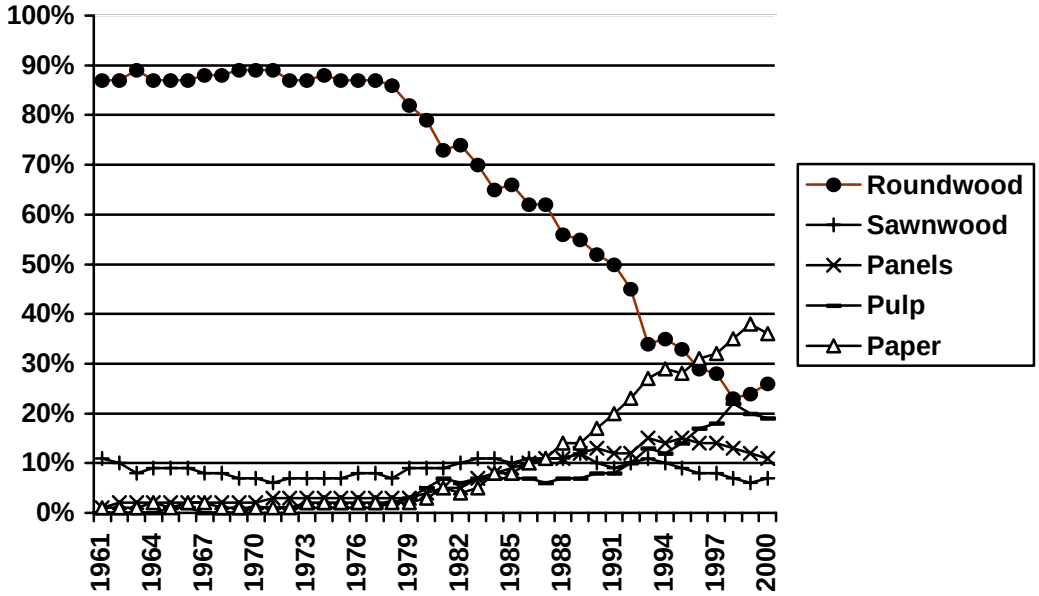
The high transport costs associated with wood products have historically meant that domestic markets for wood products have dominated international markets. High transport costs have meant that high volumes of international trade have been limited to internal regional markets such as Europe, North America and South East Asia (both in exports and imports). Nevertheless, just as globalisation and market forces are driving changes in forest type (from less efficient natural forests to more efficient plantations) so too market forces drive changes in production location (from less efficient to more efficient locations). Where insufficient investment has been made in added value products, trade patterns have driven fierce competition for logs. For example, a weak currency and abundant natural resources enabled Russia to increase its roundwood exports by as much as 14% in 2002 (Ekstrom, 2003). Even with these greatly expanded exports, Russian production is still well below its annual allowable cut. As a result, since the mid 1990s price trends for logs (with one or two high value exceptions) have mirrored the falling prices of other commodities (Arda, 2004).

A major global shift has seen the recent emergence of China alongside other Asian economies as a major global importer of roundwood and sawnwood and a major exporter, particularly of secondary processed wood products (SPWPs) – a category that includes wooden furniture and parts, builder's woodwork, other SPWPs (including packaging, cooper's products, domestic products etc.) and mouldings (Kunshan *et al*., 2000). China has leapt above Germany and Canada to become the world's second largest producer of SPWPs due to a strong policy encouraging downstream

processing, low wages and substantial inward investment from the USA, Taiwan, Singapore and other South East Asian neighbours (ITTO, 2002a).

With major shifts towards low-cost production locations, particularly for high-value, low-volume products such as SPWPs, it might have been expected that production and trade would have shifted from temperate and boreal regions towards tropical and subtropical regions. Yet production and trade figures demonstrate little evidence of an increasing market share for tropical industrial wood.

Figure 2. Percentage composition of exports from tropical countries, 1961–2000



Source: FAO Forest Resource Assessment (2000)

Within tropical regions there has certainly been a shift in the type of production for export (Figure 2). Often with the help of protectionist measures, some tropical countries have succeeded in shifting their exports into value added products. For example, the rapid development of South East Asian panel production came in response to investment policies coupled with export bans and export taxes on industrial roundwood and sawnwood exports. In one component of panel production - plywood, the trade became dominated by South East Asia, and tropical plywood exports managed to capture 70% of the global market in the early 1990s (Rytkonen, 2003). Yet, over-capacity in South East Asia has led to the exhaustion of accessible raw material, which is at least partly responsible for the subsequent loss of market share in tropical plywood which currently stands at less than 60%. Distorted trade policies can have catastrophic consequences for long term production, as the example of Indonesia shows (Macqueen *et al*., 2004).

Despite their cost disadvantages, non-tropical countries have managed to maintain market share through qualitative improvements (client-orientated flexible production technologies and design, coupled with superior marketing and delivery) (European

Communities, 2000). These have in many cases been coupled with non-tariff barriers that alter trade (e.g. subsidising forest planting in the host country, restricting competitors' products that do not meet predefined standards, placing quotas or using licenses to cover competitors' products etc). The effect of these may exceed that of tariff barriers (Rice *et al*., 2000).

1.3 Implications for Guyana

The competitive prospects for sustainable forest management (SFM) in natural tropical forests are bleak. This is particularly true for countries such as Guyana where stocking densities are low. It may be possible to make a short term profit by creaming off and exporting logs of the highest value species from frontier areas. But this strategy is never likely to be sustainable in the long term. In addition, it is a strategy that reduces the potential profits made and tax revenues returned to government. The move away from natural forests towards more efficient plantations suggests that the viability of such an approach will deteriorate over time. With increasing international attention focused on the topic of illegal and unsustainable logging such as the inter-ministerial programmes on Forest Law Enforcement, Governance and Trade (FLEGT) – such a strategy is likely to incur serious scrutiny and may damage the long term reputation of the Guyana forest sector.

An alternative strategy is to invest heavily in appropriate technology and niche marketing – adding value to forest products within country and increasing the viability of sustainable forest management. Strict sustainability will need to be enforced to avoid falling demand for such tropical forest products due to fears over forest loss among potential buyers. It is in search of such a strategy that this study is directed.

2. The present situation in Guyana

2.1 Introduction to the Guyana forest sector

Guyana covers a total area of 21.6 million hectares of forest of which 16 million hectares (75%) is forest. The forests vary in type from mangrove to dry evergreen, and from marsh, seasonal and rainforests to montane forests (GFC, 2001). While there are many alternative uses for Guyana's forests (ecotourism, research, conservation and conversion for agriculture) the predominant use remains the production of timber and non-timber forest products.

There are in excess of 1000 tree species in Guyana, but only 35 are logged commercially (Thomas *et al.* 2003). Within this subset only the following are harvested in any volume:

- Baromalli (*Catostemma commune*)
- Crabwood (*Carapa guianensis*)
- Dalli (*Virola spp*)
- Greenheart *(Chlorocardium rodiei)*
- Kabukalli (*Goupia glabra*)
- Korokororo (*Ormosia coutinhoi*)
- Locust (*Hymenaea courbaril*)
- Purpleheart (*Peltogyne spp*)
- Shibadan (*Aspidosperma spp)*
- Soft wallaba (*Eperua falcata)*
- Taurniro (*Humiria balsamifera var balsamifera*)
- Wamara (*Swartzia leiocalycina*)

The State Forest Estate is approximately 13.58 million hectares (83% of Guyana's total forested area) and the GFC is the semi-autonomous regulatory agency responsible for the management of these forest resources. The State forest includes areas for logging (concessions), reserves and other non-allocated areas but excludes indigenous, private and unforested State lands, the latter which come under the authority of the Guyana Lands and Surveys Commission.

2.2 The low potential of the Guyana Shield Forests

At over 600 million years old, the pre-Cambrian Guyana shield is one of the oldest and most stable geological formations in the world. Soils are deep and poor in nature. Many tree species have slow growth rates and dense, hard, dark wood with high defect rates (reported to be over 22% by the GFC) and small stem sizes. In search of sustainable harvesting guidelines, there have been successive downward revisions to the already low permitted harvesting levels (Bird, 2000).

Guyanese coupe rates (the harvestable volume of logs per unit area) per hectare are low. There is a reported average of 5 m^3/ha (GFC, 2004a) across the 18 active large concessions as of December 2003, concentrated on three species. This compares with South East Asia where coupe rates approach 45 – 140m^3/ha. Guyanese extraction

costs are comparatively high, since with conventional logging techniques, the infrastructure requirements per area of forest remain the same despite lower forest productivity. FAO (1977; 1978) "rules of thumb" report that to harvest one 100 ha block requires 12.5 km of skid trail, 1 km of feeder road and 300 m of main road. Because of this, logging costs per cubic metre in Guyana are extremely high compared to South East Asia with its much higher coupe rates per area.

Guyana's logging costs are also high compared to its nearest competitor, Brazil, where 75% of the logs come from land clearance schemes, and where the Government puts in the road infrastructure (Macqueen *et al.*, 2004). For example, Landell-Mills (1997) reported an average Guyanese log cost per m³ delivered to the sawmill gate of US$87, while the International Timber Trade Organisation (ITTO) Marketing Report of 5th August 2002 quoted an average log price at the sawmill gate in Brazil per m³ of US$37 for Andiroba.

The fact that Guyana's forest sector has low profitability has long been known. Studies of large, capital intensive logging operations demonstrated marginal or at worst negative returns (Landell-Mills, 1997). Indeed, in a document commissioned by Guyana's third President Dr. Cheddi Jagan in 1995 it "appeared that the promise of large future earnings from investments in logging may be little more than fantasy" (Sizer, 1996).

Sizer (1996) also noted that the Barama investment, which at the time of the report's writing had invested US$88 million in plywood, logging and start-up operations had yet to achieve net positive cash flow (this is excluding the cost of the initial investment). Low profitability was due to lower than expected extraction volumes (actual volumes of 14 m³/ha vs. planned volumes of 25 m³/ha) and higher infrastructure and transport costs due to soil and weather conditions. The response has been to plan higher coupe rates and shorter cutting cycles than the code of practice (25 m³/ha over a 25 year cycle – because Barama is concentrating on softwood species like Baromalli and Ullu). Yet they have still been unprofitable according to their reports to date. Massive governmental tax concessions have been required to maintain their operations (recently renewed for another ten years). As a consequence, Guyana has earned less than 1% of Barama's forest product export values in taxes, royalties and acreage fees. Early figures show the trend which still holds much the same.

Table 1. Barama's basic production and export data and taxes paid

Year	1993	1994	1995
Log extraction (m^3)	38,400	167,000	192,600
Log exports (m^3)	5,000	22,000	12,600
Plywood production (m^3)	9,000	53,500	96,300
Plywood production (m^3)	5,900	46,500	91,100
Value of log exports (US$)	496,000	2,199,500	1,044,600
Value of plywood exports (US$)	2,515,500	16,185,800	30,690,200
Total value of exports (US$)	3,011,500	18,384,800	31,734,700
*Total taxes paid (US$)	69,900	80,900	99,200
Taxes as a percent of export value (%)	2.32	0.44	0.31

* Royalties and area fees. Barama is exempt from other taxes.
Source: Barama Company Limited.

2.3 Inappropriate sizes of concession allocation

In 1993, Guyana's neighbour, Suriname, was contemplating allowing the establishment of multi-million hectare logging concessions for investors under particular conditions. It was later determined that these would have precipitated an economic and environmental disaster for Suriname. The crisis was averted partly by a World Resources Institute report (Sizer and Rice, 1994). This document laid out pragmatic ways for Suriname to put teeth into its forest concession policy, negotiate more secure contracts, and prevent massive environmental damage.

After reading Sizer and Rice (1994), Dr. Cheddi Jagan commissioned a similar study on Guyana (Sizer, 1996). Out of this document a policy framework and seven recommendations were made, which were followed by a moratorium on the granting of future large concessions until the recommendations were fulfilled.

Table 2. A policy framework and recommendations for development and conservation of Guyana's forest (Sizer, 1996)

No.	Policy framework
1	Make space available and in some cases assign it to a wide variety of uses – including community forestry, national parks, industrial logging, and traditional subsistence – balanced to keep future options for alternative uses open.
2	Maintain the ecological integrity of the forest lands, in part by conserving biological diversity, water, carbon and nutrient cycles.
3	Maximise forest revenues to the extent that doing so is compatible with 1 and 2 above.
4	Clearly delineate rights and responsibilities to land and resources to make the distribution of benefits from forest tenure and use more equitable.
5	Make the administration of forest land resources more efficient and more open to public scrutiny.
6	Through an open flow of information, encourage and nurture informed civic engagement in the forest policy debate.
7	Attract and encourage responsible local and foreign investors.
No.	**Recommendations**
1	Define the permanent forest estate – this should include production forest for timber harvesting, biodiversity hotspots for protection, protection forests on steep slopes and other fragile environments and community forests.
2	Maintain and extend the scope of the moratorium on major forest land `use decisions.
3	Better monitor the negative impacts of timber harvesting.
4	Standardise procedures for awarding concessions and revise the forestry tax structure to include public announcements, open competition through auctions, performance bonds, increased area fees, scrapping of royalties, and background checks on all investors.
5	Increase the contribution of chainsaw loggers and small producers to the economy and reduce their negative impacts.
6	Strengthen community sustainability initiatives.
7	Ensure that forest sustainability issues are adequately considered in the design of the structural adjustment program.

Despite the failure to implement all these policy changes new large concessions once again began to be granted. More significantly, they were granted South of the fourth parallel, this despite no improvement in the overall economic viability of the already existing large concessions. At the end of 2003, 18 of the 27 large concessions (timber sales agreements (TSAs) and woodcutting leases (WCLs) of which 6 are inactive) were in arrears to the GFC to the tune of over US$1.3 million in royalties and acreage fees, inclusive of Barama.

The viability of large capital intensive logging operations is clearly questionable in Guyana. The Government has to invest heavily in land and fiscal concessions over a long period of time to make the investment viable, if at all. Barama's timber concession is for 50 years covering an area of 1,690,000 ha, along with huge fiscal concessions that will now run/have run for a period of 20 years.

The problem is that the Barama project is premised on a large capital investment and savings from huge economies of scale derived from moving and processing large volumes of timber cut from a large catchment area. But the achievable coupe rates and high infrastructure costs in Guyana's forests negate any savings possible from economies of scale through investment in large, heavy log extraction, road building equipment, and high volume stationary sawmills.

2.4 A more appropriate response to low stocking densities

North American comparisons demonstrate the perceived importance of higher conversion efficiencies. But to achieve even a modest 3-5% improvement in conversion efficiencies in Guyana's traditional milling technology means spending significant money (often over US$1 million). Processing extremely large volumes of timber is also critical to derive sufficient revenues from these small savings margins. The problem has become that the necessary volumes now require such a large catchment area that the transport costs to these large mills are more than offsetting any small efficiency savings achieved by new investments.

As a consequence, smaller, lower volume and grade hardwood mills now seem much more attractive. These actually offer higher recovery rates in volume and grade, but are sized so they can draw their timber supplies from much smaller catchment areas to reduce their overall timber acquisition costs, and therefore their overall production costs. In other words, new mills concentrate on value rather than volume. An added bonus is that these new sawmills are optimised to "cut for grade" rather than "splitting down the line," thereby deriving a higher volume of high grade timber from the logs cut than with the larger, high volume mills.

In the older larger mills, high logging costs are exacerbated by poor conversion efficiencies. Limited, poor quality dressing of green timber compounds the issue – the best recovery rate quoted by sawmills is 38-40%. In comparison good bandmills in Brazil consistently achieve over 60%. As a consequence the production cost for both log and especially sawn timber by conventional mills is extremely high compared to Guyana's main competitors. As a result, traditional large millers have reverted to the expedient of exporting the primary commodity of logs, rather than becoming more vertically integrated by adding more value to survive, thereby exposing the industry to the potential of eventual demise if there is a collapse in log prices.

Guyana's total forest production is also small compared to Brazil. Total industrial roundwood production for 2003 was 254,000 m³ for Guyana versus 102,275,000 m³ for Brazil (FAO, 2003). Therefore, for Guyana the only way to remain competitive is to minimise capitilisation and operational costs and maximise the value derived through appropriate value added techniques from whatever limited volumes Guyana produces. Guyana needs to concentrate on the following:

- Minimise harvesting costs by the use of appropriate portable, cost effective and efficient conversion technologies. These have two advantages. First, they take the means of conversion as close to the standing tree as possible, reducing transport and road construction costs. Second they maximise

conversion efficiency and value generation by utilising thin kerf band technology which also allows cutting for grade. As an added bonus they minimise the environmental impact by leaving waste within the forest and reducing the footprint of any extraction operation relative to traditional methods.

- Maximise revenues per tree/ha/m³ and employment. This can only be done by adding value in country through appropriate conversion technologies and concentration on high-end niche markets that capitalise on the endemic characteristics of Guyana's species.

- Increase the number of trees per hectare that are commercially profitable to harvest. Locating the means of conversion close to the stump means there is minimal additional cost in converting defective stems into high grade lumber. In traditional operations these would be discarded or left in the forest.

- Maximise the benefits of the forest resource to the most depressed interior communities where the resource comes from to support poverty alleviation through maximisation of value retention in the source communities, employment, value added activities and spin off enterprises (transport, road cutting, shops, services etc.).

2.5 Inefficient land allocation and revenue collection – selling Guyana short

Enshrined in the National Forest Policy is the fact that the ownership of all forest resources (except those on private property and on Amerindian lands) is vested in the State through the Guyana Forestry Commission (GFC, 1997). Since 1953, the GFC has been issuing timber concessions on State forest land. Forest lands allocated to timber production are referred to as "permanent production forests", one of seven categories of State Forests. By 1996, some 69,000km² (73%) of State forests had been allocated for timber harvesting as permanent production forests, mainly in the central and north-western part of the country.

Allocations for timber harvesting are given according to three forms of tenure:

- Timber sales agreement (TSA): Post 1980, contracts that provide exclusive rights for periods of 10-30 years for areas exceeding 24,290ha (60,000 acres) with an option for renewal.
- Woodcutting lease (WCL): Pre and post 1980, contracts that provide exclusive rights for periods of 5-15 years for areas between 8,084ha (20,000 acres) and 24,290ha (60,000 acres) with an option for renewal.
- State forest permission SFP: Licenses issued annually (changed to two years from 2004) for areas of less than 8,094ha with the option for their renewal, but without exclusive rights to the resources.

Figure 3. Percentage forest allocation of total forest in Guyana (16 million ha)

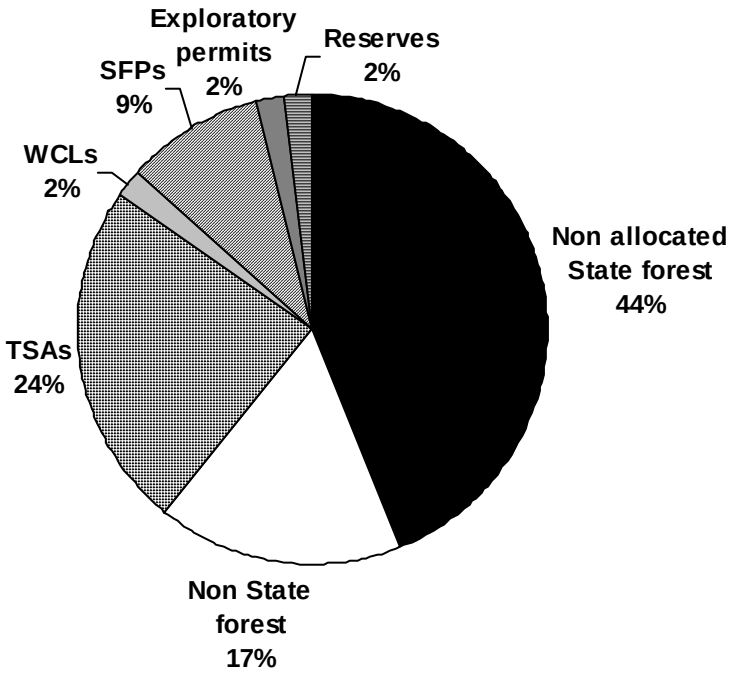


Figure 3 shows the distribution of total forest area in Guyana (Thomas *et al.*, 2003). It can be seen that large concessions (TSAs) make up by far the majority (74%) of allocated production forest areas. One would assume that this distributional bias is linked to the efficient performance of such operators and resultant benefits to Guyana. Yet closer examination reveals almost the complete opposite:

- In 2003, 18 large or medium concessionaires were in arrears to the GFC for royalty and acreage fees to the tune of G$270 million (US$1,350,000) and significant amounts to the local banking sector.
- Royalties collected per ha were G$21 (US$0.1) for large concessionaires as opposed to G$46 (US$0.2) for small concessions in (GFC, 2003).
- The large concessionaires are a net foreign exchange drain on the economy (in a comment attributed to the late President Dr. Cheddi Jagan – Sizer, 1996).
- Despite receiving 74% of the allocated commercial forested lands, large concessions have caused a decline in the contribution of forestry to GDP from 1997 to present (Thomas *et al.,* 2003; see Table 3).
- Large concessionaires are increasingly falling back on the primary exploitation of logs, thereby exposing the economy to the vagaries of a commodity market and minimised employment in the sector (see section 3.2).
- Large concessionaires exports of logs have starved the local economy of value added opportunities for key species (see section 2.6).

2.6 The state of technology

The reality is that the industry is concentrated on high volume, low revenue primary products such as logs or large sawn baulks. This has led forestry to be a net foreign exchange drain on the economy. The collapse of even the most limited value added by the concessionaires has underpinned a decline in export revenues and its contribution to GDP, despite the increase in the volume of forestry production and exports. For example, from 1999-2002 Purpleheart production was in the range 34-35,000 m³. In 1999, log exports made up only 3774 m³, while local processing and utilisation made up 26,446 m³. By 2002 the situation had reversed with log exports at 21,497 m³ and local processing and utilisation at 4816 m³. This cripples any value added growth potential for Purpleheart GFC, 2004b).

From the National Development Strategy through the DFID supported forestry project, to the recently concluded ITTO assessment mission and the Government's own Forest Policy Statement and Plan, every report has highlighted the need to develop value added in Guyana's forestry sector.

The Guyanese forest sector has not fundamentally changed its product, structure, method, management or machinery for over 80 years. If one reads the description of the sector when the forestry commission was established in 1925 and reviews the industry again today there has been very little significant change, despite massive help in the 1970s and 1980s from the Government to recapitalise and reconfigure the industry under institutions and programmes such as:

- GAIBANK (Guyana Agricultural and Industrial Development Bank): Governement Agricultural development bank that provided long term development financing at concessional rates.
- IDB LN633: Specific timber industry long term concessional funding for recapitalisation disbursed through GAIBANK.
- CIDA I, CIDA II: Specific timber industry funding for recapitalisation disbursed through GAIBANK.
- EIB (European Investment Bank): Multi-sectoral development financing provided through GAIBANK.

Despite these inputs, the sector has changed little. It now has huge arrears to private banks, and to the Government of Guyana and the GFC for royalty and acreage fees. What is clear is that the past and present methods and management do not work. Without coercion the sector has never changed – i.e. only during the Second World War with the restriction of imports did the sector widen the species used to include Crabwood and Mora to replace imported North American species. There is a clear need and precedent therefore for coercive policy measures to restructure and rejuvenate the sector. If log prices were to collapse and with no other options for survival, the sector would totally collapse as happened in Asia in the mid 1990s.

The ITTO diagnostic mission report (2003) recommended specialisation, rather than more vertical integration. Beyond logging, traditional millers will have to become more vertically integrated to extract a 'reasonable' 20% rate of return on their investment. Only by using portable technology are sustainable margins achievable at each stage of

the value chain (avoiding 'unreasonable pricing' that may make any one level of the chain uncompetitive).

Companies like Precision Woodworking compete on a global scale. At present they are paying between US$350-583 per m³ for green rough sawn Locust in Guyana, whilst in Brazil the price ex-mill for green rough sawn Locust in the August 2002 ITTO Tropical Timber Market Report was US$167. Moreover, the Brazilian trend is downwards – a function of their low log extraction costs and high conversion efficiency. In Guyana, sawing costs are in the reported range of US$260-360 per m³. Thus, to make the same profit on sawn timber as they do on the sale of logs, traditional large operators would have to charge locally in the range of US$360-–505 per m³ for green rough sawn. This is considerably above world market prices and certainly qualifies as unreasonable pricing. It is certainly above the average declared Guyanese export prices for sawn wood in 2004 of US$354 m³, which suggests that profits on sawn wood are low. (N.B. This data also includes dressed lumber so is essentially showing a higher value than it should).

To remain competitive as a nation, Guyana needs to look long and hard at all aspects of the value chain in the forest utilisation process. Guyana needs to optimise benefits whilst still retaining its competitiveness against other tropical timber exporters, especially Brazil. The use of portable technology can return that competitive edge, allow specialisation, and reasonable margins at every level of that value chain.

3. Analysis of the future opportunities and threats

3.1 Demise of forest revenues

The forestry sector's contribution to GDP has declined since 1997 despite an overall increase in exports of forest products. This is a function of increased exportation of primary lower value products such as logs instead of value added products (see Table 3 from Thomas *et al.*, 2003)

Table 3. Contribution of forestry sector to GDP 1991-2001 (Bank of Guyana, 2002)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
G$ million	327	703	1,046	1,936	2,473	2,597	3,103	2,107	2,569	2,232	2,433
GDP%	2.05	2.32	2.85	4.42	4.88	4.54	4.93	3.8	4.17	3.53	3.56

Note: Forestry figures in nominal G$ (=US$0.005) but GDP% based on factor cost at constant 1988 prices. GDP% only reflects primary production.

In a recent report (GFC, 2004c) it is stated that:

- SFPs with 26% of the allocated forested land contribute 46% of the revenue. Large TSA and WCL concessions with 74% of the land contribute only 54% of government revenue. Chainsaw operators paid nearly half the royalties collected by the GFC on one quarter of the volume of logs cut by the large concessionaires (GFC, 2002)
- All the large concessions' (TSA/WCL) productivity levels do not approach the productive potential of the lands that they hold – the average coupe per ha is 5.02 m^3/ha, concentrating on 3 species suggestive of a mining mentality. This has led to a royalty ratio per ha of G$21 per ha (US$0.1) for TSAs as opposed to G$46 (US$0.2) for SFPs. In addition these small forest enterprises represent 75% of forestry sector employment (Thomas *et al.*, 2003). Note that direct employment in the sector, excluding value added (furniture, architectural millwork, moulding, joinery) exceeds 15,000 people, a significant fraction of total employment, especially if the thousands employed indirectly in the value added sector are also considered.
- The indebtedness of 18 of the 30 TSA/WCLs was in excess of G$269 million (US$1.35 million) as of 31/12/2003 as a consequence of the above noted factors.
- The large concessionaires that are in arrears to the GFC insist that they can only afford to export logs. But this breaches the original justification for granting them concessions. GFC did not grant timber concessions to export logs. Any small producer can do that. Concessions were granted to add value to the timber product. Retreating into logging and the creaming off of prime species is a retrogressive step as is "landlordism," whereby companies sublet the nations patrimony to Barama. Barama themselves claim to have a similar reduced capacity, changing their main focus from plywood manufacture to log exports.

The TSA/WCL sector is now reaping the fruits of its own inertia. It should not be allowed to fall back on log exports. Neither should it reap any windfall profit of subcontracting to Barama (who are themselves exporting logs and failing to pay the 2% export tax on forestry products which are being subsidised by huge government fiscal incentives unavailable to the rest of the sector). Neither should more efficient SMFE value added processors be forced to subsidise, through their taxes and fees, the outmoded log extraction and conversion methods of the larger forest concessionaires. Such subsidies merely exacerbate high log extraction costs and volume and grade recovery rates of less than 40%.

Combining current TSA/WCL high log extraction costs with poor conversion efficiencies gives a sawn cost per m³ at the sawmill gate of US$250-350 per m³. Chainsaws and portable mills produce sawn lumber at a cost delivered to Georgetown of between US$80-120 per m³. As a consequence the Forest Products Association (FPA – representing largely the TSA and WCLs) correctly claims that they make more money exporting logs than sawing them into lumber and selling it on the local market.

3.2 Loss of employment and expatriation of profits

The switch to log exports with a consequent reduction in downstream processing has seen a four fold decline in jobs in the sector, coupled with a four fold decline in value creation, a fact lost to those in their unseemly rush to export logs (Government of Guyana, 2005). In Molinos' (1995) study, he quoted employment levels as a coefficient of round log in feed. Essentially per 1000 m³ of round log in feed employment levels are as follows:

- Logging: 7 people
- Sawing and moulding: 22 people
- Furniture and architectural millwork: 111 people.

Let us assume that in 1999 the local utilisation was at least sawn and dressed. From 1999 to 2002 with the increase in export of Purpleheart logs at the expense of limited value added (sawing and moulding) Guyana has lost at least 462 jobs in the sector. This loss, and the loss of three quarters of government revenues, has occurred from the substitution of log exports for just this one species.

To compound the issue, in some foreign owned businesses more than half of the skilled employees are expatriot – working as truck drivers, chainsaw operators, skidder operators, etc. Given the high levels of Guyanese unemployment, the pending closure of Omai, layoffs in the bauxite industry, and the new establishment of the Forestry Training Centre (FTC) to develop local skills, there can be no justification for this. It is especially ludicrous that the FTC has been contracted to train these same expatriot forest workers by Barama using interpreters.

In the unseemly rush to justify the export of logs the FPA has conveniently forgotten the masses that they used to employ in the sawmills and planning mills of Guyana (Government of Guyana, 2005). If we use Molinos' coefficients of employment, every 1000 m³ shift to log exports from even limited sawing and planning, constitutes at least

a four fold decline in employment in the sector, coupled with at least a four to eight fold decline in value generated from Guyana's forest resources.

An important additional area of concern is the place where profits accrue. For the large transnational companies operating within Guyana, profits accrue to foreign owners in far distant countries. For such companies, many consultancy fees and payment for equipment etc are also made to foreign countries – even when expertise and equipment is available within Guyana.

Small concession owners/portable mill or chainsaw ripping operators typically employ all their labour and contract in multiple use transport equipment from the same communities the resource comes from. Typically 50-75% of the selling price of the sawn product is retained in that source community. In addition, any profit derived is retained or spent in country. A case in point is the town of Ituni that has maintained itself and even grown after the sudden pullout of the bauxite industry from the area. This town is now wholly based on sawing lumber using portable technology and utilising local contractors to build roads, transport wood and plane lumber.

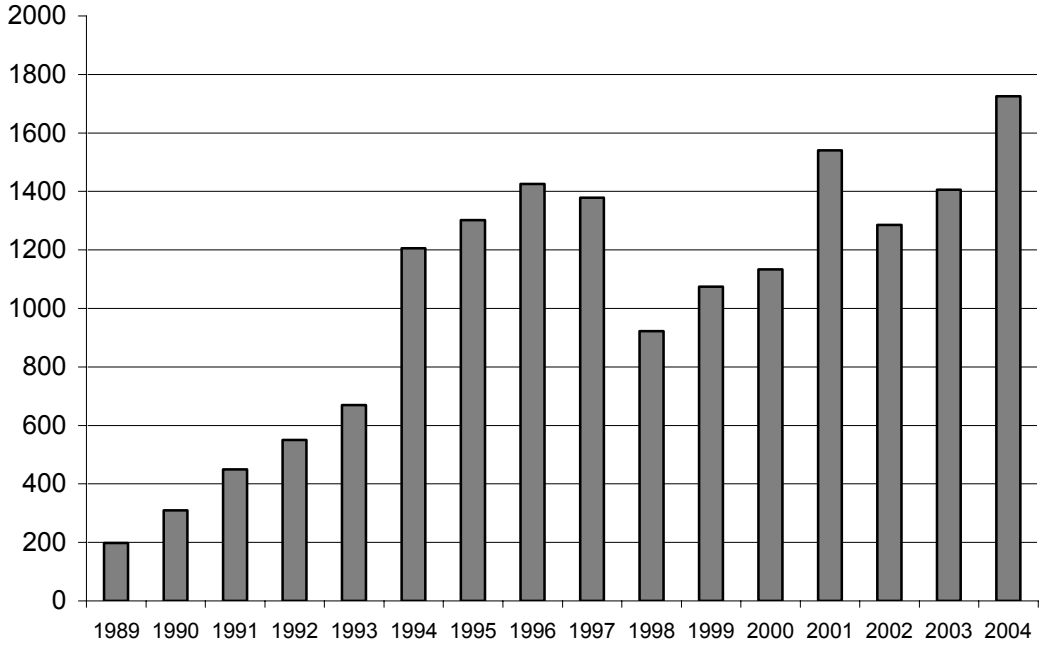
3.3 Explosion in illegal chain saw logging

Prime species (Greenheart, Purpleheart, Locust etc.) are only found in the larger concessions. These are increasingly moving to export logs rather than sawing the lumber to supply the local market. But demand from local markets still exists. Without legal access to forest resources, local markets will turn to illegal harvesting of lumber by chainsaw operators because, as the FPA is so fond of saying, "it's in the math".

We have noted that high extraction and sawing costs, coupled with poor conversion efficiencies result in a cost of production for large, traditional, stationary sawmilling operations from G$110-150 (US$0.55-0.75) per board foot. Chainsaw operations costs of production delivered to Georgetown are between G$40-50 (US$0.2-0.25) per board foot. Purpleheart is a good example. It is not economical for a large, traditional miller to saw and sell Purpleheart at G$150 (US$0.75) per board foot. Their only option is to export the logs at higher prices to the detriment of the value added sector and the economy as a whole.

Chainsaw operators on the other hand can saw 400 board feet a day for a net daily profit of at least G$40,000 (US$200). In four days they can repay the cost of the chainsaw (For example the chainsaw model Stihl 051 costs G$123,000 or US$615). In one month (24 working days) chainsaw operators can net nearly G$1 million (US$5000). After one week it would not matter if the GFC seized the saw. They would already have made a 60% net profit by that time. Figure 4 shows the unsurprising and dramatic increase in chainsaw sales over the last decade.

Figure 4. Chainsaw sales within Guyana 1989-2004



There is consequently a huge disparity between the production cost of new portable technology and traditional larger sawmills. At the same time, there is very limited supply of high value species to the local value added sector (created by the switch to log exports). A potential catastrophe awaits Guyana's image as a source of sustainably harvested forest products. The demand from the local value added sector will have to be met from chainsaw loggers. Even if sawn timber were to be made available from large traditional mills, it would be at a price well above the global market price. It is highly unlikely that value added producers would follow that direction as the situation in Ghana highlights below.

The Ghanaian forestry authorities have faced a similar situation (although at least Ghana does not allow log exports). Most Ghanaian sawmills are foreign owned and export all their sawn production to the detriment of the local value added industry. This has left a supply gap of over 2 million m^3 of sawn timber per year that is being filled by illegal ripping of lumber with chainsaws. This in turn has tarnished the image of Ghana as a source of sustainably harvested timber and led to a break down of the forestry sector overall.

Our point is this. An explosion of chainsaw logging happened in Ghana without log exports starving the local processing market of timber. How much more likely is an explosion of chainsaw logging to occur in Guyana where log exports do starve the local market?

It is widely reported that GFC's forestry reserves have been already illegally logged. How can Guyana hope to control a renewed spate of illegal harvesting, especially when the potential profits are as high as those outlined above. If the disparity in prices and technology is not dealt with immediately, we confidently predict that Guyana's status as a country with well managed forests will be rapidly eroded. This unfortunately coincides with EU FLEGT initiatives, where increasing scrutiny will fall on the legality of production.

What is called for is an immediate solution to the disparity in production costs (between chainsaw logging and large traditional mills). This will require a reallocation of some forest resources away from those large traditional mills. It is critical that the demand of the national value added processing sector is met. Otherwise the sector will plunge into ever greater dependence on illegal logging as in Ghana.

3.4 Inappropriate technology and unsupported mobile solutions

The processing equipment currently used by the industry can only be described as archaic – the majority of mills utilise circular and sash gangsaws that were discarded from use in Europe in the 1920s and 30s due to their low volume recovery and their inability to cut for grade. Such equipment dates from an era that concentrated on the volume production of large, long sawn baulks for the marine market. Essentially, the sash gangsaws suited for this product had too large a kerf and did not allow turning of the logs to cut for grade giving low production in one inch material and a low percentage recovery of high grade material. The combination of lowered production and low grade recovery with the high log extraction costs sounded the death knell of the traditional large scale mills in Guyana.

The industry has stayed away from band technology due to its inability to manage the very basic technical requirements of saw doctoring. This continues, despite the huge advantages in recovery that band technology offers (a minimum 50% increase in volume and grade recovery).

The industry has typically lowered the technology it uses to the perceived capacity of the labour pool rather than trying to raise the standards within the industry. When the UNDP was funding chainsaw training in the Bartica Triangle in 1967 a member of the FPA commented "no one will put that big heavy chainsaw on their shoulder and go into the forest to fell trees. They will always use axes (sic)." This type of prejudice against new technology is widespread in Guyana. It is ironic that the chainsaw is now putting many of the older traditional mills out of business.

The advantage of mobile technology does not come down to its ability to avoid legal detection. Royalties and acreage fees for SFPs only amount to less than 10% of the overall production cost of a chainsaw ripping operation. Instead the advantages of mobile technology come from the fact that the means of conversion is portable to the tree.

Guyana's low stocking densities of commercial species and inefficient conversion technologies are well known. Adding value to extract as much revenue per m^3/ha would seem like a sensible strategy. Sadly this is rarely the approach of the large traditional mills. To talk of kiln drying even today is like speaking a foreign language. In

moulding, the industry average accuracy is 0.8-1.6 mm compared with the USA standard of 0.005-0.012 mm.

As a direct consequence of the poor quality of the value added product, Guyanese companies sell Greenheart tongue and groove flooring in Barbados at the same price as pressure treated pine flooring – basically the low quality condemns Guyanese producers to a volume, commodity market instead of a high end, niche, hardwood flooring market. Guyana is forced to accept US$1-1.25 board foot for ¾ inch Greenheart solid wood tongue and groove flooring as against US$4.50-8.25 per sq. ft for ¼ - 3/8 inch thick laminate flooring in Trinidad (ironically laminate or "engineered" flooring is considered a cheaper product than solid wood flooring) purely because of quality.

3.5 Adopting a new marketing paradigm

Inherent in new concepts of marketing is the concept of matching resources. Basically, matching the size and type of Guyana's resource, through appropriate, sustainable (socially, technically, economically and environmentally) technology to markets either already existing or created. Markets formerly focused on by the Guyanese forest sector have typically been marine markets requiring large, long sawn baulks and squared timber, nearly all made from Greenheart. The industry's complaint that they have a high proportion of second grade timber and a requirement for long lengths is a direct result of the marketing and equipment straight jacket they created for themselves in their premise of pursuing a Greenheart marine construction market into perpetuity.

In addition, the industry's efforts to promote other products and species have been weak. They reportedly promote other species by including some in shipments of traditional prime species. In addition, their dealings with foreign traders in many cases have given the industry a bad name due to:

- Unreliable deliveries – e.g. orders delivered months late or never despite payments being made.
- Substitution of species – e.g. Manni included in a shipment of Greenheart.
- Poor grading of product and generally poor quality.
- Insect or bacterial infestation leading to seizure and destruction of shipments – e.g. the seizure of a recent shipment to Barbados.
- No kiln drying.
- Very poor finishing.

But it is not all doom and gloom. What is clear is that there are considerable markets for Guyanese timber even close by. Caribbean wood product imports total over US$60 million of which Guyana supplies 5%. In Trinidad, rough sawn kiln dried select grade Cherry from the USA is sold for US$3.60 (freight on board USA). Guyana is not seen as a viable source due to its utter unreliability and poor quality of product despite the far better inherent performance characteristics of its product.

Comparisons of different conversion technologies and efficiencies are attached in Annex 2 and 3 along with possible value added scenarios and revenue outcomes.

4. An alternative vision

4.1 Increasing forest revenues

Although there are basically two main types of portable technology used in Guyana, they are used in three different ways:

- Those that are portable to the stump comprising free hand ripping with chainsaws alone or with frame attachments called boardmills.
- Those portable to the log market within skidding distance of the trees to be harvested, comprising either circular blade or thin kerf bandsaw blade technology.
- Thin kerf band mills used in a traditional stationary mill application.

Of technology portable to the tree, the vast majority (95%) are chainsaws. These are used in the free hand ripping technique, where no form of guide is used. The logs are only marked with straight chalk lines for reference purposes, typically where the tree is felled. Accuracy of the cut varies from ⅛ -¼ of an inch across a one inch thick board. Recovery rates of 30-45% are reported and corroborated - dependent of course on log sizes and the accuracy of the cuts. Units used and costs:

1. Chainsaw: Stihl 051 c/w 30 inch bar and chain – US$640
2. Chainsaw: Stihl 070 c/w 30 inch bar and chain – US$1070

For boardmills, the accuracy varies between ⅛ -1/16th of an inch with recovery rates in excess of 50% (54.6% in tests by this author in 1999). Units used are as follows:

1. Chainsaw: Stihl 070 c/w 36 inch bar and Granberg Alaskan Mill – US$1380
2. Chainsaw: Stihl 070 c/w 44 inch double engine bar and Granberg Alaskan mill – US$2,200

Portable mills used in the log markets fall into two categories – circular blade and bandsaw blade mills (the band blade mills typically being small diameter Woodmizer type blades less than 2 inch in width to avoid excessive saw doctoring requirements). Recovery rates vary from less than 40 % for the beam saw mills with 3/8 inch kerf blades, to 50-55 % for the swing blade mills 5.25-6 mm kerfs. The thin kerf bandmills have maximum kerfs of 2.3 mm. Mill types, makes and prices are as follows:

1. Lucas swing blade circular saw mill - US$14,000
2. Peterson swing blade circular saw mill – US$13,000
3. Mobile Dimension beam saw – US$40,000
4. Macquarrie beam saw – US$47,000
5. Woodmizer LT15 manual bandmill – US$5160
6. Woodmizer LT40HDD34 Hydraulic bandmill – US$33,000
7. Woodmizer LT70 HDDRE62 hydraulic bandmill – US$51,000
8. Timberharvester 36HT25 hydraulic bandmill– US$37,000

N.B. Mills 1-5 are manual mills that have no hydraulic log handling capability. Mills 6-8 have hydraulic log loading, turning, clamping and taper rollers.

In many instances, as at Hubu on the East Bank of the Essequibo, Guyana, these same portable mills are used in stationary applications. Though not the most effective

use of the technology, static portable mills still offer advantages over traditional stationary mills comprising circular or sash gangsaw mills due to much higher volume and grade recovery rates, lower energy requirements and lower labour costs.

Portable technology can and does (as can be seen by the prevalence of chainsaw ripping) produce wood at one third to half the cost of traditional stationary sawmills. It is worth re-emphasising that these portable mill/chainsaw operations:

- Pay half the royalties of the GFC on one quarter of the volume of logs of the large concessionaires.
- Pay half the revenues of the GFC on 26% of the allocated forested lands.
- Employ 75% of the people in the forestry sector – employment presently estimated at 15,000 people directly employed.
- Maximise utilisation of the most abundant resources (labour), whilst minimising exploitation of those that are more limited (land and capital).
- Poverty alleviation – portable technology maximises the value and benefit retention within the source community and the country – between 50-75% of the final sale price is retained in the source communities. This is also in the value added form of sawn lumber and not logs.
- Portable technology tends to be labour intensive requiring hand cut roads for log or lumber extraction and for handling of lumber vs. material handling equipment in large operations for example.

Portable technology such as the Woodmizer Portable thin kerf bandmills give recovery rates of 50% greater than conventional mills. They are also more efficient than chainsaws. It is important to note that chainsaw recovery rates fall in the 40% range as well, but they pay their royalty on the sawn board rather than the cubic volume of the log and hence pay at least double the royalties per volume of log than large concessionaires. Supporting the use of portable bandmill technology may be the only way of stemming the explosion in illegal chainsaw use.

A switch to mobile sawmilling could bring the GFC a royalty recovery per ha of at least G$70 or US$0.35 (G$21 per ha or US$0.1 for large concessions). Therefore, if the inactive TSA/WCL concessions were taken back and given out to small concessionaires with this technology - representing 434,061 ha - the GFC would stand to gain G$30 million (US$150,000) in annual royalties as opposed to G$9.1 million (US$45,500) if these areas were given out to large concessionaires.

Our argument is basically this - if all the large concessions were broken up and rebuilt around new portable technology, annual royalties under this scheme would be nearly G$300 million (US$1.5 million) instead of an indebtedness of G$270 million (US$1.35). If the 1,325,000 ha of SFP concessions were added to this equation, a further G$92.7 million (US$463,500) would be added in royalties giving a grand total of G$392 million (US$1.96 million). Total royalties received by the GFC in 2002 on a total volume of 328,546 m³ of logs and lumber were just over G$125 million (US$625,000). Simply by changing the method of how Guyana's forest is harvested it will be possible to more than triple the initial revenues to the state.

Shorter but still renewable concession tenures might also be advisable. GFC could then more easily remove indebted concession holders and replace them with profitable investors as these short timeframes elapsed. In addition, more regular formal

monitoring (at the beginning and end of short concession timeframes) would improve monitoring for sustainable forest management.

Bringing illegal chain saw logging under control is perhaps the major challenge for the forest sector. The simplest option is to harness their high levels of productivity and flexibility within small but no less rigorously monitored concessions. To derive more recovery from chainsaw ripping, boardmills rather than free hand ripping could be promoted. A culture of resawing could be initiated. Chainsaws could be used as prime saws, cutting cants to be resawn at lumber dealers with band saws, thereby increasing both the productivity and the recovery of the chainsaws in the concessions. This would push recovery rates with the chainsaw/thin kerf resaw over the 60% level (tests using the chainsaw/boardmill combination gave recovery rates of 54% cutting one inch material). This would allow those who cannot afford the more expensive portable mills to still take part in the sector and in light of the profit potential, eventually develop their business to be able to expand to a larger portable milling operation.

Given the profit potential, portable milling allows specialisation in either logging and milling or value added, a privilege not afforded to traditional millers who either have to vertically integrate upwards or close their milling operations and just log, as the cost data shows.

4.2 Expanding local employment opportunities

Given the concentration by large concessionaires on log exports, there has been a shift away from employment in sawmilling and value added sectors. This is further exacerbated by the lack of supply of sawn timber to the value added sector that has seen most large operators operating at less than 50% of their capacity and has restricted the entrance of new investors in the sector – clearly no potential investor in value added will do so with the present lack of availability of raw material to process. The clearest example of this shift in focus is in the case of Purpleheart production from domestic utilisation to log exports within a three year period highlighted above losing 462 jobs.

By comparison, small portable technology operations tend to be more labour intensive, especially in the forest operations given that the use of farm tractors require the hand cutting of roads. In addition all access and feeder roads are hand cut and all loading and material handling is by hand. Forestry Commission figures point to total employment in the forest sector of 15,000 people, with 75% employed in SFPs, the major operators of portable technology. With more land given over to SMFEs, the viability of portable milling operations vs. log exports will mean that more people are employed in at least the additional activity of sawing lumber rather than just exporting logs. In addition the increased availability of sawn lumber for the value added woodworking sector will allow increased investment and therefore employment in this sector. Thus the availability of land for SMFEs should be seen as a catalyst for dynamic growth throughout the whole forestry and wood sector, generating increasing revenues and employment in both.

An interesting case study is the village of Hubu on the Eastern Bank of the Essequibo River. This village has developed on the basis of thin kerf portable sawmills cutting for grade. Though being run in a stationary manner, their competitive advantage is that

they have a much higher volume and grade recovery rate than the traditional sash gang mills prevalent in Guyana (65% vs. 35% volume recovery and 65% vs. 50% grade recovery), utilise far less energy and less labour to operate. At present they are shutting the traditional mills in the area out of their traditional sawmill lumber markets, to the extent that the traditional millers in the area are buying the lumber from these operators wholesale and reselling the wood retail through their own outlets (the operators in Hubu do not own their own lumberyards unlike the traditional millers who are located closer to the markets). 50 people are directly employed in the village, working with the planers and nine portable mills.

These operators originally started with chainsaws in the same area ripping wood for furniture manufacturers and construction. They then expanded into portable mills. Many now have two mills and are buying a third unit. In addition three of the six operators have purchased moulders to add value to their product, albeit green, dressed lumber for local construction. Many are now actively seeking their own logging concessions instead of purchasing logs on the local market with the intention of operating their mills in a portable application once the concessions are granted. Given training, direction and some financial assistance such as low interest loans, it would not be difficult to upgrade these operations to do kiln dried flooring for the export market, once a reliable supply of logs could be ensured. That the transition and growth occurred over a four year period , in less than ideal conditions without any facilitation or outside intervention, illustrates the potential of the technology given active encouragement and facilitation.

It is important to note that this increase in employment is not in any way linked to a return to out-dated or intermediate technology. There is a win-win situation between improvements to technology and an increase in employment in this particular case.

4.3 More sustainable harvests

Portable mills are usually taken to within one km of the stump. This encourages harvesting of holed or defective stems which fall above minimum diameter limits but are normally left or discarded by traditional operations. The capacity to cut for grade makes harvesting such trunks viable – greatly increasing the profitability of operations per unit area.

In addition, species that would normally not be harvested due to extraction costs could become attractive to these operations. In a study of timber operations it was found that large concessionaires were only concentrating on three prime species, and that the further haul distances became, so to increased the tendency for this practice of high grading (pers. com. Peter Van Der Hout).

The use of thin kerf band mills with hydraulic log handling capabilities also creates a 50% increase in volume and grade recovery over traditional sawmilling technology used in Guyana – 65% recovery as opposed to less than 40%. Therefore, the use of this technology has the potential to double the recovery from scarce forestry resources without putting undue strain on individual species. Given the already poor nature of Guyana's forest resources anything that maximises both recovery, benefits and profitability will ensure that fewer trees have to be converted for a given operation to be adequately supported, or for companies to achieve a reasonable or sustainable profit.

The more profit that can be made from the allowable cut, the lower the incentive becomes to harvest above legal limits or concentrate on high value species.

There are arguments that mobile technology is much less easy to monitor and control than large static sawmills. But it is just as difficult to control the mobile logging equipment currently used by industry in its drive towards log exports. There have been many recent instances of illegal logging in Guyana where loggers have jumped each others boundaries or entered other areas either by intent or mistake to harvest logs.

In either scenario, careful use of log tagging, transport and export monitoring is vital. We are certainly not advocating any relaxation of the log tagging and monitoring requirements that keep illegal harvesting in check. Nor are we underestimating the demand for training in sustainable forest management that will be required from FTC to ensure that new small concessionaires abide by the highest standards. What we are saying is that the use of new technology will significantly increase GFC revenues which we would wholly expect to be used to enhance the monitoring for sustainability across Guyana's forest areas. Our argument is that illegal harvesting by chain saws and an under-resourced GFC with heavy dependency on a few large concessionaires represents the real threat to sustainable forest management in Guyana.

There is unaided development and growth of chainsaw ripping in Guyana – partly because it is so profitable. Stamping it out would be both difficult and counterproductive – because this method of harvesting is perhaps the only way of generating a reasonable profit in Guyana's forests.

Rather than trying to stamp it out efforts would be best placed in regularising it and encouraging a best practice approach to the technology. The use of portable mills with incentives for legal and well-managed operations is our suggestion - rather than regulations which have been, and will continue to be, ineffectual. The thrust of any coherent approach must be to diminish the profitability gap between legal and illegal logging and ensure that local demands for timber for value added processing can be legally met. At least some concessions must be geared to supplying the local value added processing using technologies that provide timber at competitive prices.

4.4 A strategy that suits Guyana's forest resource

Most of Guyana's more commercially available species are dense, dark and hard in nature. These properties lend themselves more to a high end flooring, decking and architectural moulding market. As can be seen in the attached costing sheets, the increased value created, coupled with the reduced production cost from the use of portable technology, has the potential for an extremely lucrative and sustainable industry. For the first six months of 2004, 34,000 m^3 of logs were exported for a value of US$3.84 million. If those logs had been converted to kiln dried, random length, end matched flooring, revenues of US$14 million and employment for a further 748 people could have been generated (see Molinos, 1995). If the sawn wood exports of 15,641 m^3 were added to this figure, a further US$12 million could have been generated. Extrapolating these figures to the end of the year would give a yearly income (from just these exports) to the sector of US$52 million, far outstripping the current contribution of even plywood (for the first six months of 2004 plywood exports were US$7.5 million).

We reject the pessimistic scenario of gradual declining income from an obsolete forest sector. It is clear that the sector can make a significant contribution to the development of the country. But it cannot do this if the status quo that has operated for the past 80 years is allowed to continue.

The potential of Guyana's forest sector has been cited ad nauseam. A plethora of policy documents already point out the direction that should be taken. The lack of change is a function of the vested interests of groups who benefit from the current situation to the detriment of Guyana.

What is needed is an holistic approach – linking appropriate forest technology to savvy marketing – a complete re-engineering of the whole process and value chain. Changes are needed throughout – they must span forest allocation, forest tenure, forest policy, harvesting, conversion technology, value added techniques, financing, training, grading and effective promotion of Guyana's forest products. To neglect any one part of the process will only impede the initiative and foster the continued decline of the sector.

The stewardship of the large concessions clearly leaves much to be desired. The current situation in which small processors have to buy logs from them for want of access to concession areas is a travesty of justice. This situation exposes those operators to economic suicide, given that supply is predicated on inefficient production and arbitrary pricing from a monopoly source. It would therefore be far better for all stakeholders involved, (especially given the indebtedness of the of the industry) for value added producers (current plus future) including the GMA Wood Sector Group to:

- Harvest re-allocated concessions and pay the state for the logs rather than compensate concessionaires for inefficient and outmoded operations.
- Finance small concessionaires with portable mills and the training to ensure adequate supplies at fair prices, once land is made available to them.
- Lobby the GFC/Government of Guyana to make more land available to small and medium size forest enterprises.

5. Conclusions and ways forward

The Guyana Forestry Commission has taken enormous positive strides towards the careful regulation and control of the forest sector in Guyana. Emphasis has been placed on large concessions with sufficient area to allow sustainable and economically viable harvest from annual blocks. This is understandable given the state of technology in place when the concession system was put in place. But globalisation and technological advance have changed the situation. Guyana needs to adapt if well-intentioned policies are not to underwrite an explosion of illegal chainsaw logging and collapsing economic returns to the government.

In light of our analysis above, we believe there is an opportunity to put forestry in Guyana back on the right track. This will require strong and immediate action. The priority actions that we have identified span the whole range of activities from forest allocation to marketing:

- Take back non performing or under performing large concessions. Indebtedness is a vicious circle that favours neither GFC revenues, industrial development or sustainable forest management. Break up concessions in arrears into smaller concessions and give them out to smaller SMFEs with new value added processing technology – especially where they are targeting local or regional markets.

- Invest in technological upgrading through a suitable tax incentive scheme for new equipment – plus access rights to forest land. Use the tax system to favour the types of mobile technology that would drive forward value added processing.

- Coordinate training programs with the Forestry Training Centre suitable for SMFEs.

- Increase the tenure of smaller concession types to a minimum of five years to ensure they are useful as collateral at all financial institutions to enable SMFEs to access financing. Reduce the tenure review period for larger concessions to allow more flexibility to address underperformance or over-harvesting.

- Establish a small loan development financing institution specifically to help with concessional development financing for SMFEs.

- Negotiate with certifying bodies such as the Forest Stewardship Council to push for group certification of smaller producers and community forests so that all certified forests are not premised on large areas with long tenures, thereby tying the hands of policy makers.

- Provide management and marketing training for SMFE operators to help them optimise their operations.

- Provide technical training in saw doctoring, tooling maintenance and machine set up to maximise efficiency and performance as part of a GFC extension service.

- Provide sawing training programs to ensure sawing decisions are based on value rather than volume.

- Develop mandatory Guyanese sawmilling and processing standards – phased in over a negotiated time frame – to drive up minimum milling standards in terms of quality, accuracy and recovery.

- Invest in product design through sponsoring participation in regional trade fairs especially in Brazil and the Caribbean Community and Common Market (CARICOM) region.

- Limit log exports leading to an eventual ban within a short time frame to promote in country processing.

- Establish a building code and standardised lumber sizes that tie in with other international standards to broaden the possibilities for export orientated growth over time.

- Establish uniform log, lumber and dressed lumber grading rules to ensure quality products and standards throughout the forestry sector.

- Establish a consolidation yard through private/public financing to link SMFEs to the more lucrative export markets. The consolidation yard would grade and buy in the rough sawn lumber and add value dependent on the market requirements. It would also provide training and extension services to upgrade the quality and safety of operations. On site training in value added processing (kiln drying, moulding, end matching, finger jointing, saw doctoring, tool maintenance) would be provided for technical institutes and potential investors in tandem with the yards operations. The consolidation yard would actively do the marketing and promotion of forest products for SMFEs. This could be the nexus between SMFEs and a viable export market.

- Conduct research into the properties and characteristics of Guyana's timber species to devise the best ways to optimise their sawing, drying, finishing and end-use applications. Match the products inherent characteristics to the markets.

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Annex 1. Typical production costs in Guyana

No.	Description	Conventional 40%	Logging	Portable 1	Conventional 60%	Conventional 50%	Portable 2
1	Pre-Harvest Planning	6.4	2.56	4.01	4.35	5.12	3.94
2	Main Road Construction	2.68	1.07	-	1.82	2.14	-
3	Feeder Road Construction	1.9	0.76	1.22	1.29	1.52	1.17
4	Landing Construction	1.6	0.64	1.02	1.09	1.28	0.99
5	Skid Trail Marking	0.98	0.39	0.63	0.66	0.78	0.6
6	Felling	3.13	1.25	2	2.13	2.50	1.93
7	Skidding	11.25	4.5	7.2	7.65	9	6.93
8	Landing operations	0.85	0.34	-	0.58	0.68	-
9	Sawing (Portable)	-	-	63	-	-	63
10	Loading	9.1	3.64	3.64	6.19	7.28	3.64
11	Trucking	20	8	8	13.6	16.00	8
12	Unloading	6.85	2.74	-	4.66	5.48	-
13	Road Maintenance	5.63	2.25	2.25	3.825	4.5	2.25
14	Logistics	8.55	3.42	-	5.81	6.84	-
15	Supervision	0.6	0.24	-	0.41	0.48	-
16	Cooks	0.58	0.23	-	0.39	0.46	-
17	Base Camp	4.4	1.76	-	3	3.52	-
18	Administrative Cost	0.875	0.35	0.56	0.6	0.7	0.54
19	Sawing Mabura	110	-	-	110	110	-
20	Royalty Fee	7.1	2.84	4.55	4.83	5.68	4.37
21	Acreage Fee	2.5	1	1.6	1.7	2	1.54
22	Loading	3.64	3.64	-	3.64	3.64	-
23	Transport to Georgetown	20	20	20	20	20	20
		228.615	**61.62**	**119.68**	**198.225**	**209.60**	**118.9**

Conventional harvesting and mill with 40% recovery rate log production cost delivered.

Notes on costings above

All the figures above were taken from the reduced impact logging studies carried out by Dr. Peter Van Der Hout, on behalf of the Tropenbos Guyana Program (Tropenbos - Guyana Series 6 – "Reduced Impact logging in the Tropical Rain Forest of Guyana. Ecological, Economic and Silvicultural consequences" – 1999) at Pibirri Field Station 37 km south of Mabura. The study and costs are premised on a best practice approach to logging that differs very little if any from costs in conventional logging. This area actually gave a yield of 31.5 m³/ha, but was adjusted to a more reflective logging intensity figure of 6.2 m³/ha (a median figure for average coupe rates for Guyana reported by several consultants) according to logging intensity tables found in the same study (Table 5.17, page 200). Details on how the initial costings were calculated/measured is contained in Appendix C of the same study. All costs were adjusted upwards by 6% to take into account a change in exchange rates that puts US$1 equivalent to G$ - G$190 – 202. It does not take into account inflation, other net present value calculations and increases in fuel costs.

Column 2 reflects the different costs associated in transporting 1 m³ of log to Georgetown. Column 1 reflects the cost of production of 1 m³ of lumber using a conversion efficiency of 40%. Therefore, logging costs from column 2 have been multiplied by 2.5 except for sawing at Mabura (yardstick figure for tropical forest sawmills as proposed by Hendrison in chapter 7.2.1 of PROFOR's Forest Operations and Business Assessment Study – 2002) and transport to Georgetown which is per m³ of sawn lumber.

Column 3 reflects costs of operating portable mills in the forest with enough heavy equipment to do its own road building regardless of terrain. With a conversion efficiency of 65% (conservative figure), only 1.54 m³ of log infeed to the mill is needed. Hence, all costs up to row 9 are multiplied by 1.54 except for landing operations which are included in the overall sawing costs already. From the sawmill only lumber is transported on smaller, dual use (20 – 25 ton gross weight as opposed to 70 ton GVW for most logging trucks) trucks. Because of the use of smaller, cheaper dual use trucks only feeder roads are needed to carry out the sawn timber. Loading costs should be much lower than with logging as the trucks would be fitted with loading cranes to load the lumber, rather than having a 966 loader waiting in the area, but costs have been left the same. There is no unloading or loading at Mabura as the lumber would be transported to Georgetown directly from the log landing already sorted, graded and strapped. The other omitted costs are rows 14, 15, 16 and 17 which are already included in the sawing costs. Realistically, each Woodmizer can produce 7 m³ of sawn timber per day by four to five people. A labour cost of US$21 m³ would give an income if equally distributed, of US$29.40 per day per capita for five labourers (G$5,938 – US$30). This is substantially above the cost Farfan and Mendes pay their operators who supply and cook their own food (actual figure US$12.60 m³ spread between four labourers.

Column 4 is based on the costs of a traditional stationary mill with a 60% recovery. As such 1 m³ of sawn timber would only require 1.7 m³ of log infeed. Log extraction and transport costs to Mabura's sawmill are therefore multiplied by that factor.

Column 5 is a conventional mill with a 50% conversion efficiency.

Column 6 is a portable mill operation using skidders and pre –existing road infrastructure.

N.B. All these figures are taken from a benchmark study conducted under as ideal and professional conditions as have ever existed in Guyana. Costs of other operators will vary as shown by the Landell-Mills study of seven concessions in the Essequibo region. Costs of logs per m³ delivered to the sawmill gate vary from as low as US$50 to as high as US$227 m³/ha, with a median cost of US$87.05 m³/ha. With an average sawmill gate price in 1997 calculated at US$57.71 m³, only two of the seven companies studied were profitable, and only with the removal of acreage and royalty fees. Clearly, there is great disparity in the extraction and operational costs based on variations in area conditions, road size and construction costs, repair costs etc. and hence the overall efficiency of each of these operations. The cost variation is increased even more as we use different processing technologies (portable vs. stationary technology) and varying rates of recovery from the log in terms of volume and grade of lumber. It is therefore clear that the log costs Freight on Board (FOB) Georgetown reported by both the FPA and in this study must be considerably higher given that both Barama and DTL are now pulling from over 90–150 km away from their Mabura/Buckhall through areas of high relief. Assuming that the log production costs were taken from Barama which uses a two machine skidding system comprising a D6H tracked skidder and a wheeled skidder which essentially doubles the skidding costs (NB. Skidding costs in the Reduced Impact Logging (RIL) study represented 15% of overall logging costs) and would therefore significantly increase the costs quoted by the FPA. In addition, all export logs suffer some losses during extraction and final delivery to the customer – export logs must be sap free and straight so sweep must be cut out. In addition there must be no holes or splits. Thirdly, they are shipped on flat racks which measure a maximum of 40 feet in length so have to be cut to fit in many cases. These losses, estimated to be around 30%, do not appear to be included in the FPA's calculations of log costs, or in the GFC's calculations on the sustainability of Purpleheart logging in Guyana.

Annex 2. Profitability of Guyana Manufacturers Association

GUYANA MANUFACTURERS ASSOCIATION – WOOD SECTOR

PROFITABILITY IN G$										
	Logs	1	Logs	2	Logs	3	Logs	4	Logs	5
Green rough sawn (local)	145	21.89	116	40.91	99.25	46.86	88.36	134.85	88.36	144.85
KD Flooring at $1.50 per Board Metre (BM)	145	165.26	116	184.28	99.25	195.81	88.36	286.10	88.36	296.10
a) KD, EM Flooring $1.80 BM	145	215.03	116	234.05	99.25	245.42	88.36	338.35	88.36	348.35
b) KD, EM Flooring $2.00 BM	145	267.23	116	286.25	99.25	297.62	88.36	393.35	88.36	403.35
c) KD,EM, Flooring $2.20 BM	145	319.43	116	338.45	99.25	349.79	88.36	448.35	88.36	458.35

KD: Kiln dried EM: End matched

1) Stationary mill with 40% conversion efficiency – i.e. 2.5 m³ of logs in-feed to 1 m³ lumber. 62% A grade recovery, 38% B grade.
2) 50% - i.e. 2 m³ log in-feed – 1m (cubic) lumber. 62% A grade recovery, 38% B grade
3) 60% - i.e. 1.7 m³ log in-feed to 1m (cubic) lumber. 62% A grade recovery, 38% B grade.
4) Portable mills in log markets with 65% recovery – 1.54 m³ of log in-feed to 1 m³ of lumber.
5) Recovery as per #4 but assuming operation is in an area where there is a pre-existing road infrastructure, e.g. along Puruni or Madhia roads.

a) b) c) - Effect of different product pricing on each form of log conversion.

Annex 3. Notes on floor costing

1 m³ of boards = 424 board feet

Conversion efficiency m³ lumber			**-**	**logs**
40%	-	1 m³ lumber	-	2.5 m³ logs
50%	-	1 m³ lumber	-	2 m³ logs
60%	-	1 m³ lumber	-	1.7 m³ logs
65%	-	1 m³ lumber	-	1.54 m³ logs

Grade Recovery per m³ of Sawn Lumber/424 Board Feet (Bd/Ft)

1)	62%	A grade recovery	=	262 Bd/Ft
	38%	B grade recovery	=	161 Bd/Ft
2)	65%	A grade recovery	=	275 Bd/Ft
	35%	B grade recovery	=	149 Bd/Ft

All calculations for sawn lumber, kiln dried moulded flooring, kiln dried end matched flooring were calculated per m³ of sawn lumber with only A grade lumber being used for flooring and B grade being sold for US$0.40 locally in green rough sawn calculation.

The costs for kiln drying, moulding and end matching are as follows per board foot.

Kiln Drying	-	US$0.15c
Moulding	-	US$0.12c
End Matching	-	US$0.08c

Therefore, an example of calculating the profit derived from kiln dried end matched flooring using portable mills would be:

Portable Mill Recovery 65% lumber	=	1.54 m³ of logs per every 1 m³ of
A grade recovery	=	65% or 275 board feet

B grade recovery		=	35% or 149 board feet		
Price per board foot for kiln dried end matched flooring				=	US$1.80
					US$
Revenue	A Grade	=	275 x 1.80	=	495.00
Revenue	B Grade	=	149 x 0.40	=	59.60
					554.60
Sawing cost delivered to Georgetown - m³				=	120.00
Kiln drying cost		=	275 x 0.15	=	41.25
Moulding cost		=	275 x 0.12	=	33.00
End Matching cost		=	275 x 0.08	=	22.00
Profit per m³				=	**338.35**
					======