

**“Developing alternatives for illegal chainsaw lumbering through multi-stakeholder dialogue in Ghana and Guyana”**

European Commission programme on Tropical Forests and other Forests in Developing Countries

**Report on Regional Workshop on Chainsaw Milling, Ghana**



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## ACRONYMS

AAC	Annual Allowable Cut
CFA	Community Forest Association
CFMA	Community Forest Management Association
CSL	Chainsaw Lumbering
CSM	Chainsaw Milling
DBH	Diameter at Breast Height
DFS	District Forest Service
DOLTA	Domestic Lumber Traders Association
ETFRN	European Tropical Forest Research Network
EU	European Union
FAO	Food and Agriculture Organisation
FC	Forestry Commission
FD	Forestry Department
FDA	Forest Development Authority
FDF	Federal Department of Forestry
FITC	Forestry Industry Training Centre
FID	Forest Inspection Division
FLEGT	Forest Law Enforcement, Governance and Trade
FMC	Forest Management Contract
FORIG	Forestry Research Institute of Ghana
FRMCP	Forest Resources Management and Conservation Programme
FSD	Forest Service Division
FTCI	Forestry Training Centre Incorporated
GFC	Guyana Forestry Commission
GTMO	Ghana Timber Millers Organisation
ICDC	Investment Credit Development Corporation
Iwokrama	Iwokrama International Centre for Rainforest Conservation and Development
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forest Service
KIFCON	Kenya Indigenous Forest Conservation Programme
KWS	Kenya Wildlife Service
LCDS	Low-Carbon Development Strategy
MFW	Ministry of Forestry and Wildlife
MLG	Ministry of Local Government
MTS	Modified <i>taungya</i> system
NFA	National Forestry Authority
NPFD	Non-Permanent Forest Domain
PFD	Permanent Forest Domain
PFE	Permanent Forest Estate
PFM	Participatory Forest Management
PRS	Poverty Reduction Strategy
RWE	Round-Wood Equivalent
SAP	Structural Adjustment Programme
SFP	State Forest Permission
SLA	Small Loggers Association
SSV	Sales of Standing Volume
TRP	Timber Recovery Permit
TSC	Timber Sales Contract
TUC	Timber Utilization Contract
TUP	Timber Utilization Permit
UNSC	United Nations Security Council
USD	United States Dollars
UWA	Uganda Wildlife Service
VAT	Value Added Tax
VPA	Voluntary Partnership Agreement

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Special thanks go to Prof. A.A Oteng-Yeboah for excellently chairing the workshop and other Project Advisory Committee members for your support.

We are indebted to all participants for your presence and rich contribution especially during the group discussions.

Finally, we wish to thank Tropenbos International Ghana staff for your support in the organisation of this workshop.

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## SUMMARY

The international workshop on CSM for West Africa region was successfully held from 25-26 May 2009 at Erata, Hotel, Accra, Ghana. The workshop is part of planned activities to determine international best practise for policies to address illegal CSM. The general aim of the workshop was to learn from country experiences on how CSM issues have been addressed and establish best practices of addressing CSM in Ghana

The workshop was attended by a total of 65 participants made up of decision makers, scientists, forest resources managers, forest concession holders, traditional authorities, civil society and the media from Ghana, Guyana, Nigeria, Liberia, Cameroon, DR Congo, Kenya, Uganda, South Africa and the Netherlands. Twelve presentations including eight country reports on CSM situation were presented by Ghana, Guyana, Liberia, Nigeria, Cameroon DR Congo, Kenya and Uganda. The presentations were followed by plenary and group discussions. The group discussions were guided by questions covering policy, monitoring, technology, livelihoods and conflict management issues.

### ***Workshop conclusions***

CSM is widespread in countries with all manner of timber resources availability, socio-economic conditions and forest development. The origin and drivers of CSM are the continues weakening of the formal timber industry, neglect of the domestic market, dwindling forest resources which makes large investment in logging irrational, easy entry by chainsaw operators, unemployment and local people's option for addressing issue of equity in forest resources use which they perceive missing in conventional logging.

The trend of CSM appears to be increasing in all countries both timber resources poor and rich in terms of volumes of harvested trees and number of people involved. Chainsaw lumber is going beyond the domestic market to newly discovered external markets (e.g. from DR Congo to Kenya, Ghana to Mali, Burkina Faso and Niger, and Nigeria to Chad and Cameroon). Countries such as Ghana and Uganda are also serving as transit for chainsaw lumber from Ivory Coast and DR Congo respectively.

There are different policies by the countries to address CSM. It is legal, but controlled and supported in countries such as Kenya, Uganda, Cameroon, DR Congo and Guyana, while it is illegal in Ghana and some states in Nigeria. In Liberia, the policy is silent on CSM.

Effective policy implementations are rare. Where legal, it's associated with widespread abuse and illegalities. Where illegal, regulation is difficult and compromised. Nigeria is the only country where control is better in states where it's legalised.

In all the countries whether legal or illegal, CSM is important source of livelihood and provides economic opportunities for both rural and urban population. Benefits are widely distributed and the view that it may be one of the few opportunities for rural livelihoods is not strongly supported.

Best practices are few and include; licence from state (Guyana and some states in Nigeria), payment of stumpage and taxes (Guyana, Nigeria, and Uganda), direct negotiation with tree owners (Kenya), formation of associations and self regulation (Nigeria), use of attachments (Uganda) and Multi-stakeholder Dialogue (Ghana)

For the future outlook, CSM will be sustainable for timber resource rich countries provided the right policies are implemented. The implications of dwindling timber resource give artisanal logging a better future outlook than conventional logging. As timber resources dwindle tree plantations, fragmented forests, farm and solitary trees etc. will become important source of timber and this will make conventional logging less attractive

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### ***Workshop Recommendations***

Opportunity should be created for legalised, but controlled environment rather than total ban. Eradicating CSM completely will be difficult to achieve. CSM is important; both as a supplier of lumber to the domestic market (e.g. 80% in Ghana) and provide economic opportunities for people in both rural and urban areas. The size of the domestic market available to chainsaw lumber should be reduced through interventions including taxing chainsaw millers and dealer to reduce their profit margin.

Before legalising CSM in countries such as Ghana, Liberia and some parts of Nigeria an inventory of the timber resource base should be undertaken to properly calculate the Annual Allowable Cut (AAC) and subsequently the maximum number of chainsaw operators that can be accommodated. The chainsaw operators should be organised into associations and trained in the use of improved technology rather than the free hand method.

The benefit sharing on timber resource outside forest reserve in some countries should be reviewed. The tree tenure system in some countries (e.g. Ghana) does not benefit the farmer who nature and protect trees growing on their farms. This is disincentive and the farmers either destroy the trees or illegally sell them. Communities should be empowered and involved in the management and monitoring of the timber resources.

In countries where timber resources are dwindling, overland export of chainsaw lumber should ban. Where possible overland export should be formalised with the sawmill industry.



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## 1.0 INTRODUCTION TO THE WORKSHOP

### 1.1 Background

The European Union (EU) Chainsaw project '*Developing alternatives for illegal chainsaw lumbering through multi-stakeholder dialogue in Ghana and Guyana*' is implemented in Ghana and Guyana by Tropenbos International (TBI) based in the Netherlands, through its local partners: Forestry Commission (FC) and Forest Research Institute of Ghana (FORIG) in Ghana, and Forestry Training Centre Incorporated (FTCI) and Iwokrama International Centre for Rain Forest Conservation and Development (Iwokrama) in Guyana

The project focuses on the broad theme of forest governance in Ghana and Guyana which are countries with a high incidence of illegal CSM. In many local and indigenous forest dependent communities, CSM is an important means of livelihood. It is also the main supplier of lumber to the domestic market. The simplicity of CSM also facilitates illegal operations leading to conflict with legitimate forest users. CSM is currently banned in Ghana, while in Guyana, it's legal.

The project seeks to use multi-stakeholder dialogue for developing alternatives for illegal CSM. It targets stakeholders concerned with or affected by CSM and use methods that enable direct communication and discuss issues using a structured dialogue. The dialogue is expected to provide a forum for stakeholders that rarely meet to influence national policy and participate in policy reforms that address their concerns.

The project objectives are to reduce poverty and promote viable livelihoods in forest-dependent communities, reduce the occurrence of illegal logging and promote the conservation and sustainable management of tropical forests. The specific objective is 'level of conflict and illegality related to chainsaw lumbering by local communities reduced'. The expected results are:

- Causes and consequences of CSM and links with illegality understood (National Level);
- Internationally best practice determined to address CSM (International Level);
- Multi-stakeholder learning platforms established to discuss CSM issues (National Level);
- National Consensus achieved in Ghana and Guyana about issues regarding CSM using an institutionalized mechanism for permanent dialogue between stakeholders (National Level); and
- Communities dependent on CSM producing timber in a regulated and sustainable way (Local Level).

In Ghana, the project is being piloted in eight forest districts (Goaso, Sunyani, Juaso, Nkawie, Kade, Oda, Begoro and Assin Fosu) and in Guyana, in three communities (Surama, Ituni and Orealla). The project's stakeholders include: national government agencies dealing with forest, tax and law enforcement; regional and district governments; suppliers and downstream industry of chainsaw lumber; affected owners and right holders of forest resources; the "regular" sawmilling industry and community forestry organizations. At the international level, forestry decision makers will also be targeted.

### 1.2 Workshop Objectives

The workshop is part of planned activities to determine international best practise for policies to address illegal CSM (results 2). The objectives of the workshop were to:

- Share state-of-the-art information and analysis of experiences with and approaches addressing; CSM in West Africa among an international audience;
- Discuss the issues and make recommendations on possible policy options and models for aligning the practice with sustainable forest management and rural livelihoods;
- Present the case studies of Ghana and Guyana to a wider audience, and,
- Broaden the understanding of the practical perspectives gained in the case studies.

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### **1.3 Workshop Methods**

The workshop was in three sessions (annex 1). The first session was made up of twelve presentations including eight country reports on CSM situation from Ghana, Guyana, Liberia, Nigeria, Cameroon DR Congo, Kenya and Uganda. After each country presentation, an opportunity was given to participants for questions/clarifications and comments. Key issues that came up from the country reports were also discussed. The other four presentations were:

- Workshop objectives and expected outputs;
- The global picture of chainsaw lumber production;
- Overview and update on the EU Chainsaw project; and
- Efficiency in recovery using chainsaw with various attachments.

The second session involved group discussion. Participants were put into three groups based on the backgrounds and nationality. Each of the groups discussed the same set of issues. The group discussions were guided by questions covering policy, monitoring, technology, livelihoods and conflict management issues relation to CSM.

The outcomes of the group discussions were presented at the plenary session for questions/clarification and comments from participants. The outputs from the group discussions were summarised and presented at the closing ceremony.

### **1.4 Expected Outputs**

The first set of output of the workshop was an overview of chainsaw lumber production in Africa with respect to:

- policy and legislation
- resource management (allocation) with respect to CSM
- challenges to policy implementation
- multi-stakeholder processes for managing competing claims on forest resources
- new and improved technologies for chainsaw lumber production

The second set of outputs from the workshop was:

- to learn of best practices with respect to chainsaw lumber production and marketing
- to come up with policy recommendations regarding the future of chainsaw lumber production
- a publication on workshop proceedings
- a synthesis paper (issues and options) for Africa and the Guiana Shield

### **1.5 Workshop Attendance**

The workshop attracted sixty-five participants (annex 2) made up of decision makers, researchers/academia, forest resources managers, concession holders, traditional authorities, civil society, representatives from European Union, sawmillers, lumber brokers, chainsaw operators, dealers in chainsaw machines and accessories and media. Eleven of the participants came from Liberia, Cameroun, Nigeria, Kenya, DR Congo, Uganda, South Africa, Guyana and the Netherlands. The high level of attendance shows the willingness of stakeholder to participate share lesson on illegal CSM issues.

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## 2.0 Opening session

### 2.1 Chairman's Remarks

The chairman, Prof. A.A. Oteng Yeboah thanked the EU-Chainsaw project for the opportunity given him to the chair the workshop. He remarked that CSM issues have assumed international dimension. He therefore urged participants to share experiences discuss the issues and make recommendations for policy options to address the problem and sustainably manage the forests in African. He welcome all the participants especially those from outside Ghana.

### 2.2 Welcome Address

*Marieke Wit, Overall Coordinator, EU chainsaw project, Tropenbos International, the Netherlands*

Mr Chairman, Officials from the FC, Ladies and Gentlemen, TBI wants to thank you all for coming to this workshop, share your knowledge, expertise and views on CSM and domestic timber supply.

TBI is an organisation that wants to contribute to the better use and governance of tropical forests for the benefit of people, conservation and sustainable development. We do that, by making knowledge work for forests and people, contributing to well-informed decision making for improved management and governance of tropical forests.

Timber production and trade is taking place in an increasingly globalised economy, requiring actions at different levels; local, regional and international. The attention of the international community has focussed for a long time on the international timber trade. Even though these efforts like legalisation and certification of international timber markets are encouraging, the experience is that, the focus is not enough to avoid ongoing deforestation and degradation.

In many tropical countries, the amounts of timber traded at local and national markets often exceed the quantities supplied to international markets. CSM is the main supplier of these local markets, providing it with cheap wood and at the same time providing rural people with livelihood opportunities in areas where employment is scarce.

To fill the knowledge gap on domestic timber supply, TBI started an EU-funded project on CSM in Ghana and Guyana, together with local partners. In Ghana we work with the FC and FORIG and in Guyana with the FTCI and Iwokrama.

In Ghana CSM is banned, while in Guyana it is regularised to improve local livelihoods. In both countries 80% of the local market is supplied with chainsaw lumber. So, CSM is clearly catering for a need and is responsible for the processing of significant and increasing amounts of timber in the tropics, inside and outside forests, on- and off-reserve, legal and illegal.

The EU's action plan on Forest Law Enforcement, Governance and Trade (FLEGT), is the EU's response to the problem of illegal logging and trade. Ghana has been the first country to sign a Voluntary Partnership Agreement (VPA) with EU, last year September. In principle this VPA focuses on the timber trade with the EU, but Ghana has included production for the domestic market in this agreement. This poses numerous challenges, because at this moment this market is fuelled with 80% illegal chainsaw lumber. How should we address this issue without loosing the socio-economic benefits of the CSM practice to local people?

Should we stronger enforce the ban or is it time to review it? In that respect, I heard a very nice example from Guyana. One president in the 1980s wanted to promote locally produced bread. So he decided to ban the import of flour. The result of this banning was not the promotion of locally produced bread, but the start of an illegal trade in flour: people just wanted to eat their daily bread. Clearly this ban was not effective and lifted after four years.

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But how should a potential policy reform process take place so that the negative aspects of CSM are addressed while the positive ones maintained? A multi-stakeholder dialogue in which all stakeholders participate in decision making should be the basis for this process, of course fuelled with sound information. Our project is taking this approach.

And how can the increasing local demand for timber addressed in a legal way? Apart from increasing sawmill supplies, plantations and wood imports; Ghana has suggested the installation of Mobile Recovery Teams, as a way to supply the local markets. These teams, consisting of chainsaw operators, would work with timber concessionaires to exploit trees that concession holders have no interest in processing themselves. They would also collect logging residues and abandoned logs and trees at development sites.

Ghana's forest reserves account for 1.6 million ha, about 6.5% of Ghana's land area, and they are already heavily degraded. Looking at the AAC for the forest reserves of 500,000 cubic metres, I wonder how much cubic metres the Mobile Recovery Teams are envisaged to recover from these reserves, as a percentage of the local demand (which was estimated at 2.4 million m<sup>3</sup> by FORIG). Uganda has an AAC of 200,000 m<sup>3</sup> with 5 million ha of forests. So will this be a sustainable level? And how do we control the operations of the chainsaw operators in these concessions? Will that be the responsibility of the concession holder or of the FC? A lot of challenges ahead that should be addressed before opening up Ghana's forest reserves to chainsaw operators. Otherwise this solution might lead to further forest destruction.

If off-reserve trees are getting increasingly more important, what strategy should be followed to promote off-reserve tree growing? The present tree tenure system in Ghana is hampering tree growing on farms. Tree ownership and management rights are vested in the state and the financial benefits of timber revenues are exclusively for the District Assemblies and traditional authorities, not for the farmers on which lands the trees grow. In this situation farmers do not have any incentive to grow and protect trees on their lands. The case study from Kenya, where the forest cover has been reduced to less than 2 percent and exports are banned, gives a nice example of a trend where farmers invest in trees as a kind of savings banks, because of the direct benefits to the farmers.

In short, what measures or options would be appropriate to address the problems associated with CSM? With this workshop we want to collect the experiences in the region and learn from each other. The identification of issues and options should lead to the promotion and incorporation of beneficial policies and the abandonment of counterproductive ones.

Results from this workshop and the regional workshop in Guyana (in July), will be put forward in an international E-discussion (a managed discussion on the Internet), and later-on presented in a publication on Domestic Timber Supply of the European Tropical Forest Research Network (ETFRN).

I wish you a very pleasant stay in Accra and a very good and productive workshop.

Thank you

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### 3.0 Country reports presentation

#### 3.1 Chainsaw Logging in Liberia: A Country Report

Aiah Lebbie<sup>1</sup>, Hugh Blackett<sup>2</sup>, Emmanuel Marfo<sup>3</sup> and Francis Odoom<sup>4</sup> <sup>1</sup>Environmental Foundation for Africa, Monrovia, Liberia <sup>2</sup>Forestry Consultant, Kuala Lumpur, Malaysia <sup>3</sup>Forestry Research Institute of Ghana (FoRIG) <sup>4</sup>IUCN, Monrovia, Liberia

##### **Background**

Liberia lies within the Upper Guinea forest block, containing a significant area of moist forest in the sub-region. This block of forest is considered to be one of the most important forests for global biodiversity conservation (Meyers *et al.*, 2000), and a significant portion of this forest is found in Liberia, where it is divided into two blocks. Currently, Liberia contains just below 40 % of the remaining forest block in West Africa. According to Forest Development Authority (2007a) 36 % of Liberia's land area is covered in forest, comprising of 2.4 million ha of closed dense forest and 1.0 million ha of open dense forest. An estimated 22.3 % of Liberia's forest was lost between the years 1990-2005 (FAO, 2006). The endemic plants and animals in this region are threatened by deforestation/habitat loss, fragmentation and over-exploitation especially logging (Poorter *et al.*, 2004).

The forest of Liberia is rich in both plant and animal species, with several endemic species recorded. Important animal species include Liberian mongoose (*Liberictis kuhni*), pygmy hippopotamus (*Hexaprotodon liberiensis*), jentink's duiker (*Cephalophus jentinkii*) and Diana monkey (*Cercopithecus diana diana*), to name a few (Waitkuwait, 2003). However, most of these animals are threatened through habitat loss and the increasing trade in bush meat. While some efforts have been made in protecting these species through setting up of a protected area network, effective management undermines the long-term survival of these species. This has been largely exacerbated by the civil conflict that gripped the country in the 1990s.

Forest inventory in Liberia dates back to 1960-1967, and since then no comprehensive inventory of the forest resources has taken place. Logging in Liberia dates back to the conclusion of the first forest inventory, when the total volume of timber was estimated at 80 Million m<sup>3</sup>. The annual allowable timber harvest was estimated at 3.2 million m<sup>3</sup>, to be harvested in concessions on a 25 year cycle (NBSAP, 2004; FAO, 2004).

Formerly, logging was based on allocation of concessions to logging companies and in 2004 there were 72 companies claiming the rights to concessions extending to over 5.5 million ha, many of them apparently overlapping as claims were two and a half times the area of actual forest (Rochow *et al.*, 2007). To resolve the chaos, concessions were examined and this revealed that no company could meet simple criteria demonstrating the legal right to log (Woods *et al.*, 2008). In line with recommendations by the committee, the President, in 2006, declared all concession agreements to be null and void.

Liberia's timber processing capacity is rudimentary with a number of very basic sawmills in operation. A plywood mill was operated by the Oriental Timber Corporation, but was looted and destroyed in 2004. The principal forestry activity in Liberia has always been logging with limited development of timber processing industries. During the mid 90s exports expanded sharply and in 2000 the forestry sector contributed about US\$100 million to the total gross domestic product of US\$450 million (Greenpeace, 2002). By 2002 it was assumed that timber export revenues were at least US\$146 million and possibly as much as US\$180 to 200 million (United Nations Security Council, 2003).

Reforms now being implemented are that Timber Sales Contracts (TSC) or Forest Management Contracts (FMC) are being awarded through competitive tender. The TSC is intended to cover small areas of about 5,000 ha in off-reserve areas, which are destined for conversion to agriculture, have tenure of three years and will be awarded to companies having at least 51% Liberian ownership. The FMC will cover areas from

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50,000 to 400,000 ha to be managed for long-term sustainable production. Tenure will be 25 years and, if the area is greater than 100,000 ha, may be awarded to a foreign company.

In 2003, in response to protracted civil wars between 1989 and 1996 and again from 1999 to 2003, the United Nations Security Council (UNSC) imposed a timber export ban because of the lack of any effective forest authority. This was an effort to curtail financing of illegal arms trafficking linked to continuing instability in Liberia and in neighbouring Ivory Coast and Sierra Leone. The ban was repealed in 2006 when Liberia was judged to have met conditions requiring forest sector reform.

It was recently estimated that about 2,200 people are employed in the sector and the 2009-2011 Poverty Reduction Strategy (PRS) reported the sector's contribution to the economy in 2007/08 fiscal year as US\$526,000. The projected revenue for the current year is US\$22.4 million, which would make the sector extremely important to the Liberian economy. The Forestry Development Authority (FDA) is charged with management of Liberia's forests, in both forest reserves and off-reserve.

### ***Policy and legislation on chainsaw lumber production***

There has been no formal policy on CSM in Liberia, an activity that owes its origin to the 2003 UN Sanctions on Liberia that effectively put a stop to the export oriented logging industry. As the country emerged from a costly and destructive civil conflict, the need for lumber to meet the rising demand in the construction industry led to business with people taking advantage of the opportunities that was presented to them. Business people with access to chainsaws quickly moved into communities and negotiated access to forests and began supplying lumber on the market. The state, through FDA, moved to put a ban on this activity, making CSM illegal in the natural forest of Liberia. But the market demand propelled the activity to the extent that the government, even though it recognized it as illegal, issued waybills to enable it collect revenue on trucks conveying timber into the Monrovia market. CSM is currently one of the most important land-use issues and has provoked intense discussion between Liberia and its development partners because of the unregulated and indiscriminate manner in which the activity is conducted.

The lack of enforcement of the relevant legislation sent out a clear signal that the government was not concerned. The practice of collecting fees and issuing a waybill, for what is strictly an illegal activity, has strengthened the view that CSM is a legitimate activity. Now CSM is conducted with complete impunity, knowing that no enforcement action will be taken, or in the belief that it is in fact legal. Other than collection of fees for transportation, no attempt has been made to implement a fiscal regime that is consistent with the one established for commercial logging. Immunity from such charges, which represent a realistic economic rent, has made CSM extremely profitable, and there is now a strong incentive for people to invest in the sector, which has resulted in its rapid expansion.

Currently, CSM pay informal charges to community leaders or local government authorities for right of access and right to harvest. Cash is collected from chainsaw millers either directly by communities or by county authorities. Alternatively, many communities negotiate for a proportion of the planks produced by chainsaw Millers to be donated in lieu of cash. Payments negotiated may include an initial amount in return for access rights and subsequent payments based on production. Cash or planks received may then be used to fund local development projects.

At present the only official fee paid by chainsaw Millers to government is for a waybill authorizing transport of planks to Monrovia, for which FDA levies a charge of US\$0.60 per plank. No fee is charged for timber transported elsewhere. The charge is irrespective of species or dimensions, which is inconsistent with the basis of the current fiscal regime structured on category of species and volume of wood.

### ***Distribution, marketing and organisation chainsaw lumber trade***

In each of the 15 counties of Liberia, CSM is ongoing, although some counties contribute significantly to the trade in lumber. At present, CSM is confined to the most accessible areas of forest, and it is concluded that most logging takes place within 5 km off a road. Even areas designated as FMC and TSC are

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accessible to chainsaw Millers, making a large proportion of Liberia's forests vulnerable to chainsaw Millers.

It has been estimated that between 240-260 timber traders exist in Liberia, with an average monthly sale volume of 27.3 m<sup>3</sup> per trader (Blackett *et al.*, 2009). Thus, the total volume of timber traded annually is estimated to be between 86,000 m<sup>3</sup> and 201,000 m<sup>3</sup>. A comparative estimate by Whiteman (2005) used the average African consumption of sawn timber per person to be 0.02 m<sup>3</sup>. With a population of about 3.49 million in Liberia, this would put demand at about 69,800 m<sup>3</sup>. But this estimate is believed to be low timber poor countries of the Sahel will lower the average, as well as the current construction boom in Liberia might not have been captured in such estimate (Blackett *et al.*, 2009). A median value of 140,000 m<sup>3</sup> (which is twice the African consumption), was suggested as plausible.

Chainsaw Millers normally operate in partnership with a trader and supply to order, although it can happen that loads of timber are brought to Monrovia or other markets and offered on spec to timber traders. Harvesting is generally authorized within a loosely defined area agreed between loggers and either communities or county authorities. Within these areas, loggers select trees for felling, or a specific number of trees may be defined or identified within the agreement.

The supply chain starts at the point of harvesting, where the harvested tree is crosscut into 14 ft logs, which are then squared and ripped to produce planks. CSM groups are harvesting and processing 10.1 trees per week on average per saw and producing about 170 planks with a volume of 9.1 m<sup>3</sup>. After planks are produced they are carried to point of loading by carriers paid an average of L\$37 per plank. After accumulation of a load, normally 500 planks or about 24 m<sup>3</sup> of wood, transport is arranged and the lorry is loaded for dispatch to destination. The average trucking distance to Monrovia is 178 km. In Monrovia timber is delivered to the trader as ordered, where it is normally sold in the sizes delivered, but may be re-sawn and sold in smaller dimensions.

It has been estimated that in Liberia, as many as 70 % of the chainsaw operators claim to own their own saws (Blackett *et al.*, 2009), operating as free agents, but harvesting to order under contract to a trader, who may or may not provide financial backing (e.g. supply of chainsaws, fuel and food). Approximately 59 % of traders reported that they own chainsaws, some of which may be provided to contracted chainsaw Millers, while 42 % of the traders directly employ chainsaw Millers. The strong linkages between chainsaw Millers and traders mean that control is ultimately with the timber traders and is widespread with possibly as many as 560 traders in operation.

CSM and timber trading are undoubtedly profitable and therefore attractive business options. The lack of regulation and enforcement and the willingness of communities to allow access to forests mean that, while there are still trees to harvest, there are no barriers to CSM. The vast majority of the traders from different backgrounds (including businessmen, farmers, teachers and a police commander) are unaware that CSM was illegal. All the traders are therefore taking an opportunistic approach and getting involved in a profitable business option.

Blackett *et al.* (2009) indicated that due to the widespread involvement of people in many small operations, no particular group is in overall control of CSM in Liberia. Traders were not forthcoming with information on ownership and organization, as well as the involvement of powerful forces. The fact that communities indicated that logging was undertaken without their consent, it is possible that powerful supporters of chainsaw Millers might be putting pressure on communities to allow the activity unhindered. This would suggest some possible corrupt control and ownership practices in the trade.

### ***Changes in methods of production over the years***

CSM in Liberia evolved from what was traditionally known as pit-sawing, which was prevalent prior to the civil conflict which started in 1989. As the war came to an end and reconstruction efforts were underway, the high demand for timber could not be met by the traditional pit-sawing method. The introduction of

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chainsaws quickly picked up and has become the dominant means of processing logs into timber in Liberia.

Currently, the skills and techniques applied in CSM are rudimentary, involving the use of chainsaws for felling or planking, with the additional use of a guide bar for planking. A vast majority of chainsaw Millers use guide bars as a technique that ensures some reasonable quality of board, consistency in dimensions and reduction of waste. A small number of millers using "free hand" (no guide bar used) produce planks of poorer dimensions and stability.

Current practice among chainsaw millers is to produce planks of 14 ft in length and a thickness of 2 ins. The widths of most planks produced are 8 and 10 ins. Logs that are shorter than 14 ft in length are discarded. Of all boards produced about 80 % are of 2 ins thickness, thus minimizing the amount of processing in the forest.

According to Blackett *et al.* (2009) recovery of sawn timber from round-wood ranged from 22 % to 44 % with an average of 31 %. The conversion efficiency for 14 ft log lengths was around 35 %, but comparable rates from Ghana are around 34 % and 47 %. This shows that there are possibilities to improve on the current recovery rates in Liberia if other techniques involving milling attachments like Logosol are used (Marfo *et. al.*, 2009).

### ***Impacts of chainsaw lumber production.***

#### ***Social***

Taking into account the estimated consumption of timber, an average production per saw of 9.1 m<sup>3</sup> and an average of 8 workers per production, Blackett *et al.* (2009) estimated that between 1,590 and 3,850 people are engaged in CSM in Liberia. In the communities that CSM is carried out, the principal occupation of community members is plank carrying from stump to loading points, but there are also many engaged as helpers and chainsaw operators.

According to Blackett *et al.* (2009), the key livelihood activity in most communities is slash-and-burn agriculture. Communities have also benefited from the presence of chainsaw millers, and key projects that have benefited are wide ranging. Common among these are construction and repair of schools, town halls/*palava* huts, roads and bridges, clinics and toilets. Other activities also include petty trading especially the sale of manufactured goods, video clubs, trading palm wine, gasoline and carpentry.

Farmers are deriving a two-fold benefit from CSM. Current CSM in both mature and salvaged forests results in the removal of the large diameter trees, making it easier for farmers to move in and clear the remaining trees with traditional implements like cutlass. In addition, farmers are actually making use of the services of chainsaw millers to fell down all trees on their farm. Most farmers indicated that farm sizes would remain small and laborious if they were to rely on traditional implements such as cutlass and axes to clear the land for farming. In Bopolu District, several of the farms we observed either followed in the wake of chainsaw millers or farmers actually contracted chainsaw millers to fell the trees on their farms.

In most of the communities where CSM operations are ongoing, between 2-4 operators can be present, and together with the crew and associated wood carriers and cooks, a single group can bring in a total income of around US\$1,200 on a monthly basis. This results in a high purchasing power in most of these small communities and has led to several lines of petty business springing up. Most petty traders involved in the sale of manufactured goods indicated that there would be a significant drop in their income if CSM operations were to cease, and that their business would also cease to exist. The increased cash in the community also leads to the need for more social services such as restaurants/bars and video centres. In most rural areas, services such as restaurants are absent, but the presence of CSM activities and easy flow of money in the community leads to the development of such business line. A small number of respondents indicated that there would be a decline in income associated with the sale of palm wine. Also



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businesses dealing in gasoline or fuel would suffer because the closure of video clubs, bars and even chainsaws would result in little or no demand for such products.

Infrastructural development in the community would be significantly affected without the presence of chainsaw millers. For example, both chainsaw millers and communities have reported some contributions being made by millers especially in the repairs of bridges. Although this was received with mixed results, communities admitted to such efforts, which served to link their communities with the outside world, which would otherwise not be possible. The in kind contributions in planks has been used variously by community members in construction of palaver huts, town halls, school and clinic renovations and construction of individual houses. In general, carpenters and even NGOs operating in such communities rely on millers to supply them planks, the absence of which would result in very little or costly infrastructural development.

### ***Economic***

While the results have been mixed, largely due to misappropriations of funds, tolls collected on trucks conveying planks from the communities are significant contributions to community economy as well as county budgets. In two of the communities where we were able to obtain information on monies collected through the plank committees, some LD\$250,000 was reported to have been collected in Neezwein alone (a town in Rivercess County), and a significant portion of this (LD\$200,000) was used to survey and deed the land belonging to the community. In 2008, Garpue Town in Rivercess County Received LD\$292,500 (US\$5,570.00) as contribution from trucks conveying planks from its community forests, but only LD\$25,000 of this money was spent on constructing a palaver hut. Yarpah town, also in Rivercess County, reported the amount of LD\$3,400,000 (US\$53,000.00) received as toll payment, and some LD\$422,725 (US\$6,600) has been spent in constructing an elementary school. In Boliazah, also in Rivercess County, some LD\$756,000 (US\$11,800) was collected in 2008, but none of that money was spent on any activity in the community. In general, there appears to be a huge flow of monies into both the communities and county authorities, but accountability in the management of these funds appears to be questionable.

CSM makes a considerable contribution towards poverty alleviation, which would be lost if CSM was banned. The wider loss to Liberia of a ban would be reduced availability of construction and carpentry timber, which would directly affect reconstruction efforts. Even when formal milling commences and eventually when industries are developed it is not expected that it will be possible to meet current demand of at least 86,000 m<sup>3</sup>. Imports would be the only alternative and this would be an expensive option for Liberia's economy.

Benefits of an effective ban would be that the use of the forest resource is regulated and proper planning can be introduced to ensure sustainable use and proper development of a long-term industry with a capacity to earn foreign exchange through timber exports.

Stumpage, land rent, forest products fees and taxes that would be paid by a formal industry are not at present being captured in any way. Chainsaw millers are paying none of these charges. The only government revenue collected from chainsaw millers is fees for issuing waybills, which in 2008 amounted to US\$625,150. This is possibly less than the full amount that could have been collected. Further losses to government arise from the practice of charging only for timber transported to Monrovia and not to other parts of the country.

### ***Environmental***

Current CSM in the natural forests of Liberia is carried out in different forest types including virgin forest, previously logged forests and farmlands with isolated valuable timber species. Trees that are the main focus of current CSM include species belonging to the Class A and Class B categories. In assessments done at logging sites and plank depots around Monrovia, the most common species include Kosia, Framire, Blackgum, Abura, Tetra, Ceiba, and Plum.

In the forests of Rivercess where some 40 % of all planks entering Monrovia came from before the 2009 cessation of logging in the county, chainsaw millers have been able to penetrate deep into the forest by clearing and following old logging trails. This allows greater access to a wider area of forest, making their impact on the forest widespread.

Forest inventory to determine the impact of CSM on the structure of the remaining forest revealed heavy exploitation of both smaller and larger diameter size trees. In Figure 3.1, where there was heavy exploitation of *Heritiera utilis*, the forest is dominated by young trees (10-30 cm DBH), with some large diameter classes (50-59.9 cm and 70-79.9 cm) already missing. In Figure 3.2, where *Tetraberlinia tubmaniana* dominants, the forest resembles a young forest, with the predominance of small diameter size classes. It is obvious that loggers are taking out as much of the standing trees as possible, and follow no diameter limit cuts. The long-term implication is that such forests would take much longer time to regenerate and reach the next harvesting cycle.

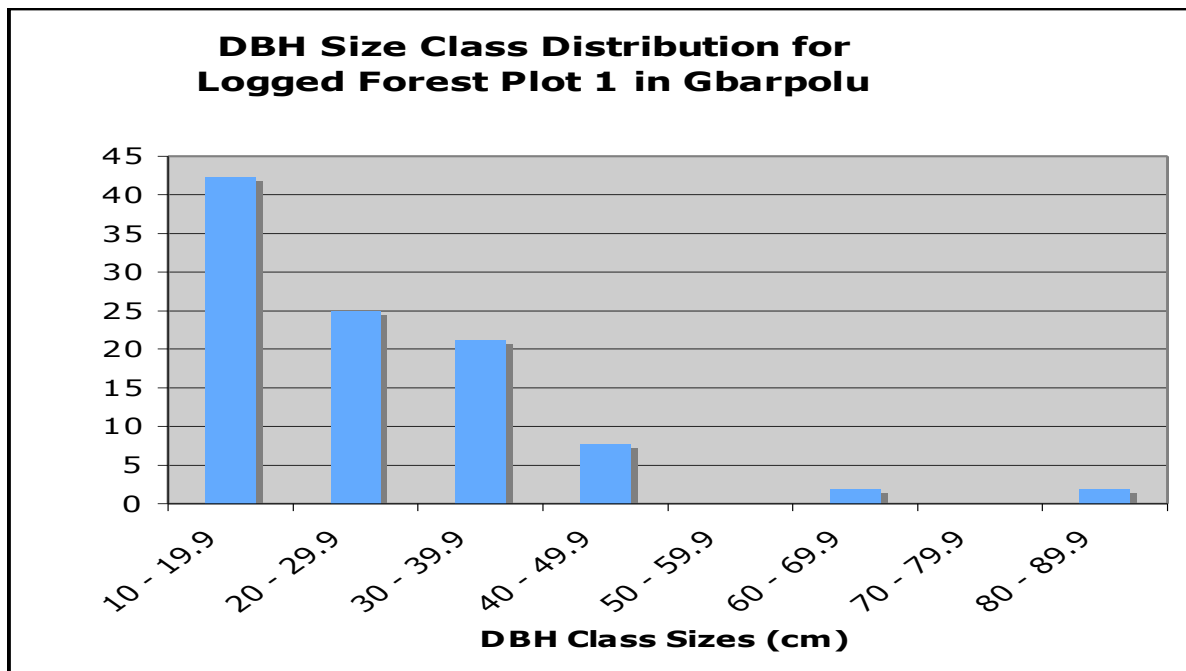


Figure 3.1.1: Impact of Chainsaw Logging on Forest Structure Dominated by *Heritiera utilis*

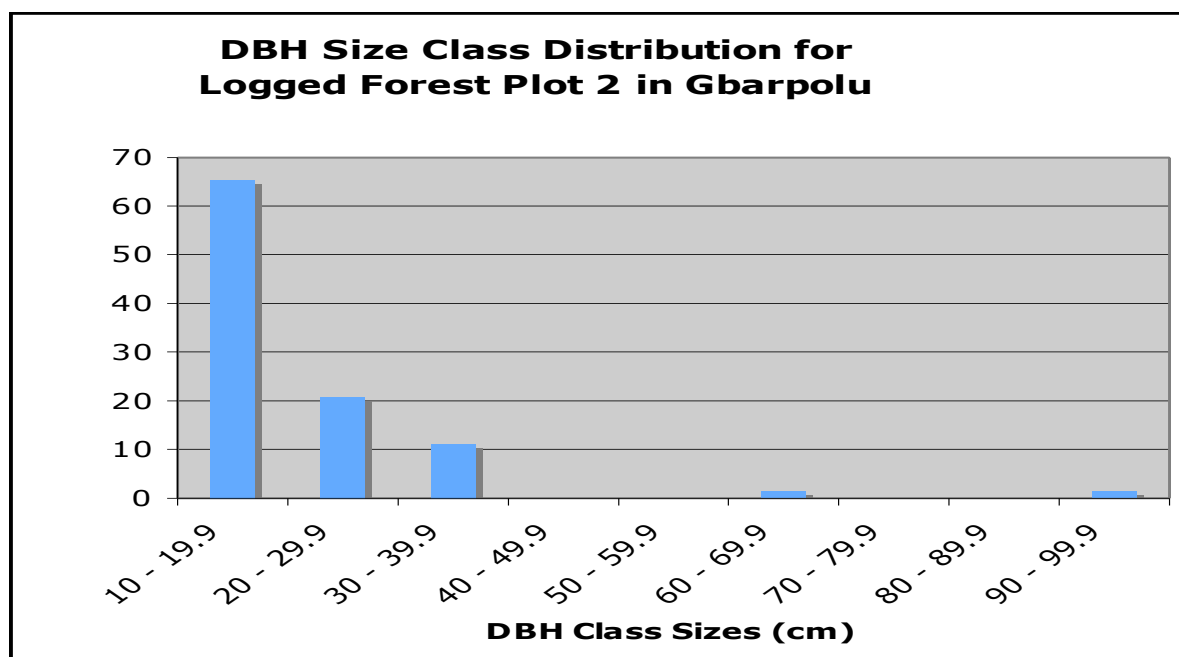


Figure 3.1.2: Impact of Chainsaw Logging on Forest Structure Dominated by *Tetraberlinia tubmaniana*

In an effort to ascertain whether there will be any long-term impact on the structure and composition of the forest, seedling and sapling regeneration of both *Heritiera utilis* and *Tetraberlinia tubmaniana* was assessed in a logged forest in Gbarpolu County.

In the two plots sampled, *H. utilis* had 30 trees per ha in Plot 1 compared to 10 individual trees in Plot 2 (see Table 1). While the species was heavily exploited, it cannot be conclusive at this stage whether exploitation had severely reduced the natural density of the species. Seedling and sapling densities were however much reduced in Plot 2 than in Plot 1. However, outside of the sampling plots, the species was found to be regenerating very well along creeks and moist areas in the forest, and the current density observed might be due to local dispersal factors. *H. utilis* also has the ability to coppice, and several of the stumps observed in the forest had a higher number of shoots coppicing.

Table 3.1.1: *Heritiera Utilis* Regeneration in Two Logged Forest Plots in Gbarpolu (Source: Blackett *et al.*, 2009).

Plot Studied	<i>Heritiera utilis</i> (Wismo/Niagon)		
	# Trees Per ha $\geq 10$ cm DBH	# Saplings per 0.1 ha $\leq 10$ cm DBH	# Seedlings per ha
Logged Forest Plot 1	30	10	50
Logged Forest Plot 2	10	2	2

In Table 2, the density of trees per ha of *Tetraberlinia tubmaniana* was higher in Plot 2 than in Plot 1. In the 1 ha plot inventoried in Plot 2, none of the large size trees recorded exceeded 37 cm DBH, and appears all size classes greater than 40 cm DBH had been harvested. However, seedling and sapling regeneration was high and appears to be recruiting itself successfully.

Table 3.1.2: *Tetraberlinia tubmaniana* Regeneration in Two Logged Forest Plots in Gbarpolu (Source: Blackett *et al.*, 2009).

Plot Studied	<i>Tetraberlinia tubmaniana</i> (Tetra)		
	# Trees per ha $\geq 10$ cm DBH	# Saplings per 0.1 ha $\leq 10$ cm DBH	# Seedlings per ha
Logged Forest Plot 1	0	3	108
Logged Forest Plot 2	320	57	4000

### **Impacts on forest biodiversity and community awareness of ecological problems**

In field observations carried out at two sites (Gbarpolu and Rivercess counties), it was observed that chainsaw millers were not following directional felling. There was a high degree of uprooting of trees, broken tops and scarring of saplings and other large trees. Prior to boxing of the boles, clearing around the boles using a cutlass results in the cutting of regenerating saplings and rattan. This situation is readily seen at new logging sites, but recent observation of sites, 5 years old, showed that regeneration of pioneer species was common. In one of the sites observed in Gbarpolu, the seedlings and saplings of *Parinari excelsa* were regenerating in a gap and along the tracks where sunlight was abundant. No presence of exotic or invasive species, were observed in any of the gaps created during logging activities.

The processing of logs on site results in the production of both sawdust and slabs, which were covered in decomposing agents such as fungi. These results in the recycling of nutrients in the forest ecosystem, and the remnant slabs and logs also provide home to epiphytes as well as ground beetles. However, several fallen branches and tree trunks were observed in streams and creeks, reducing the quality of the water. In Sando Village in Gbarpolu County, the clearing around a stream has led to it drying up in the dry season.

Accidental felling of defective trees was also observed in a limited situation, and is frequently abandoned after cross-cutting. Some of these defective logs appeared to have been used by tree nesting rodents and birds. The felling of such trees reduces the number and quality of nesting sites for such species, creating competition for limited nesting sites and potentially reducing their reproductive capacity.

Chainsaw noise was also reported by communities as causing most wildlife to move away from their forests. Bush meat is often the major source of protein in logging camps as the supply of protein through fish is limited. Some millers admitted relying on local hunters in supplying them bush meat, which are often supplemented by some of the milling crew setting traps in the forest to catch animals. This observation is supported by a recent assessment in Rivercess County, where it was indicated that some hunting and trapping of wildlife does occur, even though it concluded that chainsaw millers do not engage in hunting and trapping of wildlife (Green Advocates, 2008). Whilst a good number of chainsaw millers might not be engaged in hunting and trapping of wildlife, their disposable cash income encourages locals to engage in market hunting.

Soil compaction and attendant soil erosion were limited and observed mostly around areas where planks were landed for loading into trucks. Such sites were heavily compacted, favouring the growth of mostly weedy species.

### **Management improvements to ensure sustainability of remnant forests**

CSM as currently practiced in the high forests of Liberia is targeting high value timber species such as Niagon, Tetra, etc and ignores others which are not in demand or hard to process because of the available technology (e.g. *Lophira alata*). Two problems observed that might impact the sustainability of the remnant forests is over-harvesting per ha and the lack of management of the remnant forests after CSM.

In both Gbarpolu and Rivercess counties, some of the exploited species can be locally concentrated in the forests and appears current diameter classes being harvested by chainsaw millers is from 35 cm upwards. This biological phenomenon gives a false sense of overabundance, and harvesting densities and waste reduction are not observed, as millers are focused on getting a truckload rather than sustainability. This

situation is also compounded by the fact that limited monitoring of milling activities by both communities and FDA staff takes place in the field. In this situation, even where there are sufficient number of saplings and seedlings of the harvested species, it would take a very long time after harvesting for the next crop of trees to be available for exploitation. While some species such as Tetra, Abura and Niagon can coppice or produce abundant seeds for regeneration, sustaining the forests where these species occur would depend on how well the forests are managed in the wake of CSM.

In Gbarpolu County very large tracks of logged forests are being cleared for upland rice and cassava farming. Chainsaws were used to clear the large diameter trees that were not fell initially when the forest had been logged, with the sizes of some farms being 2-3 times larger than traditional slash and burn farms. The only plausible explanation for this is the reduced cost of labour that the use of chainsaws confers. A single person with a chainsaw could clear a 10 acre plot of farmland with large trees in a day or two. A similar sized plot would take a large number of people using traditional implements (axes and cutlasses) at least two weeks to clear.

Addressing these twin problems (felling density and use of chainsaws in slash-and-burn agriculture) would require monitoring, as most communities would find it easier to move into unprotected logged forests adjacent to them to establish farms than attempting to clear virgin forests. The large number of chainsaws operating in a given forest at a time also results in extensive area of forest being logged, encouraging farmers to move into the middle of such forests to establish farms and initiating the process of fragmentation. This gets magnified as more farmers move in such unprotected forests.

#### **Community awareness of ecological problems**

Most communities were generally aware of the ecological problems associated with CSM, with the common remark by community members being “they are destroying our forest”, referring to the actions of chainsaw millers. The most common responses are summarized in the table below (see Table 3.3), and for all three issues of concern, most of the responses showed a good knowledge among community members of the environmental problems associated with CSM.

Table 3.1.3: Common Responses from Communities about Environmental Concerns (Source: Blackett *et al.*, 2009)

<b>Environmental Issue of Concern</b>	<b>Common Responses</b>
Forest Quality	<ul style="list-style-type: none"> <li>• Declining number of trees</li> <li>• Forest damaged</li> <li>• Creates wind damaged</li> <li>• Poor/fair</li> <li>• Massive shifting cultivation</li> <li>• Heavy storm</li> <li>• Farming up hills and mountains</li> <li>• Air pollution and dust</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>• Sometimes water gets dirty</li> <li>• Not good</li> <li>• Heavy erosion</li> <li>• Poor/fair</li> <li>• Destruction of watershed</li> <li>• Felling trees along rivers and creeks</li> <li>• Farming along rivers, creeks and swamps</li> </ul>
Bush meat Availability	<ul style="list-style-type: none"> <li>• Noise of chainsaws driving away animals</li> <li>• Loggers hunting animals</li> <li>• Very hard to be seen</li> <li>• Less</li> <li>• Hunting and farming leading to decline</li> </ul>

	<ul style="list-style-type: none"> <li>• Uncontrolled hunting activities</li> <li>• Driving away by pit-sawing activities</li> </ul>
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### **Conflicts associated with chainsaw lumber production and their management**

There are large flows of benefits derived from CSM into both communities and county authorities, but accountability in the management of funds is often lacking and is a major problem with many reports of funds being misappropriated. Apart from this, other negative impacts cited by communities included refusal by chainsaw millers to make payments, theft of agricultural crops and planks, harvesting trees without community authorization and domestic disruption caused by the high frequency of women from communities having affairs or eloping with chainsaw millers (Table 3.4). It is notable that, in contrast to the surveys of traders and chainsaw millers, communities reported a far higher incidence of conflict.

About 20 % of conflicts, concern issues of funding and this figure increases if bulked with other concerns that mean communities perceive they are not getting their share of benefits or losses through theft of timber. Again this demonstrates the policy objective of granting more equitable access to forest resources is not being universally achieved through CSM.

Table 3.1.4: Reported areas of conflict (Source: Blackett *et al.*, 2009)

<b>Nature of Conflict</b>	<b>Frequency</b>	<b>%</b>
Misappropriation of funds and lack of accountability	9	20.0
Loggers sexual relationships or elopement with married women	4	8.9
Illegal entry into forest and felling trees	4	8.9
Delay in giving planks or non-payment of planks	3	6.7
Stealing crops from farms	2	4.4
Stealing bush-meat from traps	2	4.4
County authority refusing to share benefit with community	2	4.4
Bridge project not completed and logs abandoned	2	4.4
Wood theft	2	4.4
Sawing more and reporting less	1	2.2
Politician's son involved in logging and not paying toll	1	2.2
Loggers refusing to undertake community work	1	2.2
Youth not satisfied	1	2.2
Town elders not totally involved	1	2.2
Community not satisfied with payment	1	2.2
Loggers don't contact local authorities/communities	1	2.2
Total	45	100.0

### **Analysis of policy response to chainsaw lumber production**

The ban imposed on CSM by government through FDA has not been effective. Government has in effect made an illegal activity legitimate by issuing waybills to truckers to transport timber into the city. In the absence of formal milling and the increased demand for timber for reconstruction following the conclusion of the civil war, CSM has grown to meet the domestic market needs. The above approach has however allowed government to collect some minimal revenue through the issue of waybills, allowed timber on the domestic market to meet the needs of the construction industry and created employment opportunities in rural communities.

A major failure of the policy response is the wanton destruction of Liberia's forest due to lack of enforcement and the fees paid through waybills. Whilst no comprehensive assessment has been done to evaluate the impact, the public and other civil society groups feel that the activity is not sustainable, and there has been no control over the way the forest has been exploited. Nearly every forest in the country is being logged irrespective of its future potential for conservation or commercial mechanized logging. Because FDA charges US\$0.60 per plank irrespective of species class or dimension, chainsaw millers

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have targeted some of the most important commercial species and sawn them in larger size dimensions. Boles that are shorter in length (less than 14 feet) are not processed and any slabs that yield less than 2x4 are also abandoned in the forest. This is all with the view that it will be less profitable to bring in planks in smaller dimensions for which they are charged the same amount as larger size dimensions.

### ***The future of chainsaw lumber production***

It is unlikely that chainsaw lumber would disappear from the market, and its production will continue as long as domestic market demand exists and alternative sources expected through FMC and TSC take time to get on to the market for consumers. Amidst growing concern about the destructive nature of the industry and the lack of any control on the part of government, chainsaw millers have organized themselves into unions and lobbying for legality.

In a move to ensure that illegal logs do not get into legal log export, and to ensure the future of the remaining high forest in the country, the government with its development partners have taken the first step of conducting a comprehensive assessment of the whole CSM industry with the view to developing a comprehensive policy framework (Blackett *et al.*, 2009). This study put forward several options for the authorities to examine. Key recommendation of the study for the short term is to progressively increase the waybill fees from US\$0.60 per plank to US\$3.50 per plank, and enforce the collection of such taxes through the transporters of timber. In the long long-term, legislative amendments are required to create a legal framework for CSM to operate, and effective collaboration between FDA and communities will ensure support for enforcement at the community level. Granting chainsaw millers TSC areas to operate will provide a means of control as well as ensure timber is available on the market for next couple of years until sawmills are established by large communities and start supplying timber on the market.

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### 3.2 The Significance of Chainsaw Lumbering in Kenya

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#### **Introduction**

Kenya's total land area is about 57 million ha. Of this, about 3.5 million ha, which is about 6.2 % was covered by forests in 1960. With the increased commercial activities, the forest cover got constantly reduced to about 2.82 % by 1993 (MNR, Annual Reports, 1960-1993). In 1994, Kenya Indigenous Forests Conservation Programme (KIFCON) estimated that the total area of Kenya's closed canopy indigenous forests was about 1.24 million ha with plantation forest constituting 0.61 million ha. A more recent report indicates that the forest cover was further brought down to less than 2 % by 2007 due to continued cutting and less replanting among other contributing factors (World Bank, 2007).

The distribution of these resources is heavily skewed to the Motane Forest Region where 18 % of the area is afforested and to the coastal Forest Region where 9.9 % of the land surface is forest. However, due to population pressure, only 1.9 % of the western rainforest region contains forest, while the figure for the dry zone forest region is lower at 0.4 %. Majority of the closed canopy forests are gazetted forest reserves managed by the Kenya Forest Service (KFS) and a few gazetted as National Parks and National Reserves managed by the Kenya Wildlife Service (KWS).

An estimated 100,000 ha of forests is in trust lands managed by the Ministry of Local Government (MLG) through county councils, which hold the land in trust on behalf of the local people. Forests exploitation in these trust land areas is often not well managed and in some cases, total destruction has taken place. This has been due to the fact that the capacity to manage forests is not well established in the MLG and in most cases forestry is not commonly perceived as an important activity by the Councils. Similarly, an unknown area of indigenous forest is in private ownership. Although both these holdings tend to be small, they are considered important especially for water catchments and environmental conservation purposes. Their exploitation is also difficult to control.

#### **Importance of forests in Kenya**

These forests play many important roles: they trap and store rain water, enhancing ground water table as well as regulating river water flow. They also prevent flooding, improve soil fertility; reduce soil erosion and sediment load in rivers, dams and lakes. In addition, forests help regulate local climate conditions and act as carbon reservoirs and sinks. They also provide wood and wood products to over 80 % of all households in the country, contains 50 % of the nation's tree species, 40 % of the larger mammals and 30 % of birds (World Bank, 2007). The indigenous forests also contain some endemic and threatened species. They also serve as cultural, ceremonial and recreational sites and provide a variety of wood and non-wood products.

The crucial role of forestry in soil and water conservation provides strong linkages with agriculture and tourism, which are the main pillars of the national economy. Kenya's agricultural sector contributes 30 % of the GDP and provides the main livelihood for about 80 % of the population. It employs 70 % of the labour force especially in the rural areas, provides a large portion of the national food requirements and a major source of export earnings (FAO, 2005). The contribution of forests to water extends to electricity generation. Close to three-quarters of Kenya's electricity is derived from hydropower, drawing water from the countries 5 major water towers; Mt. Kenya, the Aberdares, Mt. Elgon, the Mau complex and Cherangany hills. Disturbances in these towers have been responsible for the frequent floods in parts of Western Kenya, low water flow in major rivers resulting in low electric power supply and frequent rationing in the country.

Similarly, about 71 % of the domestic energy consumed in the country comes from wood. Out of the 20 million m<sup>3</sup> of fuel wood consumed annually, 95 % is collected from forests and rangelands with the rest 5



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% coming from farms (FAO, 2005). Many forests are traditionally important for cultural ceremonies and as sacred sites to local communities with some specific tree species having cultural values. It is estimated that 530,000 forest-adjacent households (which amount to 2.9 million people living within 5 km from the forests) derive direct benefits from indigenous closed-canopy forests, with indications that in some areas, forestry sector contributes about 70 % of the forest adjacent households' cash income (Holding *et al.*, 2002).

### ***Major causes of forest loss in Kenya***

The main threats that have faced sustainable management and conservation of Kenya's forest emanated from; ineffective legislative framework and political interference; The initial Forests Act (cap 385), which was recently replaced by the Forests Act 2005, allowed the de-gazettement of forests by the Minister without any consultation, apart from a 28-days notice. This was erroneously used to excise forests in Kenya converting most of the land to human settlements and agriculture. Most of the de-gazettements were unwise and occurred in critical water catchments towers. Political interference also became an underlying cause of most of the de-gazettements, which gained momentum in the 1990s when forest loss through excisions averaged 5000ha annually (World Bank, 2007). In some cases illegal allocations occurred with no excision taking place or resolutions being passed to set aside forest land for other used in the case of local authority forests.

Encroachment and illegal cultivation; Illegal expansion of farms into forests also poses the biggest threat to especially indigenous forest conservation. Most of the indigenous forests are situated in high human population density areas. The competition for land with agriculture encourages illegal cultivation.

Illegal logging and charcoal burning; Most forests are affected by illegal logging and charcoal burning. Illegal logging happens in most of the indigenous and plantation forests due to either lack of enough surveillance or by intentional collusion between the forest officers and the saw millers. Charcoal burning is a common practice especially in the dry lands, where indigenous hard wood species are exploited, using traditional charcoaling methods which have low charcoal recoveries. The practice provides livelihoods to most of the people in the Arid and semi-arid lands, especially when crops do not thrive due to shortage of rains. Where these practices are not controlled, they are known to cause serious forest depletions.

Poor understanding of the benefits accrued from forests; Participation in forest protection and management have not been well understood or appreciated by neighbouring community members, thus the communities have little motivation to protect the forests. Consequently, they watch, connive, while others take part in forest destruction. Others request for forests to be excised for other uses. This had also been promoted by the trends where the former Forest Department planted and managed forests single handedly, without the participation of the neighbouring communities. The destruction of forests by the adjacent communities has been a major challenge due to the closeness of the people to the forests and lack of interest to protect the forests.



Plate 1 Forest clearing for agricultural activities

Among these factors, the most important one, which was blamed for serious decline in forest cover in Kenya, is poor governance. For many years, this has contributed significantly to the poor performance of the forest sector. This include among others; corruption, forestry policy failures and poor enforcement of laws. Poor forest management, low institutional capacity, poor enabling environment and inadequate community empowerment, political interference, undefined roles in public-private partnerships and inadequate stakeholder participation and poor benefit-sharing mechanisms. Inadequate facilities and low staff morale have also played key roles (Holding-Anyonge *et al.*, 2002).

The establishment of the Nyayo Tea Zones along the forest boundaries with settlement schemes contributed to reduction of forest cover by taking large land from the then existing forests. The 1989 ban on the *shamba* system (the technique of using farmers to establish a plantation in which the farmers cultivate the land and tend trees together with crops until canopy closure) as well as lack of adequate government labour adversely affected the plantation establishment (Muthike, 2007). Arson or deliberate burning of forests by people bordering the forests reserves, with the hope that the land could be leased to them for settlement and outbreak of forest diseases and pests e.g. the pine wholly aphid outbreak in the 1980s and the cypress aphid outbreak in the 1990s added to the problem.

Lack of commitment in development and adoption of technologies for the utilization of saw mill residues as well as the use of inefficient timber sawing systems continued to waste raw materials, causing more trees to be cut for less timber products (Muthike, 2004; Muthike *et al.*, 2008). Much of the wood harvested from excised areas and farms is sawn using low recovering chain and circular bench saws for quick local markets. In pulp and paper sector, another major consumer of round wood, there has been no attempt to substitute wood with other cellulose containing materials like agricultural residues. Similarly, attempts to introduce log sharing and whole tree utilization, where constituted board makers and saw millers could take the bulky, knot free butt-logs and leave the top logs for pulping and chip boards has never been pursued. Instead, inefficient processing systems have continued being used, lowering both the quality of products and recovery of the raw materials.

#### ***The emergence of farm forestry as a source of timber***

Before 1980, timber came from the natural forests mainly on the slopes of Mt Kenya, Abadares, Mt. Elgon and parts of the Rift valley and Western Kenya Forests cut by pitsaws and increasingly by static circular sawmills which became established in numbers, and later the tractor powered circular bench saws. The ban in 1982 on indigenous forests and 1999 on plantation forests resulted in large deficit of saw logs and short supply of timber in the country. Trees on farms became the principal alternative, quickly making up a significant amount of all locally available timber with small supplements from

imported timber from neighbouring countries. This has however stimulated the growth farm forestry, where farmers have increasingly planted trees for commercial gain (MENRW, 2004).

A substantial amount of *Grevillea* trees were planted during extension related projects in the early 1980s. The extensive Embu and Meru Integrated project (EMI) planted most of the roadside *Grevillea* trees in the Mt. Kenya region and promoted planting of the same in the farms in the two project Districts. *Grevillea* and *Eucalyptus* species were promoted for shade in the coffee and tea plantations respectively. Many indigenous species are also found on farms, as remnants of natural forest species, though had never before been considered as a source of timber due to the readily available materials from the natural forests.

Farm forestry has since been given priority in the country and highly supported by Kenya's development partners for the last over two decades. Several Farm forestry initiatives, funded by the Government and development partners, promoting on-farm tree growing in the dry lands are some of the major initiatives in that direction. In addition, the government through Kenya Forestry Research Institution (KEFRI) has been spending a good portion of its research grants to enhance research in farm forestry. These, together with intensified production from plantations, are expected to reduce the pressure on natural forests and reduce illegal harvesting. But it will take the efforts of many committed individuals at all levels, and it must and will be done, at least in a forester's time-scale.

### **The wood industry in Kenya**

The first sawmill in Kenya was set up in 1913, by a certain Colonel Grogan, who was given special concessions in Northern Rift Valley by the colonial Government (Mugweru, 1996). The number of sawmills increased slowly thereafter to about 10 in 1920. The first notable increase in the number of sawmills was observed during the first and second world wars (1914-1918 and 1939-1945 respectively), which was attributed to the high timber demand for the construction of army barracks and railway sleepers for both local and export markets (Table 3.2.1). Another increase happened after the wars mainly to produce timber for reconstruction work. This increase however never lasted long as the number of sawmills went down during the Mau Mau rebellion due to the uncertainties about the future of the country and many settlers who owned sawmills leaving the country just before the independence in 1963.

The highest growth of the industry was experienced between 1965- 1970, due to, on one hand, the Africanization programme and setting up of the Investment Credit Development Corporation (ICDC) by the new Government shortly after independence. This helped in financing the purchasing of existing sawmills and the start of new ones with African participation. On the other hand, during this period the rebate on royalties for all export timber was highest (50 %), which encouraged many sawmillers to export timber, especially hard woods. The growth trend was however negatively affected by the 1982 order, which stopped the exploitation of hardwoods and latter the 1984 presidential ban on export of all indigenous timber, which was extended further in 1985 to cover all timbers unless a special clearance was issued by the office of the President. Most of sawmills then turned to processing of plantation grown soft wood species for local markets and some exports.

Table 3.2.1: Number of saw mills in Kenya from 1913 – 1994 (Source: MNR Annual Reports, 1964-1999)

Year	Number of saw mills			Remarks
	Inside Forest	Outside Forest	Total	
1913-1915	1	-	1	Operating under special concessions
1920	<10	-	<10	Initial growth of the sector
1930	>10	-	>10	Mainly providing timber for the local settlers consumption
1940	>20	-	>20	Timber export markets open up
1945- 950	60	-	60	During and after the world ward
1960- 964	34	-	34	Mau Mau Rebellion and independence

				struggle
1970	200	150	350	Africanization Programme
1980	220	150	370	
1990	-	361	361	Government regulation to remove sawmills from inside the forests
1994	-	450	450	

Before the ban, with abundance of round wood from the plantations, sawmilling was seen as an easy way to make money and many sawmills, especially simple, family owned were started, raising the number of sawmills and saw benches in the country to about 450 in 1994, with a combined round wood consumption of about 545,000 m<sup>3</sup> and producing about 200,000 m<sup>3</sup> of sawn timber (MENRW, 2004). This was also encouraged by the availability of cheap or free wood from forest lands that were excised both officially and unofficially from gazetted forests in response to population and political pressure. This number continued until the ban on timber harvesting from plantations in 1999.

These sawmills were classified into three main categories' small, medium and large-scale, processing less than 2000 m<sup>3</sup>, between 2000–5000 m<sup>3</sup> and over 5000 m<sup>3</sup> of round wood respectively. The large-scale sawmills, with better conversion machineries and skilled manpower, had the highest sawn wood recovery rate (41.8 %) followed by medium scale (30.1 %) and small scale sawmills (24.2 %) respectively assessed when skilled and experienced sawyers are used and chainsaws only used for logging activities (Onchieku, 2007). The majority of these sawmills fell under the small-scale category and used mainly circular saws, which are less efficient as compared to band saws. The raw materials for sawmills were entirely soft wood (60 % cypress and 40 % pines) logs from mainly Government plantations and a little from settlements.

Before 1999, on-farm timber processing was insignificant, since the main sawmills were able to supply the country's market demand for sawn timber. Sawmillers were also not interested in buying wood from the farms since there was enough supply from Government plantations. However, the ban on wood harvesting from government plantations in 1999 resulted into acute shortage of timber in the Kenyan market, prompting increased imports from DR Congo, Uganda and Tanzania among other countries, yet trees on the farms remained unprocessed. This promoted cross-boarder timber trade both legally and illegally (Samuel *et al.*, 2007).

### ***Trends in sawing systems and skills***

The level of sawing technologies varied along the entire period of the history, beginning with simple circular saws in the early days, then band saw breakdown machines in the recent years, especially for the large-scale mills. The medium and small-scale sawmills mainly used circular saws. To avoid frequent maintenance of the saws, the sawmillers used very thick circular saws, which would take longer before they begin to wobble due to friction. These large saws are known to have large kerfs and are therefore major causes of low timber recovery. Similarly, sawing skills varied in the same way, with the large scale mills having skilled and experienced sawyers while the small-scale saw mills were operated by average to low skilled labour (Mugweru, 1996). These variations resulted in varying timber recovery across the categories; with 35-40, 20-25 and 10- 20 % for the large, medium and small-scale sawmills respectively (Onchieku, 2007).

Before the Africanization programme, most sawmills were run by well trained sawmillers, who produced quality timber for the export market. Thereafter, with the change of Government, most of sawmills were run by less experienced Africans, who were inadequately trained. With ever increasing number of the sawmills, the levels of skill went lower with most of the small-scale mills being run by untrained operators or those trained on the job. The establishment of Forest Industrial Training Centre (FITC) in the early 1980s under the then Department of Forestry (now KFS) was aimed at enhancing operators' sawing and saw doctoring skills. However, due to the cost of the courses and distance from many mills, unwillingness of the sawmill owners to train their personnel and weak policy to reinforce the training, it only attracted

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trainees from the large and medium scale sawmills and only a few from the small-scale and bench sawmills.

### ***Challenges of saw milling in Kenya***

The emerging changes within the sawmilling industry brought about challenges and constraints to the industry's development. These could be classified into socio-economic, technical, logistical and policy and legislation. They are encountered at 4 main levels; production, harvesting and logging, primary processing (debranching, cross-cutting, stacking, onward transportation), conversion and quality control, and marketing and utilization. The main challenges range from scarcity of raw materials, shift to unconventional sawmilling machinery to changes in market dynamics. Whereas a few static sawmills continued to exist after the ban, bringing in trees from farms as round wood for sawing, extensive exploitation of on-farm trees appeared to favour portable milling equipments, as many mobile circular saws sprang up, exclusively of the tractor towed and powered bench saw type mills (Muthike and Njenga, 2002).

Chainsaws began appearing from the early 1980s for felling and to a limited extent for sawing especially beams for further processing. This situation continued with little change until the Government outlawed harvesting from forests. Due to this, many of the large static sawmills were forced to close down due to a lack of trees. It also became immediately apparent that if trees were not to come from the forest, they could come from the farm, as many of the surrounding districts were densely populated with large size trees, mainly *Grevillea* (*Grevillea robusta*), Cypress (*Cupressus lusitanica*) and Eucalyptus (*Eucalyptus saligna*). Indigenous timber tree species also common on the farms included, Meru oak (*Vitex keniensis*) and *Cordia africana*, many of which had been planted before Kenyan independence. Chainsaw operators turned to farms, being hired by timber merchants to process timber for local markets.

### ***Production, harvesting and logging***

Currently the main sources of timber for the sawmilling industry are farms and private smallholder tree growers. The traditional sources of raw materials, which were mainly Government plantation forests, are no longer available to the industry since the national ban on harvesting of forest trees from both natural and plantation forests is still in force. This transition has caused considerable challenges both to the farmers and log processors. Smallholder tree growers lack access to appropriate propagation materials of the right quality. They also have limited knowledge on the type of tree species to grow, how and where to grow them to meet the requirements of the sawmillers. The technical staff to train farmers on tree silviculture and management practices such as pruning and thinning to improve stem quality are either few or lack logistics to enable them access the farmers.

Trees from farms are therefore known for their poor stem form, some having stem rots as a result of poor pruning and pollarding, while others contain metals lodged in the wood as a result of nails and fencing wire, especially those grown around boundaries.

The small-scale sawmilling enterprise is mainly concentrated in the rural areas with minimum organization. It can be described as pastoral sawmilling system because sawyers move from one region to another in search of raw materials, which are usually isolated and sometimes in difficult terrains, making procurement costly and time consuming. Most of the operations are carried out informally starting with the purchase of trees, their processing and onward transport of the resource. Such promotes the use of portable timber processing systems, most of which are inappropriate. However, some of these challenges could be streamlined with the growing of the trees professionally.

### ***Primary tree processing***

The tools and equipments used in harvesting and logging on-farm trees are axes, *pangas* (machetes) and chainsaws. Although axes and machetes are not very common, they are still used in some remote areas, especially where tree owners are interested in splitting logs into fencing posts. They are however known for their wastage during felling and crosscutting operations. Although chainsaws are mostly used

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at the felling, de-branching and cross-cutting stages to minimize log wastage, the majority of operators are either unskilled or semi-skilled in these operations. This is due to unavailability of adequate training facilities and lack of technical and financial support from both the Government and development partners. Since most operators work and are paid on piece rate basis, they are unwilling to spend their working time on training yet their employers, who are the machine owners do not clearly appreciate the need for training them. This leaves tree owners at the risk of losing their trees due to poor processing.

The legal provisions governing training on the use of these equipments, maintenance, safety and health aspects of operators are weak. Indeed no provision exists to require someone to have a proof of qualification to be allowed to operate a chainsaw. All these have contributed to the challenges experienced in the sub-sector. Comparative studies on trained and untrained chainsaw operators on timber recovery rates showed that the use of trained manpower increased sawn wood recovery by over two times (Muthike *et al.*, 2008). In this case, the trained personnel were skilled in the right machine to use at various stages, proper operation, knowledge on log characteristics and handling requirements. An appreciation that between 50-80 % of the total sawmilling costs are log costs would make the logging crew more careful to minimize log wastage at all stages.

### **Conversion and quality control**

Increased harvesting of farm trees occurred in the years immediately following the 1999 presidential moratorium of forest logging. Currently, over harvesting on the farms is common and is referred to as timber mining to make up for the shortfall in supply. Many of the larger sized trees accessible by sawyers have been felled and sawn, leaving millers, dealers and brokers to cover longer distances in search for them. Larger trees are now more likely to be found in valley bottoms and other inaccessible areas, providing the chainsaw operators a role. Such trees are felled and sawn by chainsaw either into boards for immediate sale, or into large slabs for carrying out and re-sawing by bench saw, either at the nearest point a tractor can reach, or at a yard or other collection point where the slabs remain until a buyer comes and specifies the dimensions required.



Plate 2 Chainsawing



Plate 3 Large slabs for re-sawing saw



Plate 4 Re-sawing Bench

The main small-scale machinery available for conversion of saw logs into timber at the farm level are chainsaws and to a small extent circular saws on mobile saw benches. The chainsaw was intended for tree felling, cross-cutting and de-branching but not for log sawing. Its weight and mode of operation makes handling difficult during sawing thus leading to excessive vibration especially when used freehand. Its kerf size (10 mm) is considerably bigger than that of the band saw (2.5 mm), which is highly recommended for use in conversion of logs to timber. These characteristics of the chainsaw contribute to the high wastage.

High timber recovery rates are obtained when circular saw bench is used instead of chainsaws. The kerf of the circular saw (5 mm) blade is usually smaller than that of the chainsaw. However, timber recovery could also be compromised at the in-feed and out-feed points. This causes many over sizes and under sizes due to wobbling of the machine and because the speed of the circular saw is not easily synchronized with that of the log stock. Recovery could be optimized by having detachable rollers at the in-feed and out-feed points of the saw bench which could make log handling and orientation manageable.

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Tree buyers, whether individual end users, timber dealers or brokers, being aware of farmers' precarious financial situation and their lack of better tree valuation techniques and market access exploit them to their financial advantage by obtaining a price for standing trees that is below the actual market value. The prevalence of timber brokers, i.e. those that buy standing trees and sell them on still standing, is a prime example of this. The single most commonly heard view from farmers regarding their trees concerns valuation is that they feel that they rarely, if ever, receive a reasonable price. This is a situation forced upon them because they lack financial capital and skills in assessing the value of their trees in terms of volume and stem quality. Although timber prices are relatively high in Kenya at present due to the shortage in supply, little of this comes back to the primary producer – the farmer. The farmer is usually approached by one of several types of buyers:

- Private individual, perhaps a neighbour, extended family member or other person who requires timber for a certain project such as building a house, who then hires a chainsaw operator alone, or a chainsaw and bench saw in combination, to saw the trees into the desired dimensions. Perhaps also in this category are also some other larger corporate users e.g. tea factories, schools and hospitals which fell largely on-farm trees for fuel wood. In such cases, intermediaries may be used to source the wood and cases of good quality trees being cut for fuel wood are common.
- Timber dealers (which means that they also own some form of sawing equipments), who buy standing trees and saw them on site, selling the sawn timber on to end users or other dealers.
- Timber broker, who buys and sells the tree standing, making profit without any physical effort, and often offers the lowest prices to farmers, but they may also be called 'tree finders' who are hired by either of the first two groups to locate trees and negotiate the cheapest price, earning a small commission for the service provided.

The currently used on-farm timber sawing systems gained popularity in Kenya after the 1999 ban. Propelled by the closure of the main stream sawmills, low initial investment and maintenance costs for some of them, their ability to be operated by few people as well as their portability (Oksanen, *et al.*, 2002), these technologies became common. They include Chainsaws, Mobile saw bench and Pit saws (Muthike, 2004). They have since become major sources of employment in the rural areas as well as being sources of timber for different uses in the country. The operators continue to shift from one sawing system to another depending on the availability of raw materials.

Chainsaw method has been preferred because it is faster than pit sawing, easy to operate by only one operator and an assistant at most, cheaper and less limited by terrain than the tractor tolled bench saws (Oksanen *et al.*, 2002). However, operated freehand, chainsaw has the lowest mean timber recovery (Holding, *et al.* 2002; Muthike, 2004). This is attributed to the wide chain kerf, machine vibration and to some extent the operators' level of skill, which contribute to large amount of wood lost in form of sawdust (Muthike *et al.*, 2008).

Unlike the large-scale timber processing practices that found acceptance, on-farm sawing methods lacked efficient technologies. Chain sawn timber for example is of generally poor quality around the country, with users having to insist on much larger dimensions to be cut than those required to allow for the excessive planing that is required to obtain a consistent thickness and acceptable surface finish. The Poor quality of timber and low recovery is highly attributed to chainsaw operators being unskilled, lacking the required experience, or from drinking alcohol to overcome fatigue while sawing (Muthike *et al.*, 2008). This is usually aggravated by the freehand mode of operation (Fehr and Pasiecznik, 2006).

### ***The future of chainsaw timber processing systems***

The strength of chainsaw timber processing is based on the low capital requirements with high labour input. It therefore represents a cheaper alternative to the typical high capital, low labour intensive conventional logging and milling systems. Outside traditional forest zones, in dry lands and farmlands, wood from trees provides relatively little income, as fuel, posts or sold standing. Conventional saw milling

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systems find it uneconomical to operate with the wood, which in most cases is of poor stem form and sometimes inaccessible. Processing logs on-site therefore increases value and revenues for the tree owner and stimulates local economies by providing timber products and employment opportunities. Low timber volumes and large distances to the processing facilities and market mean even small sawmills are often uneconomical. CSM has therefore proved valuable in some remote locations but is little-known or has been abused elsewhere where it could be promising.

### ***The vision for improving chainsaw timber processing systems***

Kenya's environmental vision spells out that by 2030, the country aims at being a nation with clean, secure and sustainable environment. This is expected to be achieved through among other goals; increased forests cover from the current about 2 to 4 % by 2012 and further to about 10 % by 2030. This will involve promotion of environmental conservation through eco-efficient processing systems including timber sawing and community participation in forest establishment and management (GoK, 2007). The shift of sources of saw logs from plantation forests to smallholder tree growers has enable farmers to maximize benefits and services derived from practicing on-farm forestry. Due to the availability of ready market for their trees when money is needed, many farmers are currently investing heavily in tree growing. The direct benefits include increased income from sale of timber, poles and posts, seeds etc. Other benefits and services are environmental conservation and preservation such as soil conservation, wind breaking, boundary marking, aesthetics etc. Motivation from these benefits has encouraged farmers to increase land area under trees and is expected to be an extra incentive to grow trees more professionally.

In recent years, the role of trees as savings banks has been emphasized in agricultural and agroforestry systems (World Agroforestry Centre, 2005), especially important in low-income years, during droughts or when prices of commodity crops or livestock products fall, or when cash is required immediate needs. Shade trees in plantation crops, e.g. *Grevillea robusta* and numerous species elsewhere are typical in this regard, and many studies have assessed the production, value and importance of such trees as a source of timber in supporting rural livelihoods.

A greater quantity, quality and diversity of timber products produced locally is also likely to have secondary effects, stimulating further processing or artisanal activities such as furniture or craft making, transport and the associated trade in tools, materials and equipment within the local centres. More money to tree owners from the sale of value added timber products and to timber processors will increase local cash flow, the chances for re-investment, and other aspects that would benefit the local economy. There are, however, numerous constraints that may prevent such an ideal vision for rural development taking place, though with careful insight, assistance and a suitable policy environment, advances could be made.

CSM has been responsible for the processing of significant and increasing amounts of timber in the country, both inside and outside forests, legally and illegally. Most CSM in Kenya is however operated freehand, which is highly blamed for the rough timber surface and low recovery. There is therefore a clear need for more information on improved systems and techniques, when and how they are used and their economic, environmental and social impacts. The global review provides information from forested areas and temperate regions supporting the view that CSM could be economically viable in similar situations, increasing revenues for tree owners, millers and artisans, and reducing negative environmental effects. However, these may not all occur in every situation, especially if the technology is used without control, and the dangers of uncontrolled use are identified and included in the assessment.

While this is appropriate to the current emphasis on policy and livelihood impacts, practical problems on the ground are rarely addressed. This is especially true of primary timber processing, and the increase in revenues that on-farm milling could achieve have been largely overlooked. Farmers therefore continue selling their trees without value addition and earns very little from them. In other countries like Australia,



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increasing wealth of knowledge on the role of portable sawmilling in timber production from farm forestry has been observed to contribute enormously to the local economies (Pasicznik and Samuel, 2006).

***Ongoing improvements in on-farm timber processing technologies***

The current research focus is that if trees are indeed acting as a 'savings bank' for farmers, then inexpensive portable sawmills could greatly increase the value of their withdrawals from the bank, by adding significantly to the sale price, as sawn timber, way above that paid for standing trees. Such processing should be eco-efficient and protected by law. It is expected that such efforts will be a strong incentive for the farmers to grow more trees on their farms, increasing tree cover and reducing the overdependence on the natural and plantation forest stands.

In dealing with these challenges, KEFRI introduced chainsaw frames in 2006. These are attachments to the chainsaw bar to guide the operator to saw timber of consistent size, smooth surface and improve recovery. The system is used in Europe, America and parts of Asia. These attachments work well with splitting chains. The chains in the country are usually felling chains, which make the technology difficult to work.

Working with partners in mechanical engineering, the Institute has been working on the felling chain to adapt it for the chainsaw attachments. Comparative studies of the production parameters associated with the system have shown improved timber recovery and better surface quality than chainsaw free hand method (Muthike *et al.*, 2008). It also greatly improves the operators' safety. The technology has been demonstrated and trainings conducted in various parts of the country in an effort to promote its adoption. Since the frames have no moving parts, they are free of maintenance costs and have been successfully modified and fabricated locally. They are being promoted to replace the freehand chainsaw uses.



Plate 5 Chainsaw with sawing attachments



Plate 6 Hands on the new sawing technology in Kirinyaga District among many other areas

The setting up of training programmes and availability of chainsaw operation manuals (Muthike *et al.*, 2006; Pasiecznik *et al.*, 2006) have played important roles in improving the sub-sector. Training opportunities for various stakeholders in small-scale sawmilling has shown significantly contribution towards optimization of log recovery and improve the socio-economic status of rural community (Luvanda and Muthike, 2008). Continued practical training on chainsaw operations and safety will be essential especially during tree felling, log extraction and processing. Proper maintenance of chainsaws is essential for safe use.

These efforts were as a result of the realization that the use of chainsaw for various forest harvesting and conversion operations is a long-term option in on-farm timber processing business. There is therefore an urgent need to explore opportunities of improving most of its features such as kerf size, weight, guide bar and the level of vibration. Major Research efforts on the chainsaw are therefore being directed towards ensuring that timber recovery rates are substantially improved. Appropriate modifications of the chainsaw are ongoing to ensure handling stability, enhance portability and minimize wastage due to saw blade kerf. There are also opportunities of formalization of the small-scale sawmilling enterprise by engaging in the usual marketing activities such as market research, product development, distribution, pricing and promotion.

#### ***Participatory forest management options***

In addition to the technical inputs targeting the processing sector, other efforts are also being directed to ensuring that more people participate in recovering the country's diminishing forest cover. In November 2005, the Government of Kenya ratified the new Forest Act 2005. This was an outcome of the Kenya Forests Master Plan in 1994. In the new Act, the Government among other things encourages communities to participate in the management of forests adjacent to them; and embrace the concept of Participatory Forest Management (PFM) as a tool to actualize community involvement.

The act gives considerations to the formation of Community Forest Associations (CFAs), which will be recognized as partners in the management of the country's forest resources. The act is in the process of being implemented.

Furthermore, the Act opens commercial plantations to lease arrangements by interested groups to supplement Government efforts in tree planting. This is considered as a radical departure from the previous practice which did not recognize the local community participation in management of forests as a viable option, resulting in forest degradation, alienation of the communities and conflicts. The current system, which provides for a wide range of stakeholders and communities' involvement, when fully implemented is expected to improve community responsibilities in managing and conserving the forests, increase productivity and availability of forest products as well as minimizing illegal trade in forest

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products. Under PFM, it is expected that the local communities will be empowered to produce, process and market forest products sustainably from their own farms, while managing and protection the natural forests and forest plantations. By extension these initiatives will enhance the control and minimization of the abuse of the chainsaws in illegal timber processing in the country.

Once implemented, smallholder tree growers will access propagation material and develop partnerships with various stakeholders especially experts on forestry management and development, processing and marketing of the products. It will further provide for adequate harmonization between other resources policies, which often led to conflict in farm forestry production, development, marketing and utilization. The demand for sawn logs surpasses supply by a large margin because the traditional small-scale tree growers were not necessarily growing trees for the large-scale construction and furniture industry but for small scale use at the local level. This has also been exacerbated by the entry of other consumers such as tea and tobacco processing factories which buy trees from farmers at very low prices by exploiting farmers' lack of knowledge on resource inventory and valuation techniques.

### ***Policy and legislation regarding chainsaw timber processing***

Before the ban in 1999, Chainsawing was used by timber dealers who bought trees from plantations to convert into beams for ease of transport to markets outside the region of operation. Its use has since extended to timber of commercial sizes. It was also known to have been used to convert timber from Government indigenous and plantation forests illegally for a long time and today it is seen as a source of major legal challenges in the forestry sector due to its frequent abuse by those sneaking into the forests for free materials. Similarly, due to its frequent use, the chainsaw is blamed for environmental degradation through fast rate of tree felling from both the farms and the plantations.

Chainsaws are however still considered as legal equipment in Kenya and is freely used by operators. At the moment, there are no levies imposed on chainsaw operators in the country. Due to this, it is difficult to know how many chainsaws are operating in a particular area. Similarly, the use of chainsaws has been highly abused by unscrupulous traders to process and trade in illegally acquired timber, making it a major legal challenge in the forest sector.

Currently, most of the timber found in the Kenyan Market has the 'trademark' tell-tale markings indicating it was sawn by a freehand chainsaw operator. While it is assumed that most of it comes from the farms, quite some substantial amounts are sourced from Government plantations illegally. Timber without these marks is assumed to have been imported from neighbouring countries, mainly Tanzania, Uganda or the DR Congo yet some again could easily have been illegally acquired from neighbouring Government forests. Based on this, the amount of illegal timber being traded is estimated to be between one half to the same as the declared legal harvest.

To minimize illegal practices, a number of legal procedures have been put in place by the Government to control timber processing and trade. These include;

- Acquisition of a certificate of origin; this is a document obtained from the local administration office certifying that the trees are from individually owned farm before felling. This document is supposed to be requested for and given to the farm owner who indents to sell or fell his trees.
- Acquisition of a loading and transportation permit from the local District forest office; this document is issued to certify that the materials are sourced from farms and are authorized for transportation. It is supposed to be signed by a forest officer after certifying that the timber being loaded was sawn from materials authorized under the certificate of origin.

These documents are considered vital to minimize illegal trade in timber products. The main challenges however that are the methods of enforcing them opens other challenges. After acquiring the certificate of origin from the local administration officer for a few trees from the farms, unscrupulous traders are likely to steal and process wood from nearby plantation and obtain a transportation permit for the mixed timber

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to the market since there is no supervision during the processing. Although the transport permit is supposed to be signed after a forest officer has supervised the loading of the timber from the sawing site, some traders process timber from different sites and gather it in different places. During this gathering, illegally obtained materials can easily find its way into the stores and become difficult to be differentiated from the legally obtained timber. These are some of the loop holes giving environmental activists headache over the prolonged ban on timber processing in the country.

Other steps taken to reduce illegal timber trade in Kenya include, reducing the demand for timber from timber-deficient regions by increasing their capacity for timber production and processing. With natural forests being increasingly protected for the global good and plantations having to compete with agriculture, growing trees for timber outside forests is being increasingly seen as a way forward (Pasicznik, 1999; World Agroforestry Centre, 2004). Farm forestry has shown huge potentials to meet the demand for more wood, and the vast dry lands are being slowly turned into productive agro-forests, equipped with the appropriate skills and tools (Felker, 2000; Muthike *et al.*, 2008).

### **Conclusions**

Value addition to trees from areas outside forests poses a number of challenges. Important aspects to be considered when selecting mill types include: access to trees, technical skills, productivity, and available capital, availability of the equipment or the possibility of fabricating the same locally, labour considerations and the timber markets. When trees are in plentiful supply, static sawmills have been the most viable, with a highly mechanised and efficient operation able to process tens or hundreds of cubic metres of timber per day. For fewer trees growing together, semi-static which can be dismantled and moved with less effort could be used, but the time required means that a certain amount of timber has to be sawn to ensure profit before changing location again. The most applicable sawing systems for the isolated farm trees would be the portables with little terrain limitations, simple to assemble and operate with fewer moving parts and able to economically process small volumes of timber. Chainsaws with the guiding frames make the best option so far.

Promotion of agroforestry and processing of trees on the farms is playing a major role in the fight against trade in illegally acquired timber. The use of chainsaws in harvesting (felling and processing) and conversion stages is very common compared to the saw bench which is also used for conversion leading to low recovery rates. Training of logging crew on general safety, chainsaw maintenance and timber recovery optimization at various stages of log processing is very low and without proper organization. The logging personnel who are either unskilled or semi-skilled have limited knowledge on log characteristics, milling characteristics and market requirements leading to low recoveries. There is lack of information by the farmers and tree buyers especially on tree inventory and valuation, timber types and sizes, grade specification and appropriate timber uses, which affect the tree trade negatively.

### **Recommendations**

There is need to train smallholder tree growers and other stakeholders on basic tree husbandry such as silvicultural treatments (pruning and thinning) and management, simple on-farm tree inventory and valuation, timber marketing and utilization. Timber sawyers should be trained on the use and maintenance of the appropriate machinery and equipment for harvesting, processing and conversion and safety precautions, and timber quality, marketing and utilization specifications. Most features of the chainsaw should be modified to enhance portability, increase recovery by reducing the kerf, weight, level of vibration. The use of chainsaw guiding frames should be promoted and chainsaw operators trained and encouraged to invest in the system to enhance timber recovery and surface quality.

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### 3.3 Chainsaw Lumbering in Nigeria: Challenges and Prospects

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#### **An overview of the forestry sector**

Until recently, the focus of forestry and forest resources management was as fulcrum for development of commercial and forest industries. That scenario encouraged logging which led to large scale deforestation of our forests. Increasing population has also led to large tracts of forest being deforested for other non-forest uses. According to Popoola and Akinwumi (2003) available statistics in Nigeria for example indicate that some 400,000 hectares of forest is lost annually through shifting cultivation. FORMECU (1996) has indicated that in all categories of land and land use there have been changes that in most cases have led to loss of vegetation. According to Popoola and Akinwumi (2003) loss of vegetation implies loss of habitats for both lower and higher animals. It also leads to several adverse ecological consequences such as floods and windstorms.

In spite of the dearth of information in Nigeria, many authors have given some insights into the trends in loss of biodiversity and their economic dimensions (Enabor, 1991; Adamu, 1991; NEST, 1991, Salau, 1991, Chokor & Obadan, 1991; Popoola & Ajewole, 2001; FORMECU, 1996; World Bank, 1990). According to Okali (1987) it is sufficient to say that the rate of soil loss from gully and other forms of erosion nationwide is quoted in tens of millions of tonnes of soil per annum, while the Naira cost to the nation, in terms of agricultural and other losses and repair works, is in the hundreds of millions per year. Perhaps the best indication of these costs is the billions of Naira sunk into ameliorating strategies in the name of ecological funds. With the grinding poverty, particularly in the rural areas, the situation appears to be worsening because as stated by IUCN, people on the margins of survival are compelled by their poverty to destroy the few resources available to them, [and that] people whose very survival is precarious and whose prospects of even temporary prosperity are bleak cannot be expected to respond systematically to calls to subordinate their acute short-term needs to the possibility of long term returns.

These situations are therefore at the heart of the problem of forest management in Nigeria as succinctly represented in the key statistics in Table 3.3.1. These throw up some challenges, for which urgent interventions are required.

At the global level many believe that, the only way to solving forestry problems is through Sustainable Forest Management- a concept/process which emphasizes wise and prudent use of the forest. The concept/process is however, unattractive and perhaps meaningless to rent-seeking loggers and the poor whose livelihoods depend on the forests.

Table 3.3.1: Nigerian Forests: Key Statistics (Sources: Synthesized from FAO, 2001a; FAO, 2001b; Broadhead *et al.*, 2000; FAO, 2002; UN, 2003; World Bank, 2002).

<b>Forest/Forest-related parameters</b>	<b>Nigeria</b>	<b>Total for West Africa</b>
Total Forest Area in 2000	13,517,000 ha	72,155,000 ha
Forest Plantations	693,000 ha	1,750,000 ha
Annual Plantations	23,000 ha	58,000 ha

Natural Forests	12,824,000 ha	70,395 ha
Percentage Forest Area	14.8%	14.2%
Forest Area per capita	0.1 ha	0.3 ha
Other wooded lands	9,645,000 ha	43,768,000 ha
Annual forest cover loss	-398,000 ha	-1,255,000 ha
Rate of change	-2.6%	-1.7%
Trends in wood fuel consumption (2000)	67,789,000 m <sup>3</sup>	175,056,000 m <sup>3</sup>
Trends in industrial round wood production	9,418,000m <sup>3</sup>	18,166,000m <sup>3</sup>
Extent of protected area (and % of land)	3,021,000 ha (3.3%)	27,757,000 ha (5.5%)
Total Population (2000)	140million	234.02million
Rural Population (% of total)	56.9%	60.4%
Population Density (2000)	121 inhabitants/km <sup>2</sup>	43 inhabitants /km <sup>2</sup>

### **Chainsaw milling in Nigeria**

Flitching is a logging activity usually carried out in the forest by artisanal sawyers also known as mobile chainsaw operators. It involves the identification of trees with appropriate log lengths, which are then marked to be converted by mobile chainsaw operators. This activity is usually un-authorized and illegal. Chainsaw operators illegally gain access into the forest, fell the trees and convert them to planks of different dimensions hurriedly and carry them by human portage to the nearest road from where they are then transported into the market. When legal authorization is sought, it is usually on the excuse that the operation will assist to extract logs from difficult terrains where it is practically impossible for trucks to gain access. But the authority is usually abused as the chainsaw operators extend their activities to other areas of the forest.

Artisanal sawing which was initially confined to the forest zones around large towns is now expanding into the more remote areas of the forest in Nigeria. The products from this activity are primarily aimed at the local markets for construction wood. Also there has been a proliferation of local markets for the sale of small-scale wood products (particularly in the major urban centres). This segment of the forestry sector provides rural income and employment. The supply of wood products from this enterprise to the local markets is significant. Despite its importance it is more or less completely beyond the control of the forestry administration. (Rural Development paper 25 f. 2001).

Opinions are divided on the profitability of the enterprise. However, some past studies have shown that profitability in the use of chainsaws for sawn wood production was 36 % of the price/m<sup>3</sup> and 57 % of the average cost of production/m<sup>3</sup> (Udo, 1994). FAO (1979) had earlier reported a similar profitability rate while Federal Department of Forestry (FDF) reported between 15-25 % profitability per cubic meter of wood converted. The average profitability rate is 36 % of the price. The rate was observed to increase with wood recovery efficiency. The observed mean recovery ratio for six selected species of timber in Cross-River State is about 0.46 (46 %). The recovery factor is higher than what obtained for conventional sawmill, which was 0.4 or 40 % (Adeyoku 1979 cited by Sanwo 1982). FRIN (1984) had earlier reported 47 % for conventional sawmills while Afuwape (1990) reported 0.56 or 56 % for conventional sawmills.

Other factors such as log size, operator's skill and log girth were found to affect wood recovery ratio in the chainsaw operation. Log size had the greatest impact on the wood recovery ratio. When the log size is big enough, the sawyer can more conveniently and properly align his saw and bring out straighter and more saleable pieces of sawn wood from the log, unless the log has some defects. Adebago (1982) reported that 23 species of trees were found to be converted through chainsaw at Bodija Market in Ibadan. Of the 13 selected species studied for comparison of volume recovery ratio between conventional sawmill and chainsaw operation about seven were found to give higher volume recovery with chainsaws than the conventional sawmills. Furthermore, chainsaw-flitched planks of given species were found to attract lower prices in the market than those produced from conventional sawmills (Ogunsanwo *et al.*, 2005). This is possible because chainsaw operation attracts lower tariffs than the conventional saw milling hence, the cost of production may be lower (Udo, 1994). The economic

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implication of this may be far-reaching as it may make wood more affordable in the market. Ogunsanwo *et al.* (2005) argued that the high wastage often associated with chainsaw operation may be reduced if the operation was legalized such that better-trained operators are employed and the job is more carefully executed and monitored. They were of the opinion that the method could be more environment-friendly as it ensures maximum return to the ecosystem. Also, damages to residual stocks and untargeted species are minimized and roads construction or trampling by heavy equipment is also reduced.

Even in the area of employment generation, opinions are divided. For example the perception in Benue state where the operation of chainsaw is permitted under licence is that CSM milling has actually reduced the number of people per gang. Pit sawing required more able-bodied men per gang while a chainsaw operator can do the work of several pit sawyers' gangs at once. Chainsaw therefore, engages fewer people. The team is usually made up of the operator, the assistants (partners) and occasionally a few more hands to help in road construction and as porters to move the planks/beams to a safe place.

Although there is a reduction in the number of members of the gangs in pit sawing, many more people have actually gone into timber business through direct purchase of their chainsaws. There has been an increase in income among chainsaw operators as evidenced in their improved lifestyles. On the part of government, there is equally an increase in revenue by way of issuance of permits. To farmers, their income has increased because they sell stands of trees directly to chainsaw millers and make some money.

Considering these varied scenarios and opinions about the desirability or otherwise of the chainsaw enterprise there is a need for a thorough investigation of the enterprise to be able to optimize the strengths and opportunities it offers and minimize/ameliorate the weaknesses/ adversities inherent in it. This paper reports the Nigerian component of the outcome of a study sponsored by DFID on CSM in three countries (Cameroon, Ghana and Nigeria)

### **Methodology**

Nigeria was stratified into agro-ecological zones i.e. mangrove, rainforest, derived savannah and guinea savannah. This was based on relative availability of timber in the zones. Three states were purposively selected on the basis of CSM activities in those states. The states are Benue, Cross river, and Osun. Benue state was selected because CSM activity is very rampant and dominates the timber trade in the state. Cross river state was selected because it one of the states still carrying relatively high percentage of the country's high forest, yet conventional sawmilling is hardly in practice, while CSM is more of the rule than exception. Osun state was selected because it is a rainforest state with high incidence of conventional sawmilling and permissible level of CSM.



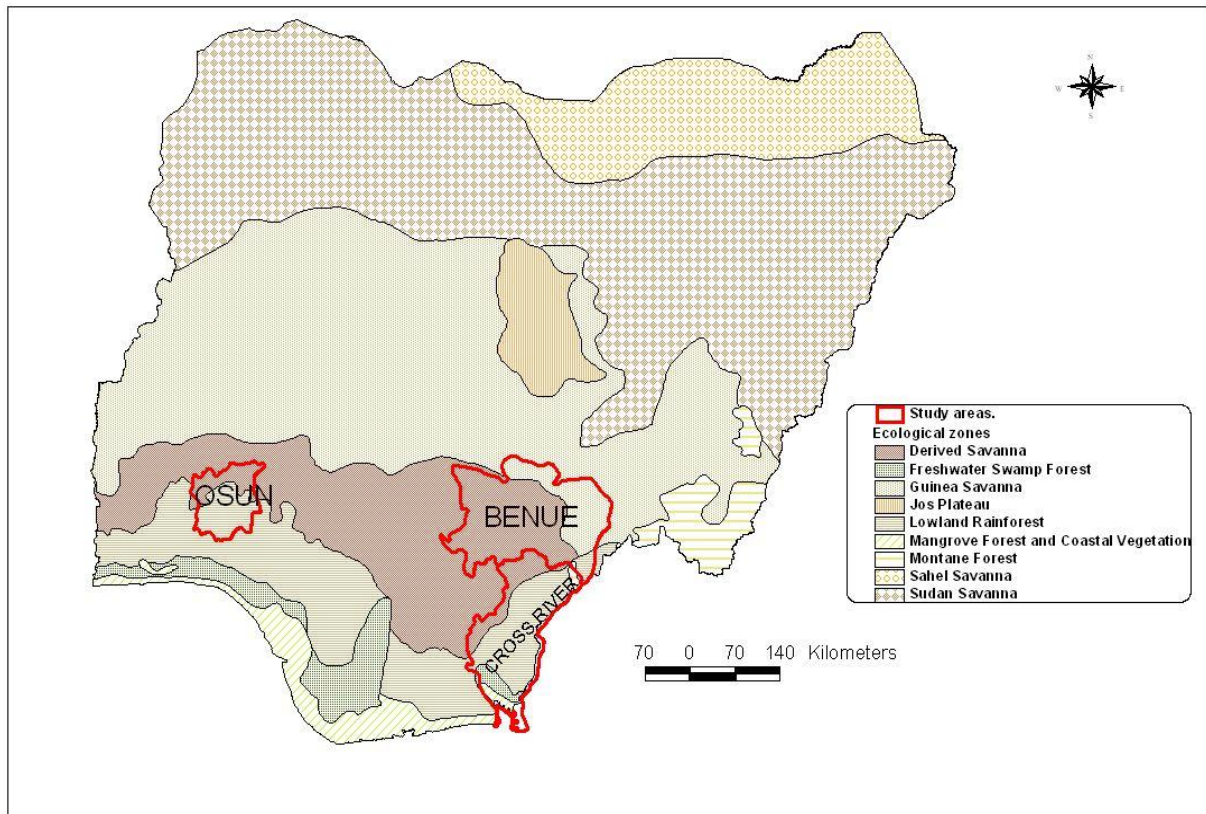


Figure 3.3.1 Map of Nigeria

### **Study approach**

With the aid of three sets of questionnaire' information was obtained from stakeholders including forest officials, lumber marketers, chainsaw operators and households within the selected study sites. Information elicited included operational efficiency of practice, availability of wood for sawing, environmental impacts of practice, and contribution to sustainable livelihoods of operators.

### **Data analysis**

Data obtained were analysed using SPSS and Microsoft Excel to carry out descriptive statistical analysis. Results were also illustrated by the use of Tables and charts.

## **RESULTS**

### **Policy and legislation**

Chainsaw operation is not a new practice in Nigeria and it has grown over the years from small illegal units into large number of participants forming themselves into associations and unions and seeking recognition from forestry authorities. Most states with substantial area of forest in Nigeria still regard the activity as illegal. However some states seem to have relaxed their regulations to accommodate this ubiquitous segment of the forestry sector, perhaps out of realities. Such states include Akwa Ibom, Cross River, Benue, Osun, Taraba and some states in the cores east of Nigeria. Of all the states named above, Cross River and Akwa Ibom states are in the lead. For example, Cross River State with about 26.44 % of the land area forested out of which about 6,101.29 km<sup>2</sup> represent constituted forest reserves and also contained about one third of the countries forest resources (Anon 1988), until recently Cross River State had no sawmills. According to Alviar (1982), there were only ten (eight small and two large) sawmills in Akwa-Ibom and Cross-River States with a total capacity of 177,000 m<sup>3</sup> annually. Apart from SERON Wood (now Calabar Wood which came into existence in the 60s, the others such as Calabar Veneer and Plywood company (CALVENPLY), Roote-Edge Industries, Mike Plank Processing Industries, Hamseatic and the Cross-river Agro-allied Industries are all recent entrants. Most of these companies depend heavily on supply of logs from individual cuttings across the state. Many small-scale operators who

cannot afford the high cost of convectional sawmilling equipment are also engaged in sawn wood production using chainsaws. The miller engages the services of 'tree finders' who go in search of merchantable trees in both constituted forest reserves and free areas. Tree finders are paid an agreed sum of money depending on the number and species of trees found. The miller then pays for and obtains a forestry permit for trees he intends to harvest in a particular forest area and he then engages an operator and other assistants to carry out the harvesting and conversion. After conversion he engages human porters to convey the pieces of sawn wood from the stump site to accessible landing points in the forest where trucks are used to evacuate the rough products to the market. The sawn wood is usually sold at the landing points to the customers who are responsible for the cost of transportation to the different destinations. The wood processor pays fixed stumps rates per tree in accordance with current tariff schedules in the state. These prices vary with classes of species. Class 'A' species cost ₦5000.00 per tree while class 'B' species cost ₦3000.00 per tree irrespective of tree sizes. Though the minimum felling girth is adhered to, the tariff rate comprises fees paid to government for raising and protecting the trees to maturity and royalties paid to the traditional forest owners. The forestry division also charges each permittee a tree inspection fee of ₦150.00 per tree and a regeneration fee of ₦250.00 per tree, the latter being meant for supplementing the cost of replanting cut-over forests. There may be other unofficial payments.

***Distribution, marketing and organisation of the trade of chainsaw lumber***  
***Ownership and Uses of Chainsaw***

In the whole of the study area 78.7 % of the operators owned their chainsaw (CRS 44.4%, Benue 100% and Osun 68.5 %) (Table2). Ownership of operating plant has some inherent advantages and disadvantages. For one, it enables the owner to have better information on the situations within the operating environment and also to better manage his resources for optimum productivity and efficiency. The reverse is also true if the operating plant is owned by another person.

Apart from the use of chainsaw in logging operations, other identified uses in order of importance are crosscutting, renting it to other users and clearing. The modal quoted income from alternative uses is ₦10,000 while the least is ₦300.00. Other accessories and equipment considered are jack, securing bars, band saws, circular saws and motorcycles. Most of the operators (over 70%) did not own or have these and thus the question of alternative earnings from them did not arise.

Table 3.3.2: Distribution of Ownership of Chainsaw Operating Plants

Ownership of Plants	Cross River		Benue		Osun		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	4	44.4	22	100	11	68.8	37	78.7
No	5	55.56	-	-	5	31.3	10	21.3
Total	9	100	22	100	16	100	47	100

***Foremen***

The nature of chainsaw operation demands the use of additional hands other than the owner or operator. Thus it can be observed from Table 3 that 74.5 % of CSM entrepreneurs work with foremen, other categories of workers and hired labour (CRS 100 % Benue 72.7%, Osun 62.5 %). The income of the foremen ranges between ₦1200 and ₦2500, although most (57.1%) of them earn between ₦1000 and ₦2500.00 per day across the study area. Few of the foremen are also engaged in other jobs most important of which is driving and farming. Other alternative jobs, though with very minimal participation of the foremen are artisanship, labourers, salesmanship, porters among others. These other alternative jobs bring in an additional income ranging from ₦750 to ₦1000, while 58.6% of these earnings are less than ₦1000 per day.

Table 3.3.3: Distribution of Use of Foremen.

Use of Foremen	Cross River		Benue		Osun		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	9	100	16	72.7	10	62.5	35	74.5
No	-	-	6	27.3	6	37.5	12	25.5
Total	9	100	22	100	16	100	47	100

### **Chainsaw Operators**

Income of an operator from chainsaw operation ranged between ₦2000 and ₦5000. The modal income level was ₦2500 as indicated by 10.6% of the respondents. This compares favourably with what the average skilled worker such as vehicle driver or electrician could earn in a day. Hence it is an incentive for young able-bodied men to want to go into chainsaw operation. Many people are also engaged as operator assistants otherwise referred to as partner in Nigeria. About seventy nine percent of the respondents indicated that they work as assistant operators. Few (28.3 %) of these operator assistants are also engaged in alternative jobs such as carpentry, shop assistants, farming, labourers, lumber porters and traders. The proportion of operator assistants that are engaged in alternative jobs is relatively small since most of them in this category are not skilled in any specific profession, hence they have only very few options available to them. The daily earnings of assistant chainsaw operators range from ₦750 to ₦1500 while that of alternative engagements range between ₦500.00 and ₦1000. This observed difference in earnings will obviously make the operator assistants to prefer chainsaw engagements to the alternatives which are likely to be more tedious and less rewarding.

### **Lumber Porters**

Timber merchants engage the services of workers who assist in conveying the converted wood products from the stump site to the landing site while the wood would be loaded subsequently into timber trucks. Forty four percent of the respondents belong to this category. These are usually casual workers who are engaged only when there is work to be done. The average daily income of porter as can be observed in Figure 2 ranges between ₦300.00 and ₦1500. This is the range of daily labour rate in the country depending on the nature of the job and the location. While labour wage may be as low as ₦300 – ₦600 in rural areas the average labour wage in urban areas is between ₦800 and ₦1500. Lumber porters do engage in a few other jobs when chainsaw operation activities are not available. Such alternative engagements may be as bus conductors (4.3 %), farmers (4.3 %) casual labourers (10.6 %) photographer (2.1 %) and others (2.1 %) while 76.6 % of them do not have alternative jobs. This is to be expected as many of them are unskilled and have few options open to them. The availability of alternative engagements for lumber porters is a plus for the sustainability of chainsaw operation because workers could get temporarily busy in alternative jobs when logging is off season.

### **Loading Gang**

These workers are also referred to as “loaders” in Nigeria. Their job is to move the planks from the gantry or landing site to the lorry. They are usually unskilled labourers including women and young adults who engage in the job temporarily to earn some income to meet immediate needs. The daily income for each member of the loading gang as can be observed in Figure 3.3.3 ranges between ₦300 and ₦1500. This depends on the number of planks an individual is able to carry per day. Majority of the loading gang 14.9% earn ₦500.00 per day while 6.4% each earned ₦300.00 and ₦1000.00 per day respectively. This is a better pay when compared with ₦300.00 to ₦1000.00 which majority get from alternative jobs. About 59.6% of the respondents were engaged in this activity. As it is with the other categories of chainsaw operation activity groups, a number of alternative jobs are also available to this category of workers though limited since they are largely illiterate and unskilled. Such alternative jobs include commercial motorcycle riding (*okada*), farming, and serving as security guards, labourers, porters and shop assistants.

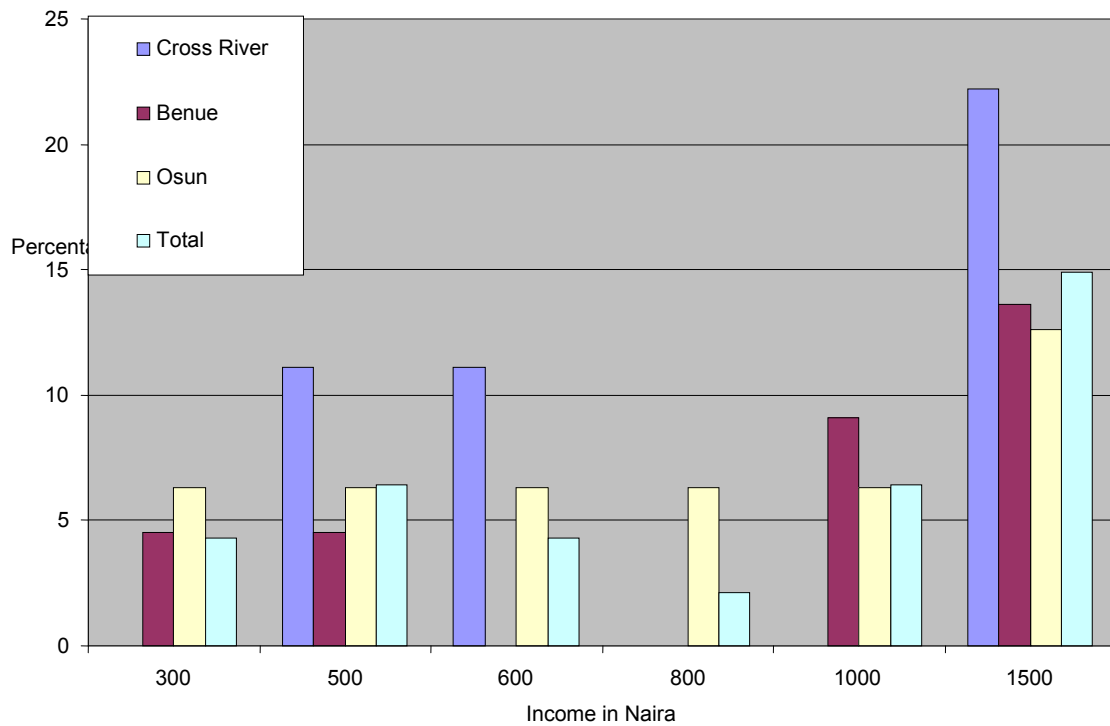


Figure 3.3.2: Percentage Distribution of Lumber Porters' Income in Nigeria

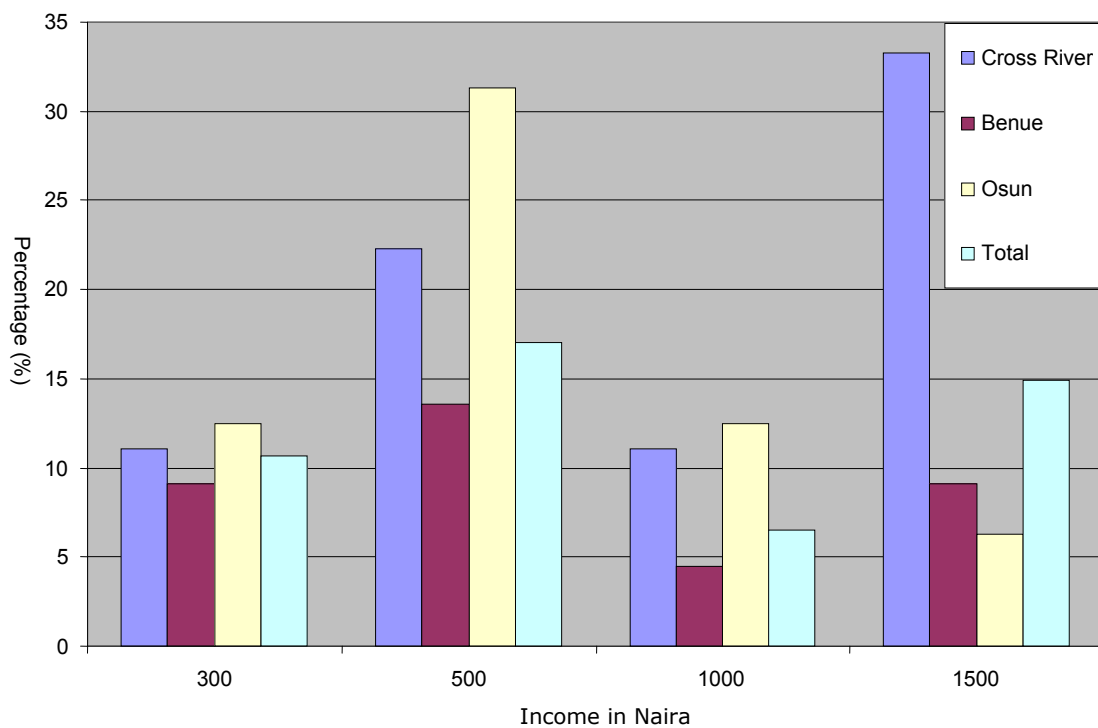


Figure 3.3.3: Percentage Distribution of Income of Lumber Loaders in Nigeria

**Source of Trees for Chainsaw Operation**

Basically five locations were identified as major sources of trees for chainsaw operations. These include secondary forest, food crop farm, cocoa farm, riparian strip and forest reserve. Interestingly the most important source of trees for the operation varies from one state to another as can be observed in Figure

4. From this figure, it can be observed that riparian strip ranked highest with 76.3 % as the most important source of trees for chainsaw operation in Cross River State. In Benue state, Cocoa farm ranked highest with 53.6 %. And in the case of Osun state, secondary forest ranked highest with 21.1 %.

**Range of Sizes of Tree Felled for Chainsaw Operation**

The range of sizes of trees felled for chainsaw operations varies widely. The study revealed that the lower girth limit is as low as 2 cm while the upper girth limit is as high as 30 cm. Furthermore, the number of pieces of lumber obtainable from these various sizes of trees also varies widely. The number of pieces of lumber that can be obtained from these trees ranges between one and forty. The wide range of sizes of trees felled by chainsaw operators is an obvious indication of lack of regulation of the sizes of trees that can be cut by chainsaw operators. However, the principle of sustainability demands that laws be put in place to regulate the sizes of trees that can be felled, so that very young and immature trees can be prevented from being cut. This is largely not enforced at the moment.

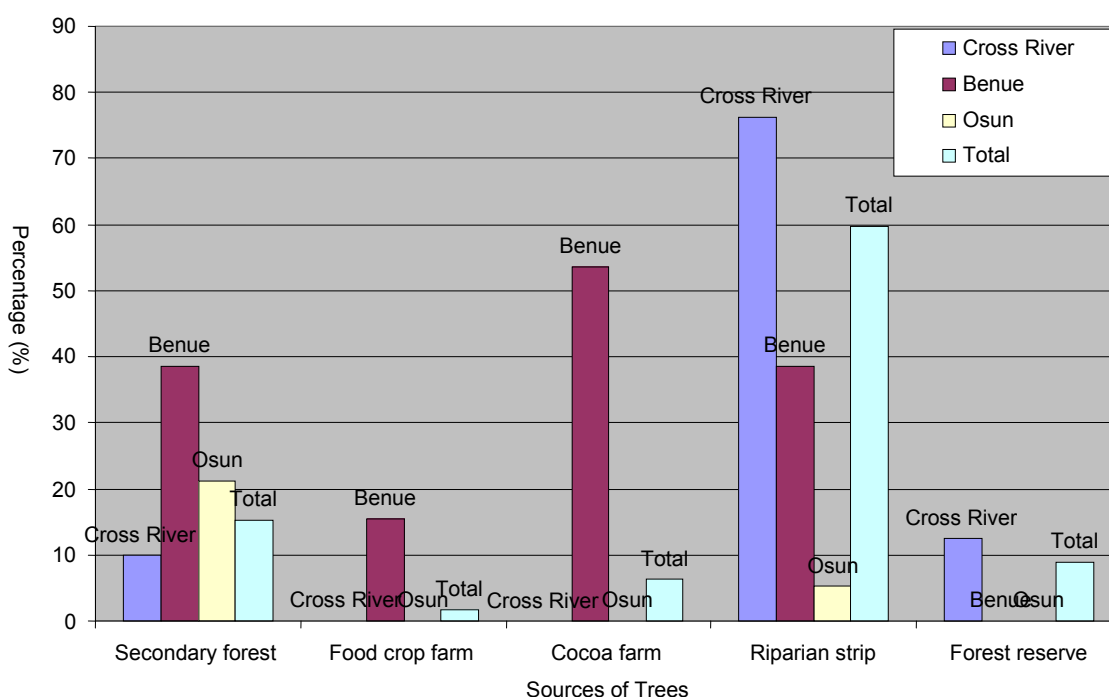


Figure 3.3.4: Percentage Distribution of Opinions on the Most Important Source of Trees for Chainsaw Operation

**Felling in areas that have been previously Logged**

As shown in Table 3.3.4, 48.8 % and 36.8 % of the chainsaw operators interviewed in Cross River and Osun states respectively were of the opinion that felling in areas closed for logging is a common phenomenon, while another 47.5 % and 15.8 % in Cross Rivers and Osun States respectively considered this phenomenon very common. On the contrary, felling in areas closed for logging appears an uncommon phenomenon in Benue state, where 53.8 % and 46.2 % of the chainsaw operators considered this phenomenon as non-existent and rare respectively.

Table 3.3.4: Distribution of Opinions on Felling in Areas that have been previously logged

Frequency of Occurrence	Cross River		Benue		Osun		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Non-existence	1	1.3	7	53.8	5	26.3	13	11.6
Rare	2	2.5	6	46.2	4	21.1	12	10.7
Common	39	48.8	0	0	7	36.8	46	41.1
Very Common	38	47.5	0	0	3	15.8	41	36.8
Total	80	100	13	100	13	100	112	100

#### **Removal of seed trees for natural regeneration**

On the issue of removal of solitary trees which serve as seed trees/wildlings for natural regeneration on fallow grounds, results in Table 3.3.5 shows that 45.0 %, 42.1 % and 23.1 % of the respondents in Cross river, Osun and Benue states were of the opinion that such practice is a very common occurrence. This practice is detrimental to regeneration, although opinions are divided on the scale of loss of these wildlings in chainsaw operations compared with conventional commercial logging.

Table 3.3.5: Distribution of Opinions on Felling of Seed Trees for Natural Regeneration

Frequency of Occurrence	Cross River		Benue		Osun		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Non-existence	1	1.3	7	53.8	4	21.1	12	10.7
Rare	8	10	1	7.7	4	21.1	13	11.6
Common	35	43.8	2	15.4	3	15.8	40	35.7
Very Common	36	45	3	23.1	8	42.1	47	42
Total	80	100	13	100	13	100	112	100

#### **Changes in methods of production over the years**

In the late 1970s and the early 1980s, CSM was completely outlawed in several states of Nigeria that were endowed with forest resources. However, since the years of the Structural Adjustment Programme (SAP) which major features were removal of subsidies on several utility items such as petroleum products, equipment; and the massive devaluation of the national currency, many industries were negatively affected. For example, many sawmills and logging companies folded up, while those that did not, operated with obsolete and inefficient plants. This led to loss of market in the formal sector, which now led to the ascendancy of chainsaw operations in many localities. The gradual acceptance of the products of the chainsaw operation in the timber market, therefore, encouraged the refinement of the processes and thus the products. It is not unusual now to find chainsaw operators lining and measuring logs preparatory to flitching. Today, products of chainsaw operations in some localities are so refined that it may take the discerning eye to spot the difference between the millsawn and the chainsawn wood.

#### **Conflicts associated with CSM and existing mechanisms to manage conflict**

One of the major problems of valuation in forestry is the not-so-well defined ownership structure of the resource, which combined with other characteristics have made value capture difficult, hence the erroneous notion that forestry is not a major contributor to national income. CSM suffers from this scenario. If CSM is not a major contributor to national income, then it is necessary to consider how important it is to the different resource owners and to what extent they are prepared to invest in managing them sustainably. Several factors influence the ability of the chainsaw operators/ owners in capturing the values of their investment. Some, as in the case of economic benefits from the production of wood from the operation could be easily captured, while capture of environmental, social and cultural values becomes difficult on account of their public goods characteristics. In the case of private goods largely it is a question of understanding the markets and developing products and services that are in demand.

According to the FAO (2004) the key factors that influence the ability of resource owners to fully appropriate the values and transform them to economic benefits are (a) resource characteristics, (b)

ownership of resources, including policies and legislation that define ownership, the social and economic conditions of the owners and more importantly their entrepreneurial ability (including the ability to understand the changing opportunities and to move up the value chain, and (c) the nature of markets served. These interact with each other altering the opportunities and constraints in capturing the different values derived from CSM as indicated in Figure 3.3.5:

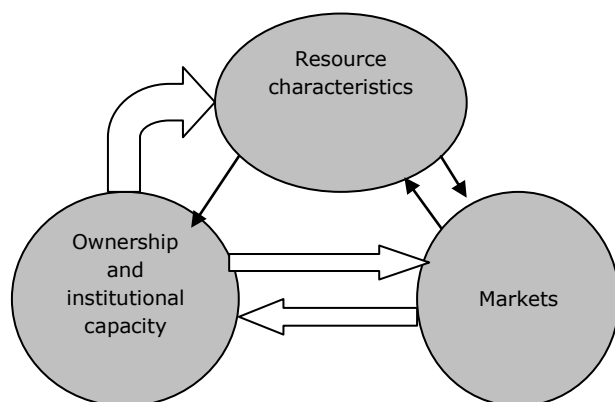


Figure 3.3.5 Factors affecting value capture in forestry and chainsaw

Forests resources have continued to play major roles in livelihood sustenance among the people of the tropics and indeed, globally. In spite of the fact that forest products and services are associated with the daily living, human beings continually display less and less interest in understanding the intricacies of its management. According to Popoola (2002) forest management in Nigeria has more often than not focused on timber as the main, or in several cases the sole end-product of forest operations. Arising from this, virtually all activities tend to be geared towards maximizing wood production to the detriment of other forest components. This is further compounded by the common property characteristic of most natural forests where CSM usually takes place, state governments being the major owners in several instances in Nigeria. In such circumstance, pricing is inappropriate, while efficiency and transparency in resource extraction are not guaranteed.

On the issue of ownership, chainsaw operation is largely a private enterprise made up mainly of several individual owners with varied interests. In this circumstance, standards are not assured; neither do the issues of ethics and professionalism come into play. Maximum profit however remains a common aim. In recent times however, some of the operators have organized themselves into cooperatives or associations, with the common goal of resisting the drive of the formal sector operators to get government to outlaw CSM.

Market is a key determinant in any enterprise. Before the 1980s, lumber from chainsaw operations were found mainly in rural and peri-urban markets. Patrons were mainly people who required wood for rough construction works. However, with the down turn in the economy in the mid-1980s the products of chainsaw operations began to make forceful entrance into the urban markets. One major reason for this is the relatively cheaper and affordable prices of the products compared with the mill sawn wood. With drop in personal incomes and the increasing burden of sustenance, buyers now tend to settle for the cheaper sawn wood from CSM, thus creating a huge market for it. A survey of selected markets shows the significant disparity in prices of chain sawn and mill sawn planks in Nigeria (Table 3.3.6).

Inter process (between mill sawn and chain sawn) price differential ranged from N20 to N450 in 2006. By 2009 the differential has been ranging between N100 and N1100. Clearly, what this signals is that the market prices of mill sawn wood are much higher in comparison to those of chain sawn wood. This becomes significant when large consignments are involved. For example, to construct a structure

requiring *Gmelina* wood input of up to two Million Naira, a net savings of up to One million Naira is possible, using chain sawn wood.

This amount is reasonable enough to defray the labour and other material costs for the wood work in the construction. This “simple street logic” tends to be a major driving force in the continuing relevance of the CSM in the economy. Added to this is the improvement in the quality of the output (Plates 3.3.7, 3.3.8, 3.3.9 & 3.3.10)

Table 3.3.6: Price Differentials of Sawmill and chainsawn planks in a Nigerian plank market, 2006 & 2009.

	species	Mill sawn wood				Chain sawn Wood				Inter Process Price Differential	
		Dimension	2006 N	2009 N	Intra Process price Differential N	Dimension	2006 N	2009 N	Intra Process price Differential N	2006 N	2009 N
High grade	<i>Afzelia Africana</i> (Red apa)	2x3x12	350	600	250	2x3x12	200	450	250	120	350
		2X4x12	380	700	320	2X4x12	300	600	300	80	100
		2x6x12	450	1100	750	2x6x12	400	900	500	50	200
		3x4x12	500	700	200	3x4x12	300	700	400	200	-
		1x12x12	800	1100	300	2x12x12	1000	900	200	300	200
	<i>Milicia excelsea</i>	2x3x12	350	700	350	2x3x12	200	375	175	150	325
		2X4x12	320	950	630	2X4x12	280	500	220	40	450
		2x6x12	400	1400	1000	2x6x12	350	750	400	50	850
		3x4x12	400	1400	1000	3x4x12	320	800	480	80	600
		1x12x12	700	1400	700	1x12x12	650	1200	550	50	200
		2x12x12	850	2800	1950	2x12x12	700	1500	800	150	700
	<i>Tectona grandis</i> (Teak)	1x6x12	450			1x6x12	300				
		1x15x7	800			1x15x7	600				
		2x8x7	800			2x8x7	600				
	Medium grade	<i>Cordia milleni</i>	2x3x12	300	800	500	2x3x12	200	700	500	100
2x4x12			350	1100	750	2x4x12	280	950	670	70	150
2x6x12			400	1700	1300	2x6x12	350	1500	1150	50	200
1x12x12			1100	1700	600	1x12x12	1000	1500	500	-	200
2x12x12			1800	3200	1400	2x12x12	1350	2800	450	450	400
<i>Terminalia ivorensis</i>		2x3x12	250	800	550	2x3x12	200	700	500	50	100
		2X4x12	280	1100	1720	2X4x12	250	950	700	30	150
		2x6x12	400	1700	1300	2x6x12	300	1520	1220	100	180
		3x4x12	850	1700	850	3x4x12	500	1520	1020	350	180
		1x12x12	1100	1700	600	1x12x12	850	1520	670	350	180
<i>Gmelina arborea</i>		2x3x12	180	550	370	2x3x12	150	350	200	30	200
		2x4x12	250	750	500	2x4x12	220	500	280	30	250
		2x6x12	420	1110	680	2x6x12	400	700	300	20	410
		1x12x12	700	1110	410	3X4X12	600	700	100	100	410
		2x12x12	1000	2200	1200	1x12x12	900	1100	200	100	1100
					2x12x12		1400				





Plate 7: CSM in progress in a Nigeria-Cameroon border community



Plate 8: Chainsawn Planks at a Landing ready for evacuation to the market

Plate 9: Chainsawn plank evacuation by truck in Osun State, Nigeria



Plate 10: Chainsawn Plank Dealer's stand



### ***Analysis of policy response to CSM, including an assessment of their success and/or failure***

As stated elsewhere in this paper, CSM was outlawed in many states in Nigeria until recently. However, in some states, it is a practice borne out of reality. Increasingly, however, more states are relaxing legislations banning the enterprise. Some reasons may be adduced for this:

- Depleting trend in timber resources making investment in formal saw milling unattractive
- Huge capital requirement for the establishment of sawmills (band saw, trucks, saw doctoring equipment, skilled and unskilled labour etc). These have increased by between 1000 and 5000% since 1985.
- Ageing and obsolete plants
- Poor power supply situation from the national grid and the ever increasing prices of diesel (AGO) and petrol (PMS)
- Ever increasing fees and charges payable to government without commensurate returns
- Corruption among forestry officials

A combination of these or all of the factors has led to poor returns on investments in the formal sector. As a matter of facts, many operators in the formal sector have sold off their plants to invest in units of chainsaw machines to be able to stay afloat. Arising from these realities some states are now licensing more chainsaw operators. This in itself has created a conflict situation between the formal sector operators and the chainsaw operators. The former pushes for the complete banning of the latter as a result of its own

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dwindling fortune. The reality on ground, markets, however, favours the continued existence of the chainsaw operation in several localities.

### ***The future of CSM***

#### ***Threats***

Illegal CSM is still rampant in some localities. Where occurs, the level of wastage has been observed to be high on per area basis. Unfortunately, corruption among forestry officials tends to exacerbate this. Existing rules regulations must be strengthened and sanctions applied on erring officials and collaborators

#### ***Opportunities***

Since majority of the trees felled for CSM are obtained outside forest reserves, then strategies to increase the population of trees outside forest (TOF) will have to be evolved. Chainsaw operators are now organizing themselves into associations which establish private plantations in some localities in Nigeria. This should be encouraged. Majority of the CSM entrepreneurs in Nigeria borrowed their working capitals and were able to repay their loans with ease. This suggests that CSM is profitable and reliable enough to ensure loan repayment. Increasing the capital base would increase the returns and consequently capacity for poverty reduction. Therefore CSM entrepreneurs can organise themselves into cooperative associations which can approach micro-finance institutions for investment loans to increase the returns on the chainsaw business.

#### ***Conclusions***

CSM is a major source of sawn wood supply in Nigeria. The business also provides employment for both family and hired labour in one or more groups of personnel that are directly involved in the technical operation of CSM business; thereby improving household and general social well-being through generation of employment and income. Furthermore, the wage rates earned by these personnel compare favourably with what the average skilled worker such as drivers, mechanics, masons or electricians could earn in a day, and are by far higher than the less than US\$1.00 recorded as the amount on which more than 60 % of Nigerians live on daily. Formal sawmilling has increasingly become an investors' nightmare. The minimum amount required to establish a standard mill is so huge yet returns on the investments are not significant. Moreover, the high and uncontrolled rate of depletion of our natural forests has led to loss of merchantable trees worthy of the huge investment in the formal logging/milling enterprise, hence the increasing relevance of CSM. There are clear indications of the social and economic importance of CSM business in Nigeria. Therefore, there is the need to address policy and governance issues that will make CSM in Nigeria sustainable in terms of social acceptability, economic viability and environmental friendliness.

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### 3.4 The State of Chainsaw Milling in Uganda's Timber Industry

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#### **Status of forests in Uganda**

Forests in Uganda cover an area of about 4.9 million ha which is 24 % of the total land area, making it an important element of land use (MWLE, 2002). The forests are broadly categorised as tropical high forests (THF), woodlands and plantations. Their ownership falls into two broad categories namely Government reserves, which are protected by Government, and private/community forests that are owned by individuals/communities. 30% of the forests are in protected areas and 70 % on private land. Table 3.4.1 below gives the distribution, in hectares, of different forest types and their ownership.

Table 3.4.2: Forest types and their ownership in Uganda (Source: Adapted from National Forest Plan, 2002)

Forest type	Government Reserves		Private and Community	Total
	Forest reserves	Wildlife reserves		
THF	306,000	267,000	351,000	<b>924,000</b>
Woodland	411,000	462,000	3,102,000	<b>3,975,000</b>
Plantation	20,000	2000	11,000	<b>33,000</b>
<b>Total</b>	<b>737,000</b>	<b>731,000</b>	<b>3,464,000</b>	<b>4,932,000</b>

Government reserves constitute the Permanent Forest Estate (PFE) which is set aside permanently for forestry activities and held in trust by government (MWLE, 2002). The National Forestry Authority (NFA)

manages the bulk of the forest reserves (60.9 %); District Forestry Services (DFS) manage the local forest reserves (0.3%) while Uganda Wildlife Authority manages the national parks (38.8%) (Turyahabwe and Banana, 2008). Twenty percent of the forest reserves are strict nature reserves in which no production is allowed while 30 % are buffer zones in which non-timber utilization activities are allowed. The remaining 50 %, totalling about 140,000 ha, are the production zones set aside for the production of hardwood timber (Odokonyero, 2005). The plantations comprise of mainly *Pine spp*, *Cupressus lusitanica* and *Eucalyptus grandis*.

Tropical high forests and plantations produce over 80 % of the timber in the country with plantations supplying about 20 % (MWLE, 2002; NFA, 2005). However, most of the plantations have been harvested and almost exhausted (Figure 3.4.1) while the supply of timber from natural forests is declining and the forests continue to be lost at an alarming rate (Figure 3.4.2) to the extent that Uganda was projected to face a timber deficit by 2010 (Odokonyero, 2005).

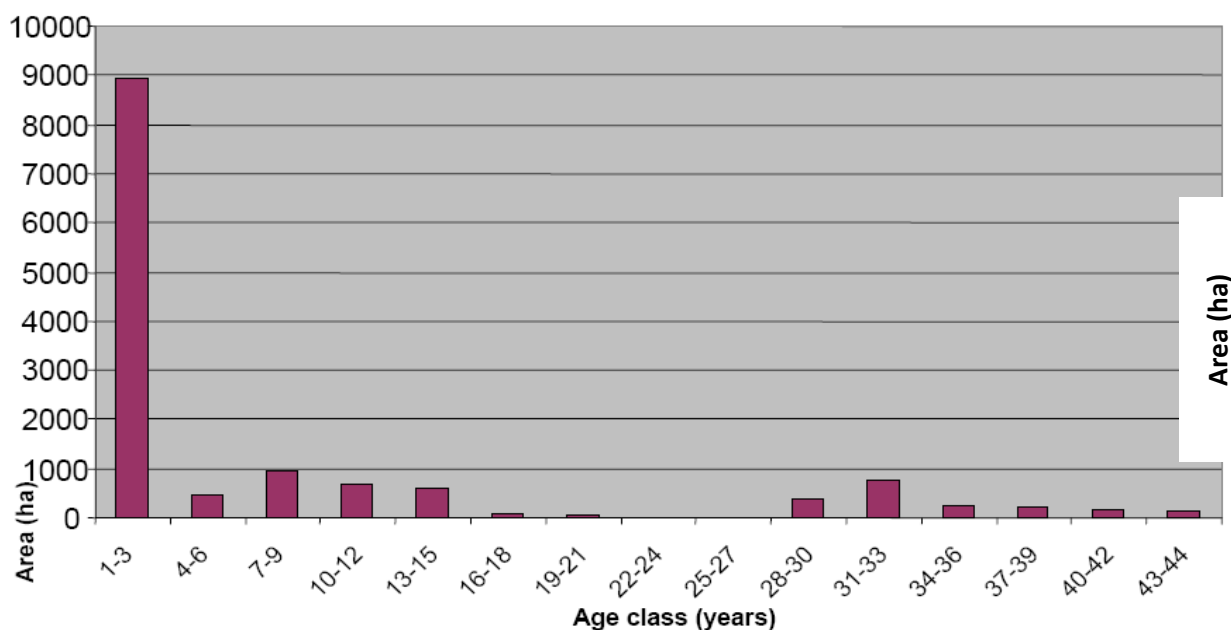


Figure 3.4.1: Age structure of plantations in Uganda (Amumpe, 2008)

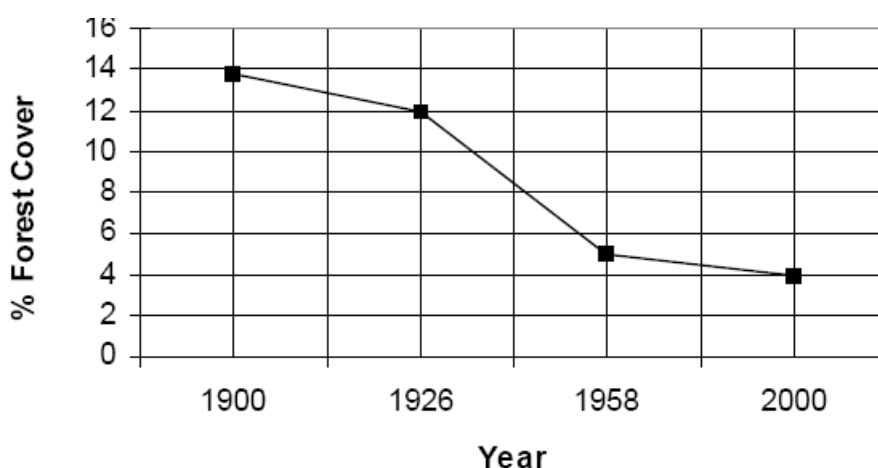


Figure 3.4.2: Forest Cover in Uganda (Kazoola, 2007)

The imbalance between demand and supply of timber is increasing (Figure 3.4.3) and this encourages illegal activities such as the production and trade in chainsawn timber and illegal importation of timber from the DR Congo (Odokonyero, 2005).

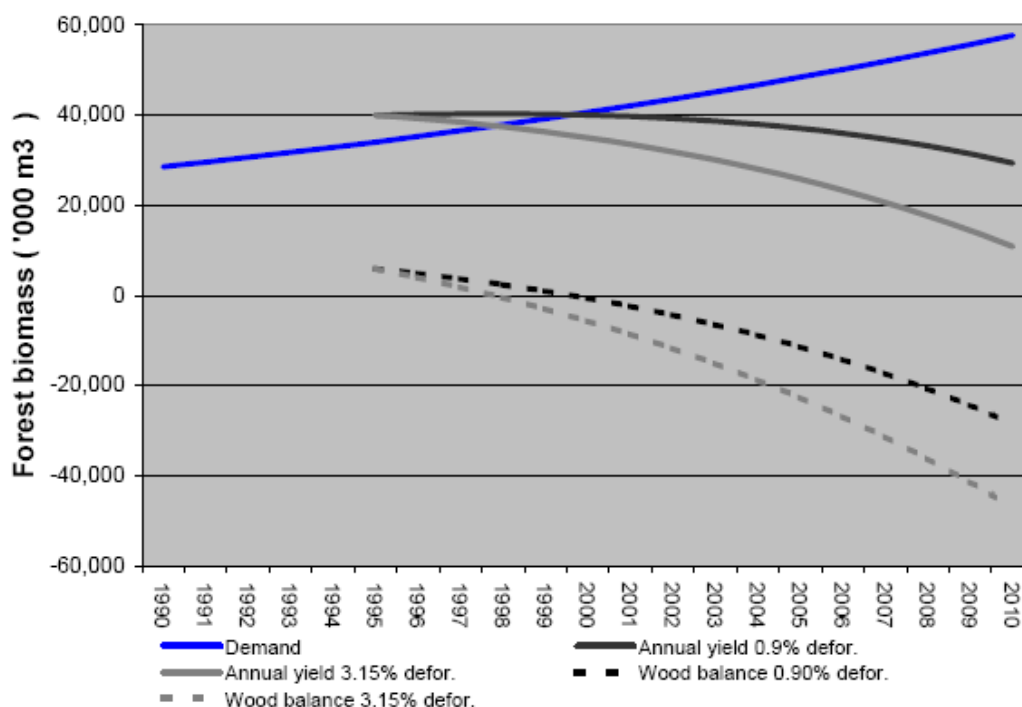


Figure 3.4.3 Demand and supply of forest products (Source: MWLE, 2002)

### Forestry and the wood industry in Uganda

Forests in Uganda are an important economic resource supporting livelihoods through provision of energy, forest products, employment, livelihood support, government revenues, business opportunities and environmental functions and services (MWLE, 2002). The contribution of the forest sector to Uganda's GDP is estimated at about 2 % excluding value addition resulting from wood processing, transportation and trade as well as the non-traded consumptive and non-consumptive benefits provided by forests (MWLE, 2002). A more realistic estimate puts the contribution of the forest sector to GDP at about 6 %. Wood-based industries particularly play an important role in economic development, both in terms of employment and value addition (MWLE, 2002; Plumptre and Carvalho, 1988). According to the MWLE (2002), forest-based industries provide an equivalent of 3,200 formal jobs annually. Thus a sustainable wood industry can play an important role in contributing to national development. The importance of the wood industry sector to Uganda's economy is bound to increase with the increased demand for wood and wood products as the economy grows (MWLE, 2002). Figure 3.4.4 below shows the timber value and volume output for five years since 2003 at 2008 prices (US\$1= 1750 shillings). Chainsaw lumber is estimated to be a third of the total timber output.

However, timber production in Uganda is still a relatively simple labour-intensive process. In terms of structure, the timber industry in Uganda is highly fragmented, consisting of small-scale, labour-intensive production units reflecting the small local markets, cheap but limited raw material, and low labour costs. Industrial processing of wood is not well developed. Primary processing comprises of timber and plywood production, with only one major plywood manufacturer in the country (Auren and Krassowska, 2004; UFSCS, 2001). Thus the primary wood industry in Uganda is generally a one-product industry, solely producing timber. This is done by three categories of producers namely sawmillers, pit-sawyers and chainsaw operators. Table 3.4.2 below is a summary of the distribution, areas of operation and estimated output for the different categories of timber producers. However, as Auren and Krassowska (2004) noted, there are many players operating illegally and as such official statistics only represent a small percentage of the actual number.

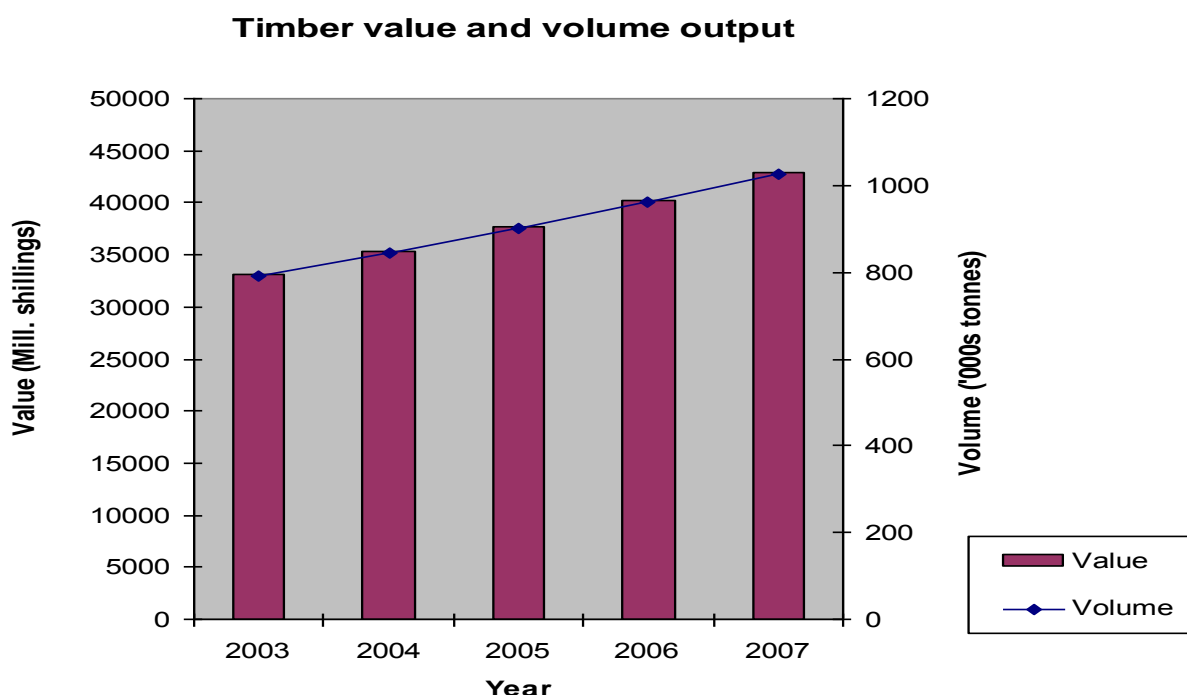


Figure 3.4.4 Timber value and volume output (Source: Uganda Bureau of Statistics, 2008)

Table 3.4.2: Categories of timber producers [Source: NFA and FID, 2007; Licensed timber producers]

Category	Licenses issued	Licensed volume (m <sup>3</sup> )	Estimated recovery (%)	Location of operations
Saw millers	24	31,830	30 - 40	Plantation (CFR)
Pit-sawyers	183	97,000	25 - 30	Natural (Private)
Chainsaw millers	-	-	20 - 25	On-farm/Natural
Others	-	-	-	Urban/Natural

Pit-sawyers harvest in the natural forests and woodlands where they are licensed as individuals or as associations (Odokonyero, 2005; MWLE, 2002). Their activities are restricted especially in reserves because they are difficult to control and regulate, they damage the forests, and their tools are inadequate to handle hardwood logs (Odokonyero, 2005). Thus the majority of pit-sawyers work on private land but do produce the majority of the timber on the market. The sawmilling industry in Uganda is plantation-based comprising of mobile units. Odokonyero (2005) noted that the conservation sentiment in Uganda doesn't favour large static sawmills since forests are small, scattered and restricted for conservation; moreover the current AAC in the range of 150,000–200,000 m<sup>3</sup> can only sustain small mobile sawmills and pit-sawing. Until recently, there has been a standing ban on the use of chainsaws in timber production. Their use has been limited to felling and cross-cutting operations on grounds that chainsaws are wasteful when used for ripping operations. The chainsaw is however an important tool for timber production on private land especially farmland and woodlands where regulation is limited. In addition, some operators now transport billets, disguised as firewood, to urban centres where they convert them to timber using chainsaws and bench sawmills.

#### **Policy and legislative framework**

The policy and regulatory framework for the forest sector in Uganda is contained in the Uganda Forest Policy, the National Forest Plan and National Forestry and Tree Planting Act. The framework commits Government of Uganda to promote a modern, competitive, efficient and well-regulated industry (MWLE,

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2002). The strategies in pursuit of this goal include the development and management of concessions in forest reserves, reducing inefficiency and waste in processing; reducing market distortions through better information and improvement of business services for forest products processing (MWLE, 2002). The forest sector is coordinated by the Forest Inspection Division (FID), which supervises the NFA and the DFS. Regulations for timber production are set by the FID and implemented by the DFS and NFA within their areas of jurisdiction. Timber production regulations restrict the use of chainsaws to felling and cross-cutting operations. It is illegal to use chainsaws for ripping operations using freehand milling. However, chainsaws are permitted provided the owner uses milling attachments, registers with the NFA and pays the relevant fees. The criteria for permitting a certain type of chainsaw mill are the evenness and smoothness of the cut and to ensure limited wastage.

### ***Distribution and marketing***

Marketing of timber in Uganda is done through formal and informal channels. The formal market channel is subjected to control and regulation through the application of taxes on harvest, movement permits and market taxes. Such regulation is difficult to apply to the informal channel, comprising mainly of illegal timber producers. Most of the timber passing through the informal channel originates from forests on private land. Forest regulations are not strictly enforced when it comes to private forests due to shortage of manpower and corruption. Consequently, freehand chainsaw timber does find its way into the formal markets. The timber is however easy to identify owing to the 'trademark' chainsaw marks. Such timber and the tools used in its production and transportation are usually confiscated.

The key players in timber markets are the suppliers of trees, primary processors, secondary processors and consumers (Kazooru and Carvalho, 2005). The timber producers are also involved in its trading and as such control the timber production and marketing chain (Auren and Krassowska, 2004; UFSCS, 2001). Most of the timber produced is consumed by the building and construction sectors. Boards of varying cross-section dimensions are produced but the length is predominantly 4.2 m, a practice that has been noted to be a major cause of inefficiency in timber production (MWLE, 2001). The timber is marketed on basis of species, size and quality of pieces although the grading system is not fully entrenched in the timber marketing system. Owing to the poor quality awareness there is a low incentive for quality control.

### ***Evolution of production methods***

Commercial timber exploitation in Uganda can be traced back to the introduction of pit-sawing in Mabira and later Budongo forest reserve at the beginning of the 20<sup>th</sup> century (Odokonyero, 2005). Pit sawing remained the predominant method of timber production until the 1930s when sawmilling commenced while pit sawing was progressively discouraged. The high demand for timber during the Second World War attracted many firms to the industry, most of which had little or no knowledge of sawmilling, used very inefficient locally-made or second-hand machinery and had no vested interest in maintaining stable conditions and high standards. After the war, a number of these firms continued operating and for many years placed obstacles in the way of sensible marketing, high quality standards and improved utilisation practices by selling inferior timber at low prices (Tack, 1962).

In the mid 1960s the Ministry of Agriculture introduced the chainsaw in Uganda to facilitate pruning of coffee trees and bush clearing for planting coffee seedlings. The first training took place in 1967 at Kabembe near Kifu CFR, since then this area is known for the highest number of chainsaw operators. The first chainsaws were small models with short bars (30 cm) and used for felling and crosscutting small trees but not for ripping or sawmilling. Following the nationalisation of sawmill industries in the 1970s after the expulsion of Asians (who dominated the sawmilling industry), skilled workers dispersed and the industries deteriorated due to lack of maintenance and spare parts, and lack of trained personnel (Carvalho and Pickles, 1994). Consequently, most sawmills collapsed and the few that remained were in a very poor state (Windhorst, 2005; Carvalho and Pickles, 1994). There was also an increase in timber harvesting for export. Thus a supply gap for timber was created. In the mid 1970s chainsaws, and a large number of pitsaws, were widely used by encroachers in CFRs. Since pit-sawing was considered a slow process, more and larger models of chainsaws with long bars (60-100 cm) were imported and employed in timber production.

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The 1980s saw the beginning of massive illegal chain sawing to supply the increasing volume of much needed timber for the building construction boom in the country. In 1988, the European Union funded Forest Resources Management and Conservation Program (FRMCP) of the Forest Department (FD) emphasized biodiversity conservation aspects of forest management. Therefore the FD had no option but to lobby for the ban of chainsaws and to license but restrict pit sawing. While this led to a decline in the number of pit-sawyers, pit sawing continued to be the dominant form of timber production in both natural forests and plantations until the mid 1990s when it was gradually phased out in plantations because of its inefficiency in converting small plantation logs and the difficulty associated with controlling pit-sawyers (Odokonyero, 2005; McCaughan and Carvalho, 2003). CSM and pit sawing along with other illegal activities reached a peak in the early 1990s. A Ministerial ban was imposed on CSM in 1996. Specifically the ban was on importation of chainsaws and/or to restrict imports to small chainsaws or agricultural tools with short bar of 30 cm. That ban was a directive in a letter by the Minister without a statutory instrument. In 2004 another public notice was issued by the Minister declaring the chain sawn timber contraband and to be confiscated at site, together with the chainsaw and any vehicle used for transportation. This is addition to heavy fines and prosecution (New Vision 12/11/2004).

The majority of chainsaw timber producers use the machines free-hand. There is virtually no use of milling attachments such as guides, frames or rails (complete chainsaw mill) that would otherwise help sawyers produce better quality boards with limited chance of accidents. This is wrong and the reason behind the waste attributed to chainsaws. The operator using a chainsaw without the help of a guiding frame cannot make accurate and straight cuts. Moreover, only the rounded tip of the bar is used in cutting leaving very rough marks of the saw teeth on the timber and increasing the risk of accidents. The NFA with FRMCP and FAO has piloted the use of complete chainsaw mill in Kalinzu and Budongo CFRs respectively (FRMCP, 2004; Odokonyero, 2005b). The milling trial reported a marked improvement in efficiency. Recovery increased from 25 to 55 % while productivity increased from 0.02 to 0.25 m<sup>3</sup> per effective hour and better grade of sawn timber from the poorly formed trees and branch wood.

### ***Impact of CSM***

The current use of chainsaws without attachments is wasteful in resource use and contributes to the rising rate of deforestation and forest degradation. Chainsaws are principally designed and used for felling and crosscutting and not intended for rip sawing or sawmilling. The conventional crosscut chain has wide kerf about 9 mm and reduces to wastes large quantities of wood in terms of long splitters and flakes rather than normal sized sawdust. It produces curved boards and leaves rough marks, easily recognisable on impounded timbers. Another 9 mm is lost to make the rough-sawn boards smooth, straight and have parallel edges. Thus for every three boards produced, the sawyers loses one board. Because of the relatively low recovery rates, more trees have to be harvested and this contributes to degradation and depletion of forest resources.

The quality of chain sawn timbers cannot conform to any market specification or standards for grading. Rough-sawn timbers are priced low even if they are valuable Ugandan high-quality hardwood timber. Unfortunately, the low price is its major attraction in the market where quality-consciousness is very limited. In addition, owing to high speed of production associated with chainsaws, there is danger of dumping timber on the market thereby suppressing market prices further. This distortion makes timber produced legally uncompetitive. CSM is also associated with or illegal forest harvesting activities and they are difficult to regulate and monitor owing to their mobility, low cost and high speed. Moreover, chainsaw millers harvest selectively, searching for the best trees around and this can lead to genetic depletion.

There are some positive or potential impacts as well. Chainsaws are instrumental in conversion of isolated trees especially on-farm trees and trees in difficult terrain such as swamps and steep hills as well as deformed logs. Although no specific study has been done, casual observation indicates that the CSM could be more ecologically friendly when compared pit-sawing since the tree is milled at the stump. This is in contrast to the sawmilling and pit-sawing where logs have to be rolled thereby damaging young trees. In



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addition, poor households can access the forest resource to improve household income in the short run and/or add value to on-farm trees instead of selling standing trees. Data from an on-going research on the sawn wood commodity chain in Uganda indicate that tree owners get as little as 10% of the value of the timber from the standing trees they sell.

### ***Conflicts associated with CSM***

Most of the conflicts associated with CSM arise because of the ban and enforcing the law as discussed below. CSM activities from production to marketing are unregulated and carried out illegally, the chain sawn timber is contraband; the timber, chainsaw used and vehicles involved in transportation are confiscated in addition to heavy fines, arrests and prosecution of persons involved leading to loss of assets and income. This has resulted into a very poor working relationship between the regulatory authorities such as NFA and timber producers/traders, who view themselves as victims of mistreatment by regulators. Conflicts also arise because chain-sawing activities involves a multiplicity of overlapping interest and a complex network that links the various actors in the CSM and marketing chain; the owners of trees and forests, owners and operators of chainsaws, timber dealers, transporters and traders of chain-sawn timbers, timber users, forestry authority, the police and courts enforcing the law.

Also because the CSM is carried out illegally, exploitative business relations are developed especially in unfair sharing of the proceeds, with most of the benefits going to the chain sawn lumber dealers. The owners of trees or farmers are paid peanuts for the trees or the chainsaw operators evade payment altogether leading to conflicts. The chainsaw timber dealers often fail to compensate the farmers for damages to crop caused by their poor felling methods. Chainsaw lumber production is closely linked to conflicts and illegal logging. Trees are stolen by chainsaw operators, from CFRs and private land or farms, who cut and convert them at night using powerful lamps.

The ban on the use of chainsaws in lumber production also represents a policy conflict. The Uganda Forest Policy envisions an “integrated forest sector that achieves sustainable increases in the economic, social and environmental benefits from forests and trees by all the people of Uganda, especially the poor and vulnerable”. The poor and vulnerable cannot afford (financially and technically) the type of technology recommended by regulations. Moreover the trees are small and scattered; they can only be profitably harvested using simple technologies such as chainsaws.

### ***Policy response to CSM***

The policy response to CSM over the last two decades has been its banning, making chainsaw lumber contraband. The success of this policy has varied across forest types. In plantations, the policy has been effective in locking out chainsaw operators due to existence of licensed mobile sawmills whose concession agreements commit them to protection of the forest estate. In the natural forest reserves, the policy has been largely successful because NFA monitors and enforces the regulation against chain sawing. There are however cases of encroachers harvesting from reserves using chainsaws. The policy has not been successful for trees on private land. The use of chainsaws is widespread due to corruption, political interference and the inability of both NFA and DFS to effectively monitor timber production and trade because of limited manpower and wide geographical areas. The use of chainsaws is particularly rampant on-farm. This is because of the small volume of trees per unit area rendering mechanised logging and pit-sawing.

### ***The future of CSM***

CSM is responsible for the processing of significant and increasing amounts of timber. The demand for lumber and timber products in Uganda is increasing and it cannot be met from remaining natural and plantation forests. In the short run, the demand can be met from on-farm trees and other sources outside the conventional forests. However, these sources are characterised by low timber volumes and diversity of tree size, shape and quality, making them of less interest to saw millers. CSM is peculiar amongst sawmilling techniques due to its high portability, low cost, and suitability for milling low quality logs that would otherwise be wasted. This can help meet the increasing timber demand and reduce pressure on

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natural forests and plantations. Thus CSM can be an appropriate technology for increasing timber production outside conventional forests and this can reduce the pressure on forests.

However, effort will be required to ensure that chainsaws are used appropriately to minimise the waste generated through free-hand milling. Enforcement of existing regulations, especially on private land is inadequate and this encourages illegal cutting which may lead to over-exploitation. Trials with chainsaw frame mills have been done and the use of chainsaw frame attachments is now permitted provided the owner registers with the NFA and pays requisite fees. It is therefore necessary to streamline the regulations, sensitise stakeholders and promote appropriate CSM technology.

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### **3.5 The Timber Domestic Industry Sector in Cameroun: Preliminary Analysis and Issues**

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#### **Forest status**

The Cameroonian Ministry of Forests and Wildlife estimates the forest cover of the country at about 22.5 million hectares (PFBC 2007; MINFOF 2008). More recent estimates, however, list about 19.6 million hectares (PFBC 2007). Over the years, Cameroonians' deforestation rates varied widely according to the method and the period used for the assessment (Ndoye and Kaimowitz 2000; Wunder, 2003; Gbetnkom 2005; MINFOF and FAO 2005). In 2005, the MFW and the FAO (2005) estimated the rate of deforestation in Cameroon over the previous 30 years at about 100,000 hectares per year (0.48%/yr), while more recent estimates focussing only on forested areas indicate much lower rates (0.14%/yr), albeit over the decade 1990-2000 (Duveiller *et al.*, 2008). Fuel wood collection and agricultural expansion are often listed among the main causes of forest loss (MINFOF and FAO, 2005), while logging is mostly mentioned in the literature as a source of forest degradation (Gbetnkom, 2005).

To regulate the use of its forests, in 1994 Cameroon adopted a new forest law, and divided its forests into a Permanent Forest Domain and a Non-Permanent Forest Domain (PFD and NPDF). In Cameroon, the PFD covers about 14 million hectares and includes land permanently allocated to forests and/or wildlife habitats, and the NPDF covers about 5 million hectares and includes forested lands that can potentially be allocated to other land uses.

The PFD is made up of production and protection forests, and they represent, respectively, about 60 percent and 40 percent of the total PFD area (MINFOF 2008). Production forests are divided into about 100 logging concessions and auctioned to industrial logging companies who can harvest them for a period of 15 years renewable once, and about 15 council forests, while protection forests include national parks and wildlife reserves.

Management plans are prepared in line with the widely used ITTO principles, criteria, and indicators (ITTO and OAB 2005), are required for all logging and conservation activities in the PFD. Logging companies are granted 3-years provisional harvesting contracts during which they can harvest timber but they also must prepare and submit a management plan to the MFW, who approve it or demands modifications. Management plans started to be approved in 2004 and, as of mid-2009, about 65 concessions have approved plans, covering an area of about 4.5 million ha representing about 65% of the total concessions' area (MINFOF, 2009).

Timber harvesting also takes place in the NPDF, through logging titles such as Sales of Standing Volume (SSV) and Timber Recovery Permits (TRP), which are allocated by the MFW. The law does not require logging in the NPDF to take place following the principles of sustainable forest management as it requires

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in the PFD, and thus SSV and TRP are short-term logging titles lasting from few months up to a maximum of three years. Exceptions are community forests, located in the NPF which need the approval of a simplified management plan before any logging activity can take place (Cerutti and Tacconi, 2008).

As far as timber exports are concerned, it must be noted upfront that, although the Cameroonian legal framework tried to boost its domestic processing capacity in order to create more added value, the results of this policy have been only partially fulfilled. In fact, although the domestic processing capacity did increase from the 1980s and 1990s to more recent years (ONF-International *et al.*, 2002), the country has not yet been able to push timber processing beyond the most rudimentary transformation on a national scale. Logging companies were forced by the legal prescriptions to build sawmills, which they did, but only few companies invested in modern and efficient sawmills able to produce valuable finished products. Those are the main reasons why, to date, logs and sawn wood are still the most exported products (Figure 2), with veneers and plywood and further processed products representing only a tiny minority of total exports.

Figure 3.5.2 clearly shows the impact of the partial log-export ban enacted by Cameroon in 1999. Log exports abruptly decreased from about 1.8 million m<sup>3</sup> in 1998 to about 200,000m<sup>3</sup> in 2001, a value which remained stable ever since. On a different pattern sawn wood export from Cameroon almost tripled from 1995 to 2008, and stabilised at about 600,000m<sup>3</sup> in recent years. To date, timber processing capacity is about 2.2-2.3 million m<sup>3</sup> (Atyi, 1998; ONF-International *et al.*, 2002). Unless new logging concessions are created and auctioned, the Cameroonian timber processing capacity should not vary much in coming years. Logging concessions provide the vast majority of the timber produced and exported by industrial logging companies. Concessions and few other logging titles also provide the vast majority of the production and exports recorded in official statistics.

None the less, national timber production is made of industrial timber as well as timber generally produced by small- to medium-scale logging companies or individuals. Unfortunately, the latter production, and the domestic timber sector developing around it, has remained surprisingly unaccounted for in both national statistics and national policies. The next section provides a brief history of the domestic timber sector.

### ***The domestic timber sector***

The number of Cameroonians involved in logging activities grew significantly during the period of economic depression, at the end of the 1980s, and was further boosted in the second half of the 1990s by the delay in the attribution of concessions and the consequent lack of timber for large-scale operators. The number of national accredited loggers grew from 296 in 1987 (Eba'a Atyi, 1998) to 519 in fiscal year 1997/98. Although the number of officially accredited loggers almost doubled, the MFW officially delivered only very few new logging titles to industrial companies or logging authorisations to small- and medium-scale loggers in the second half of the 1990s. This trend helped boosting illegal logging, both industrial and small-scale (Cerutti and Tacconi, 2008), also because in 1999 the MFW officially suspended, and made illegal, all logging titles and authorisations previewed in the 1994 law for small- and medium-scale loggers (Cerutti and Tacconi, 2006). The amount of wood harvested by individuals or small enterprises grew from 250,000 m<sup>3</sup> in 1996 (Enviro-Protect, 1997) to 500,000 m<sup>3</sup> in 2000 (MINEFI, 2000). In 2002 one short-term assessment was carried out on several markets in Yaoundé and Douala (Plouvier *et al.*, 2002). Its results, extrapolated to the entire country and to an entire year, estimated the timber consumption of the domestic timber sector at about 1 million m<sup>3</sup> (Round-Wood Equivalent, RWE), of which about 10% entered the official export market, i.e. the Port of Douala, and the rest was consumed locally. In 2005, a brief analysis carried out on some markets in Yaoundé reached similar conclusions (JMN Consultant 2005).

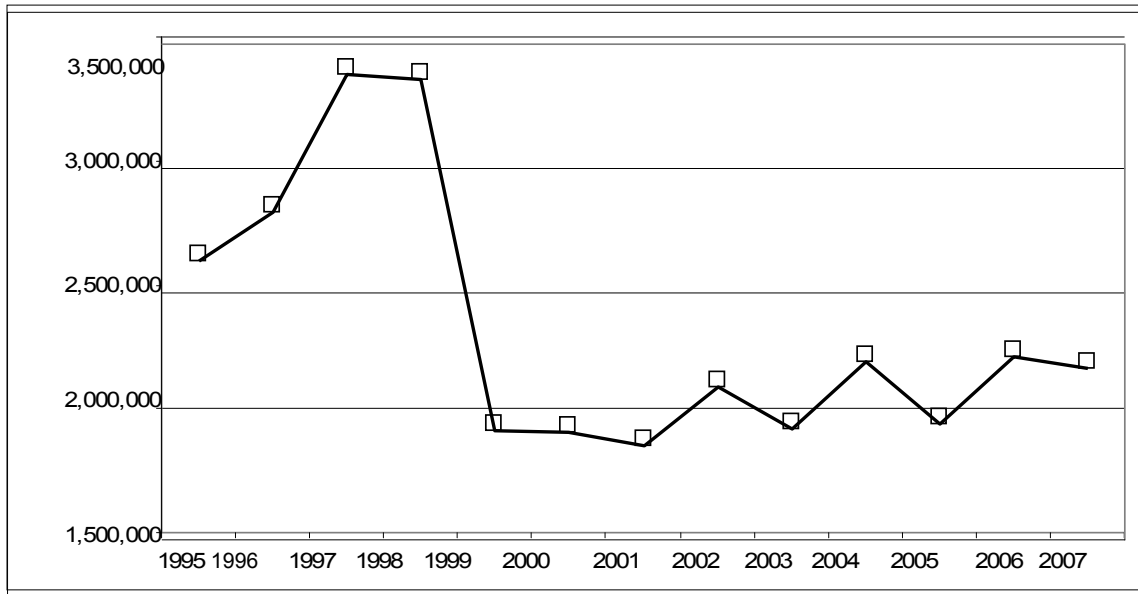


Figure 3.5.1 Official timber production (1995-2007)

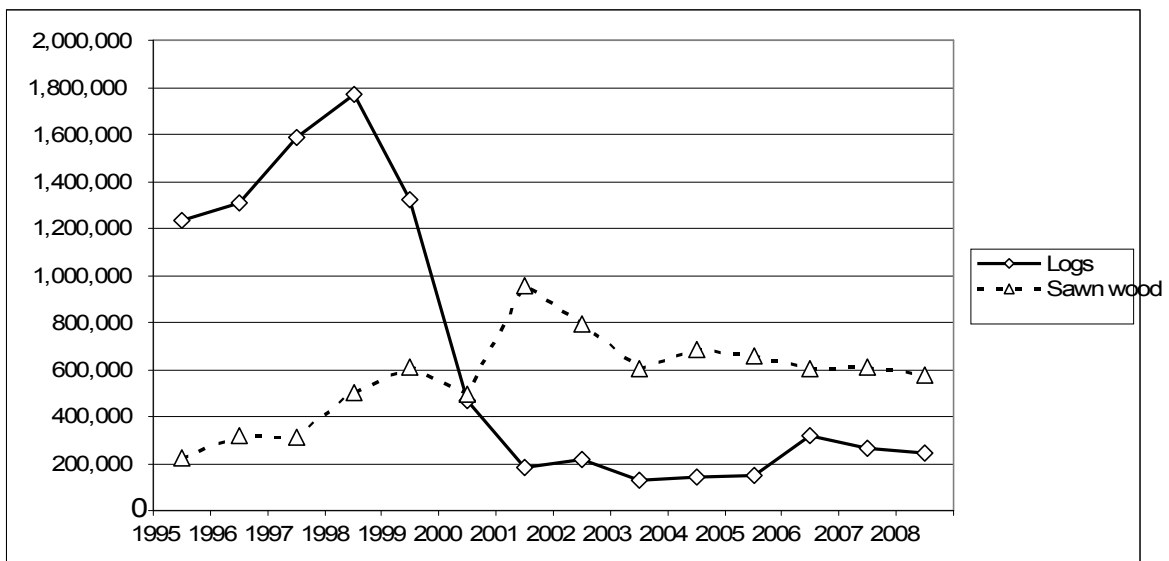


Figure 3.5.2 Official timber exports (1995-2008)

Considering that 40% of the timber used domestically was estimated, in the same years, to be sourced from industrial scraps (ONF-International *et al.*, 2002; Plouvier *et al.*, 2002), the total harvest for domestic consumption could be estimated at about 540,000 m<sup>3</sup> RWE unaccounted for in official production statistics. We find available figures on the production of timber by small- and medium-scale loggers are a gross under-estimation. Before presenting the preliminary results of this research in a further section, let us detail the materials and methods used.

**Materials and methods**

Domestic timber markets in Yaoundé, Douala and Bertoua and its satellites cities, in the Eastern Province, were assessed. Yaoundé and Douala were selected because they are the two largest cities in Cameroon, where construction activities are more developed and where most of the timber harvested in rural Cameroon is sold. Moreover, they had been used as sample cities in past assessments of the

domestic market (Plouvier *et al.*, 2002). Bertoua and its satellite cities in the Eastern Region were selected because, in recent years, timber harvested in the East, the largest forested Region of Cameroon, and exported through the northern Regions of Cameroon, or transported to Yaoundé via the rail, has been described as an increasing phenomenon (e.g. Koffi, 2005).

Overall, 46 markets were counted in the three cities, each market including multiple points of sales with different owners (*dépôts* in French and 'stores' hereinafter). A sample of 34 markets were selected for data collection, representing 811 stores, or about 92 % of total stores counted in the three cities (Table 3.5.1). After a preliminary visit to all counted markets, the sample was selected following criteria of accessibility (not all markets' representatives agreed to be part of the data collection effort), markets' size (the average number of stores in sampled markets is about 33 while the average number of stores in non-sampled markets is about 6), and optimisation of available funds (*ceteris paribus*, markets with more stores required similar financial efforts in terms of working days than smaller markets, and thus the former were selected).

Table 3.5.1. Cities and markets' sample

City	A. Markets with data collection	B. Stores in A	C. Total markets	D. Total stores
Bertoua	2	47	2	47
Yaounde	12	544	22	610
Douala	20	220	22	228
<b>Total</b>	<b>34</b>	<b>811</b>	<b>46</b>	<b>885</b>

Within markets, an average of 30% of stores was selected for data collection. In the largest markets, where the availability of funds was the limiting factor to a larger number of stores to be followed, stores were selected according to their size, and attention was paid to select the average size, according to preliminary visits and interviews with local experts.

In sampled stores, data were collected following a questionnaire developed for this study by taking into account all available previous studies (Plouvier *et al.*, 2002; JMN Consultant, 2005), in order to be able to compare results to the maximum extent possible. A major difference with all previous assessments, however was that, data were collected weekly on each store, for a minimum period of 12 months, in order to account for differences in the domestic market due to seasonality of activities.

The same procedure (development of a questionnaire, interviews and data collection) was followed for the economic and commodity chain analysis, with the main difference that, instead of city markets, about 180 small-scale forestry operations were followed in 33 councils located in the Center, South, East, and Littoral Regions. Data on the costs and benefits of forestry operations were collected as well as data on the location of harvesting. Collected data were then entered into a database, checked for consistency, and eventually analysed.

### ***The chainsaw lumber production situation***

#### *The legal framework of the domestic timber market*

One of the general objectives of the Cameroonian forest policy is to support the participation of nationals in the forestry sector. As said, the 1994 forest law provides several types of logging titles and authorisations for nationals to access the forest resources, notably in the NPF. They are in particular the licenses/permits of exploitation, the personal/individual authorizations of harvesting wood, community forests and the user rights by the people who live along the forest areas. These titles and authorizations can be granted only to Cameroonian nationals.

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According to provisions of the Article 56 of the 1994 law, the license/permit of exploitation is an administrative authorization of harvesting of the particular forest products, in the NPF, for a maximum of 500 m<sup>3</sup>. Licenses are granted for one year and the holder must sign and respect book specifications with the local forest administration.

Personal/individual authorization of cutting wood are defined as an individual permit of harvesting wood which cannot exceed 30 m<sup>3</sup>, but only for non-commercial use. The personal authorization is delivered by the regional delegate of the forests department, for a period not exceeding 3 months. In principle, personal authorizations are intended for those people who cannot use the user rights granted exclusively to the local native neighbours of a given forest area.

The tax system in place for these logging titles appears rather vague when one examines the provisions of the law. According to article 66 (2) the owners of the licences of exploitation and the personal authorizations must pay the selling prices of timber to the owner, but further clarification on the nature of such taxes is missing.

In 1999, the MFW suspended all small-scale logging titles, on the ground that they were used to source illegal timber. Although the suspension remained active until 2006, the MFW had no means to control and manage activities on the ground, and thus small-scale logging continued unabated (Cerutti and Tacconi, 2008). In fact, instead of reducing illegal logging, the 1999 suspension forced an entire sector to follow the rules of informality, with no possibility of legal harvesting titles and no formal taxes to be paid.

In 2006, when small-scale logging titles were re-activated and almost a hundred of them were auctioned by the MFW, not a single one was requested by and granted to small-scale loggers, who had developed an informal domestic timber sector which, in fact, did not need formal logging titles to function properly. Indeed, during interviews held for this study, small-scale loggers listed the absence of formal logging titles as one of the least important problems in carrying out their job.

#### ***Changes in methods of production over the years***

Because of the poor road system and other limiting factors, logging was not an attractive business for rural Cameroonians until the mid-1980s, and only few logging companies, mostly owned by foreigners and using industrial machineries, were operating during that period.

Moreover, the country received its wealth mainly from the export of oil and agricultural products such as cocoa, coffee and cotton, and timber played a marginal role for the national economy. While local energetic needs were filled with hand-sawn or collected fuel wood, the needs in sawn wood for construction or carpentry were filled by the logging industry.

The introduction of the chainsaw in rural areas gradually changed, first and foremost, the traditional shifting cultivation systems, which involve the clearing and burning of primary and old secondary forest just before the rainy season. Secondly, it allowed farmers to start providing building materials also to the local timber market, covering at least part of the role of the timber industry.

In 1986, when the economic crisis struck, the prices of timber products proved more stable than agricultural or oil products and the relative importance of the forestry sector in the national economy rose progressively, with local loggers replacing industrial companies in the domestic sector.

From 1994 to 1995, just after the 50% devaluation of the CFA Franc, the total number of the enterprises in logging industry grew from 194 to 351, an increase of about 81% (Eba'a Atyi, 1998). The devaluation attracted the business community of Cameroon to logging, certainly because of the available profit margins. The same margins, meanwhile, pushed industrial logging companies to

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cease supplying the local market, because of the highest prices they could get on the international market (Ndoye and Kaimowitz, 2000).

To make the domestic timber sector more efficient and create integrated local small industries, local investors introduced portable saws which replaced in most cases chainsaws. Portable saws are used today in all harvesting operators for processing timber sourced to the domestic market. Portable saws are often rented from local timber businessmen by small-scale loggers, but the number of them directly bought by small-scale loggers to start their own timber activity is increasing. The most common portable saw used in Cameroon is the brand "Lucas Mill", which is sold now on the market for about 20 million CFA Francs. According to the timber species and local conditions, portable saws guarantee higher recovery rates and better products than chainsaws, and they can be carried around from one operation to another via the common pick-up trucks used on the roads of rural Cameroon.

### **Quantitative analysis**

The most recent and comprehensive analysis of the domestic timber sector was conducted in 2002 (Plouvier *et al.*, 2002). The authors estimated the annual national volume sold on the domestic market at about 300,000 m<sup>3</sup> of sawn wood, produced from about 1 million m<sup>3</sup> RWE harvested. They also estimated that 10% of the produced timber entered the export market through Douala and was then shipped to international destinations. Data were collected over a period of 19 days in 2 markets in Yaoundé and 10 days in 2 markets in Douala, the two major cities in Cameroon, between August and September 2002 (Plouvier *et al.*, 2002). We opted for collecting data over a period of at least 12 months, as explained above, so as to better account for seasonality, which is very important for the timber market, not only in terms of sales, but especially in terms of the periods when timber can be harvested in the forest.

At present, only data over 8 months period have been collected and processed, thus an extrapolation over the entire year has been made to estimate annual sales. Overall, for the 38 existing markets in Yaoundé, Douala and Bertoua, data collected show an estimated total annual amount of sales of about 1.4 million m<sup>3</sup> of sawn wood. However, about 15% of sold timber was sourced from industrial sawmills, and thus not directly harvested by small-scale loggers. Moreover, about 14% of the sales recorded, notably in Douala but also in Yaoundé, were sourced from the largest market in Yaoundé (Messa) for re-sale. Thus, the total estimated annual sales directly sourced from small-scale logging operations amount to about 1 million m<sup>3</sup> of sawn wood, which represent more than a threefold increase as compared to the 300,000 m<sup>3</sup> estimated by Plouvier *et al.* (2002). As expected, seasonality is very important (Figure 3.5.3).

Data vary among cities, but overall the impact of the rainy season, starting in August and lasting throughout November, is clear and results in a decrease of the amount of timber sold per counter (Figure 3.5.3). Harvested and sold species do not differ much from the species harvested and exported by the industrial sector, with ayous (*Triplochyton scleroxylon*) representing about 42% of total sales, followed by iroko (*Milicia excelsa*) and sapelli (*Entandrophragma cylindricum*) on top of the list (Figure 3.5.4).

### **Distribution and marketing**

The urban surveys conducted in Douala, Yaoundé and Bertoua clearly show that domestic timber markets are supplied by a very broad range of locations. In fact, informal logging occurs almost in every council in the forested part of Cameroon. To assess the impacts of informal logging activities on rural economies, 278 in-depth surveys were conducted in 33 councils located in the regions of the East, South and Centre, which represent the vast majority of the Cameroonian forest.



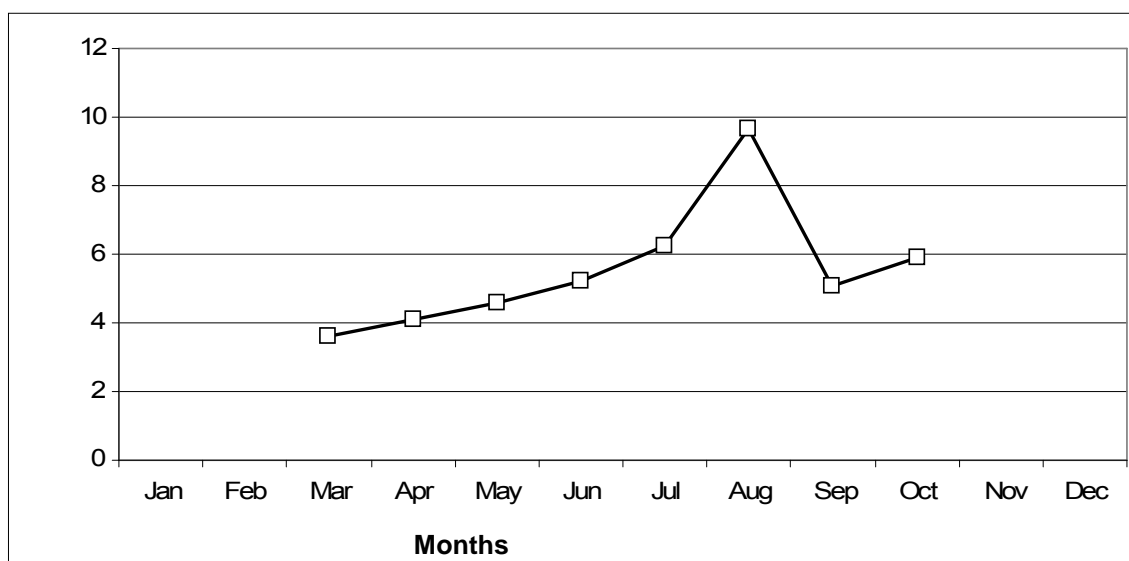


Figure 3.5.3: Effect of seasonality on timber sales

On average, informal logging is a profitable activity as the net benefit of small-scale loggers is estimated at about 7,800 CFA/m<sup>3</sup> of round wood. This gain is shared among the sawyer, the conveyor of sawn wood, and the employer, when present, of the sawyer and/or the conveyor.

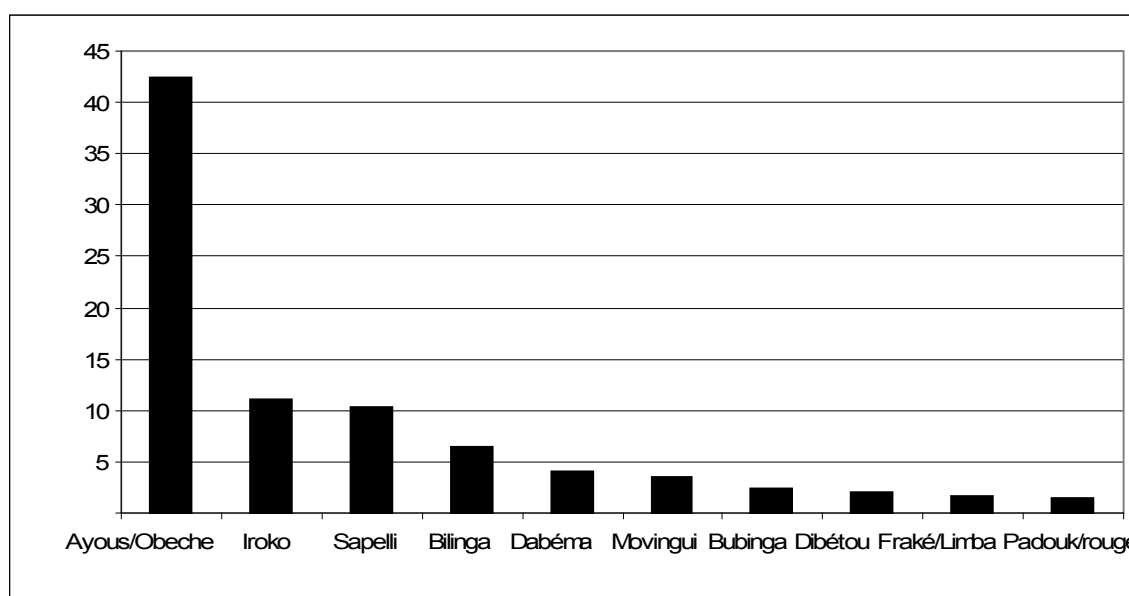


Figure 3.5.4: Sold species (percentage of total sales)

The average cost to log and saw one cubic meter is close to 22,200 CFA. The financial margin rate is then around 35%. If we roughly apply this margin to the global informal timber volume sold in Douala, Yaoundé and Bertoua (1 million m<sup>3</sup>) sawn wood estimated at about 3.3 million m<sup>3</sup>) RWE with the average transformation rate for Cameroon of about 30%), the overall financial gain estimated at national scale is about 26 billion CFA per year. It is however important to distinguish two types of informal timber marketing networks. On one hand, professional or semi-professional businessmen or loggers who look for timber in rural areas only after securing an order, normally from the cities, from identified and reliable buyers and consumers. Usually, this activity is carried out with good equipment and harvesting and delivery activities very often take place under the protection of an influential person (politician, businessman, or army officer). Loggers live in or around the village only until they have enough timber to fulfil their order, they are well connected to the urban markets, and they bear operational costs of about 25,000 CFA/m<sup>3</sup>). Their benefit margin is on average at about 12,000

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CFA/m<sup>3</sup>). This kind of informal logging takes place in about 62% of our case studies.

On the other hand, freelance loggers, who are usually native from the area where logging takes place. Contrary to what happens with professional loggers, marketing of processed timber takes place only after the trees are already logged and sawn. Thus, this type of logger is in a weak position to negotiate the final price with consumers or intermediary buyers. Moreover, freelance loggers also bear all the risks associated with their informal activities, often lacking a "good" protection, and their produce is frequently seized by the authorities. As a result, their benefit margin is almost reduced to zero, at an average of about 130 CFA/m<sup>3</sup>, while their operational costs reach 15,700 CFA/m<sup>3</sup> (Figure 5).

It is important to note that the costs borne by the informal logger may constitute substantial revenue at the local level. Indeed, when considering the structure of above-mentioned average operational costs (22,200/m<sup>3</sup>), we found that about 50% of the cost is due to the payment of wages to local manpower, mainly sawyer, carriers and assistants, while an average of about 7% (1,600 CFA/m<sup>3</sup>) is paid to the customary owner of the tree to be logged.

In other words, an informal logging economy is in place at the village level and brings substantial revenues to many poor rural people. An indirect effect of the Expansion of the informal logging at the village level is that many people employed by this activity devote less time to their traditional extensive cultivations. As a consequence, the new loggers recruit workers to cultivate their food crops fields and pay them with the money earned through informal logging. That is, revenues generated through informal logging are disseminated in the local economic network.

Informal logging revenues also reach external stakeholders, like administration or different elites, mostly in the form of informal taxes. We found that off-the-record, or informal, taxation is often collected by administrative, military, or political authorities, at all levels of the marketing structure. Due to their nature, such informal taxes are difficult to quantify comprehensively. None the less, from the operations followed for this analysis, we could estimate it at about 2,000 CFA/m<sup>3</sup>, or 9% of the total operational costs.

The latter may seem a reasonable transaction cost, considering the very positive impact of this sector on the local economies. However, from the viewpoint of the State, and when applied to the total volume of informal timber sold on the domestic market as estimated above (in RWE), this transaction cost can be considered as a loss of direct and formal revenues of about 6,6 billion CFA per year.

The majority of the informal timber comes from degraded ecosystems, mainly degraded forests, young/old fallows and cocoa plantations. However, primary, undegraded, forest remains an important source of timber for the informal loggers. It is noteworthy that primary forests from where informal timber is sourced are almost entirely located in the NPF. Thus, although the ecological impact remains the same whether a forest is harvested in the PFD or in the NPF, from legal point of view forest degradation in the NPF should not be a concern.

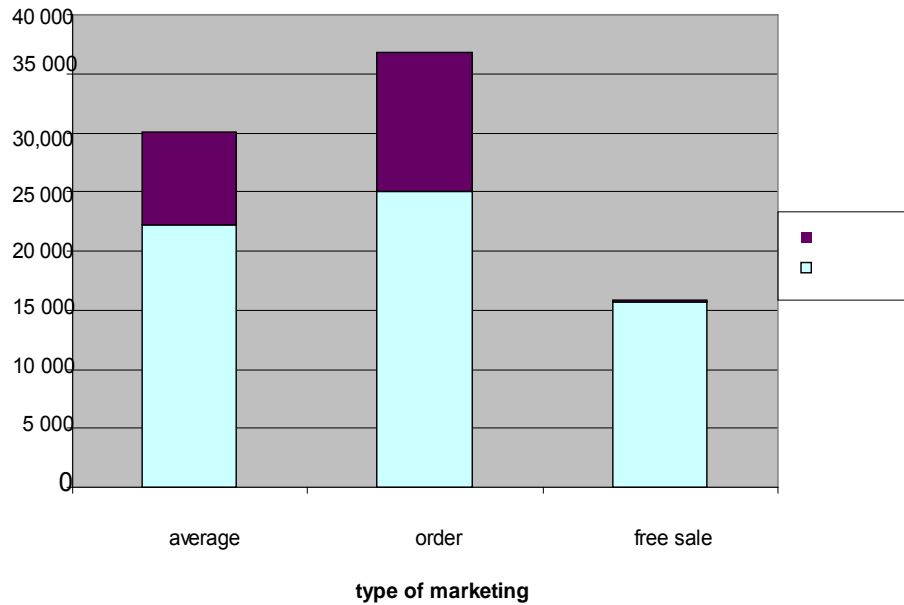


Figure 3.5.5: Net benefits and costs per type of informal marketing

### **Conflicts and their resolution**

The adoption, interpretation, and application of the forest law, and its gaps and weaknesses, as well as the informal nature of the economic networks described above and the rate of poverty found in rural Cameroon, are at the origin of many conflicts found in rural Cameroon around chainsaw lumber production. The types of conflicts found in sampled locations are listed and described below

- At the village level, logging activities foster conflicts among people, such as disputes about the traditional ownership of the resource, or conflicts on revenue sharing. Along the same line, it often happens that the owner of a given trees wants to renegotiate a pre-established selling price after processing has taken place, because he or she has a better idea of the amount of timber that can be sold after the tree has been processed into sawnwood;
- Conflicts are also frequent between the sawyers and local inhabitants, because when sawyers reside and operate in a village, they manage to contract debts that they are not able to pay at the end of their work;
- Conflicts may also take place between the city-based businessmen or loggers and the local sawyers, often on working conditions and remunerations which are discussed but not respected or maintained by the former;
- Conflicts arise when the prescriptions of the law and customary rights are misinterpreted by the agents supposed to enforce it. For instance, it often happens that customary owners are not aware that a logger has been authorised (formally or informally) by the administration to harvest timber within their customary land.

Despite the multiple forms that conflicts may take on the grounds, we also found that most parties prefer to negotiate their way out of conflict, avoiding violent or physical confrontations. Three main forms of conflict management were found, according to the actors involved;

- At the level of the villages, it is the council of the elders that are consulted when the conflict is about the ownership of the litigious space containing the resource. Negotiations and payments

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occur following customary laws, except when there is aggravation, in which case the conflict is brought forward to the qualified administration.

- If conflicts occur between businessmen or loggers and their employees, they are usually solved through the use of formal contracts and the acknowledgement of debts by the defaulting party.
- When conflicts arise between the administration and other concerned parties, the payment by the defaulting party is made by application of the laws in force, or by an arrangement, which occur through negotiations, between the contravener and the officer in charge of the execution of the law.

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### **3.6 Chainsaw Milling in Ghana**

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#### **Introduction**

CSM is the on-site conversion of logs into lumber for commercial purposes using chainsaws. Illegal CSM and trade is one of the main forest governance issues in Ghana. A range of policies, laws and institutions have evolved to govern and control the practice. Although CSM was outlawed in Ghana in 1998, the ban has failed to address the activity, and it continues to flourish. Chainsaw milled timber is the main source of lumber supply for the growing domestic market and its production generates rural incomes and employment. CSM has raised significant public debate and led to intense conflict, but an approach as to how to deal with it in policy and in practice has not yet been developed. It is crucial to develop options that take into consideration the merits of the claims for banning chainsaw operations.

Two main assumptions underlie the ban:

- CSM is wasteful, and using it to supplement sawmilling will lead to a rapid degradation of forest resources and the environment.
- Allowing CSM to take place will lead to enormous monitoring challenges that the Forestry Commission does not have the capacity to deal with.

#### **The forestry sector in Ghana**

Ghana's forests cover about 1.6 million hectares (ha); see Table 3.6.1. This figure is down from eight million ha at the beginning of the 1900s, which indicates a high rate of deforestation. Some forest resources are located in the approximately 260 production- and protection-forest reserves, and a significant proportion is located outside these areas. These off-reserves consist of a mosaic of patchy secondary forests, sacred groves and communal forest lands. Significant timber resources outside forest reserves also exist on farmlands, especially cocoa farms; farmers traditionally used trees to provide shade for their cash crops. Ghana has been harvesting timber at unsustainable levels, sometimes four hundred percent of the official allowable cut. Off-reserves provide a substantial proportion of the harvest (70%), which is mostly undocumented and largely carried out by chainsaw operators (Parren *et al.*, 2007).

Currently, timber rights are granted in the form of long-term TUC or temporary permits such as TUP and salvage permits. Although TUPs were intended to be used for non-commercial use of the forest, such as supplying timber for community development projects, there is evidence that they have been abused

and used for commercial purposes. In the past, the Ghanaian timber industry has been oriented to exports, and CSM has helped meet the domestic demand, which is increasing. Today, CSM supplies at least 80 % of timber for the domestic market. It has been the main supplier to the domestic market of prime hardwoods with a high export value, such as Iroko.

Table 3.6.1: 1 Key facts about forestry in Ghana

Land area	238,500 km <sup>2</sup>
Population	22.5 million
Forest area (forest reserves)	1.6 million ha (16,000 km <sup>2</sup> )
Off-reserve forest area	400,000 ha (4,000 km <sup>2</sup> ) spread over an area of 6 million ha
Allowed annual cut	2 million m <sup>3</sup> per annum (0.5 million m <sup>3</sup> in reserves; 1.5 million in off-reserve forests)
Installed processing capacity	5 million m <sup>3</sup> per annum
Production	3.3–4.4 million m <sup>3</sup> per annum *
Local lumber production	450,000–1.3 million m <sup>3</sup> per annum **
Deforestation rate	65,000 ha/year
Contribution to GDP	6 %

### **Institutional and legal framework**

CSM has gone through several phases. It was a recognized enterprise before the 1980s, after which time registration by District Assemblies became required. In 1991, direct controls were instituted; logging procedures and post-logging inspection measures were tightened. In 1998, CSM was completely prohibited by law. There is overwhelming evidence that the ban has been ineffective. Enforcement is complicated by inconsistencies in sector policies and in the very laws that proscribe CSM. Outlawing CSM for domestic consumption and using official waybills for chainsawn lumber in spite of legal restrictions on the transportation of chainsaw milled timber, for example, are particular problems. It is inconsistent to prohibit the supply of chainsawn lumber without requiring the use of TUPs to address community timber needs. It is also inconsistent to ban CSM without cracking down on timber markets that openly sell illegal lumber. Ghana's tree tenure system effectively vests tree ownership and management rights in the state. This alienates communities and farmers even though in practice they decide the fate of trees on their lands. In addition, the financial benefits of timber revenue accrue exclusively to District Assemblies and traditional authorities (chiefs), not farmers. Over the years, this has served as an incentive for farmers to connive with chainsaw operators who are willing to pay them directly for the trees growing on their land.

### **The chainsaw sub-sector**

Chainsaw enterprises are generally small in scale and loosely structured in terms of organization. CSM is often carried out by a small group of operators with assistants who help mill the lumber and transport it from the felling site to access roads. Chainsaw operations are mostly financed by dealers from urban centres who trade lumber in the timber markets, although some individual operators are reportedly self-financing. Farmlands constitute the most important source of timber and farmers are by far the most important partners to operators, even though timber dealers and carpenters are also involved. Local people also work in the industry as tree spotters and assist in actual operations and transportation. Processing involves a portable chainsaw, which requires little capital investment; in addition, rural labour is available at relatively cheap rates. The lumber is mostly cut into large beams that are brought to re-saw points and cut into various marketable dimensions. Even though chainsaw lumber mainly supplies the local market, overland export to neighbouring countries is on the increase.

## Impacts

CSM and its ban have had numerous social, economic and environmental impacts on Ghanaian society. Some of these impacts differ from those of mainstream sawmilling; this needs to be considered when developing legal and policy initiatives to address CSM.

## Production and consumption

A high local demand has contributed to the upsurge in chainsaw lumber production. The price of chainsawn lumber is relatively low, averaging approximately 40 % of the price for saw milled lumber. Operators do not pay taxes or rent for trees and their production cost is low. Sawmills pay corporate tax, stumpage fees, social security for workers and income tax in addition to production costs. The high local demand for lumber is not being met by legal supplies from sawmills. In addition, CSM provides a wider range of species and dimensions of lumber: 25 different lumber dimensions were recorded. The four major species processed by operators are Dahoma, Ofram, Wawa and Mahogany. Based on analysis from the study, it is estimated that CSM consumes over eight hundred thousand trees per year, providing approximately a million cubic metres of lumber to the domestic market (Table 3.6.2).

Table 3.6.2: Employment, production volumes and revenues of CSM in Ghana

Direct CSM-dependent jobs (stump site)	41,000
Indirect CSM-dependent jobs (processing)	45,000
Number of trees felled by chainsaw operators	818,160 trees
Production: volume of trees felled	2.4 million m <sup>3</sup>
Lumber produced	0.9–1.3 million m <sup>3</sup> *
Revenue for communities/farmers	GHC 9.8 million (USD 7 million)
Gross revenue retained by chainsaw operators	GHC 3.7–5.4 million (USD 2.7–3.9 million)
Revenue lost by the FC	GHC 25.5 million (USD 18.2 million)

Amounts estimated by the study, per annum \*Estimated total volume of wood processed by chainsawyers at recovery efficiency rates of 30 and 43 %, the minimum reported and experimental values from case study were used as the range.

As previously mentioned, farmlands are the most important sources of timber for chainsaw operators; only 2 % of operators said they obtained timber from forest reserves. Operators prefer farmlands for several reasons: they find high-quality timber trees there; they are less likely to be arrested; access routes are already available for conveying lumber; and the activity opens the land for more farming activities.

Farmers were identified as the most important contact persons for negotiating access to trees. This is largely due to the perception of the majority of operators (85 %) that farmers are owners of the trees. Operators also understand the practicality of negotiating directly with farmers rather than attempting to obtain an official permit; not surprisingly, lumber dealers (and operators) were unlikely to approach officials for permits. In the study, 86 % of the lumber retailers interviewed obtained their stock of boards from chainsaw millers, compared to 14 % who obtained their lumber from sawmills. Just over half of bench-saw millers got their supply of boards from chainsaw millers. Chainsawn lumber was purchased by individual consumers (41 %); small-scale carpenters (33 %) and other building contractors (29.4 %), government institutions (8.6 %) and large-scale carpenters (13.5 %).

## Revenues

CSM is profitable. Even though chainsaw operators capture about 19 % of revenue, the distribution of profits is skewed towards the urban timber dealers who sponsor the operations (Figure 3.6.1).

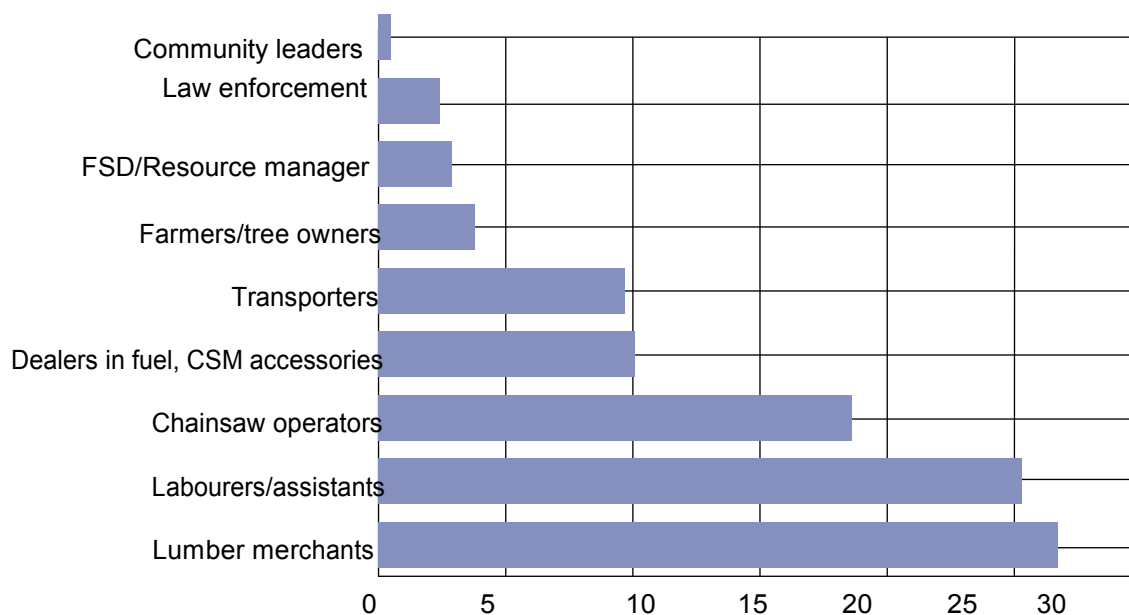


Figure 3.6.1: Distribution of chainsaw revenue

Chainsaw lumber production helps sustain rural economies and livelihoods in six ways (Figure 3.6.2): employment; community benefits such as provision of schools and wells; informal taxes collected by District Assemblies; supply of lumber; supply of firewood; and services such as transportation. The most important economic benefit to rural communities is the provision of jobs. The study established that about 86,000 people are involved in chainsaw-related operations and trade (a figure that is probably increasing), compared to approximately 100,000 people in the formal logging industry. This is significant given Ghana's unemployment rate, which is generally 20 % in most rural areas of the country.

The growing domestic demand for lumber acts as an incentive to support these jobs. The three most important related jobs identified by communities were carrying boards, loading boards and involvement in actual milling. Most people employed in chainsaw operations are also involved in agriculture or farming. CSM tends to supplement agricultural income rather than replace it. Chainsaw operations contribute significantly to household budgets: more than half of the people involved in chainsaw activities earn 80 % of their household income from it. CSM has also contributed to the emergence of community enterprises, including carpentry shops, lumber markets and charcoal production.

### State revenue

Chainsaw operators do not currently pay a stumpage fee for trees they fell because of the absence of a legal framework. The loss of stumpage revenue to the state is potentially more than USD 18 million per annum. This exceeds the stumpage fees collected from licensed loggers; between 2000 and 2003, the FC collected an average of only USD 9.1 million per year<sup>3</sup>. Ghana's FC has the lowest rate of rent collection in West Africa (reportedly less than 50 %)<sup>4</sup>. Assuming that 40 % of the potential stumpage from chainsaw operators could be captured under a regularized regime<sup>5</sup>, this would translate into about USD 7 million per annum.

Currently, the fees paid by chainsaw operators to farmers/land-owners correspond to about 38 % of the potential stumpage revenue that would have been collected by the FC. Even if the government was willing to pay this amount (USD 7 million) to farmers/land-owners to compensate them for protecting these trees, it could still retain revenue of about USD 11 million annually.



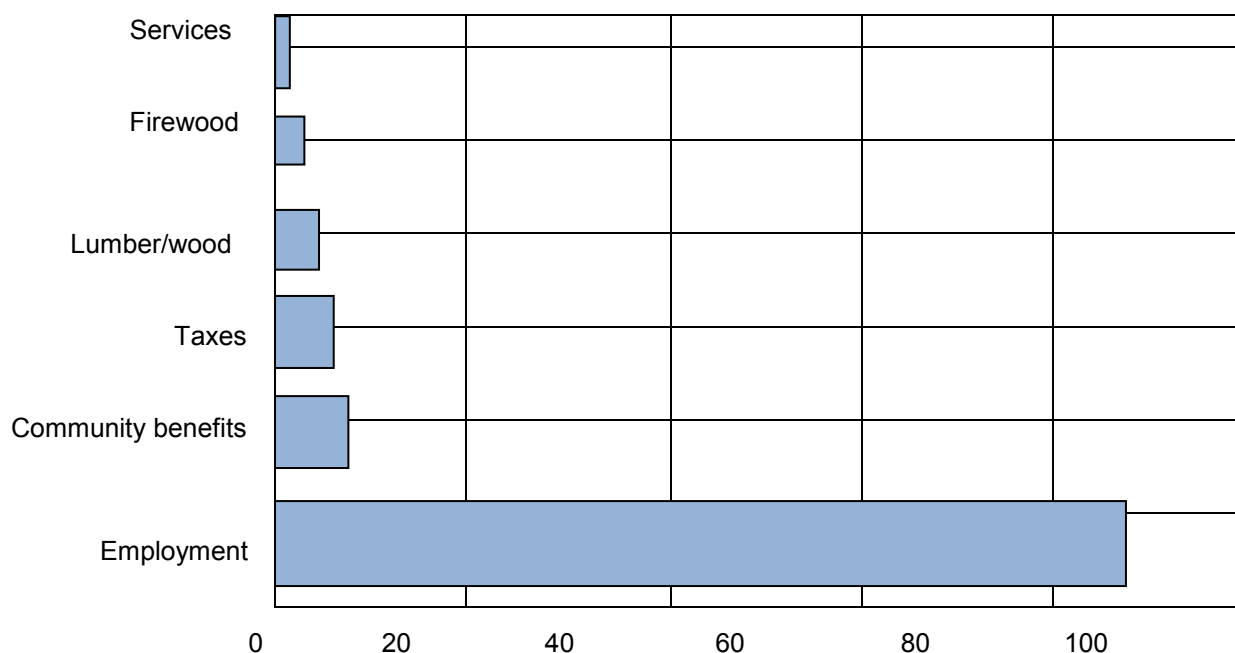


Figure 3.6.2: Economic contribution of chainsaw lumber production to rural economies

**Note:** Data obtained from the eight forest districts studied in the project

#### Willingness to pay for trees

Even though chainsaw operators pay some fees to farmers/landowners for cutting trees, this revenue is illegal as it is not paid to the FC. All chainsaw operators interviewed during the case study were willing to pay the FC for the trees they cut (Table 3.6.3), although their preferences varied: about half preferred to pay tax on timber; about one-third wanted to pay monthly permit fees; and one tenth wanted to pay tax on their income.

Table 3.6.3: Operators' willingness to pay for trees

Quality of tree	Minimum–maximum Ghana cedi (GHC)	Average (GHC)	Comparison with stumpage of US\$7.5/m <sup>3</sup> (or 22.5/tree)
High	5–300	33.9 (\$24)	6 percent more
Medium	4–150	17.7 (\$8)	65 percent less
Low	2–50	9.4 (\$7)	69 percent less

The summary data in Table 3.6.3 suggest that the average price that operators were willing to pay for high quality timber compares favourably with the stumpage fee currently paid by licensed loggers. In terms of the way in which chainsaw activities should be regularised, at least 70 % of operators want concessions for registered groups of operators, 18 % want individual permits and 6 % want small concessions for individuals. Most operators were in favour of any system that allowed for organized groups.

One key economic challenge, however, is the failure to market chainsawn lumber at a price that would enable it to be sustainable. In the absence of government regulation of CSM practices, the lumber obtained from chainsaws with improved milling attachments (such as the portable sawmill, Logosol) is likely to be subject to price manipulation by dealers. This may make it difficult for these operators to compete with cheaper chainsawn lumber in the local market.

### Recovery efficiency

CSM is reputed to be a wasteful method of converting timber into lumber. A comparison of the recovery efficiency of three different milling techniques<sup>6</sup> shows that a portable sawmill such as Logosol increases processing efficiency by at least 6 % over free-hand CSM (Table 3.6.4).

Table 3.6.4: Comparison of recovery efficiencies

milling technique	Processing efficiency				
	Log recovery (%)	Lumber recovery (%)	Lumber production rate (m <sup>3</sup> /hr)	Fuel consumption rate (litre/m <sup>3</sup> )	Processing cost (GHC/m <sup>3</sup> )
Sawmill	not measured	53.9	—	—	—
Logosol (M7)	67	49.6	0.43	10.8	131.64
free-hand chainsaw	70	43.5	0.52	8.4	88.23

The data were not conclusive on which technique had lower investment and operational costs, or whether the revenues generated were significantly different. This was mainly because the market did not distinguish between portable-sawmilled lumber and chainsawn lumber in terms of price.

### Conflict

Even though chainsaw operators and farmers face significant conflicts, they seem to be coping within constructive limits; therefore, CSM cannot be said to have grave social consequences for farming communities. In fact, there is a high incidence of farmer-operator cooperation with regard to chainsaw operations. In general, conflicts are part of the everyday struggle over commercial access to timber. Although only 59 % of farmers were paid some compensation for the damage to their farms inflicted by logging, this is no worse than the percentage indicated by other studies that included licensed loggers. Severe conflicts can arise between the FSD and operators due to FSD confiscation of sawn timber and haulage trucks. In some cases these encounters have reportedly resulted in lorry accidents, injuries and even death.

### Environmental impacts

The most pervasive argument against CSM has been its negative environmental impact. The case study, which includes the results of an environmental impact assessment of CSM, noted several negative environmental consequences compared to conventional logging:

- The estimated logging intensity can be as high as seven trees/ha, which exceeds the standard of two to three trees/ha;
- Some valuable tree species are felled below recommended size limits;
- Most chainsaw operators do not practise directional felling; this can lead to the destruction of young trees and agricultural crops;
- Chainsaw operators have carried out a significant invasion of ecologically sensitive sites such as globally significant biodiversity areas and convalescent areas of production forest reserves.

In terms of logging waste and impact on soil and forest canopy, however, CSM can be less destructive than conventional commercial logging. The actual impact of CSM in terms of ground area exposed to soil hardening and erosion, canopy gap and recovery volumes observed in the study does not differ significantly from data obtained from conventional logging.

The problems related to CSM seem instead to stem from lack of technical know-how and from the illegal framework within which it operates. A regularised environment could support administrative development and capacity building to address issues like directional felling, logging intensity and choice

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of sites. The available resources for logging and CSM are dwindling: 90 % of operators interviewed for the study said that timber was less available than previously. The main reason for this is unregulated harvesting by both chainsaw operators and conventional logging operations; 72 % of operators admitted that this had contributed to the scarcity of timber. This situation may force chainsaw operators in the near future to target protected areas such as forest reserves, as these remain the only areas with commercial timber trees. This may create serious conflicts; chainsaw operators would then have to compete with licensed loggers for trees.

### **The ban**

The CSM ban has not been effective in addressing indiscriminate logging. Most stakeholders agree that the ban on CSM has not worked to stop the practice, lessen the pressure on forest resources or reduce conflict between stakeholders. Surprisingly, at least half of the District Forest Managers interviewed during the case study agreed with most of its observations and suggested that the ban be revisited. Lumber dealers felt that criminalizing chainsaw operations leads to loss of revenue to the state due to non-collection of taxes. Another side effect is the corruption of officers and the confiscation of lumber.

Six major factors contribute to the ineffective enforcement of the ban:

- Corruption among FSD officials;
- Corruption among law enforcement agencies;
- A high rate of rural unemployment;
- A lack of political will to enforce the ban;
- Market demand (i.e. the relatively cheap price of chainsawn lumber); and
- Political interference, particularly by chiefs and local politicians.

High transaction costs — in terms of FSD personnel's time in the courts — are a disincentive for prosecuting cases. FSD deals with a significant number of issues that do not lead to convictions or to the collection of fines.

Monitoring of CSM operations is problematic due to the operators' informal organization, their lack of record-keeping (in order to avoid paying taxes), and the clandestine nature of their activities. With respect to monitoring, 98 % of operators interviewed for the case study said they had been arrested. This suggests that monitoring activities have not been relaxed and that being arrested has not deterred these individuals. Almost all operators admitted that they were aware that their activities were illegal; ignorance of the law is not an issue.

### **Recommendations**

#### *Social and economic benefits*

A specific economic, social and political environment drives CSM. Most stakeholders recognise that CSM is important both as an employer of rural youth and a supplier of domestic timber. Regularization or eradication of CSM could adversely affect the rural economy and would affect enterprises that depend on it for lumber. It could also reduce employment and income earning opportunities for rural people who are directly involved in chainsaw operations.

#### *Dwindling forest resources*

If the estimated harvest by chainsaw operators of about 2.4 million cubic metres is added to the official allowable cut of 2 million cubic metres, this means an annual harvest level of about 4.4 million cubic meters. This is approximately four times the recommended allowable cut. If the current level of exploitation continues, a serious shortage of merchantable trees is imminent. Plantation development therefore seems to hold the key to the sustainability of both the formal industry and CSM enterprises.

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### Access

Tenure reforms that recognise some ownership or management right on the part of communities, especially outside forest reserves, are an important consideration. In practice, farmers already decide the fate of trees on their land. The current regime of benefit-sharing – which alienates communities — needs serious restructuring in order to gain community assistance in the management of forest resources. In effect, forest resources must be seen as economic resources that benefit communities.

### *Policy reform: lifting the ban?*

Ghana's 1994 Forest and Wildlife Policy can incorporate all the options suggested by stakeholders and experts in dealing with CSM. The legal framework criminalises the use of CSM and trading for commercial purposes, although its enforcement has been fraught with difficulties and inconsistencies. The law does not criminalise CSM for household use but the FSD's Manual of Operations does not provide straightforward procedures for domestic use permits to use chainsaw to mill timber for local consumption.

In spite of the ban on CSM in Ghana, the practice is highly accepted among the general public. It is also supported by some stakeholders, including more than half of FSD District Managers. The timber trade associations, especially the GTMO, oppose it, however. Social, economic and environmental impact studies show that most of the negative impacts of CSM are the result of its being banned and of the attendant problems of ineffective monitoring, rather than of the practice itself. If the fundamental reason for the chainsaw ban was its adverse environmental impacts, the empirical observations in the study do not support this claim. Chainsaw operations need to be regulated, either through effective enforcement of the ban or by being integrated into mainstream forest management and operations. Based on the information provided by the case study, the ban needs to be reviewed. Declaring CSM as illegal without addressing the timber markets that sell these "illegal" products is not realistic or effective.

Since CSM has high social acceptance and significant economic interests and it supplies a critical domestic market, maintaining a ban without effective enforcement capability may only enforce connivance and illegality. Enforcing the ban will be very challenging unless three critical conditions are simultaneously met:

- The timber industry is prepared to supply wood to the domestic market;
- FSD procedures are streamlined to allow for the processing of timber for domestic use; and
- Resource governance is significantly improved (particularly in terms of corruption within the FSD and law enforcement agencies) and genuine political will for addressing CSM is secured.

Since it is unlikely that these conditions can be met within the near future, and since CSM is increasing, some immediate interventions should be instituted. Even though there is increasing pressure to lift the ban, the study suggests that this option should be approached with some caution. Several tenure procedural and monitoring capacity issues still need to be resolved:

- How should policy initiatives address the issue of request for timber for domestic purposes by individuals?
- What specific provisions are needed in the procedure manual for harvesting timber outside reserves to address the domestic use of timber using registered chainsaws?
- What capacity in terms of personnel and logistics of the FSD is needed under a regularised CSM regime?
- What licensing mechanism is needed to integrate chainsaw operations?
- How does the government ensure equity in the payment of economic rent (or stumpage) for trees?
- What are the impacts, especially on the resource base and the domestic market, of an arrangement that regularizes CSM?

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- How will the government pursue the legality assurance condition under the VPA with its EU trade partners without addressing legality of domestic timber supplies?

#### *Domestic timber supply*

Approaching the problem from the demand side is a more practical option. Without addressing the issue of domestic timber supply within the context of the production and supply of legal timber, it may almost be impossible to develop and enforce an adequate CSM policy. CSM is increasing because the high local demand for lumber is not being met from sawmills and because it provides a wider range of species and dimensions. Supplying this demand with legal timber must be the basis of any policy option. This requires obtaining information on the exact size of the demand in the domestic market and assessing whether legal sawmills can meet this demand.

#### *Distribution of benefits*

Many people support the idea of paying financial benefits directly to farmers as a way to build a state community partnership that can address illegal logging (Marfo 2004; Adam *et al.*, 2007). It has been proposed that 40 % of timber revenue collected by the FC from off-reserve areas be distributed to communities or farmers as a way to compensate them for tending and managing the trees on their lands and farms. This seems to be supported by economic analysis. Farmers already gain almost this much, through direct payments from chainsaw operators. Chainsaw lumber production has become a key contributor to rural livelihoods. This fact — coupled with the apparent connivance of operators with FSD staff and traditional resource owners — suggests the difficulty that the country will face in enforcing regulations. The government may need to consider incentives to ensure that adequate benefits from tree resources are paid, especially to farmers and land-owners.

#### *Multi-stakeholder dialogue*

A process is needed to review the ban of CSM and design innovative policy options to address the issue of supplying the domestic timber market with legal timber. Stakeholders need to be engaged in this process as soon as possible. The multi-stakeholder dialogue approach is crucial; the drivers for CSM cut across social, political, environmental and economic realms and involve a range of stakeholders. Several factors must be considered when beginning discussions to design innovative policy options:

- Policy discussions need to be approached with an open mind, because there is general social acceptance of CSM, and because most stakeholders are in favour of regulating the activity rather than maintaining a ban that cannot be enforced.
- In order to be effective, policies must have the participation of key stakeholders, including legal and illegal loggers.
- It is vitally important to deal with local elite interests.
- Dealing with sector corruption, particularly within the FSD district-level staff and the police, is a fundamental requirement.
- The applicable laws on CSM must remove the ambiguities often encountered by practitioners. It may be useful to subject this interpretation to further public and stakeholder discussion.
- The procedure manuals for harvesting timber need to be revised to accommodate a range of methods for accessing and processing timber for domestic use.
- Research should continue to be an important part of policy discussions. Stakeholders need relevant information when considering options and impacts.

#### *Capacity building for stakeholders*

Any effort to integrate chainsaw operators in mainstream forest operations should consider improved technology for an organization of operators; otherwise, monitoring will be difficult. In addition, the capacity of the FC and civil society groups needs to be increased to ensure that they can facilitate effective monitoring and ensure compliance.

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1. The author is a research scientist at the Forestry Research Institute of Ghana.
2. See Marfo, E., K. A. Adam and B. Darko-Obiri (eds.). 2009. *Ghana country case study report on chainsaw milling: Developing alternative to illegal chainsaw milling through multi-stakeholder dialogue in Ghana and Guyana*. Final Report. CSIR-Forestry Research Institute of Ghana/Tropenbos International, The Netherlands.
3. Adam and Gyamfi 2009.
4. Birikorang and Rhein, 2005.
5. The Forestry Commission's share of legal stumpage fees is 40%.
6. The comparison was based on data from a recent sawmill efficiency study commissioned by the Forestry Commission (Gyimah and Adu-Gyamfi 2009), a FORIG/ITTO project on processing of log residues using a Logosol portable sawmill, and field experiments carried out as part of the Ghana case study involving four species of trees and Stihl and Husqvarna chainsaws.

## 3.7 Chainsaw Milling in Guyana

### Introduction

CSM (also called chainsaw lumbering) has emerged as a major component of the timber industry in Guyana. The activities of this sub-sector provided an estimated 40 percent of the fees — total royalties on logs and lumber — received by the GFC in 2007 (Clarke 2009).

CSM provides income and livelihoods for a large number of persons within and outside forested areas, and affordable lumber for the local market. Despite these benefits, there are major issues related to CSM: concern about continued availability of commercial stocks of forests; under-utilization of timber resources as a result of poor cutting techniques and practices; poor occupational health and safety practices; and level of compliance with approved environmental practices.

Policy-makers and other stakeholders in Guyana have responded positively to CSM's potential to foster the development of rural communities by supporting the development of Small Logging Associations that operate within State Forests. The GFC also supports community logging initiatives by Amerindians on communal lands. Given the legal status of CSM, it is desirable to develop a suite of instruments to enhance the benefits of the practice and align it with other initiatives on sustainable forest management, such as the recently launched LCDS.

## The forestry sector in Guyana

Tropical high forests cover some 16.4 million hectares (ha) or about 76 percent of the country's total land area (Table 1). Under the *Forest Act* of 1953, 13.6 million ha of the denser forest area were gazetted as State Forest. Amerindian and other lands, totalling some 2.4 million ha, are also forested and provide a means of livelihoods for many communities.

The GFC issues three main kinds of forest concessions:

- State Forest Permissions (SFPs) are granted for one or two years for areas smaller than 8,000 ha with the option to renew for an additional one or two years;
- Wood Cutting Leases (WCLs) are granted for periods of three to ten years for areas between 8,000 and 24,000 ha — a forest management plan is required, and there is an option to renew the concession; and
- Timber Sales Agreement (TSAs) are issued for periods of 25 or 30 years for areas exceeding 24,000 ha — a forest management plan is required, and there is an option to renew the concession.

**Table 3.7.1: Key facts about forestry in Guyana**

Land area	215,000 km <sup>2</sup>
Population	0.75 million
Forest area	16.4 million ha (163,777 km <sup>2</sup> )
State forest	13.6 million (m) ha: (State Forest Permission: 1.7 m ha; Wood-Cutting Lease: 0.07 m ha; Timber Sales Agreement: 4.2 m ha; State Forest Exploratory Permit: 0.6 m ha; Reserves: 1.5 m ha; Unallocated: 5.6 m ha)
Annual Allowable Cut	0.33m <sup>3</sup> /ha/year (max. of 20 m <sup>3</sup> per ha in 60-yr cutting cycle)
Yearly average logs and other roundwood production	357,000 m <sup>3</sup> *
Yearly average chainsawn lumber production	60,500 m <sup>3</sup> * (processed)
Yearly average sawmill lumber production	103,392 m <sup>3</sup> ** (processed)
Recovery efficiency, chainsaw milling	19–44%
Recovery efficiency, static sawmilling	47–65%
Deforestation rate	0%
Contribution to GDP	3.4%

\*average yearly production for 2004–08; \*\*average yearly production for 2002–06  
Sources: GFC 2002, 2006, 2007, 2009; FAO 2009; Clarke 2009

The new Forest Bill approved by Parliament in January 2009 designates all the concessions listed as simply “forest concession agreements”. Guyana’s commercial forests are characterised by high species diversity. The main commercial species have a low standing volume per unit area; this results in a low rate of extraction. The country’s forests are considered to be largely intact, mainly because logging is selective and relatively low in intensity. However, in terms of remaining commercial productive capacity there are some marked geographical differences; the most accessible near-interior forests have lost their productivity for high-value species of marketable dimensions and quality.

### The legal framework

The GFC’s general policy on CSM is that it is legal in SFPs in the country once all conditions are met, including licensing, tagging, declaration and royalty payment. The new Forest Bill will become the central piece of legislation governing the forestry sector. The old Acts, including the *Forest Act* of 1953, will be repealed as soon as the bill is formally proclaimed as law. The new Forest Bill recognizes chainsaws as “primary conversion units” that must be registered each year.

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The bill introduces the concept of CFMA. The purpose of a CFMA is to provide communities with a means of acquiring clear and secure rights to manage and benefit from their forests on a sustainable basis in order to help meet local needs, stimulate income generation and economic development, and enhance environmental stability. CFMAs are granted for a maximum of two years. They can be applied for by any legally registered “community group”, which is defined as being comprised of persons living within and having strong ties with the community. The agreements are suitable for SLAs who practise CSM.

### **Small Loggers Associations**

In 2001, the GFC reaffirmed its commitment to poverty alleviation by implementing its Social Development Programme, in accordance with the 2001 National Forest Plan. The overall objective of the programme is to ensure that all communities located in or close to forests utilize their forest resources in an environmentally sustainable manner which yields economic and social benefits for everyone. In line with this policy, GFC supported the formation of SLAs. These associations allow members to obtain access to State Forests via State Forest Permissions; they provide other benefits as well. By the end of 2008, 25 community logging associations were registered with the GFC and had been issued 42 SFPs. Other community groups operate on titled Amerindian lands, outside State Forest lands.

All chainsaw operators within the community are encouraged to join SLAs. This gives them the right to operate on the association’s leased lands; it also conveys benefits in terms of access to authorities, support and markets. Logging associations that harvest on titled Amerindian Lands are not required to pay fees to the GFC. These lands are governed by the relevant Amerindian Village Council and are subject to royalty payments to the council. The GFC does, however, monitor the removal of timber from Amerindian Lands.

Research conducted by this project found that SLAs were at various stages of development, and faced problems related to issues such as governance and capacity. The associations have between 20 and 90 members. There is evidence of behavioural change among SLA members due to the availability of training opportunities and more intensive monitoring of forestry activities by the GFC.

Log tracking and quota system

### **Log tracking and quota system**

The GFC monitors the origin of produce and the levels of harvesting within State Forests by means of a log-tracking system introduced in 2000. The log-tracking system provides information about the location, magnitude and legitimacy of forest operations. The system is used to monitor all operations, including those on State Forests, Amerindian Lands and private property. It is linked to the SFP quota system, a protocol that controls the volume of produce harvested. Cutting levels of ten trees per ha (20 m<sup>3</sup> per ha in a 60-year cutting cycle) are currently being applied to SFPs through the quota system.

### **The chainsaw milling sub-sector**

CSM has become widespread in small-scale logging operations for various reasons, primarily its simplicity, low capital requirement and mobility. It has thus become almost synonymous with the small-scale forestry sub-sector, although the two are not necessarily the same thing. CSM has several typical features:

- Operators are often paid based on production, without a written contract;
- Chainsaw operators do not receive any formal training;
- Operators do not own concessions or get involved in marketing lumber;
- There is little if any consistent use of personal protection equipment, with grave implications for occupational safety and health; and
- There is a high turnover rate for operators.



To operate a chainsaw on an SFP, the permit holder must obtain an annual sawpit licence from the GFC. Trees are selected, felled, bucked to length and “ripped” to produce the desired dimensions of lumber. In most cases, lumber is removed on a trailer pulled by a small farm tractor; occasionally it is carried out to roadside by hand. The short (two-year) length of tenure for SFPs constrains the practice of sustainable forest management. As a result, banks are hesitant to provide loans to logging cooperatives and community associations.

Concentrations of chainsaw milling activity can be found in several places:

- On SFPs around former bauxite mining communities, such as Ituni and Kwakwani;
- In and around Amerindian Lands, such as Kwebanna and Moruca;
- Around non-Amerindian rural communities, such as Port Kaituma; and
- On SFPs and conversion areas leased by individuals and associations, mainly in the near interior.

Chainsaw operators service both the domestic and export market. Registered production shows that chainsawn lumber production has increased from 751 m<sup>3</sup> in 1980 to a high of almost 75,000 m<sup>3</sup> in 2007 (Figure1). Chainsaw lumber production grew from an average of 0.5 percent of total primary timber production in the 1980s to approximately 18.5 percent in 2008.

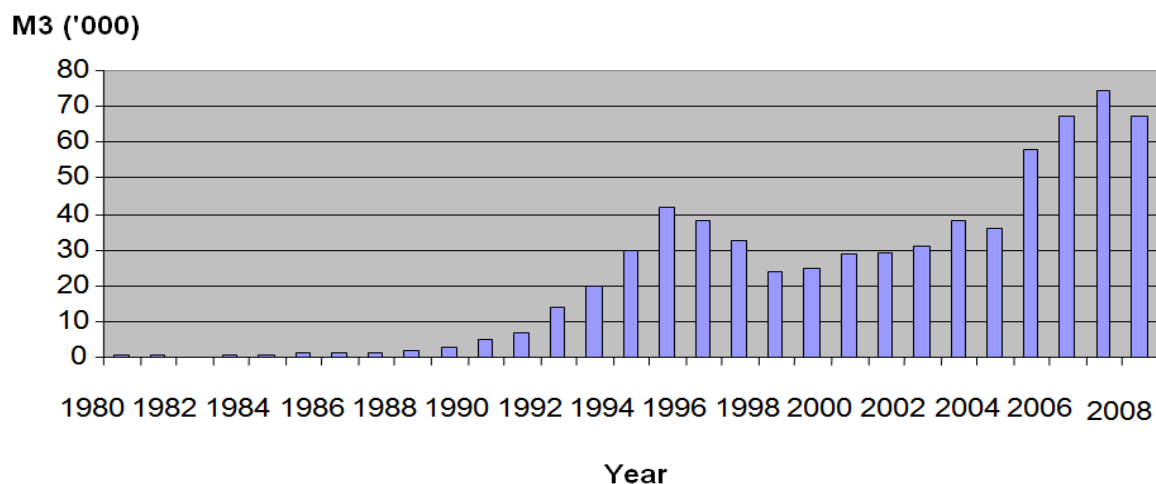


Figure 3.7.1 : Chainsaw lumber production (m<sup>3</sup>)

Source: GFC

The small-scale sector pays higher area fees and royalties than the large-scale sector. Area fees vary by concession type; for SFPs they are US\$ 0.20 per ha. Thanks to successful lobbying, large scale concessions pay only 60–90 percent of this rate (Hunter 2001), which is seen as unfair by small-scale concessionaires such as SLAs. Fixed royalty rates for logs are recalculated using a conversion factor for chainsawn lumber of 16 percent. Most chainsaw millers achieve more than 16 percent conversion (Mendes 2006), and therefore claim that they are unfairly assessed for higher royalty payments. Large-scale sawmillers are also charged royalties, but on logs, where conversion factors do not apply. Although SFPs cover 20 percent of all allocated State Production Forests, chainsawn lumber brings in up to 40 percent of estimated royalties (Clarke 2009). Small-scale concessions are often located in worked-over or degraded forests, which mean that the tree stocking is often poor. There are reports of small loggers cutting undersized logs or logs outside the concession boundary. Small loggers who engage in these activities incur fines; this constitutes a substantive part of the cost of the production of chainsawn lumber. Fines can accumulate to one million Guyana dollars (US\$ 5,000) in a year for some SLAs. In 2007 SLAs were collectively fined G\$10.6 million or US\$ 53,000 (GFC 2008).

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### **Drivers of chainsaw milling in Guyana**

The paucity of viable livelihood alternatives in rural areas without industry or other commercial activity acts as a powerful driver for the practice of CSM, as do the availability of the resource and the possibility of making a reasonable living from CSM.

There is scope for profits in CSM given the strong demand for lumber. Chainsawn lumber can supply domestic markets with timber more cheaply than sawmilled lumber because of the relatively high production cost of large concessions. It can provide a wider range of species than large-scale industry, which focuses on log and lumber exports from a few prime species.

Chainsawn lumber's profitability varies, depending on type of transport, fuel costs, costs for rations, price for lumber and distances to harvesting and selling locations. Simple economic analyses indicate that at least some actors in the trade chain can make a reasonable living from chainsaw lumber production. In three different CSM scenarios the gross margin percent was found to be 25.1, 15.2 and 2.3 to an SFP/lumberyard owner; an SLA member and contractor; and an Amerindian logging cooperative, respectively (Clarke and Mangal 2006). CSM operators' ability to easily obtain chainsaws through informal short-term financing options and hire purchase has allowed the practice to expand within communities. Chainsaw milling is also sustained by an enabling policy environment. The GFC supported the formation of SLAs to provide access to land through State Forest Permissions. The designation of areas as conversion forests — due to mining (bauxite, sand and gold), agriculture and hydro-electric development — is also a major factor that supports chainsaw milling. The construction of roads, bridges, culverts and buildings in some remote communities has led to short-term chainsaw milling activities in these locations.

### **Impacts of chainsaw milling**

The GFC reports that more than 27,000 people are directly employed in the forest sector (GFC 2007). Approximately 70 percent of them are employed on SFPs. It is estimated that approximately 70 communities in Guyana are involved in CSM. In some of these communities as many as 80 percent of the residents are actively involved in CSM. The proportion of financial benefits in the supply chain increases markedly from primary producer to retailer (Figure 2). The people directly involved in the production of chainsawn lumber earn less than five percent of the final retail lumber price. Wholesale suppliers of rations, equipment and parts receive a much larger proportion of the sales revenue.

There has been no specific study of the environmental effects of CSM, nor have any attempts been made to compare the environmental impacts of CSM with those of conventional logging. It can be speculated, however, that the lack of heavy machinery in CSM reduces the impact on soil, regeneration and fauna. On the other hand, chainsaw operators are less likely to follow the Code of Practice or adopt reduced-impact logging techniques. In addition, the range of species typically cut in CSM can result in a greater opening of the canopy, especially in logged-over areas. There are also reports of chainsaw millers cutting undersized and protected trees (including trees in forest reserves and watercourse buffers) and converting them into lumber.

The extent of illegal logging in Guyana is debated. Depending on the definition applied, high figures can be reported. Based on GFC's definition, total illegal produce is considered to make up less than two percent of total annual timber production. Violations of forest laws range from travelling with expired or no documents to cutting undersized logs, sourcing logs from outside concessions (poaching), harvesting protected species and false declaration of harvested volume.

Violations of the *Forest Act*, however, are not restricted to any particular subsector: they include small, medium and large operators. Lack of access to forests with "marketable" trees is a significant problem for chainsaw millers and a principal driver of illegality among small-scale loggers. Many of the concessions awarded to small loggers become unproductive within a year. Various conflicts are associated with CSM:

- operators not adhering to forest laws or forest management guidelines;
- the low prices offered for chainsaw-milled lumber by lumber dealers;
- the fact that chainsaw operators receive only partial payment for the lumber sold;
- revenues collected not clearly accounted for by logging associations;
- quotas for some SFPs not being able to meet the needs of members adequately; and
- orders for lumber restricted to a powerful few rather than shared between all members of the SLA

### **Conclusion**

The de facto policy of the government, as put forward by the GFC, is to acknowledge and accept CSM. This is demonstrated by the establishment of SLAs, SFS, CFMA, and a regulatory framework. CSM will need to increase its efficiency in conversion and achieve higher recovery rates. The industry will also need to improve its compliance with the Code of Practice and other forest management prescriptions. From the perspectives of optimum resource utilisation, rural livelihoods and economies — both local and national — there seems to be justification for supporting the small-scale forestry sector, which comprises mainly appropriate forms of logging. This support is bounded by the capacity of Guyana's forests to sustain a yield that can support communities who depend on both CSM and industrial sawmills. The overall performance of the sub-sector appears inadequate to address the local livelihood requirements of chainsaw operators and dependent communities. The commercial depletion to date of accessible forests suggests that the current number of saws and operators cannot be sustained, at least not everywhere in the State Forest or on private lands. Alternative economic activities are needed to support long term livelihood goals.

In addressing the issue of CSM in Guyana, the evidence gathered suggests that two general lines of action (and their interactions) need to be considered: strategic interventions and improvement of current practices. Strategic interventions must start from a concept of CSM sub-sector vis-à-vis the mainstream forest sector, the role of forestry in regional development and potentially competing land uses. The Government of Guyana's LCDS provides excellent opportunities to consider these issues within a broader framework. A multi-stakeholder approach is crucial to address these issues.

Dialogue between a wide range of participants is critically needed to discuss the impact of national strategies on individual costs and benefits of diverse actors in the forest sector, and to facilitate the most economically viable, efficient and equitable allocation and exploitation of the national forest estate. There are numerous opportunities within the context of sustainable forest management to improve current practices in order to optimize benefits to communities that depend on CSM:

- improved functioning of SLAs, including matching the number of SLA members to the size and quality of the forest resource;
- improved SLA capacities and awareness about forest management, forest regulations, bookkeeping, leadership and organisational management, marketing and improvement of productivity and product enhancement;
- greater representation of the small-scale sector in trade associations and on agency boards, and the formation of a Small and Medium Forest Enterprise association.

To better understand the CSM sub-sector in Guyana, further research is needed on several issues:

- socio-economic impacts on communities;
- actual direct and indirect employment generated by the sub-sector;
- distribution and use of benefits along the supply chain;
- the extent of illegal logging;
- the efficiency of conversion, including the waste left in the forest;

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- the true extent of CSM, including on Amerindian lands and in SFP not
  - involved in Small Logging Associations; and
  - environmental impacts.

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## 4.0 Group discussions

Participants were grouped into three based on their backgrounds and nationality to discuss the same set of issues covering policy, monitoring, technology, livelihoods and conflict management related to CSM. The discussions were guided by questions. The outcome of the group discussions were;

### 4.1 Group one

#### *Policies in place to deal with chainsaw milling*

- **Liberia:** CSM is illegal in the natural forest, but because of the massive reconstruction after the Liberia civil war, it has become quasi-legal with the government giving a blind eye to it. The practice of collecting fees and issuing a waybill, for what is strictly an illegal activity, has strengthened the view that CSM is a legitimate activity.
- **Nigeria:** CSM is illegal in some states, but legal and regulated in unfriendly terrain like swamps and hilly places and about 6 other states which have forest.
- **Ghana:** CSM is illegal but the practise is widespread in Ghana. Chainsaw lumber feeds the domestic market and some exported overland. Although illegal, chainsaw lumber are sold openly in the market and patronised by Ghanaians and also used for government funded project. The lumber brokers also pay tax. CSM is allowed only for private use or for community projects
- **Congo:** CSM is allowed and there are official frameworks but they are not being followed. The country is now working on a decentralisation scheme. This informal sector is much bigger than the formal sector.
- **Kenya:** CSM is allowed on private farms and in plantation areas but not allowed in natural forests and reserves.
- **Cameroon:** CSM is legal but regulated in the NPFD. Licenses/permits are issued for only Cameroonian nationals.

#### *Resource allocation*

- **Liberia:** Operators go to communities, negotiate and pay some money to get accepted in the community. After milling, the operators give out some planks and or cash to the communities
- **Nigeria:** Where CSM is permitted, licences are issued. Operators then pay royalties to communities while stumpage and regeneration fees are paid to the government. Application can be done by CSM association or individuals to the forestry department.
- **Kenya:** The operators make negotiations with farmers to buy timber for milling. Timber harvesting is not allowed in the forests.
- **Congo:** Some forest areas are reserve for CMS. Operators apply for concessions and pay stumpage and royalties to the government.
- **Ghana:** Communities apply for Timber Utilisation Permit from the FSD. Operators take one-third of lumber. Issues of land tenure are important in the Ghanaian case as there is the need to recognise ownership by communities.
- **Cameroon:** Negotiations are made with farmers and unofficial money paid to the forestry department

#### *Equity between CSM and large scale loggers*

- Operators can gain equity only when they are organised into groups, when organised, they can get government to listen to them.
- Issues with CSM are political e.g. wastage
- Some forest could be reserve for CSM for equity with large scale loggers e.g. **Ghana:** areas too small for TUCs could be considered as a 'concession' for domestic supply.

#### *Effects of CSM policy on community rights to trees*

- In many countries, farmers benefit directly from trees on their farm

- In countries like Ghana, farmers do not benefit and therefore there is no incentive for farmers to nurture trees
- Issues of tenure needs to be looked at in regularising CSM

#### ***Revenue mobilisation from CSM***

- **Ghana:** The majority of payments made are unofficial. In addition, dealers pay vat, market toll and income tax.
- **Kenya:** Charcoal production and transportation are illegal, but taxes are imposed on them once they are found on the market.
- **Liberia:** Revenue from CSM are in the form of transport bills paid to a chainsaw union and a waybill paid to the government. Sometimes, more lumber is transported than what the way bill allows. Again, this system of revenue mobilisation is only for lumber coming to the capital with no system in place for lumber being moved to other places. So though some money is being mobilised, revenues are still being under-collected.

#### ***Present thinking***

- Legalise and regularise CSM (including permit and taxing)
- Improve upon CSM technology (for efficiency)
- Key conditions for legalisation CSM should include making inventory of stock, define the AAC and calculate the number of operators that can be allowed
- Delineate areas for CSM. This should include difficult terrain

#### ***The future of CSM***

- **Ghana:** Looks bleak with current resource base. Unless it is regulated and controlled and more trees planted. If legalised, the quality of chainsaw lumber will improve with high recovery and wastage reduced especially, with use of new technologies such as chainsaws with attachments.
- **Nigeria:** The future of CSM is bright since investment cost is high in the formal sector (sawmilling) and the resource is also not there to support the formal sector.
- **Liberia:** Though there is a good resource base, but the manner of chainsaw operation is very worrying and unsustainable. Regulation is needed.
- **Cameroon:** The future is bright as there is no alternative to meet the domestic lumber market demand.

#### ***Dealing with increasing demand in the face of dwindling resource***

- Encourage Plantation; Massive afforestation including agroforestry e.g. *taungya*.
- Alternatives for lumber (resource substitution)
- Fifty years lease arrangement in Ghana need reviewing. It is driving away potential plantation investors

#### ***Managing easy entry points of CSM***

- Make CSM less attractive by regularising the practice and imposing taxes on the chainsaw millers and dealers.
- Provide incentives to sawmills to increase local supply
- Introduce timber procurement policy to guide public institutions and large scale contractors

#### ***Monitoring***

- **Ghana:** There are some monitoring mechanisms in place such as the task force but these institutions are not effective due to corruption, FC capacity and lack of capacity resources.
- **Liberia:** More focused on revenue collection and not compliance with timber harvesting rules.
- There is the need to group operators, register them, assign certain area for their operation based on the AAC and closely supervise them.

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### **Technology**

- Use of attachments is good for ensuring products quality, safety and waste reduction
- Attachments should be insisted with regularization of CSM (as the case in Kenya)
- Constrain to adoption of improved chainsaw milling include;
  - Ban on CSM e.g. Ghana
  - Extra investment in the new technology
  - Low price of free hand chainsaw lumber
  - Knowledge
  - Production per hour is higher for free hands than using frames
- Training necessary
  - Capacity needs to be built on safety, directional felling, tree inventory, use of attachments, marketing skills etc

### **Livelihoods**

- CSM contributes a lot (Employment, income, cheap wood for local use etc)
- Livelihood strategies comparable to CSM;
  - Alternative: grasscutter rearing. Snail farming, bee keeping.
  - Challenge: the alternatives may not generate income comparable to CSM income.
  - Reduce profit margin of CSM to make it less attractive
  - Encourage operators to diversify their income; e.g. in Liberia, operators diversify their income into transport and video centre video
  - Provide micro credit facilities.

### **CSM Conflicts**

- Major conflicts are among chainsaw operators, with forestry authorities, sawmills, farmers and landowners.
- Conflict management is not very effective.
- Few court cases
- Some minor cases are managed by chiefs e.g. In Ghana.
- 

## **4.2 Group two**

### **Monitoring**

1. Monitoring mechanisms:
  - Give a number of tags for same number of trees (one tag for the stump and the other for the log)
  - Give chainsaw machines serial numbers in connection with their concessions (check for chainsaw machine movement)
  - Impose fine on culprits
  - Form chainsaw operators association with mechanisms for monitoring members.
  - In situations of permit abuse culprits are sanctioned and this is in the form of paying fines or blacklisting.
2. Problems with compliance
  - Sale of tags/permits
  - lack of human resources the monitoring process
3. Measures to limit the scope CSM
  - Community involvement in granting permits to operators and monitoring
  - Operators should pay total stumpage fees before logging
  - Community share of total stumpage should be put into a central community fund and made available for community projects

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### ***Technology***

1. Efficiency
  - Use of hand computers, GPS, coded cards, tree maps and radar systems
  - Use of frames attached to the mill to make it mobile
  - Establishment of in-situ mills
  - Use of bicycles to transport beams
  - Use of portable mills (bush mills, logosols)
2. Constrains
  - Capital cost
  - Public education (creating awareness)
  - Selection of appropriate equipment
  - Training
  - Sustainable supply

### ***Livelihoods***

1. Importance of CSM to livelihoods
  - Very important
  - CSM should be done alongside reforestation
2. Alternative livelihoods
  - Realistically, competitive alternatives will be difficult to come up with; nevertheless an appeal can be made to the good senses of operators, once reasonable alternatives with modest returns have been identified.
  - Support from industry for handicraft production from off cuts
  - Improved agriculture activity (agro-processing, marketing)
  - Environmental insurance on plantation trees and crops

### ***Existing conflicts***

- Inequities in benefit sharing
- Theft on farms (farmers/operators)
- Destruction of farms and nonpayment of compensation (farmers/operators)
- Lack of information (farmers/chiefs)

### **Conflict management Mechanisms**

- **Guyana:** A community liaison officer from the FC handles all conflicts
- **Ghana:** Chiefs, police (use of police has not been effective)

### ***Policies***

- Ghana's forest policy is silent (neutral) on chainsaw
- The aim of the policy on the equitable access and distribution of forest benefits to all segment of society is not being met.
- There is the need for a better interpretation of the policy on CSM.

### ***Modalities for resource allocation***

#### **Guyana**

- Available lands (< 8,000 ha) are published in newspapers and anybody can apply
- Evaluation of applications is done based on applicants capacity to log the area (equipments, human resource etc)
- Successful applicant demarcates the boundaries of the concession area
- Concessions are granted for 1-2 years and
- Successful candidates are given annual quota of timber to harvest,



### DR Congo

- Chainsaw operators acquire lands from the chiefs and then application sent to government,
- Processing of application takes 30 days,
- if applicant does not receive any letter of refusal within 30 days, then applicant can go ahead to log and
- Permits are renewed annually
- In the case of saw millers, application for a forest area is sent to the government and after approval logging is done in compartments

### *Present thinking*

- If suggestions and regulation are enforced, the rate of chainsaw operations will reduce
- Organized chainsaw operators and attach them to timber companies (operators should not be given concessions).

### *Dealing with increasing demand*

- Encourage plantation establishment
- Reduce waste
- Encourage the use of sawmill lumber

### *Managing entering points of CSM*

- Over-land market should be addressed (20 trucks/day are transported from Angloga in Kumasi

### *Recommendations*

- Communities should be involved in the granting of permits and monitoring
- Part of revenue should be given to communities for monitoring as part of the management cost
- Payment of stumpage fees should be made to the FSD before tags/permits are given
- Pilot study of the tagging system could be done with a well established industrial wood company
- There should be a multi-stakeholder group for formulating and enforcing guidelines and regulations

## 4.3 Group three

### *Existing conflicts*

The chart below shows actors/stakeholders involved in conflicts and the intensity

	Chainsaw Operator	Loggers	Farmers	Landowners	Indigenous People	Policy Makers	Resource Manager	District Assembly	Mining
Chainsaw Operator	-	XX	X	X	X	X	XXX	X	-
Loggers	XX	-	XX	XX	XX	XX	X	X	X
Farmers	X	XX	-	XX	-	X	X	-	X
Landowners	XX	XX	XX	--	-	X	X		
Indigenous People	X	XX			-	X	XX	-	
Policy Makers	X	XX	X	XX	X	-			
Resource Managers	XXX						-		
District Assembly	X							-	
Mining & Other Uses	-								

- X less intense conflicts
- XX intense conflicts
- XXX very intense conflicts

### ***Interest of stakeholders involved in conflict management***

In the table below are a list of CSM conflict actors and what they protect during conflict

<b>Actors</b>	<b>INTEREST</b>
Loggers	Access to the trees
Chainsaw operator	Access to the trees
Farmers	Crop security
Resource managers	Revenue , Sustainable use of the resource
Indigenous people	Revenue, Misuse of their resource, mining
Landowners	Revenue,
Policy makers	Loss of revenue
District assembly	Revenue

### ***Conflict management mechanisms adopted***

- **Ghana** : Conflicts are managed through Social Responsibility Agreements, informal dialogue in handling chainsaw conflicts is 50/50 whiles
- **Guyana**: the FC handles and manages all conflicts associated with chainsaw lumbering

### ***Policies***

- **Ghana**: CSM is banned, but allowed for domestic purposes
- **Uganda**: CSM is allowed with conditions to control the supply of lumber to the market and reduce inefficiency.
- **Guyana**: CSM is allowed with conditions

### ***Modalities for resource allocation***

- **Ghana**: Modalities for resource allocation in Ghana are ineffective.
- **Uganda**: The cost of meeting conditions for resource allocation is very high thus making implementation difficult. The system in Uganda is such that chainsaw operators identify tree owners who are willing to sell and apply through the local council, after which the ministry grants the permit.
- **Guyana**: Resource allocation is through competitive bidding in which communities who have land do not need permission to log. What is required are tags from the forestry commission to enable them transport

### ***Equity***

- **Uganda**: There are no large scale loggers which imply there is no problem with equity in terms of resource allocation.
- **Guyana**: There is a categorization of small and large scale logger upon which resource allocation is based to allow for equitable access to timber.

### ***Effects of policy on community tenure rights to tree***

- **Ghana**: The current policy regarding community rights to trees is not very clear and also not favourable to communities for commercial purposes. Land owners believe that the resource belongs to them that is why they still go ahead and sell resources on their lands despite the law.
- **Uganda**: community rights to trees is one year renewable

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### ***Present thinking on CSM***

There is the need for proper evaluation/review of status quo on chainsaw milling in Ghana considering the following:

- Complete ban of lumber export
- Selective ban for selected species
- Direct flow of cash benefits to communities and additional responsibility in resource management (MTS)
- access to the resource by operators
- Communities given increased access to the raw material

### ***The future of chainsaw lumber production***

- The need for proper regulation to make it more amenable to the dwindling resource e.g. extraction of remnant trees and trees in less accessible location
- investment in value addition technologies
- incentives for operators who invest in value addition
- appropriate training of chainsaw operators
- use of milling and logging residue
- plantation establishment by operators

### ***Dealing with increasing demand***

The increasing demand for timber resources can be met through;

- Plantation establishment by the state, private, individuals and partnerships
- On-farm tree planting
- Use of alternative materials as wood substitutes.

### ***Managing entry points of CSM***

- Proper registration of machinery
- Grouping of operators at the regional, district and community levels
- Control importation of chainsaw machinery (number and location in the country)
- Creation of designated lumber markets for registered producers

### ***Monitoring***

Some monitoring mechanisms for CSM are the:

- Establishment of monitoring divisions within government regulatory organizations (e.g. Guyana);
- Lumber tagging and tracking system (e.g. Guyana)
- Permit to produce lumber and certificate of conveyance (e.g. Uganda)

### ***Problems associated with compliance***

- Lack of personnel and inadequate logistics
- High level of corruption
- Inaccessibility of sites
- Local economic situations influencing peoples' behaviour
- Political interference

### ***Enforcement of monitoring mechanisms***

- Confiscations
- Effective prosecution
- Sanctions e.g. withdrawal of permits
- civil society advocacy

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### ***Measures to limit the scope of Chainsaw operation***

Allocation of permits for specific volumes, species, size dimensions and site for a given period with limitations on operations based on recovery activities (log residue)

#### ***Technology***

- Use of chainsaws with attachments
- Training in appropriate sawing techniques
- Use of mobile mills acquired through cooperatives
- Training in entrepreneurial skills and business management

#### ***Experiences in practice with improved technology***

- Reduction in waste or increased recovery
- Improved quality of products

#### ***Constraints to technology adoption***

- Initial investment cost
- Lack of appropriate training programme
- Risk of being less competitive when there are cheaper products

#### ***Livelihoods***

Finding alternative livelihoods for people engaged in chainsaw operation is a big challenge. There could be considerations for:

- Agro-processing of local crops with well planned marketing strategy
- Improved existing cottage industries

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## 5.0 Closing

The closing ceremony was attended by some senior officers and dignitaries from the MLNR, FC, EU and other international and local organisations, and the press. The outputs of the workshop were presented by the facilitators after which the Ghana case study was also presented again. Participants expressed satisfaction about the workshop and noted that a lot of information and lessons have been shared and learnt. It is expected that good international best practises would be determined so that countries with problems of illegal CSM could adopt.

## 5.1 Keynote Address

*By the Minister of Lands and Natural Resources*

Mr. Chairman, Parliamentary Select Committee Members, Chief Executive of Forestry Commission, Members of the Project Advisory Committee, International and Invited participants Members of the Press, Ladies and Gentlemen.

I am very glad to join you at the closing session of this workshop where you have discussed the subject of illegal chainsaw lumber production, which has become widespread economic activity in Ghana and therefore posing a serious threat to forest resource sustainability and biodiversity conservation in Ghana today.

The Timber Resources Management Act 1997, Act 547 and the Timber Resources Management Regulation 1998, LI 1649 which prohibits the use of chainsaws, whether registered or unregistered to convert timber lumber and other wood products for sale, exchange or any commercial purpose made chainsaw lumber production illegal in Ghana.

However, trading in this illegal activity is still widespread and is a major source of worry to all of us, resource owners, government and the general public. Clearly, there seems to emerge two main schools of thought; the first is to continue to maintain chainsaw milling as an illegal operation and rather strengthen the arms of the Forestry Commission and the law enforcement agencies to ensure total compliance. The second is to find alternatives, possibly regularizing the operations to integrate them in the formal timber industry in Ghana.

Mr. Chairman, the government has followed both sides of the argument with keen interest and the issues are so complex that I will not attempt to go into them now.

In any case, the reality is that we have not been very successful in eliminating chainsaw milling or at least reduce chainsaw operations in our forest areas.

Previous attempts in controlling the menace of illegal chainsaw activities included the accommodation of chainsaw operations under the Trees and Timber ('Chainsaw Operations) Regulation 19191 (LI 1518) and consolidating their regulation in the 'Interim Measures to control illegal. Timber Harvesting Outside Forest Reserves" of 1994.

Under these Regulations, the activities of Chainsaw operators were legally recognized and their activities were supposed to be regulated by the "District Assemblies and District Forestry offices at the local level.

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However, due to widespread abuses of the system and expression of grave concern about indiscriminate felling of trees under the system, the situation was reviewed and deployment of “Timber Task Forces to check abuses instituted in 1995.

Mr. Chairman, having realized that chainsaw operations under its present form cannot be sustained or controlled within the limits of ACT 547 and LI 1649, the Ministry of Lands and natural Resources decided that chainsaw operators should be accommodated under the following alternative livelihood programmes:

- Forest plantation programmes such as land clearing, thinning, coppice management and other related activities on the ongoing National Plantation Development Programme;
- Forest boundary demarcation and cleaning;
- Assisting timber companies in timber harvesting operations in more difficult areas; and
- Recovery of timber off-cuts in the forest.

In addition, the Ministry has tried to assist known chainsaw operators who have the means to invest in the establishment of mobile mills in strategic locations in the country. The objective is to help the more resourceful ones to invest and thus make a living in the small-scale wood processing industry.

The Forestry Commission has also been requested to draw up a comprehensive programme to link up all wood dealers with the various sawmills where the stock of timber are located to enable them source lumber for sale to the general public.

Mr. Chairman, in order to ensure effective monitoring of logging, processing and export of wood products, a Log Tracking or Validation of Legal Timber Scheme is being installed by the Forestry Commission through the support of the European Union.

It is envisaged that a successful implementation of the Scheme will yield the following results:

- Significant reduction in illegal logging (chainsaw operations)
- Waste control in logging and processing
- Significant reduction in over-exploitation of timber, and
- Significant increase in revenue (for both government and the private sector)

Mr. Chairman, while we continue to explore better and permanent solution to the problem of illegal chainsaw lumbering, it appears to me that we need an approach that is not just consultative but also participatory to bring all stakeholders on board to discuss options and evolve mechanisms that address the social, political, economic and ecological dimensions of the issues.

This obviously requires a multi-stakeholder platform that is open to all options. It is against this background that the Ministry of Lands and Natural Resources, together with the Forestry Commission is so supportive of this new project that seeks to find alternatives to chainsaw milling in Ghana.

I personally consider this Regional Workshop an appropriate forum and hope you have discussed the issue dispassionately and objectively, drawn on lessons from other past and present interventions in Ghana and other African Countries, Shared information on best practices, developed a roadmap and an effective way forward for the identification and implementation of suitable options and alternatives for chainsaw lumber production in Ghana.

Judging from the agenda of the workshop and the calibre of participants gathered here. I am very confident that very objective and practical recommendations have been made to guide the Ministry in its efforts towards sustainable timber resource management, poverty alleviation and maintenance of environmental quality in Ghana.

Mr. Chairman, Distinguished Ladies and Gentlemen, let me finally leave this workshop with three thoughts of a politician’s imagination.

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1. In our efforts to provide alternatives to chainsaw milling under its current form, we need to be guided by what will benefit the country in the long term; thus paying particular attention to sustainability of our efforts.
  2. All suggested initiatives will have to feed into addressing the MDGs, particularly in equipping government to deal with poverty reduction while ensuring that we don't compromise on environmental health.
  3. That the outcome of this regional workshop and the project will provide recommendations to move the domestic lumber supply component of the VPA process in a positive and sustainable direction

In conclusion, Mr. Chairman, Ladies and Gentlemen, I wish to extend the Government of Ghana's appreciation to the European Commission for providing financial support to the project and making it possible for us to share and learn from our sister countries issues and options associated with chainsaw lumber production.

I also wish to thank Tropenbos International, and its partner institutions the Forestry Commission and the Forestry Research Institute of Ghana for initiating and implementing the project and hope that they will collaborate with other key stakeholders to ensure a successful implementation. Once again I assure you of the Ministry's support and commitment to the implementation of the project as one of the pragmatic ways of dealing with this menace of illegal chainsaw operations in the country more so when Ghana has signed a Voluntary partnership Agreements with the European Union.

On this note, I wish you all safe journey especially our international participants. I look forward to greater cooperation between the government and other stakeholders locally and internationally. May the God Lord bless us all.

## **5.2 Chairman's closing remarks**

The question is what do we do with the chainsaw operators and what options are available? When you consider resource depletion and scarcity, you actually are looking at loss of biodiversity in particular; the potential to regenerate and this include also genetic resources which especially in habitat of our fragile supply base is utilized. Just to consider the situation where supply has become limited then we will find that, various ways are being used to find scapegoats to blame for resource depletion and scarcity.

Inefficiency and low recovery have been noted to be a waste in resource utilization of the fell timber particularly at the time of preparation into lumber for the market. This is attributed to the low efficiency of the equipments used and the lack of technical know-how in its use.

Chainsaw operations we also noted involve the use of technology and we are familiar with a fact that the advent of technology in the felling of trees can be equated to the advent of computers and internet facilities particularly for data binding, storage, transfer and utilization. The fact that, there is a wrong use of technology does not negate the usefulness of that technology. What is most important as far as the technology is concerned is its availability, proper use and the capacity to ensure proper equipment maintenance and function. So you will find that the technology is only a means to an end, it is like a baby to a destination. As a new source of livelihood to a group of people who see chainsaw milling as a lifeline to their existence, there is no way you can stop them. Indeed they have become a force which we cannot just wish away. What we can do is to engage them in some form of dialogue. We need to find a way to manage them. Therefore instead of continuing to make the operations illegal and send the operations underground, it is better to regularize and manage them through a legal recognition and make their operations transparent.

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In advocating for regulation and ensure management of their operations means that the operations is in tuned with general plans, programmes and policies of the government in particular, for sustainable development. Like any other challenges that this country has been faced before, the idea of management has always held supreme and provided immense opportunities to share the vision of close range within and between groups of people either in communities or in associations. Therefore, bringing the chainsaw operations in tune with government mission and the realities of the general Ghanaian environment involves awareness creation, capacity training in the proper use of new technologies and general managerial skills. Awareness creation on the national view of sustainable development and the tenets of the eight millennium development goals emphasizing particular desire of government to overcome extreme hunger and poverty among its people and also promote a sustainable environment, a concept of conservation of biological diversity, the concept of sustainable use of biological diversity and the general concept of equity arising out of the sharing of benefits of genetic resources, all of these have been a must.

We note that in our quest to utilize biological resources, we often do not consider carefully the lifestyle of the organisms we are dealing with. This is necessary so as to get a feel of the gestation, reproduction and maturity stages, because it has been noted that each stage in the life of an organism has a purpose in the long chain of orchestrating services for human well being.

Capacity development is important to ensure taking full advantage of benefits provided by a technology. This will take care of the constant crying of the developing world and indeed it is always a cry everywhere we go that we need a transfer of technology. When that technology is transferred, what is needed is to utilize it properly with state of the art knowledge. Provisions of managerial and entrepreneurial skills have advantage of making chainsaw operators capable managers so that should government decide to give allocations they would be able to utilize these allocations properly.

I recognize the EU representative, and as the Minister is waiting for us it is something which is going to fulfil a desire for one stage as a segregate chairman.



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## ANNEXES

### Annex a: Some comments, questions and answers

#### **Comments:**

- It is very important that CSM is looked at as a viable small-scale forest enterprise as in Nigeria since it has the potential to contribute to rural poverty reduction. It is clear that the economic opportunities it offers to rural livelihoods are enormous. Governments in countries where CSM is banned should rather look at improving the methods and build the capacity of the operators so that they can also be involved in the management of the timber resources.
- It is evident from the presentations that with the dwindling forest resources, large investment in logging and milling would be irrational and many sawmills would fold up eventually. CSM if well regulated and improved would fill the gap by providing lumber for domestic needs
- In addressing the problems associated with illegal CSM, it is also important to look at the tree and land tenure issues together with benefit sharing. In Ghana, the farmer who nurtures the trees does not benefit at the moment and will illegally give out the trees to the chainsaw operator than wait for the concessionaire to log and destroy his/her food crops.
- It is clear that the main driver to CSM in Ghana is the market. In addressing the problem, it is important to look at it from the market demand perspective.
- Public awareness creation on the laws on CSM should be intensified amongst the general public especially the consumers of chainsaw lumber as part of the solution.
- In Ghana, the sawmill industry are not able to supply the domestic market with the 25% of lumber produced because of the cost of production. If government should support the industry, they will be able to satisfy the domestic market needs.
- It is surprising that the industry is using the cost of production as a reason for exporting all their lumber outside Ghana, most of the industries are using obsolete equipments and for the industry to be efficient and cut cost, they must use efficient machines. Again, the industry can still sell their lumber locally and consumers who want quality lumber would patronise it.
- In Ghana, the monitoring of government project especially at the district assembly level is weak. There must be a mechanism to ensure that contractors executing government project buy only legal lumber for their work.
- The AAC for Ghana is definitely unsustainable looking at the remaining forest compared to a country like Uganda. It is important that a research is carried out to calculate the real AAC for Ghana.
- The figure for domestic consumption of lumber in Ghana may not be correct. It is important to also calculate the amount for overland export to get the correct amount consumed locally.
- The MSD approach being adopted to address the issue of illegal CSM in Ghana is a good one. Other countries in the region can adopt it to address not forest related issues, but problems in other sectors.
- From the presentations, it is clear that the issues and problems related to illegal CSM is similar in most of the countries and therefore would be important to share information and best practices in the course of the project implementation.

#### **Questions and answers**

##### **Overview of the EU-Chainsaw project, Ghana**

**Que:** What was the basis for selecting the 8 pilot districts?

**Ans:** The pilot districts are falls within the high forest zone and are some of the illegal CSM hotspots.

**Que:** Will the project consider the allocation of resources in relation to where chainsaw operators could get their resources apart from the logging residues as part of the recommended options?

**Ans:** The MSD will discuss a wide range of issues and options. This may be looked at if it comes up as an issue under resource allocation.

**Que:** Is the project aimed at legalising the illegal CSM?

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**Ans:** It is clear from the presentation that the aim of the project is to reduce conflicts and illegality related to CSM. This will be done through developing alternatives through MSD. The MSD will discuss a number of alternatives and options including legalising CSM based on sound research information.

***Guyana country report***

**Que:** What is the extent of illegal activity with regards to CSM in Guyana?

**Ans:** There are quiet some illegal activity such as poaching and poor documentation. Culprits are punished by the Guyana forestry commission e.g. by redrawing permits

**Que:** How does the Guyana Forestry Commission monitor the CSM activities?

**Ans:** Using the log tracking system and involvement of the CSM associations/groups/communities.

**Que:** How are conflicts manage

**Ans:** They are no formal mechanism to resolve, but conflicts are managed by the Forestry Commission staff.

***Ghana country report***

**Que:** How does chiefs and local politicians' interference fuel illegal CSM?

**Ans:** Chiefs and local politicians wield a lot of power in Ghana and they interfere by asking for the release of offenders arrested by FC staff/law enforcement agencies. Sometimes the chiefs threaten the law enforcement agencies and offenders are released for fear of being victimised.

**Que:** How do the illegal chainsaw operators get access to timber resources?

**Ans:** In forest reserves, the resources are stolen, sometimes with the connivance of FC field staff and chainsawing is done most of the time in the night. Off reserves, they illegally buy the tress from farmers,

**Que:** Why is it that the law enforcement agencies do not arrest those selling the illegal lumber on the market, but rather the chainsaw operators, transporters etc.

**Ans:** Lack of political will

**Que:** Who are the financiers of the illegal CSM?

**Ans:** The financiers are normally in the urban areas. They are businessmen, politicians, chiefs etc.

***Nigeria country report***

**Que:** At what point does the State collect revenue?

**Ans:** In States where regulations on chainsaw milling are relaxed, chainsaw operators pay stumpage to the state and the farmers who own the trees. They also pay compensation in the event of destroying food crops.

**Que:** Do loggers who have established their plantations pay revenue to the State?

**Ans:** This is being argued, but till now government has a say on how trees are harvested and tree permits are used.

**Que:** In States where regulations on CSM is relaxed what are the forms of illegalities?

**Ans:** Logging without permits, but this is not widespread because the operators have formed strong associations to regulate their activities. Some of the associations have established their own plantations and can access loans to enhance their activities.

**Que:** Where do chainsaw operators get their raw materials?

**Ans:** Mostly from farmlands, packets of forests and fallow lands. Some associations have bought concessions from collapse sawmills.

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***Uganda country report***

**Que:** Why is chainsaw banned in Uganda, if 70 % of the forests in Uganda are private owned?

**Ans:** This to ensure that efficient processing methods are used for logging and milling so that good products are produced for the market. Freehand method is not allowed. CSM is done with attachments

**Que:** How do chainsaw millers get access to timber resources and how are they monitored

**Ans:** Millers negotiate for trees from private owners. In some instances private owners do the milling themselves. Monitoring is done mainly

***Liberia country report***

**Que:** Are the ex-combatant involved in illegal logging?

**Ans:** CSM is a lucrative business in Liberia and people with varied background are involved, not only ex-combatants.

**Que:** Is Liberia considering including the domestic market in the VPA process as Ghana did?

**Ans:** It is not clear whether Liberia would include the domestic market in the VPA process

**Que:** Are there formal mechanisms to resolve conflicts?

**Ans:** There are no formal mechanisms to resolve conflicts. Conflicts are resolved informally by community leaders and sometimes local authorities

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## **Annex b: Guiding questions for group discussion**

### *Policies*

1. What policies are in place to deal with chainsaw milling (banned or accommodated)
  - What considerations might have informed these policies
  - How effectively are they implemented?
  - Problems associated with implementation
2. Where chainsaw is legal , what modalities (procedures) have been used for resource allocation
3. How do these modalities ensure equity between chainsaw operators and large scale loggers
4. How do policy and legal framework on chainsaw milling affect people/community tenure rights to trees (and how does the tenure system affect chainsaw milling practices?)
5. What fiscal regime pertains for revenue mobilisation from chainsaw activities and what have been the associated problems?
6. Present Thinking
7. Future of chainsaw lumber production
8. How do we deal with increasing demand in the face of dwindling resource
9. How do we manage the easy entry points of chainsaw milling

### *Monitoring*

10. What monitoring mechanisms have been implemented under a legal regime to contain the mobility problems associated with chainsaw milling?
11. What problems are associated with compliance ( how are they enforced)
12. What measures are in place to limit chainsaw millers to definite scope of operation

### *Technology*

13. What technologies have been used to improve the processing efficiency?
14. What constraints exist for the adoption of improved technology?

### *Livelihoods*

15. What is the relative importance of CSM for rural people's livelihoods?
16. What rural livelihoods strategies may compare with chainsaw lumbering

### *Conflict Management Procedure*

17. What major conflicts exist with CSM (which players fight over what)
18. What conflict management mechanism exists to handle chainsaw related conflicts, especially with local communities, officials and large scale commercial loggers?
  - Where are they found
  - How are they managed
  - What successes
  - What problems

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**Annex c: Press release**

***Press Release***

*May, 25 2009*

*[For immediate release]*

**INTERNATIONAL WORKSHOP ON CHAINSAW MILLING**

**Under the project “Developing alternatives for illegal chainsaw lumbering through Multi-stakeholder dialogue in Ghana and Guyana”**

**Date: 25-26 May 2009, Venue: ERATA Hotel, East Legon, Accra.**

CSM refers to on-site conversion of logs into lumber using chainsaws. This practice offers livelihood opportunities to many people in both rural and urban areas in Ghana. The strength of CSM is that it pairs low capital requirements with high labour input. Therefore it represents a cheaper alternative to the typical high capital, low labour intensive conventional logging and milling. As a result, the price of chainsaw lumber is low and therefore within the means of poor sections of the population.

Chainsaw machines were first introduced in Ghana in the 1960s to replace the long manual blade to improve felling of trees for farming. In the late 1970s, chainsaw operators were introduced to the technique of converting logs to lumber using the free hand method to replace the pit-sawing. In early 1980s, the use of chainsaw to produce lumber on commercial bases became widespread as a result of the decline in sawmills operations due to the downward economic trend in Ghana. The then government recognised the socio-economic importance of the chainsaw lumber production enterprise and promulgated the tree and timber (Chainsaw operation) regulation 1991(L.I. 1518) to regulate chainsaw activities. The District Assemblies and the Forestry Services Division were mandated to regulate chainsaw activities at the district level.

In 1998, CSM was prohibited due to the following reasons:

- Indiscriminate felling of trees including prime species thus attracting public concern for resource depletion and environmental degradation
- High level of waste and inefficiency in converting logs to lumber
- Evading payment of stumpage fees to government or photocopying permits and using them several times
- Cheap lumber sources thus affecting domestic sawmills
- Guaranteeing future supply of raw materials to the timber industry among others.

Measures put in place to enforce the ban included: educating the general public; identifying sawmills at strategic locations in the high forest zone to supply lumber to the local market; asking sawmills to set aside twenty percent (20%) of lumber produced for domestic market; establishing a taskforce among others.

The implementation of the ban has not been successful and the practice is widespread despite measures put in place by government to enforce the ban. Several factors have promoted the widespread illegal CSM in Ghana. Some of the key factors are: high demand for chainsaw lumber due to relatively cheap prices, failure of the sawmills to supply 20% of their lumber products to the domestic market as required by law, strong support of some local communities for illegal chainsaw operation and connivance of some law enforcement personnel's and Forest Services Division staff with illegal chainsaw operators. The illegal chainsaw activities have lead to forest degradation and conflict with several other stakeholder groups like the government, traditional sawmill owners, conservationists and other owners of trees and forest resources. Sometimes, these deep and sometimes open conflicts

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characterize the interactions between forest sector actors. It is now estimated that the chainsaw lumber production enterprise now employs about 86,000 people.

Developing and implementing comprehensive measures to address the problem of CSM can only be successful if all stakeholders in the chainsaw milling enterprise both national and international are involved in the decision making process, including the monitoring of timber harvest. TBI-Ghana in 2003 initiated a process by bringing together all stakeholders to discuss the chainsaw lumber production problem and come up with a workable way forward. Follow up to this workshop, Tropenbos International in partnership with the Forestry Training Centre Incorporated (FTCI) and Iwokrama International Centre for Rain Forest Conservation and Development (Iwokrama) in Guyana and the Forestry Research Institute of Ghana (FORIG) and Forestry Commission (FC) in Ghana are implementing the project *“Developing alternatives for illegal chainsaw lumbering through multi-stakeholder dialogue in Ghana and Guyana”* to address the negative impacts of chainsaw milling, while maintaining and enhancing its positive socio-economic effects for local and indigenous people in both Ghana and Guyana.

One of the expected results of the project (result 2) is to determine international best practice for policies to address illegal chainsaw milling. This will be done through sharing of experiences and approaches for policies from decision makers within the forest authorities around the world.

The target groups are decision makers within forest authorities around the world and international policy makers. The first step in this result is the organization of two regional meetings to identify the main issues in West Africa and the Guiana Shield/Caribbean region. The case studies of Ghana and Guyana will serve as inputs to these regional meetings. The experiences from these regional meetings will be summarized in a synthesis paper that will be discussed and refined during an e-conference with participation from experts around the globe. The outputs of these exercises will be documented in a publication of the European Tropical Forest Research Network (ETFRN) News and distributed through this network.

The regional workshop for West Africa will target decision makers and scientists in countries where chainsaw activities occur to present and articulate issues and options for regulating chainsaw lumbering.

The objectives of the workshop are to:

- Share state-of-the-art information and analysis of experiences with and approaches addressing chainsaw lumbering in West Africa among an international audience
- Discuss the issues and make recommendations on possible policy options and models for aligning the practice with sustainable forest management and rural livelihoods.
- Present the case studies of Ghana and Guyana to a wider audience;
- Broaden the understanding of the practical perspectives gained in the case studies.

Sixty participants have been invited. Ten of the participants will come from outside Ghana, mainly from countries, where chainsaw milling occurs, namely Guyana, Liberia, Cameroun, Nigeria, Kenya, DR Congo and Uganda. International organizations like FAO, WWF, CARE International, IUCN and Dutch Embassy have also been invited.

The media are invited to the closing ceremony on 26<sup>th</sup> May 2009. In attendance will be the Honourable Minister of Lands and Natural Resource, the Chief Executive Office of the Forestry Commission, Senior Officers from the Ministry of Lands and Natural Resources and Forestry Commission, The Director of Forestry Research Institute of Ghana and the Chairman of the Project Advisory Committee among others will be addressing participants at the closing ceremony.

#### **Brief information on the project**

The project is financed by the European Commission and is being implemented by Tropenbos International (TBI) based in the Netherlands, through two local partners in Ghana Forestry Commission (FC) and the Forest Research Institute of Ghana (FORIG).

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The project focuses on the broad theme of forest governance in countries with a high incidence of chainsaw milling, and reviews the situation in Ghana and Guyana respectively. In many local and indigenous forest dependent communities, chainsaw lumbering is an important means of livelihood. Chainsaw operation serves as source of livelihood for about 86,000 people in Ghana mostly in forest fringe communities. It also provides 70-85 percent of lumber needs in Ghana. The simplicity of chainsaw milling also facilitates illegal operations leading to conflict with legitimate forest users. Chainsaw milling is currently banned in Ghana.

The project objectives are to reduce poverty and promote viable livelihoods in forest-dependent communities, reduce the occurrence of illegal logging and promote the conservation and sustainable management of tropical forests. The specific objective is 'level of conflict and illegality related to chainsaw lumbering by local communities reduced'. The expected results are:

- Causes and consequences of chainsaw lumbering and links with illegality understood (National Level)
- Internationally best practice determined to address chainsaw lumbering (International Level)
- Multi-stakeholder learning platforms established to discuss chainsaw lumbering issues (National Level)
- National Consensus achieved in Ghana and Guyana about issues regarding chainsaw lumbering using an institutionalized mechanism for permanent dialogue between stakeholders (National Level)
- Communities dependent on chainsaw lumbering producing timber in a regulated and sustainable way (Local Level)

The project will be implemented in eight districts in Ghana namely Goaso, Sunyani, Juaso, Nkawie, Kade, Oda, Begoro and Assin Fosu, three communities in Guyana namely Ituni, Orealla and Surama. The project will target stakeholders of chainsaw lumbering particularly those directly involved and their representatives. These include: national government agencies dealing with forest, tax and law enforcement; regional and district governments; suppliers and downstream industry of chainsaw lumber; affected owners and right holders of forest resources; the "regular" sawmilling industry and community forestry organizations. At the international level, forestry decision makers will also be targeted.

The project has a duration of 5 years (March 2007-March 2012) and a total budget of €2,732,513 (approximately GH¢3,825,518) of which 80 percent is funded by the European Commission and 20 percent by the partners.

*For further information, please contact:*

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Email: [euchainsawprojectghana@gmail.com](mailto:euchainsawprojectghana@gmail.com)

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## Annex d: Guideline for Authors

The country reports should cover the outlined key areas below:

1. Forest status (total area)
2. Forestry and wood industry
3. The chainsaw lumber production situation
  - a. Policy and legislation regarding chainsaw lumber production with respect to access to resources and associated payment (to whom and by whom)
  - b. Issues regarding distribution, marketing and organisation of the trade of chainsaw lumber
  - c. Changes in methods of production over the years
  - d. Impacts (Social, economic and environmental) of chainsaw lumber production.
  - e. Conflicts associated with chainsaw lumber production in the country & existing mechanisms to manage these conflicts and other natural resources related conflicts
  - f. Analysis of policy response to chainsaw lumber production, including an assessment of their success and/or failure
4. The future of chainsaw lumber production

The above are recommended areas to be covered in the country reports however; participants could include other relevant topics. The thrust of the paper should focus on chainsaw lumber production and trade in the country. An Overview on status of forestry and the wood industry could be used as introduction or preamble.

Deadline for submission of abstract is **15<sup>th</sup> April 2009** and papers, **30<sup>th</sup> April 2009**. Papers should be submitted via e-mail as a Microsoft word file as one document. The length of the paper/presentation should not exceed 30 pages, including tables, figures, notes, appendices and references. The main text of the paper should be in Arial font pt. 12 with the title in pt 14, bold and align centre. There should be an abstract before the main text. The maximum length of the abstract should not be more than 300 words also in Arial font pt. 12. The names of authors and co-authors should also be in Arial font pt. 12 bold and centred with initials and surname in that order. Multiple authors should be separated by a comma. Pages of the paper should be numbered in the bottom right-hand corner of the page. All submissions must include the author's name(s), affiliation(s), the title of the paper, an abstract and key words.

Participants will be required to prepare and make power point presentation on the country report during the workshop. The total time for each presentation is 20-25 minutes, 5 minutes would be allowed for questions.

### 2.0 Contact details

For more information, contact:

Dr Emmanuel Marfo,  
Research Scientist  
Forestry Research Institute of Ghana (FoRIG)  
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Tel. +233-24-4627274

Mr. James Parker  
National Coordinator  
EU-Chainsaw Project  
TBI-Ghana  
Email: [jparkmckeown@gmail.com](mailto:jparkmckeown@gmail.com)



Annex e: Power Point Presentations on Country Report: DR Congo

<p>Améliorer la Gouvernance de l'Exploitation Artisanale de Bois pour Réduire la Pauvreté et Promouvoir la Gestion Durable des Ressources Naturelles en Forêt de l'Ituri</p> <p>WCS-DR Congo Program <b>Forestry Project</b></p> 	<h3>Contexte du Projet</h3> <ul style="list-style-type: none"> <li>• Changements importants dans:             <ul style="list-style-type: none"> <li>– Système d'administration et de gestion politique                 <ul style="list-style-type: none"> <li>• Elections démocratiques</li> <li>• Décentralisation</li> </ul> </li> <li>– Législation forestière et gestion des RN (Nouveau Code Forestier)                 <ul style="list-style-type: none"> <li>• Gestion durable</li> <li>• Gestion participative</li> <li>• Plan d'aménagement</li> <li>• Cahier des charges</li> </ul> </li> </ul> </li> </ul>  
<h3>Contexte du Projet (Suite)</h3> <ul style="list-style-type: none"> <li>• Intérêt de la communauté internationale             <ul style="list-style-type: none"> <li>◦ Rôle des forêts tropicales dans l'atténuation du changement climatique</li> <li>◦ Objectifs du Millenium (réduction de la pauvreté)</li> </ul> </li> <li>• Projet intégré dans le cadre des activités de CARPE dans l'Ituri</li> </ul>  	<h3>Contexte du Projet (Suite)</h3> <ul style="list-style-type: none"> <li>• Exploitation artisanale de bois est une activité très importante sur le plan économique en l'Ituri.</li> </ul>   
<h3>Contexte du Projet (Suite)</h3> <ul style="list-style-type: none"> <li>• Exploitation artisanale irrationnelle et moins rentable</li> <li>• Souvent illégale (beaucoup d'exploitants illicites)</li> </ul>   	<h3>Contexte du Projet (Suite)</h3> <ul style="list-style-type: none"> <li>• Peu de bénéfices pour les communautés locales</li> <li>• Beaucoup de conflits exploitants-communautés- services étatiques</li> </ul>   

## But du Projet

- Améliorer la gouvernance de l'exploitation artisanale de bois et promouvoir une exploitation durable en vue de
  - S'assurer que les communautés locales ont un mot à dire dans cette activité, en tirent des bénéfices légitimes, et ont un droit de regard sur la gestion de leur forêt;
  - Réduire la déforestation et la perte de la biodiversité

## Objectifs du Projet

- Améliorer le cadre légal de l'exploitation artisanale du bois et solliciter l'adhésion des parties prenantes à la nouvelle proposition de législation.
- Renforcer les capacités de l'Administration Forestière locale (appui technique et logistique)



## Objectif 1: Activités

- Rassembler et analyser la documentation sur le cadre légal, la taxation, le commerce et toute autre régulation sur l'exploitation artisanale de bois;
- Organiser des réunions individuels avec les Parties Prenantes (PP);
- Organiser un atelier de 2-3 jours avec les PP pour développer les objectifs de planification des terres et les principes de partage des revenus issus de l'exploitation de bois;

## Objectif 1: Activités (suite)

- Proposer un cadre légal qui tienne compte des intérêts de toutes les Parties Prenantes (PP) et assure une exploitation durable et la conservation de la biodiversité;
- Organiser un atelier de validation de la proposition de législation au niveau local;
- Assurer un lobbying au niveau du district et de la province;
- Identifier d'autres partenaires pour un éventuel lobbying au niveau national
- Vulgariser la nouvelle législation.

## Objectif 2: Activités

- Former le staff technique de l'Administration Forestière en techniques de mensuration, d'utilisation d'équipements de terrain (boussole, GPS, etc.) et informatique;



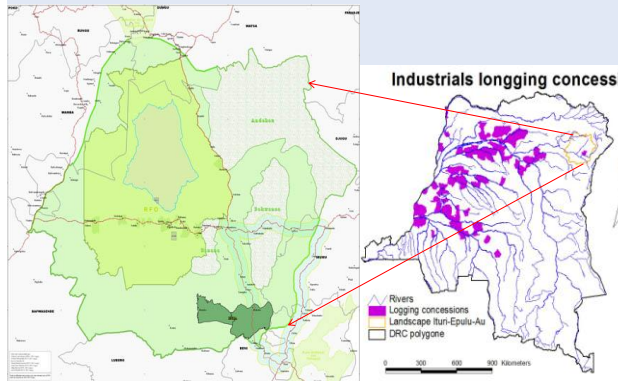
## Objectif 2: Activités (Suite)

- Fournir à l'Administration Forestière locale, équipements de terrain et matériels informatiques
- Assister l'Administration Forestière locale à évaluer la légalité des exploitants artisanaux;



## Sites du Projet

### Landscape Ituri



## Parties Prenantes Majeures

- Administration du Territoire
  - Autorité étatique
  - Administration forestière
  - Services des Impôts et taxations
- Exploitants Forestiers
- Communautés locales
- Société Civile (ONGs et Associations Locales, etc.)
- Autorités Coutumières

## Résultats Attendus

- Cadre légal issu d'une large consultation des PP et qui:
  - Reconnaisse les droits des communautés locales;
  - Tienne compte de la conservation de la nature;
  - Maximise les recettes de l'état;
  - Garantisse l'intérêt des exploitants.



## Résultats Attendus (suite)

- Administration forestière capable d'assurer une gestion durable des ressources forestières par:
  - Des contrôles efficaces sur terrain,
  - Des statistiques fiables,
  - Des rapports
  - Vulgarisation des techniques d'exploitation à faibles impacts
  - Etc.

## Exécution

Lancement officiel et Présentation du projet auprès des autorités territoriaux et élus du peuple à Mambasa (Octobre 2008)



## Exécution( suite)

- Présentation du projet aux communautés de zone CBNRM Banana et Bakwanza
- Sensibilisation pour solliciter l'intégration des communautés locales



## Exécution( suite)

Etat de lieu de l'exploitation artisanale de bois en Ituri: Consultation des **Parties Prenantes sur:**

- Politique et textes légaux,
- Réalisations sociales et redevance coutumière.



## Exécution( suite)

### 1. Proposition de la réglementation

- Draft de la réglementation
- Atelier d'adoption de la réglementation au niveau locale



### 1. Proposition de la réglementation (suite)

- Lobbying au niveau provinciale pour validation de la réglementation.



## Exécution( suite)

### 3. Appui technique à l'Administration Forestière Locale:

- Remise des matériels (de terrain, informatique et engin roulant)
- Organisation des séances de formation théoriques et pratiques



## Etapes suivantes

- Tenue de l'atelier d'adoption au niveau provinciale (début juin 2009).
- Lobbying au niveau national.
- Vulgarisation
- Suivi dans la mise en application



# MERCI

QUESTIONS?  
COMMENTAIRES?



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**Annex f: List of Participants**

<b>Seq</b>	<b>Name</b>	<b>Stakeholder/Designation</b>
1	Jaap Vermaat	EC delegation to Ghana

2	K.S.Nketiah	PTL,TBI Ghana
3	Marieke Wit	OPC,Chainsaw Project
4	Paul Sowa	Regional Forestry Officer PAFORM ,Forestry
5	George Muthike	KEFRI
6	Kambugu Robert K.	Makerere University,Kampala
7	Labode Popoola	University of Ibadan, Nigeria
8	Dr Raquel Thomas	Iwokrama International Centre
9	Hilton lane	International Area Manager,Husqurna,Africa
10	Dr Emmanuel Marfo	FORIG
11	Kwakye Ameyaw	FSD
12	Bernard Tabil	FSD
13	James Parker	Chainsaw Project
14	Dr Aiah Lebbie	EFA
16	Dr Marc Parren	Tropenbos
17	Sanja Sevic	Husqurna Oden
18	Dr Kweku Asamoah Adam	FORIG/WWF
19	Osahene Kweku Aterkyi II	President,B/A House of Chiefs
20	Dr Emmanuel Acheampong	FRNR,KNUST
21	Sebastian Houweling	JCM,John Bitar
22	A.A. Boadu	FC
23	Francis Wilson Owusu	FORIG
24	Emmanuel Fosu	Chainsaw Project
25	Manu Godson Nana Yaw	DOLTA
26	Paul Sosei Tutu	TBI,Ghana
27	Mercy Owusu Ansah	Chainsaw Project
28	Ekua Ansah-Eshun	Civil Society
29	Dr Kyereh Boateng	TBI,Ghana
30	Togbe Kasa III	President,VOREF
31	Essiane Mendoula Edouard	CIFOR,Central Africa

32	Rebecca Baning Oppan	CFW,Oda
33	Dr Beatrice Darko Obiri	FORIG
34	Eric Nutakor	FORIG
35	Godfrey Marshall	Forestry Training Centre Inc
36	Kow Quaison	FC
37	Jacob Madidi	Wildlife Conservation Society,DR Congo
38	Francis Nana Akowuah	FAWAG
39	Frnacis K.Odoom	IUCN
40	Kwame Asamoah Dwomoh	NFF
41	Peter Lasen	Oden Ltd,Husquarna
42	E.E.K Acquah Moses	GTMO
43	Edith Abroquah	FSD,Ashanti
44	A.N.Attah	TIDD,Takoradi
45	Naa Robert Loggah	President,NFF
46	Alex Asare	FC
47	Valerie Fumey-Nassah	FC
48	Dr Ricard Gyimah	FC/VPA
49	L.Damnyag	FORIG
50	Bright Ntramah	GBC Radio
51	Albert Futukpor	GNA
52	Francisca Andoh	The Insight
53	Florence Animah	The Insight
54	Thomas Donkor	GTV
55	Ikes Fosu	GTV
56	Sika Simon	Pink FM
57	Peter Quao Adattor	TV3

**Annex g: Programme**  
*Programme 25<sup>th</sup> May 2009*

Time	Activity
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08:30 a.m.	Arrival & registration participants – <b>Mr. E. Fosu / Ms. J. Aggrey</b>
09:00 a.m.	Opening prayer/welcome, introduction of participants and Chairman – <b>Dr Kyereh-Boateng</b>
09:30 a.m.	Workshop objective and expected outputs – <b>Mr. K.S. Nketiah</b>
09:50 a.m.	Presentation: The global picture of chainsaw lumber production – <b>Ms. Marieke Wit</b>
10:10 a.m.	Presentation :Overview of EU Chainsaw Project - <b>Mr. James Parker</b>
10:30 a.m.	Presentation of Ghana report – <b>Dr. E. Marfo</b>
11:15 a.m.	Presentation: Guyana country report – <b>Mr. Godfrey Marshall/Dr. Raquel Thomas</b>
11:40 a.m.	Presentation: Nigeria country report – <b>Prof. Labode Popoola</b>
<b>12:05 a.m.</b>	<b>Cocoa break</b>
12:20 p.m.	Presentation: Liberia country report - <b>Dr. Aiah Lebbie</b>
12:45 p.m.	Presentation: Kenya country report – <b>Mr. George Muthike</b>
01:10 p.m.	Presentation: Uganda country report – <b>Mr. Robert K. Kyeyune</b>
01:35 p.m.	Presentation: Cameroun country report – <b>Mr. Edoudond Mendoula</b>
<b>02:00 p.m.</b>	<b>Lunch</b>
03:00 p.m.	Presentation: DR Congo country report - <b>Mr. Jacob Madidi</b>
03:25p.m.	Presentation: Efficiency in recovery using chainsaw with various attachments – <b>Mr. H. Lane</b>
03:50p.m.	Group work on options
<b>05:30p.m.</b>	<b>Cocoa break and closing</b>

### **Programme 26<sup>th</sup> May 2009**

<b>Time</b>	<b>Activity</b>
08:00 a.m.	Registration of participants – <b>Mr. E. Foso &amp; Ms. Jane Aggrey</b>
08:30 a.m.	Presentation: Group work
<b>10:30 a.m.</b>	<b>Cocoa break</b>
	<b>CLOSING CEREMONY</b>
10:50 a.m.	Introduction of dignitaries and chairman – <b>Dr Kyereh-Boateng</b>
11:00 a.m.	Short address - <b>Chief Executive Officer, Forestry Commission</b>
11:15 p.m.	Presentation of workshop outputs – <b>Facilitators</b>
11:45 p.m.	Presentation of the case studies of chainsaw milling in Ghana – <b>Dr. E. Marfo</b>
12:30 p.m.	Closing address – <b>Hon. Minister, Land &amp; Natural Resources</b>
01:00 p.m.	Chairman's closing Remarks
<b>01:15 p.m.</b>	<b>Group photograph</b>
<b>01:30 p.m.</b>	<b>Lunch &amp; departure</b>

*Facilitators: Dr Kyereh-Boateng/ Mercy Owusu Ansah*