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# FOREST CONCESSIONS—COMMERCIAL FOREST REVENUE PROJECTION MODEL

## FINAL REPORT

**JUNE 2013**

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History clearly shows that in countries with abundant natural resources and sparse population there is no thought of the future, and all energy is directed to the exploitation and reckless use of what nature has abundantly provided. The waste under such conditions is naturally very great and a more economic utilization does not pay. As the population increases and industry grows, the demand for raw material of all kinds increases, and there is a gradual awakening of public opinion for the need for a more careful husbanding of natural resources. Practically all nations have travelled the same road. Some reach this point sooner than others, but everyone is inevitably bound to face the same situation.

♦ ♦ Zon, 1910

Cover picture from Euro Liberia Logging Concession Area F—log landing.

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**DISCLAIMER**

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# TABLE OF CONTENTS



## ANNEXES

## FIGURES



## TABLES

## ACRONYMS

| | |
|---|---|
| AAC | Annual Allowable Cut |
| CoC | Chain of Custody |
| DBH | Diameter at Breast Height |
| EU | European Union |
| EUTR | European Union Timber Regulations |
| FDA | Forestry Development Authority |
| FMC | Forest Management Contract |
| FMM | Forest Management Model |
| FOB | Free on Board |
| FUP | Forest Use Permit |
| GEMS | Governance and Economic Management Support |
| GIS | Geographical Information System |
| GoL | Government of Liberia |
| GPS | Global Positioning System |
| ICC | International Consultant Capital |
| LEITI | Liberia Extractive Industry Transparency Initiative |
| LM | Loyal et Marchand |
| MAI | Mean Annual Increment |
| NBC | National Bureau of Concessions |
| NFRL | National Forestry Reform Law |
| PPCA | Public Procurement and Concessions Act |
| PUP | Private Use Permits |
| RME | Reliable Minimum Estimate |
| SGS | Société Générale de Surveillance |
| TSC | Timber Sale Contract |
| USAID | United States Agency for International Development |

# EXECUTIVE SUMMARY

In Liberia, forest resources represent a significant asset that is used to generate government revenues to support economic development and provide a wide range of environmental and social goods and services.

Estimating forest value within confidence limits for implementing forest-based revenue reform is, inherently, difficult to undertake as revenue projections are directly related to multiple data sets in a complex system. The most basic of these inputs are the existing standing timber volume, tree growth, direct cost of extraction and administrative fees.

On the other end of the equation, several factors are having a severe impact on the forestry sector, including volatile timber markets that distort competitive market prices; a complex revenue collection system of royalties, fees, and taxes; and an inadequate infrastructure of roads, bridges, and ports, intensified by the lack of a skilled work force. In theory, the forestry sector should support rural economic development and provide a wide range of environmental and social goods and services to the people of Liberia. The lack of such results raises concern about the financial viability of the existing forest management system, specifically, the use of Forest Management Contracts (FMC) under the current revenue collection system.

Given the constraints and complexity of the revenue collection system, it is unlikely that an "ideal" set of revenue charges exists. However, through an evaluation of Liberia's own particular objectives and circumstances, including discussions with stakeholders from the Government, industry, and community, the most appropriate forest-based revenue reform may be identified.

The issue of exploitation within the forestry sector cannot solely be resolved within the sector itself. The root causes of forest exploitation reach throughout all economic sectors, requiring a solution that can address these broad reaching problems.[1]

Basic to this reform is the fundamental question that all Stakeholders should be asking: *How much is the forest concession worth in commercial terms*? This type of analysis is normally called the "financial" analysis and is concerned with monetary flows resulting from the change in use.

This report presents a review of the price and fiscal system of forestry charges on timber production within commercial forestry concessions in Liberia. The objective of the report is to help the staff of the National Bureau of Concessions (NBC) calculate projected revenue and use this measure as a basis to monitor and evaluate the revenue collection system, lead the discussion regarding the current constraints on the forestry sector and suggest policy measures that might encourage such reform.

[1] FAO, State of the World Forest 2012.

The scope of this report is defined within the Terms of Reference contained in the Consultant's contract signed with the USAID-Governance and Economic Management Support (GEMS) project. The subject data used in the development of this report is specific to forestry concessions, specifically seven FMCs covering an area of approximately 1 million ha and nine Timber Sale Contracts (TSC), which make up 45,000 ha.

This report is in six main sections. Section one briefly describes the objective of using a forest concessions system. Section two is an overview of Commercial Forest Management in Liberia. Section three reviews the change in the global market, specifically the switch from Europe to Asia as the primary destination for Liberia's timber. Section four identifies the necessary requirements for a fully functioning forest management system. Section five reviews two forestry concessions, International Consultant Capital - Area K and Euro Liberia Logging - Area F, as well as overall forest revenue projections. Section six (6) presents the key findings and recommendations.

# I. INTRODUCTION

It is globally recognized that Liberia's forests cover around 46 percent of its land area – approximately 4.3 million ha. This territory includes two of the last three remaining large blocks of Upper Guinean Rainforest in West Africa, and are an enormously valuable natural asset, both because of their globally important biodiversity and their economic value.

In the case of the natural forest, the resource exists without any investment, that is, it occurs naturally, and the value of outputs from the forest is higher than the costs of production up until the point at which low stocking, poor accessibility or distance from markets makes production not economically sound.

The Forestry Development Authority (FDA), as authorized by the Government of Liberia (GoL), uses a forest management system that allows the private sector to manage the extraction of timber--e.g., as forest concessions--in return for the payment of royalties, fees and taxes.

The objective of using a forest concessions system is that the GoL benefits from the perceived greater efficiency of the private sector in the production of commercial timber. In addition, the system is designed to allow the GoL to concentrate its attention on forestry policy development. However, under the current conditions, the GoL is presented with two major challenges:

- Monitor and enforce existing laws governing forest harvest practices.
- Design, implement and collect forest charges (royalties, fees and taxes).

Forest charges are broken into two categories, Forest-Based and Administrative. Within these categories, royalties, fees and taxes are collected from the concession holder in return for the opportunity to utilize state-owned forest resources. A forest revenue collection system can be designed such that the system becomes too complex and cumbersome for the administration to effectively manage.

Designing or modifying an existing forest revenue collection system is, at a minimum, challenging. Estimating forest value within acceptable confidence limits becomes problematic when we consider an imperfect and volatile timber market that distorts competitive market prices, environmental and social obligations, and the lack of forest inventory and tree growth projections that are the foundation of revenue projections.

Sustainable forest production is a function of how fast trees grow, the forest management standards that are applied, the rate at which concessions are approved, and the extent to which investment is mobilized to ensure that forest management plans (essential to establish levels of timber production in a forest concession) are developed and

implemented. Forestry sector revenue forecasts are dependent on timber production estimates and expected timber prices, but are also a function of taxation and revenue policies designed to capture a certain percentage of the Free on Board (FOB) value of timber before export.[2]

One of the most important aspects of a forest revenue collection system is the understanding that forest charges (royalties, fees and taxes) should, in principle, be based on and reflect as close as possible, the stumpage value of the timber cut.

Stumpage value (the value of the standing timber) is calculated by deducting from the FOB price the total cost of operating, sorting, processing, transportation, and port handling, with or without forestry taxation. A "normal" profit margin is also deducted from the residual value to calculate the final figure.

As stumpage values are derived, changes in stumpage values are proportionately greater than changes in log product prices. Sensitivity of the stumpage value has a significant impact on stumpage charges and the forest revenue systems.[3]

The analysis separates the forest revenue collection system into two categories, Forest-Based and Administrative fees. These fees are calculated by area ($/ha), or volume ($/m3) and are applied at different times throughout the process of production.

Forest-Based fees include the Bid Premium or Annual Land-use fee, Area fee, Log Stumpage and Export fee, and the Community Benefits fee. The Administrative fee includes a number of additional charges, such as Contract Administration fee, Annual Coupe inspection fee, Export License, Bid Application, Prospectus, Waybill fee, and Chain of Custody (CoC) fee.

In Liberia, the Stumpage and Log Export fee is differentiated by the class of species as identified in Schedule 1, page 90 of the 10 Core Regulations (2007). This makes estimating revenue or making projections without forest inventory data extremely difficult.

## METHODOLOGY

The preparation of this report included meetings and discussions with various stakeholders and representatives from the private sector and government agencies, who also provided much of the forestry related data. All amounts in are in US dollars.

There are two main problems with the collection of cost and price data for economic analysis of forest production. The first is that such information is not readily available and, even if it were available, it may not be very reliable. The second problem is that it is

[2] World Bank Management Response to Request for Inspection Panel Review of the Liberia: Development Forestry Sector Management Project (Trust Fund Nos. TF057090-LR; TF096154-LR; AND, TF096170-LR), September 2010

[3] Gray, J, 1983, Forest revenue systems in developing countries, Forestry Paper 43, Food and Agriculture Organization of the United Nations, Rome.

often in the interests of the respondents to favorably report prices and costs that defend their position within the forest management system. This problem can only be overcome by judging how reliable the data collected are by comparing the responses given by individuals with available competitive market information.

These problems are exacerbated by the variability of the price and costs due to factors such as operator efficiency, the volume of commercial species present, and transport distances.

To prepare this report, the consultant conducted the following:

- Reviewed all relevant existing documentation readily available on Liberia's Forest Sector
- Conducted interviews with relevant parties:
  - National Bureau of Concessions personnel (particularly forest economists)
  - Forestry Development Authority personnel (particularly those in the commercial logging division)
  - Forestry sector personnel (concessionnaires and Société Générale de Surveillance (SGS))
  - National Port Authority personnel
    - Site visits to Buchanan Port, Liberia Tree & Trading Company
    - Export log yard, International Consultant Capital from the Area K Concession, and Euro Liberia Logging from the Area F Concession.
    - Information requested from stakeholders included:
      1. FDA calculated reserve bid price (documented methodology)
      2. FDA bid inventory of concession area (maps, plot cards, methodology, analysis)
      3. Forest Management Contract
         a. Concessionaire's Business Plan
         b. Forest Management Plan
         c. Five Year Strategic Plan
         d. Annual Operating Plan
      4. FDA Annual Coupe Inspection Report
      5. SGS Chain of Custody data (number of logs, volume, destination, etc.)
      6. Annual Compliance Audit
      7. Costs of Production, Transportation, and Processing

Intensive data gathering required by the assignment was constrained by the limited availability of and access to consistent and relevant information. Unfortunately, only limited data was provided under Items 3, 5, and 7.

# II. COMMERCIAL FOREST MANAGEMENT

All forest resources in Liberia, except those located on communal forests and developed on private or deeded lands through artificial regeneration, are held in trust by the Republic for the benefit of the people.[4]

Specific regulations that apply to the Forestry Sector include

- Act Creating the FDA of 1976;
- National Forestry Reform Law of 2006 (NFRL);
- Forestry Core Regulations - FDA Ten Core Regulations, effective September 2007;
- Act to Establish the Community Rights Law with respect to Forest Lands of 2009;
- FDA Regulations to the Community Rights Law with Respect to Forest Lands, July 2011;
- Guidelines for Forest Management Planning in Liberia; and
- National Forest Management Strategy, 2007.

Forestry is defined in the NFRL as the science, art, and practice of Conservation of Forest Resources. Taking this one step further, Conservation is defined as the sustainable management and protection of forest resources to achieve maximum environmental, social, economic, and scientific benefits for present and future generations.

Under the NRFL, the objective of forest management is to

- Assure sustainable management,
- Conserve forest resources,
- Protect the environment and sustainable development of the economy,
- Ensure the participation and benefit of all Liberians, and
- Contribute to poverty alleviation.

Forest management is carried out through the use of a Forest Resources License. The NFRL defines a Forest Resource License as any legal instrument pursuant to which the FDA allows a person, subject to specified conditions, to extract forest resources or make other productive and sustainable use of Forest Land. This includes FMCs, TSCs, Forest Use Permits (FUP), and Private Use Permits (PUP).

The subject of this report is specific to commercial forestry concessions, specifically Forest Management and Timber Sale Contracts. Reports on Private Use Permits and

[4] National Forestry Reform Law (2006) Chapter 2, Section 2.1

Community Forest Management Agreements are extensive, and not a subject of this report. See the Special Independent Investigating Body Report (December 2012) on the Issuance of Private Use Permits and the Final Report for the Liberia Extractive Industry Transparency Initiative (LEITI) Post Award Process Audit (May 2013).

A Concession, as defined in Section 73 of the Public Procurement and Concessions Act (PPCA) are "the grant of an interest in a public asset by the Government or its agency to a private sector entity for a specified period during which the asset may be operated, managed, utilized or improved by the private sector entity which pays fees or royalties under the condition that the Government retains its overall interest in the asset and that the asset will revert to the Government or agency at a determined time."

FUPs are not included in this report, as FUPs are given to specific classes of persons, such as subsistence farmers, forest dependent communities, residents of a particular county or district, academic researchers, artisans, eco-tourism organizers and others to exercise a commercial use, such as production of charcoal, tourism, research and education, wildlife-related activities harvesting small amounts of timber and harvesting of non-timber forest products.[5]

All contracts—both FMCs and TSCs—awarded by the GoL must be awarded on the basis of competitive bidding. The PPCA is designed so that the process is fair and open to the public.

All companies wishing to bid on a contract must be pre-qualified in compliance with PPCA and FDA Regulation 103-07. Pre-qualification includes an assessment of the bidder's business plan to determine whether the applicant has the capability to carry out the proposed operations. No information was provided as to how the assessment is carried out.

The National Forestry Reform Law of 2006 requires that forest management concessionaires and communities affected by the activities of the concessions enter into these agreements to define the parties' respective rights, roles, obligations and benefits.

FDA Regulation 105-07 defines an Affected Community as: *"A community comprising less than a statutory district (including chiefdoms, clans, townships, towns, villages, and all human settlements) whose interests are likely to be affected by operations carried out under a Forest Resource License. "Interests" for purposes of this definition may be of an economic, environmental, health, livelihood, aesthetic, cultural, spiritual, or religious nature".* (FDA Regulation 105-07, Section 1)

[5] Blaser,J. & Dagbe,B.V.2008.Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities .FDA/ITTO/Inter-cooperation and Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005.Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.

## FOREST MANAGEMENT CONTRACTS (FMC)

Under the NFRL (2006) as presented by Blazer (2008), the FMC is a Forest Resource License issued by the Government under Section 5.3 of the NFRL, which includes concession areas of at least 50,000 ha and no more than 400,000 ha in size. The large area of the concession is designed to promote a model of large-scale, export-oriented logging. Areas between 50,000 and 99,999 ha are open for bids form qualified bidders that demonstrate at least 51% ownership by Liberian citizens. All FMCs over 100,000 ha are also open for bidding to international investors. Among other conditions, an FMC requires the preparation of a sound, long-term forest management plan, including inventories and annual operational plans and less detailed plans for each 5-year period of harvesting activities that eventually cover the entire contract area. The annual operations plan includes major activities such as road construction, as well as detailed projections of harvest volumes based on individual stand maps.

Several documents are required, including a forest management planning document, a business plan, an environmental impact assessment, and a social agreement with local forest-dependent communities. A new FMC is only effective once it is signed by the President, ratified by the Legislature during the legislative session in which the contract has been presented, and is in place for 25 years.

A recent report prepared by the LEITI, called the Final Report for the LEITI Post Award Process Audit (May 2013), set out to conduct a post-award audit of the processes involved with awarding material public concessions, contracts, licenses, permits and other rights of exploitation of diamond, gold, oil, timber, and agricultural resources of Liberia. The examination of documentation submitted by the FDA with regard to FMCs showed several instances of non-compliance:

- Entity Concession Committees were not appointed,
- Concession Procurement Plans were not prepared,
- Stakeholder Forums were not held,
- Concession Bid Evaluation Panels were not appointed and their works were not substantiated,
- Invitations to bid and bid documents were not approved by Inter Ministerial Concessions Commission,
- Communities were not involved in the Validation Process,
- Original bids submitted were not kept on file, and
- FMC Areas overlapped with private land.

Seven FMC concessions, awarded by GoL from October 2008 to October 2009, cover an area of approximately 1 million ha, less than a quarter of the total forest area (4.3 million ha).

The two largest of these concessions total 652,046 ha. International Consultant Capital, Area K at 266,910 ha, and Euro Liberia Logging, Area F at 253,670 ha.

### TIMBER SALE CONTRACT (TSC)

A TSC is considered a short-term Forest Resource License issued by the Government under Section 5.4 of the NFRL, which is established on the basis of bidding for areas up to 5,000 ha. Bidders must demonstrate at least 51% ownership by Liberian citizens. Contractors must prepare an annual operations plan. Consistent with land planning requirements specified in the law, TSCs can be awarded for the purpose of allowing forest land to be cleared for agriculture or the establishment of plantations, and is in place for three years.

TSCs do not require a forest management plan, but the operator must still file annual operations plans. Likewise, they must comply with all environmental and forestry laws in accordance with generally accepted silvicultural practices as outlined in the Forest Management Guidelines and Code of Forest Harvesting Practices.

The examination of TSCs in the Final Report for the LEITI Post Award Process Audit (May 2013) showed similar findings as those of the FMCs:

- Entity Concession Committees were not appointed,
- Certificates for Concessions were not obtained,
- Concession Procurement Plans were not prepared,
- Stakeholder Forums were not held,
- Communities were not involved in the Validation Process,
- Original bids submitted were not kept on file, and
- Award procedure was not compliant with the PPCA.

Nine Timber Sale Contract concessions awarded by Government from June 2008 to October 2010 cover an area of approximately 45,000 ha.

All operators who obtain a forest resource license, either FMC or TSC, are subject to annual compliance audits and they must provide timely information under Section 18.13 of the Forestry Law. In theory, each year the FDA publishes, under Section 3.4(b) (1) the volume available for harvest for each contract; (2) the volumes and monetary values of the harvested, processed, and exported forest products by species; (3) the fees and taxes assessed and paid; (4) the nature and monetary value of benefits provided to each community; and (5) the violations and penalties assessed and actually paid. This

information was not provided through the data request. There are no indicators suggesting this procedure will become standard protocol.

This reporting is facilitated by the CoC system through which all timber must be tracked (Section 13.5), and which requires accurate records from maps of harvesting trees to transport waybills to export permits (FDA Regulation 108-07). The system is run independently by the SGS Group.

Regulation 108-07 is designed to ensure that the CoC system facilitates the issuance of certificates of legal origin for timber originating in Liberia.[6]

## TAXES, FEES AND CHARGES

This section briefly discusses the two main reasons it is so important for the GoL to set the correct level of forest charges and reviews the current revenue collection system.

The most obvious reason for setting the correct level of forest charges is the direct impact on the government revenues that will be obtained from the utilization of the forest resource. If charges are too low, government revenues will not be maximized and this will reduce the scope for the government to use such revenues for its other policies and programs. If, on the other hand, forest charges are set too high, this will either result in reduced production from the sector and lead to the government obtaining less than the maximum possible level of revenues from the sector or force the industry into exploitive over-production to generate maximum cash flow to pay government fees. In the case of Liberia, in 2012, only 5% of the annual bid premium, land rental, and contract administration fee were collected ($1,859,551 out of the $36,409,431 owed).

Consequently, if the revenues generated are low, this will generally limit the attention that the government is able to give to the forestry sector and reduce the efficiency of the forestry administration, leaving room for excessive abuse of the forestry system.

Liberia's production cost and administrative fees are considered high. The key factors contributing to high costs are the poor transportation system, the high cost of fuel, the limited management and operational capacity at a company level, and the overall cost of business transactions between the government and forest communities. With respect to the taxes and fees imposed on the forestry sector, the burden of these charges is higher in Liberia than in neighboring countries. A recent report by the European Forest Institute states:

[6] World Bank Management Response to Request for Inspection Panel Review of the Liberia: Development Forestry Sector Management Project (Trust Fund Nos. TF057090-LR; TF096154-LR; AND, TF096170-LR), September 2010

> The current potential tax burden on logging companies is USD106/m3 harvested and USD172/m3 exported, when bid premium is considered. Bid premiums account for 61% of the tax burden on harvest and together with area fees these area-based fees account for 81% of the tax burden.[7]

A comparison of the weight of different taxation elements is challenging since the countries use different methods of defining the volume-based fees and making specific deductions. The area fee is highest in Liberia if we are considering area-based fees, particularly when combining the area fee and the bid premium.

The analysis separates the forest revenue collection system into two categories, Forest-Based and Administrative fees. These fees are calculated by area ($/ha), or volume ($/m3) and are applied at different times throughout the process of production.

### Forest-Based

#### *Pre-Harvest Fees*

- Annual Bid Premium (Area-Based)
- Area Fees:
  - FMC: $2.50 / ha /year
  - TSC: $1.25 / ha / year

#### *Harvest Fees*

- Log Stumpage fee based on Species class: 2.5% to 10% FOB
- Community benefits: $1.50/m3

#### *Post-Harvest Fees*

- Log Export fee: based on Species class: 2.5% to 10% FOB

### Administrative Fees

- Contract administration fee: $1,000 / year
- Annual coupe inspection fee: $50 / ha block or $ .50/ha/yr.
- Export License: 100 / shipment or $.10/m3
- Bid Application: $10
- Prospectus: $10
- Waybill fees: $150 / Booklet (x10) or $.25/m3
- Chain-of-Custody fee: 1.4% FOB

[7] INDUFOR—European Forest Institute—Liberia Forest Sector Fiscal Review Nov-17-2011. The quotations are found at pages 15 and 22.

Forest-Based fees include the Annual Bid Premium or Annual Land-use fee, Area fee, Log Stumpage and Export fee, and the Community Benefits fee. The Administrative fee includes a number of additional charges, such as Contract Administration fee, Annual Coupe inspection fee, Export License, Bid Application, Prospectus, Waybill fee, and CoC fee.

The Annual Land Use Fee or Bid Premium, also known as royalties, is paid to the Republic of Liberia for the privilege of logging the forest. It is based on the size of the concession and not the operable area of the concession. The Annual Land Use Fee is determined by pre-qualified, public bidding and is a direct cost for the Concessionaire.

If the Annual Land Use Fee is set too low, in combination with other market factors, the system can influence behavior by encouraging concessionaires to request larger concessions to reduce the overall unit price, thus allowing flexibility in meeting export market demands. This however, does not allow the government to maximize revenues. In contrast, the Annual Land Use Fee could, depending on how it is apportioned within the government, have a positive influence on forest management, specifically Forest Practice Enforcement.

The goal of an Annual Land Use Fee is to maximize government revenues while allowing the concessionaire an acceptable rate of return, maintaining the investment capabilities; i.e., continuing to invest in the concession contract.

The Annual Land Use Fee (Bid Premium) and Area fee can severely impact the operating capital of a company as these fees are front loaded prior to any log sales. In addition, these fees are based on the entire concessions area regardless of how much land is deemed inoperable due to steepness of slope, watercourses, or conservation areas. In essence, the concessionaire is paying for the opportunity to harvest but not receiving the full benefit.

Consequently, at the point of sale in the production cycle, if the allowable cut in the harvest block is low, or the species composition is not what was expected, the company's projected operating capital is reduced, making it difficult to pay the subsequent year's area fees.

The Stumpage & Export fees are volume-based charges that take into account the variability in productivity between different areas. These charges are the easiest to collect; if there is no payment to the GoL, then the export sale cannot occur, in principle, reducing opportunities for fraud.

Volume-based stumpage and export fees require log measurement, supervision, a billing system, and all the administrative costs that go with them. Varying stumpage prices to properly reflect stumpage values can add to the complexity of the revenue collection system and administrative costs, and can also generate evasion and avoidance problems.

The impacts on forestry and the forest industry are often complex and unintentional, much like the area based fees.

Community benefits or Social Agreements have been introduced where forest concessions have been awarded on public land that is already customarily occupied and used by communities. In exchange for ceding usage rights to the concessionaire, the Social Agreement provides for compensatory benefits to communities for restrictions of access or use of forest resources directly or indirectly arising from the concession. In Liberia, these have been established as a financial levy on timber production of US$1.50 per m3 of production.[8]

The CoC system, initially financed by the United States Government, is key to the integrity of the overall strategy for access to information and accountability of payments. Called "Liberfor," the CoC stump-to-ship system, which is currently being implemented under a contract with SGS, promotes transparency of payments, independent monitoring of approvals for payments and shipping permits, as well as monitoring of all log movements. Unfortunately, SGS did not provide the information requested and was of little help in generating data for this analysis.

A Chain of Custody system is a tracking system to demonstrate that timber is of legal origin. In Liberia, the system was designed to track the flow of wood from the stump, where individual trees are logged and registered in the system, through the supply chain. The system is also used to ensure that all forest fees have been paid.[9] However, at this point, the system only reconciles log inventory at the port for exports. The system does not track all log movement from the concession itself.

[8] World Bank Management Response to Request for Inspection Panel Review of the Liberia: Development Forestry Sector Management Project (Trust Fund Nos. TF057090-LR; TF096154-LR; AND, TF096170-LR), September 2010

[9] World Bank Management Response to Request for Inspection Panel Review of the Liberia: Development Forestry Sector Management Project (Trust Fund Nos. TF057090-LR; TF096154-LR; AND, TF096170-LR), September 2010

# III. MARKET

Market demand and market supply interact in a competitive market to determine the price and quantity of the good traded. When the quantity demanded and the quantities supplied are equal, there is a state of balance known as equilibrium. From an equilibrium position, if market demand increases while market supply remains constant, price tends to increase. On the other hand, if market supply increases while market demand remains constant, price tends to decrease.

A change in just one of the many variables affecting supply or demand is likely to create a price and/or quantity movement in the market. The relative strength of the market forces underlying demand and supply determines whether price increases or decreases, and whether quantities demanded and supplied increase or decrease.

Thus, neither demand nor supply acts alone in determining value. British economist Alfred Marshall illustrated this by asking the rhetorical question: Which blade of the scissors cuts the cloth? The clear answer is that both blades cut it. Similarly, in a competitive market both demand and supply interact to determine value. A change in one of the variables affecting either supply or demand is likely to create a price movement in the market.

The core of market value is that it is market derived. In financial analyses, only inputs and outputs that have market prices count. Market prices are useful because they are observable and objective.

## CHINA

Historically, Europe has been the major market for Liberian timber. Recently, China has dominated the export log trade.

In China, tropical timber is of strategic interest. Wood is fuelling domestic processing industries such as the plywood and wood furniture sectors. It is also a direct input into the construction sector (driven by an expansion of physical infrastructure and housing). In general, China is now being referred to as the wood workshop of the world, thus requiring large volumes of inputs both for domestic consumption and export markets. In total, private and industrial consumption in China, as well as export demands, have outstripped domestic wood production capacities to such an extent that China is increasingly depending on imported wood. Constraints by a government forest protection program have added to the demand.

In March 2013, the European Union Timber Regulations (EUTR) went into effect. The regulations make it illegal for any company to place illegally harvested timber and wood products on the market.

Currently, the European Union (EU) is China's second largest market for wood products.[10] Chinese companies that sell timber on the EU market will be subject to the new EUTR. The regulations have important implications for China and could impact the global market.

## LIBERIA

In Liberia, the FDA has the authority to develop the list of estimated market prices for the forest products derived from the tree species list in Schedule 1, page 90 of the 10 Core Regulations (2007) as the various kinds of grades of logs and wood products. The FDA "*shall revise the list at the start of each logging season and may revise the list more frequently in response to changing markets."*

All timber species are classified into A, B, and C classes. In 2008, 27 species were classified in category A, 19 in category B, and 19 in category C. As the commercial Forestry Sector contribution to GDP has increased, the per unit m3 contribution to Liberia's GDP has declined by over 80%. This decline reflects the shift in the market from Europe to Asia, and suggests historic over-cutting of primary species as lesser-used species now carry the market. This shift is also reflected in current extraction rates and species composition. 42 species were exploited in the year 2000.[11] Currently, FDA's CoC system tracks 96 species, consisting of 28 class A, 19 class B and 49 class C, more than double the amount of class C species identified in 2008.

Free on Board (FOB) prices are based on Loyal et Marchand (LM) log grade. "Loyal et Marchand" is an old-fashioned term to designate the best quality, in this case replacing the A class. Grade B, is the second-best and Grade C is the third quality.

International FOB market value, as required by FDA under the 10 Core Regulations (2007), reflects only the higher quality price (LM quality) and not the average commercial value of logs usually exported from Liberia. Tracking local FOB prices would alleviate this issue.

Stumpage value (the value of the standing timber) is calculated by taking the FOB price and deducting the total cost of operating, sorting, processing, transportation, and port handling, with or without forestry taxation. The sensitivity of the stumpage value has an impact on stumpage charges and the forest revenue systems.

[10] Environmental Investigation Agency, "Appetite for Destruction: China's Trade in Illegal Timber", 2012

[11] Blaser,J. & Dagbe,B.V.2008.Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities .FDA/ITTO/Inter-cooperation and Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005.Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.

### Table 1—Stumpage Value Sensitivity

| Prices, Costs and Values ($ per m3) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Initial Price | Declining FOB Prices | | | Increasing FOB Price | | |
| | | -10% | -20% | -40% | +10% | +20% | +40% |
| FOB Export price of logs | **$180** | **$162** | **$144** | **$108** | **$196** | **$216** | **$252** |
| port handling charges | **$20** | **$20** | **$20** | **$20** | **$20** | **$20** | **$20** |
| production costs | **$60** | **$60** | **$60** | **$60** | **$60** | **$60** | **$60** |
| transportation cost | **$40** | **$40** | **$40** | **$40** | **$40** | **$40** | **$40** |
| Derived Stumpage Value | **$60** | **$42** | **$24** | **($-12)** | **$78** | **$96** | **$132** |
| **% Change in Stumpage Value** | | **-30%** | **-60%** | **-120%** | **+30%** | **+60%** | **+120%** |

As stumpage values are derived, changes in stumpage values are proportionately greater than changes in log product prices. For example, a 10 percent variation in FOB price results in a 30 percent change in the stumpage value derived. Likewise, a 10 percent error on FOB price would result in a 30 percent error in the stumpage value derived. Thus accurate stumpage prices, which fully reflect stumpage values, require accurate estimates of log and forest product prices.[12]

[12] Gray, J, 1983, Forest revenue systems in developing countries, Forestry Paper 43, Food and Agriculture Organization of the United Nations, Rome.

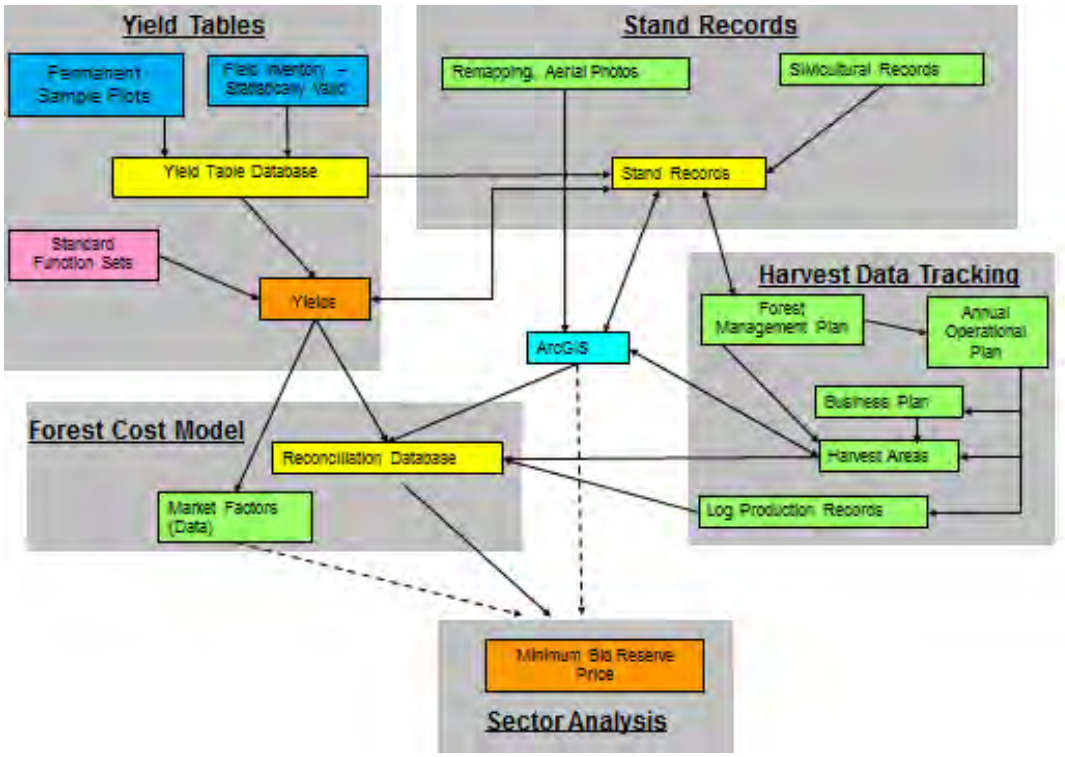
# IV. FOREST MANAGEMENT MODEL

The USAID-GEMS Project provides the GoL with support to improve its management of natural resource concessions. The project is to develop the capacity of the NBC, the granting entities and other government agencies responsible for granting and administering concessions. One aspect of capacity development is the provision of a Forest Management Model (FMM) that incorporates tools to record, index and track interests held by forest concessionaires.

In general, an FMM, as diagramed in **Figure 1**, provides the means to more efficiently plan for future concessions, provide data needed to evaluate concession applications, and monitor the performance of concession holders to ensure that forests are managed to achieve maximum environmental, social, economic, and scientific benefits for present and future generations.

The forest management model is a combination of models linked to a Geographic Information System (GIS) to provide forest sector analysis. Each model is constructed using the base forest description GIS data, allowing forest managers to explicitly identify individual forested areas, and constrain them accordingly if required.

**Figure 1—Forest Management Model Diagram**




Accurate yield tables based on forest inventories supplied through the GIS system are a fundamental requirement if cash flow forecasts and estimates of forest value are to be

reliable. The yield tables are based on the measurements provided in a comprehensive inventory.

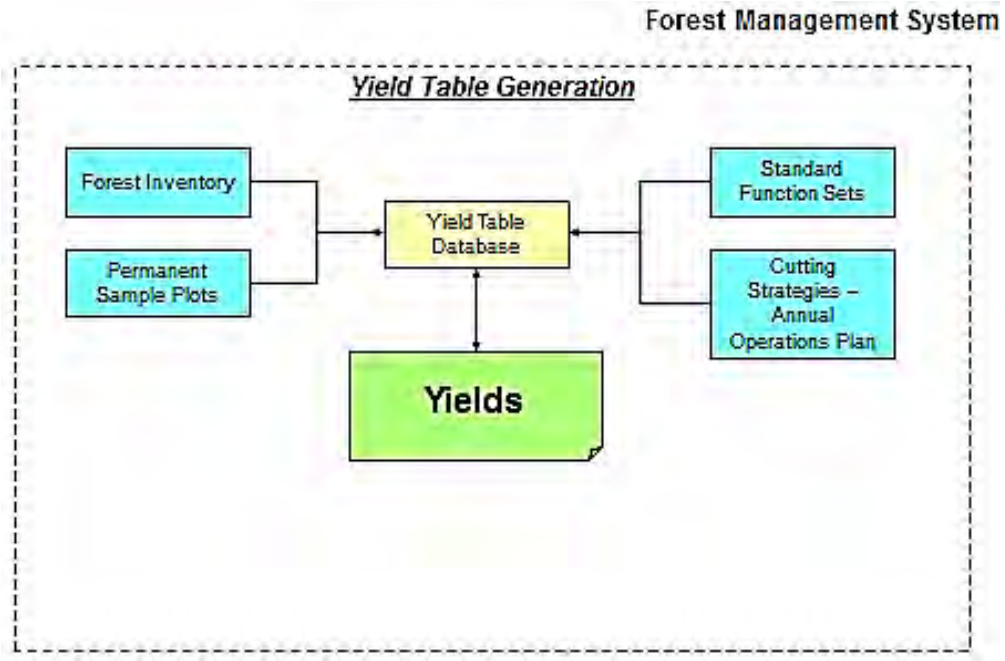
## YIELD TABLE MODEL

Yields are estimated using the model-based approach and are reproducible from source data and assumptions.

The yield table models convert tree measurements into yield tables which provide per hectare estimates of volumes (m3/ha) by log grade. The key components of the modeling system are

- Growth models that estimate the Diameter at Breast Height (DBH) and height for each tree as these change over time and the per-hectare frequencies of trees as these decline due to competitive mortality.
- Models that analyze and account for the effects of Silviculture.
- Taper, volume and growth functions that provide estimates of the total volume of each tree given DBH and height, and the volumes and diameters of logs that might be bucked from those trees.
    a) Taper Function—calculates the inside bark diameter at a particular height up the stem given the trees diameter at breast height.
    b) Volume Function—calculates the stem volume given the independent variables of diameter, height, and form.
    c) Growth Function—uses stand measurements at a given point in time to predict growth of basal area, stocking & height at a future point in time.

**Figure 2—Yield Table Model**



Growing stock is strongly correlated to forest area, which means that if the forest area declines, so usually does the growing stock. Growing stock per hectare provides a better indication of whether forests are becoming more or less well stocked.

According to the Global Forest Resources Assessment 2010, Liberia growing stock is on average of 158m3/ha.

It is impossible to assess the sustainable potential of the Liberian forest as there has not been a complete forest inventory in the country in the last 40 years. Records for logged over areas and volumes extracted over the last 20 years are incomplete and unreliable. The growth and yield dynamics of the Liberian forest are not well known and there are no permanent sampling plots or research on growth and replenishment rates.[13]

Mean Annual Increment (MAI) is the volume of wood growing on one hectare of forest during one year (m3/ha/year) on average since the forest has been established.

The most extensive inventory of the forests of Liberia was completed in 1968. The results of the inventory put the extractive potential of mature timber at 80,000,000 cubic meters. According to Shearman (2009), the 25-year felling cycle for concession areas was sourced from the inventory work of Woll (1981). However, Parren and de Graaf, (1995), call into question Woll's interpretation of his data, the growth projections used and his assessment of the logging damage.

Using the 25-year felling cycle, an annual allowable cut is estimated at 3.2 million cubic meters.[14] The Annual Allowable Cut (AAC) is the amount of wood that can be cut in one year to ensure sustainability and productivity of the forest e.g., not cutting more than grows.

The land base at the time of the inventory was estimated to be approximately 24,000,000 acres or 9,448,000 ha for all forest types. Currently, the forest area estimate, including both closed dense and open dense forests, is 4,539,662 ha.[15]

Using these numbers, and assuming sustainability, MAI can be estimated by dividing the annual allowable cut by the total forested land base. If we use the 1968 numbers, we get a forest growth of .39 m3/ha/yr.

Over the last 40 years, there has been controversy surrounding the historic total forest area land base. As a comparison, if we use the 2010 forest area estimate, the MAI is

[13] Blaser,J. & Dagbe,B.V.2008.Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities .FDA/ITTO/Inter-cooperation and Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005.Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.

[14] Sachtler, M. 1968. National Forest Inventory in Liberia - Technical Report No. 1 of the Germany Forestry Mission to Liberia in Cooperation with the Bureau of Forest and Wildlife Conservation Department of Agriculture Republic of Liberia

[15] Global Forest Resource Assessment 2010 Country Reports Liberia FRA 2010/116 Rome, 2010 Forestry Department - Food and Agriculture Organization of the United Nations

estimated at .70 m3/ha/yr. Regardless, the growth is estimated at less than one m3/ha per year.

In a 2003 tree ring analysis of *Triplochiton scleroxylon* (Obeche, Samba Wawa), the study concluded that even the fastest growing timber species in Cameroon needs almost 90 years before it can be used commercially (80 cm). In total, the growth rates in tropical forests seem to be low.[16]

In a telephone conversation with Mr. Kofi Ba of the Ghana Forestry Department, it was confirmed that the average annual growth for the Upper Guinean Rainforest in Ghana is 1.2 m3/ha per year.

## STAND RECORDS DATABASE

A forest inventory is a statistical sample of a distinct forest area (e.g. a stand or sale/harvest area) used to collect estimates on parameters of that forest area. It is possible to collect 100% measurements of forest characteristics to obtain the true value of these forest parameters, but the time and cost involved would be impractical. The sample sizes chosen are aimed at providing a good representation of the mean parameters of the forest, within some range of acceptable statistical error, without undue cost. Generally the more plots measured, the lower the statistical error associated with the inventory, though this comes under the law of diminishing returns, and to achieve extremely precise estimates can cost a small fortune.

Some common parameters estimated via a forest inventory include

- Mean tree diameter
- Mean tree height
- Mean Top Height
- Mean total or log product volume per tree or per hectare
- Mean wood density
- Mean Annual Increment (MAI) – growth

To ensure the results of the inventory are statistically reliable (and to be able to calculate the statistical error associated with the outputs), the plots used in the inventory are located throughout the forested area of interest (e.g., a population) in a stratified randomly located systematic design.

Stratified random sampling has two main advantages over unrestricted random sampling:

- Separate estimates of the means and standard errors are made for each stratum.

[16] Worbes, M., Staschel, R., Roloff, A., Funk, W.J., 2003. Tree Ring Analysis Reveals Age Structure, Dynamics and Wood Production of a Natural Forest Stand in Cameroon. Forest Ecology and Management 173, 105-123.

- For a given sampling intensity, stratification often gives a more precise estimate. However, this assumes that the homogeneity of the stratum is greater than the homogeneity of the whole population.

As each stratum is more uniform it should result in less variation within the individual strata than between the strata assuming a reasonable sample of the area. This in turn will give more precise estimates of parameters (e.g. basal area and stocking). However, it cannot be stressed enough that *the inherent error of statistical samples is driven by the variability of the data collected.* Mixed stands with many species, products, and size classes will require a more intensive sample. A small sample size (e.g., < 3%) with high variability will over-estimate the parameters that are the function of volume, and thus value.

## HARVEST DATA TRACKING

In a mature, fully functioning forestry sector, harvest scheduling is used to optimize a sequence of timber harvesting options that will produce a maximum or minimum value for the objective. It usually involves mathematical programming (specifically, linear programming), and an objective that can be optimized; i.e., timber production or some financial criterion. The objective is a mathematical expression of the thing being optimized. Three common objectives that are optimized relative to timber harvesting are to (1) maximize net present value or internal rate of return; (2) maximize timber production; and (3) minimize timber cost.

## GEOGRAPHIC INFORMATION SYSTEMS

Geographic information systems (GIS) and global positioning systems (GPS) are essential to the acquisition and management of concessions data. A GIS is a computer system for assembling, storing, manipulating, analyzing, and displaying data that contain physical locations (geographic coordinates displayed in the form of maps) of features and attribute data to those features.

In principle, GIS is a tool to support management decisions, facilitate accurate access to the required concession data, screen applications, control deadlines, and monitor the rights and obligations of both the GoL and the holders of concessions.

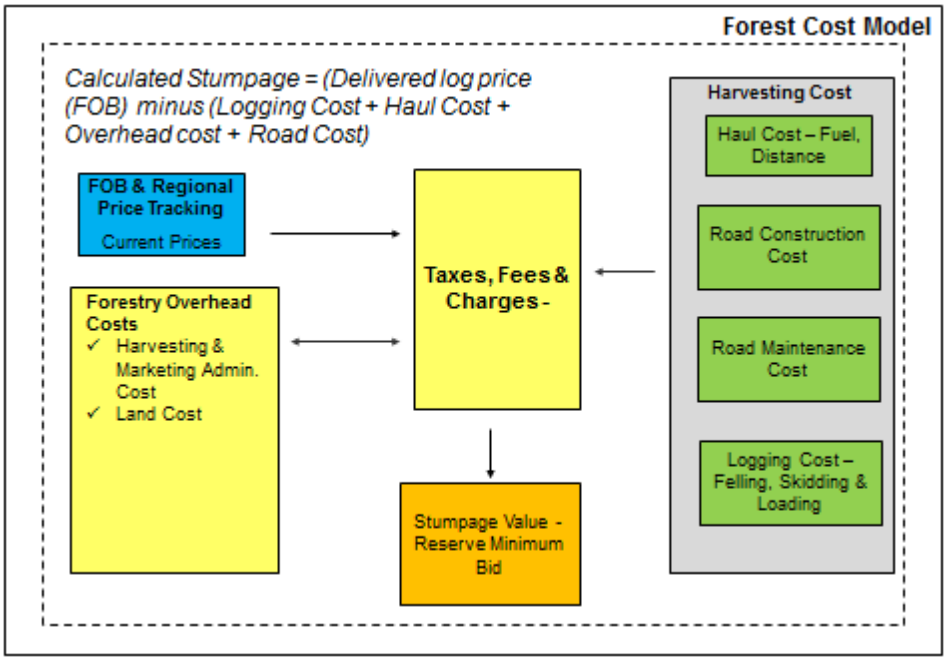
A GIS database gives a user the ability to handle multiple, robust datasets both spatial (maps) and tabular (attribute), and apply rules and relationships. GIS is essentially an industry-standard technology for natural resources and general land use and management that will give the GoL a basis to make better management decisions about concessions.[17]

[17] USAID, A "Roadmap" to Develop the National Concessions Cadastre for Liberia, May 2013

## FOREST COST MODEL

A financial model is an abstract representation of a financial decision-making scenario or hypothesis. It is a mathematical model designed to represent a simplified version of the potential performance of an investment. In essence, a financial model is a method of projecting asset pricing based on a set of assumptions that translates to a predicted behavior of the market, i.e., a return on investment.

### Figure 3— Forest Cost Model




Financial models can be as simple as a 'back of the napkin' calculations or more complex, utilizing spreadsheets and databases.

# V. FOREST CONCESSIONS REVIEW

Sustainable forest production is a function of how fast trees grow, the forest management standards which are applied, the rate at which concessions are approved, and the extent to which investment is mobilized to ensure that forest management plans (essential to establish levels of timber production in a forest concession) are developed and implemented.

The GoL adopted a forest concessions system because of the perceived greater efficiency of the private sector in the production of commercial timber. In addition, the system is designed to allow the GoL to concentrate its attention on forestry policy development.

## CONCESSIONS MONITORING

Monitoring and evaluation should be performed in the National Bureau of Concessions and in the concession-granting agencies. Monitoring of forest use by the NBC and the FDA should give a holistic view of the concessions sector and assess the impacts of concessions in economic development and other areas. Individual department heads and enforcement bodies, among others, should monitor compliance with procedures, performance of compliance reviews, and other performance indicators. This would also include

- Determining the level of concessionaires' compliance with social obligations,
- Ascertaining compliance with legal requirements, and
- Monitoring departmental performance.

## INTERNATIONAL CONSULTANT CAPITAL (ICC)—CONCESSION AREA K

On May 21, 2013, representatives of the USAID-GEMS team and the National Bureau of Concessions (NBC) made a site visit to the International Consultant Capital logging operation in River Cess County.

FMC Area K has a total area of 266,910 hectares situated in Nimba, Grand Gedeh and River Cess Counties. Roughly 7,000 hectares are mangrove swamp wetlands. The concession area is roughly 130 miles from the port of Buchanan and 110 miles from the port of Greenville.

According to the ICC Strategic Forest Management Plan submitted to the FDA, three percent of the concession area has slope over 30% or approximately 8,000 hectares, while an additional three percent is rock outcrop or degraded due to anthropogenic activities.

ICC representatives explained its operations and the difficulties it faces in being profitable under current market conditions and given the constraints of operations in Liberia. A number of problems were discussed, including the

- Transfer of electronic data to the FDA
- Annual bid premium and operations cost (fuel transport from Monrovia)

After a brief meeting at the logging camp, the group departed for a tour of the concession area. The group drove to the first staging area in the forest.

The logs prepared for shipment were appropriately identified with tags and paint.

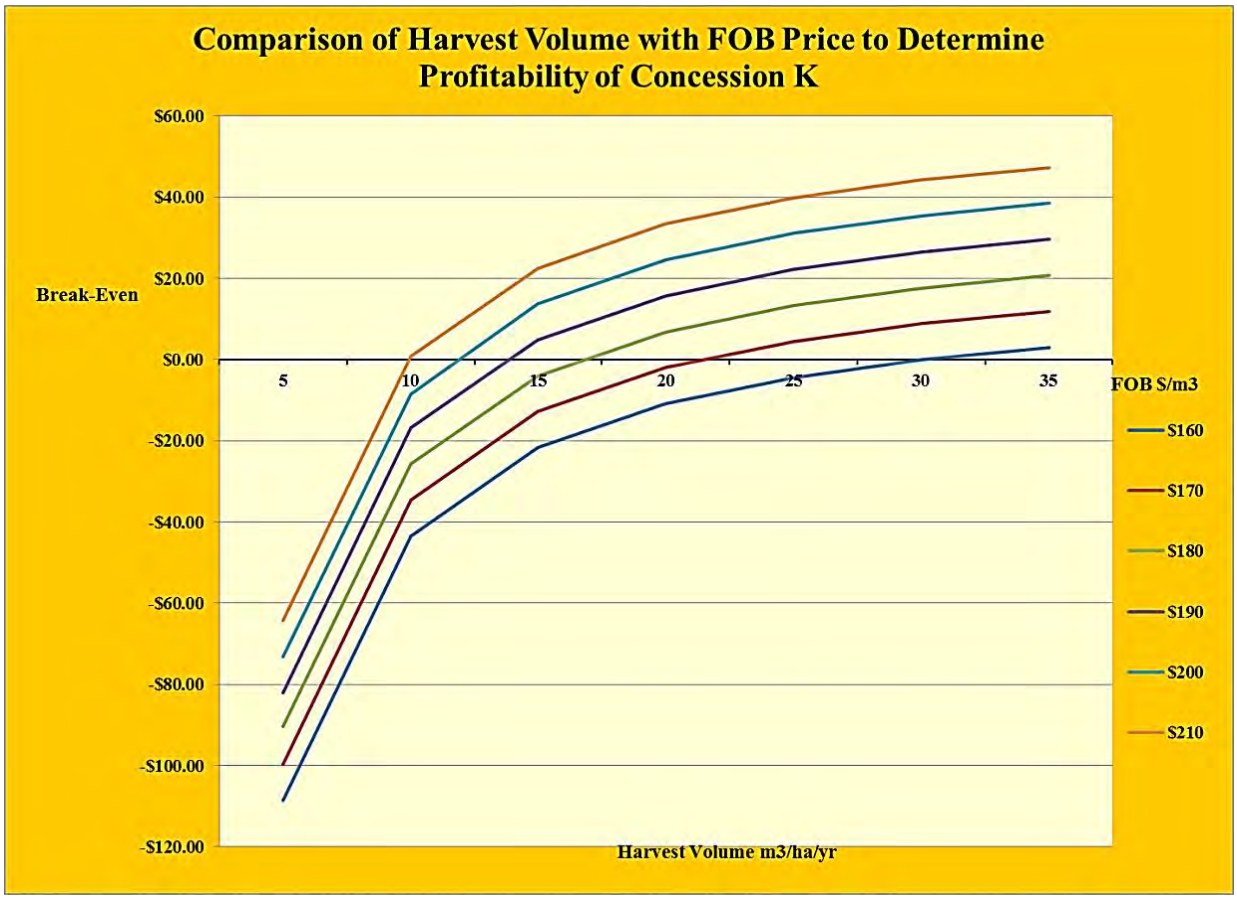
Most of the equipment was fully functional, with the exception of a minor hose break on the 545 skidder.

The landing was operational and a log truck was being loaded.

The roads and skid road were in good shape with little sign of erosion.

Overall, the logging operation was fully functional without major issues identified.

**Figure 4—Comparison of Harvest Volume with FOB Price, Area K**




The graph shows the required harvest volume for a given FOB price for the ICC Concession Area K to become profitable based on all the available data.

Using an average FOB price of $180 per m3 for all species combined, the operation must extract roughly 17 m3 per hectare to break-even. This does not include corporate taxes.

If the forest resource is managed sustainably and total removed volume per hectare (including harvesting damage) does not exceed the mean annual increment, the resource can generate sustainable benefits for the society into perpetuity, including cash flows to the private sector, fiscal revenue for the state, and monetary and nonmonetary benefits for the civilian society. However, if the forest resource is harvested at a higher level than its capacity to regenerate i.e. the total annual removed volume is higher than the mean annual increment, the forest resource will deplete. This has serious implications for the future potential of the resource to generate fiscal income.[18]

[18] INDUFOR – European Forest Institute - Liberia Forest Sector Fiscal Review Nov-17-2011.

## EURO LIBERIAN LOGGING COMPANY—CONCESSION AREA F

On May 28, 2013, representatives of the USAID-GEMS team, the NBC, and the FDA made a site visit to the Euro Liberia Logging operation in Grand Gedeh County.

The Euro Liberian Logging Area F is the second largest concession at 253,670 hectares, approximately 130 miles from the port of Greenville and 116 miles from the port of Harper.

According to the Bid Prospectus, which was not readily available from the FDA but was subsequently provided by Euro Liberian Logging, the concession area contains an estimated 15,670 hectares of in-operable area. The estimate is derived from the .002 percent sample of the gross area.

*"Overall, the estimated total volume of trees in all species categories over the statutory cutting limits in the entire Forest Management Contract area is* ***52 million*** *cubic meters (rounded down). The average tree size is 6.1 m3 and average volume stocking is 204.8 m3/ha."*[19]

The estimate of forest stocking, as provided in the Bid Prospectus, indicates variability in the amount of volume distributed throughout the species classes. The stocking table provided confirms this observation.

The Bid Prospectus reduces the gross area to net by subtracting the inoperable area and then applies the unbiased estimate of stocking to the net area to derive the Reliable Minimum Estimate (RME) merchantable volume (all species categories over cutting limits) of **32 million m3** (rounded down)**.**

Finally, *"For the purposes of ensuring* ***sustainable forest management*** *within an agreed Management Plan, FDA will restrict overall offtake to a maximum of 15% of RME volume in each block, based on a 25 year felling cycle…"*[20]

The annual allowable cut for all tree species over the statutory cutting limit is ***21 m3 per hectare per year***. In comparision to the information provied in Section 4, Yield Table Model, the tree growth projections within the Upper Guinean Rainforest is significantly less. There is a conflict within the ***sustainable forest management model.***

The allowable cut exceeds growth. This does not meet the basic tenet of the law; e.g., sustainable management and protection of Forest Resources to achieve maximum environmental, social, economic, and scientific benefits for present and future generations.

[19] FDA Bid Document Forest Management Contract Area-F
[20] FDA Bid Document Forest Management Contract Area-F


Representatives from the USAID-GEMS team traveled to the Euro Logging concession in Grand Gedeh County in company with two representatives from the NBC and two representatives from the FDA. A meeting was convened on the 29th of May with the GEMS, FDA and NBC personnel, together with representatives of the FDA Region 4 office in Zwedru and field personnel of Euro Logging. The meeting was open and cordial. The purpose of the USAID-GEMS project was explained, the purpose of the visit was explained, and the role of NBC in concessions monitoring and management was explained. Euro Liberia Logging then explained its operations and the difficulties it faces in being profitable under current market conditions, and given the constraints of operations in Liberia. A number of problems were discussed, including a lack of a market for Class A trees. Prices are such that, with Class B trees, the operation can only break even, and, with Class C trees, the company loses money. Currently the Euro Liberia Logging's market is only for Class C species due to:

- A lack of trained mechanics to repair the equipment, much of which uses sophisticated electronics,
- Excessive down time (up to five months/year) due to the rainy season and time lost waiting for spare parts to be shipped to Liberia (no spare parts are available in Liberia), and
- The requirement of transporting the fuel to the concession site from Monrovia.

FDA personnel from Monrovia requested several documents from the Euro Logging managers. Those documents were delivered to them later in the day
After this meeting the group departed for a tour of the concession area. The group drove to the first staging area in the forest. The camp was furnished in a very rudimentary manner; there were no semi-permanent or permanent structures.

The landings were jammed with approximately 2,000 m3 and apparently the logs were brought in hurriedly to get as many logs out of the forest as quickly as possible. In addition, many of the logs were not tagged.

This could be the result of a delay in tagging logs cut from the main stem, and it could also be a result of the speed with which the logs were dumped in the yard. The lack of tags may not be a long-term problem, but it is an issue that should be addressed.

About a dozen pieces of equipment were scattered about the first log yard. None were in operational condition.

The group then proceeded down the logging road to the second staging area. The road was muddy and deeply rutted. It was virtually impassable.

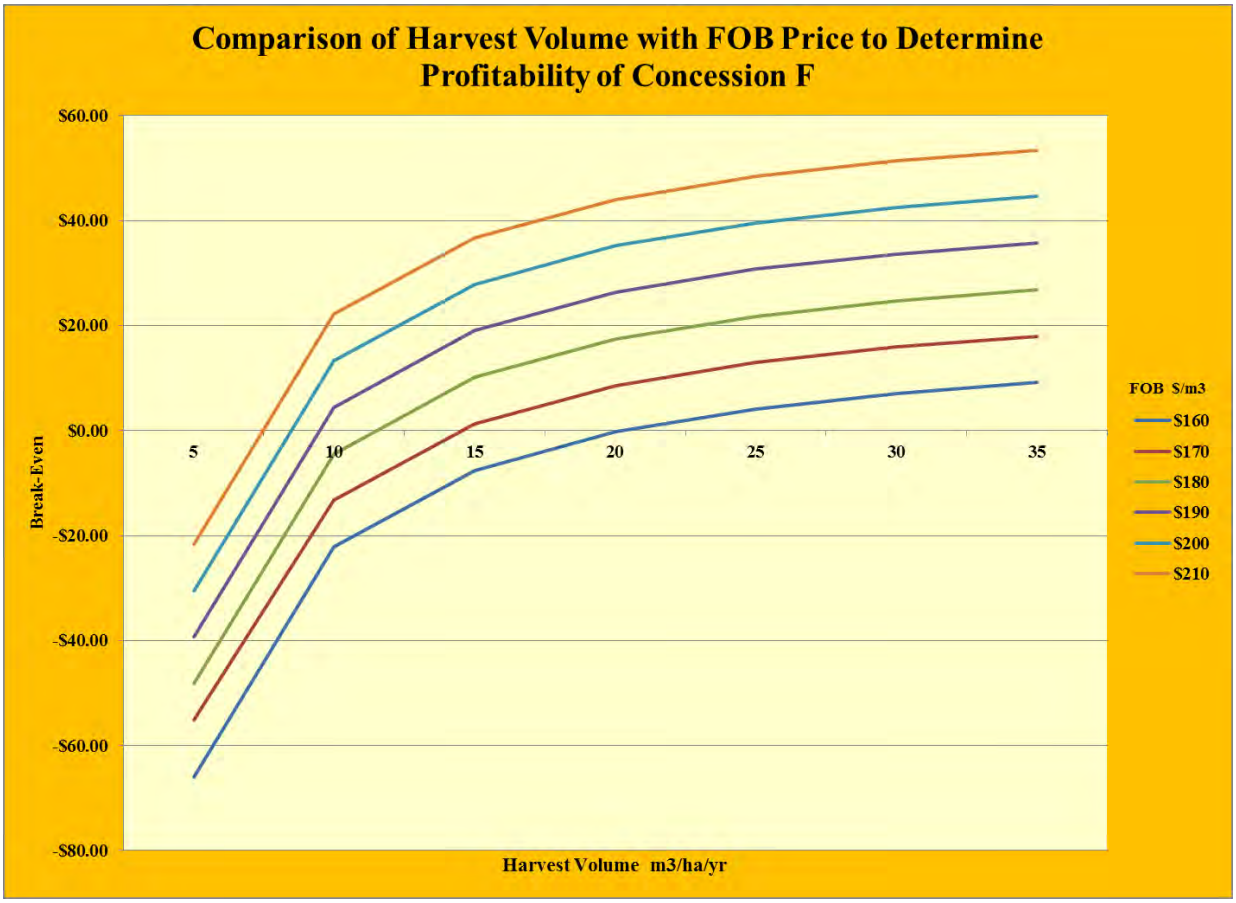
The second staging area was at least half a mile from the first staging area. Logs were scattered around the area, but there was no equipment at this site. Again, tags seemed to be missing on a number of the logs.

The trip was very beneficial for the NBC, FDA and GEMS personnel from Monrovia. It gave them first-hand information about the state of this concession, the problems the concessionaire faces and the difficulties this concessionaire will have to make this concession profitable.

On a positive note, Euro Logging reported no problems when transporting goods between the logging site and the port in Greenville from which the logs are shipped.

However, the company faces serious problems, among them being arrears in payments of funds to the Government of Liberia, possessing too little functional equipment, having a lack of trained mechanics, and working in a market for species that have a very low price on the market

**Figure 5—Comparison of Harvest Volume with FOB Price, Area F**



The graph shows the estimated harvest volume at a given FOB price for the Euro Liberia Logging—Concession Area F to become profitable.

Using an average FOB price of $180 per m3 for all species combined, the operation must extract roughly 12 m3 per hectare to break-even. This does not include corporate taxes.

## REVENUE PROJECTIONS

Estimating forest value within confidence limits for implementing forest-based revenue reform is, inherently, difficult to undertake as the revenue projections are directly related to multiple data sets entered into a complex system. The most basic of these inputs are existing standing timber volume, tree growth, direct cost of extraction, and administrative fees.

On the other end of the equation, having a severe impact on the forestry sector are volatile timber markets that distort competitive market prices, a complex revenue collection system of royalties, fees, and taxes, and an inadequate infrastructure of roads, bridges, and ports, intensified by the lack of a skilled work force. In theory, the forestry sector should support rural economic development and provide a wide range of environmental and social goods and services to the people of Liberia.

As shown in the National Bureau of Concessions 2012 Annual Report, only 5% of the annual bid premium, land rental, and contract administration fees were collected, that is $1,859,551 out of the $36,409,431 owed. An additional $9.2 million was collected during the same period in stumpage and export fees, as would be expected given the type and timing of fee (production fee based on volume at the time of sale). Interestingly, $3.3 million was collected in 2011, a change which can be directly related to the expanded use of the Private Use Permits (PUP). *It is safe to assume that the majority of the outstanding fees owed are attributed to the annual bid premium. The system is broken.*

Given the constraints and complexity of the revenue collection system, it is unlikely that an "ideal" set of revenue charges exists. However, through an evaluation of Liberia's own particular objectives and circumstances, including discussions with stakeholders from the Government, industry, and community, the most appropriate forest-based revenue reform may be identified.

Forest resources represent a significant asset that is used to generate government revenues that support economic development and provide a wide range of environmental and social goods and services. A major concern for all involved is when short-term measures to raise revenue override sustainable management and protection of forest resources.

In 1976, Nobel laureate economist Paul Samuelson noted that "applying what is sound commercial practice to government's own utilization of public forests … is a sure prescription for future chopping down of trees". He observed that "everybody loves a tree

and hates a businessman" and "indeed, if the externalities involved could be shown to be sufficiently important, I am naïve enough to believe that all economists would be found on the side of the angels, sitting thigh next to thigh with the foresters" (Samuelson, 1976).

Intensive data gathering required by the assignment was constrained by the limited availability of and access to consistent and relevant information. Unfortunately, only limited data was provided by the stakeholders.

An analysis of the data provided identified the cost of log production between $43 and $65 per m3. Transportation cost between $26 to $44 per m3 and Forestry overhead cost between $12 and 18 per m3. The total operating cost varied between $98 and $122 per m3. These numbers do not include charges, fees or taxes.

Revenue projections were developed using a Microsoft Excel spreadsheet revenue projection model. The data entered into the model includes information from the seven FMCs, and nine TSCs. Of the seven FMCs, one was not used in the analysis. FMC P has embraced some controversy, so as such, FMC P was removed from the analysis.

The model is designed to allow the user to input the AAC, and the FOB price as well as change the percent of Stumpage and Export fees, CoC fees, and the discount rate to project annual and future revenue contributed to the GoL from the Forest Concessions.

The **Home** page of the model allows input of the basic assumptions. The **Data** page allows the user to input the GoL fees and contract specifics.

### Table 2—Assumptions

| | |
|---|---|
| **Stumpage Fee - 10%, 5%, 2.5%** | **5.00%** |
| **Log Export Fee - 10%, 5%, 2.5%** | **5.00%** |
| **SGS Chain of Custody** | **1.40%** |
| **Discount Rate** | **12.00%** |
| **Harvest Volume/Year (m3/ha)** | **7** |
| | |
| **FOB ($/m3)** | **$180** |
| **Harvesting Cost - Stump to Dump** | **$100** |
| **Export Yard Cost** | **$15** |

The output is annualized showing the percentage for each tax, fee, or charge and further segregated by contract types FMC or TSC.

Annually, the total burden is $36.5 million for all concessions with the annual bid premium making up 25%. The FMC fee and tax burden is $134.21 /m3 harvested. This is over 74% of the FOB price. Combined with harvest cost at 64% of FOB and the

operation is not viable. As harvest volume increase, the impact on company profitability increase significantly.

By doubling the harvest volume from 7 to 14 m3/ha, all others being equal, the FMC fee and tax burden is $79.91 /m3 harvested, or 44% of FOB.

Finally, the necessary harvest volume to meet the average break-even point for all FMCs is 19.3 m3/ha.

### Table 3—Output Table

| Fees & Taxes Totals (ANNUAL) | % | Total | FMC $/m3 | TSC $/m3 |
|---|---|---|---|---|
| Annual Premium Payment | 25.48% | 9,318,976 | $ 35.75 | $ 4.11 |
| Coupe Inspection Fee (.50/ha/yr) | 1.28% | 466,461 | $ 1.79 | $ 0.21 |
| Area Fee ($/ha/yr) | 6.22% | 2,276,055 | $ 8.93 | $ 0.54 |
| Contract Admin Fee ($/yr) | 0.03% | 12,000 | $ 0.02 | $ 0.06 |
| Waybill ($/m3) | 0.24% | 88,405 | $ 0.25 | $ 0.25 |
| Export License Fee ($/m3) | 0.10% | 35,362 | $ 0.10 | $ 0.10 |
| Min. Monitary Benefit to Comm. ($/m3) | 1.45% | 530,427 | $ 1.50 | $ 1.50 |
| Processing Requirements (USD) | 42.22% | 15,439,992 | $ 62.10 | $ - |
| SCS Chain of Custody | 2.44% | 891,118 | $ 2.52 | $ 2.52 |
| Stumpage Fee - 10%, 5%, 2.5% | 8.70% | 3,182,563 | $ 9.00 | $ 9.00 |
| Log Export Fee - 10%, 5%, 2.5% | 8.70% | 3,182,563 | $ 9.00 | $ 9.00 |
| Port Fees | 3.14% | 1,149,259 | $ 3.25 | $ 3.25 |
| Total | 100% | $ 36,573,181 | $ 134.21 | $ 30.54 |

According to a recent study in Liberia, in fiscal year 2010-11 the total tax burden was $106 per m3 harvested, as calculated for six companies.[21] This is 58% of the average FOB price of $180 / m3.

By removing the Annual Bid Premium from the equation, the harvest volume to meet the average break-even point for all FMCs is 12.9 m3/ha.

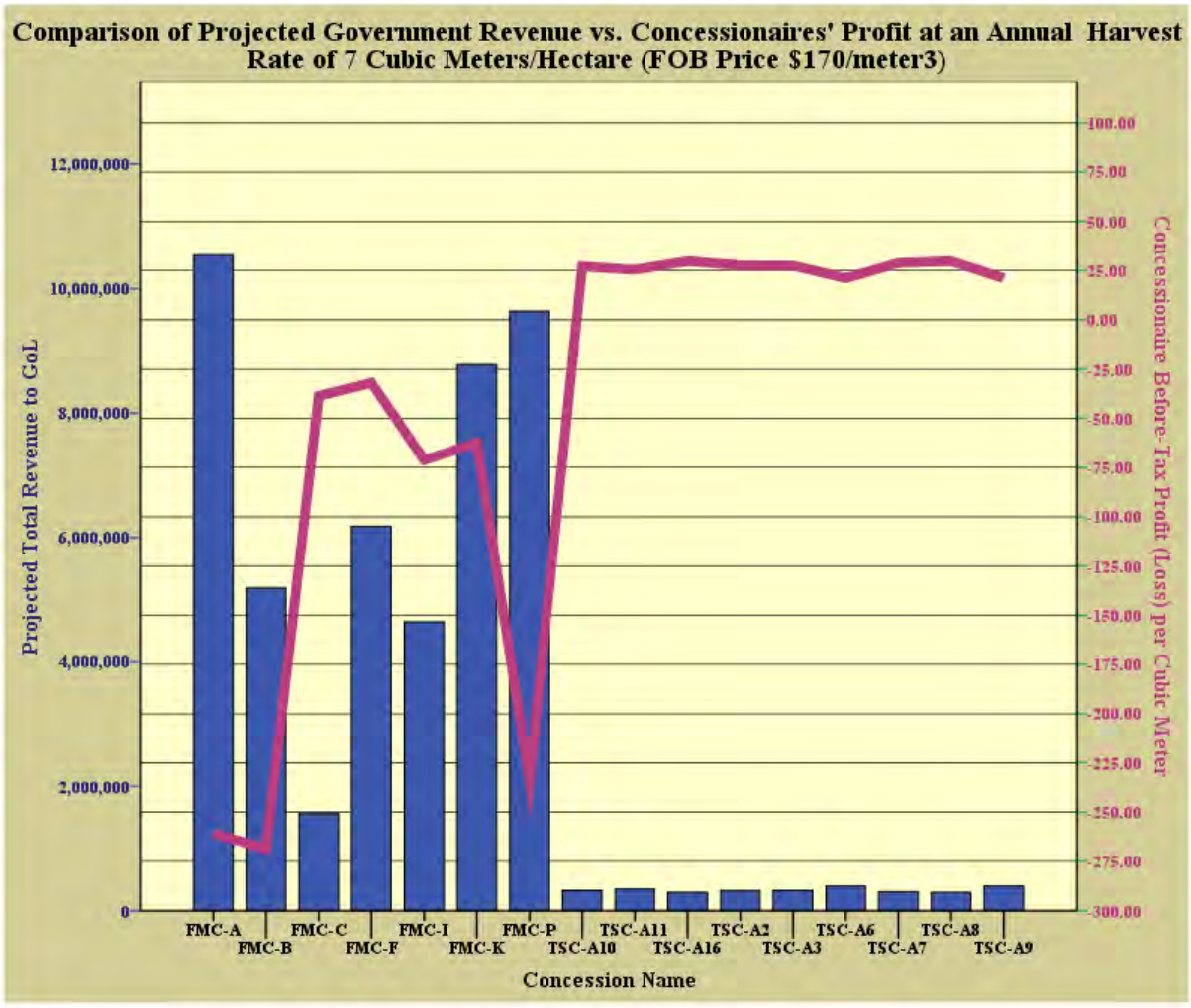
If we hold the harvest volume at 12.9 m3/ha to meet the average break-even point for all FMCs, the total revenue collected by the GoL drops to $34,954,948. This drop can be recaptured by increasing the Stumpage and Export fees by one-half of one percent.

The current tax and fee structure is based on both area and production, with area-based fees front-loaded. Concessions tend to be large, but production is limited to one block per year (in reality, 1/25th of the concession). As illustrated, the fees and taxes are not synchronized with actual production or with what is considered sustainable.

The following graph, **Figure 7**, Projected Government Revenue, compares the projected GoL revenue to the Concession holders profit based on an annual harvest rate of 7 m3/ha, holding the FOB at $170 /m3.

[21] INDUFOR – European Forest Institute - Liberia Forest Sector Fiscal Review Nov-17-2011.

**Figure 6—Projected Government Revenue—7 m3, FOB $170**



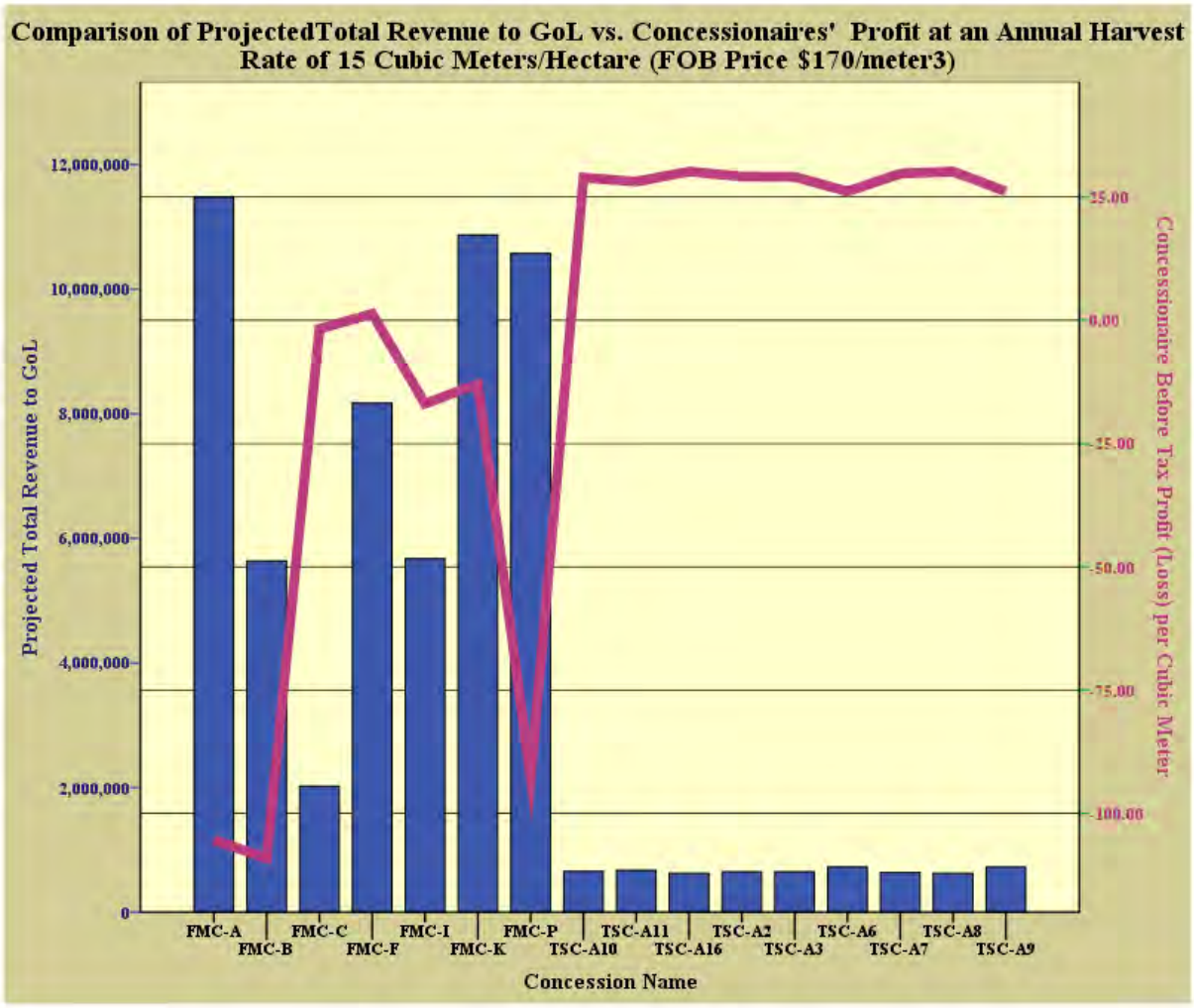

The x-axis lists the seven FMCs and nine TSCs, the blue columns. The left side y-axis is the projected total revenue to the GoL. The right side y-axis is the concessionaire's profit or loss, as identified by the magenta line.

As illustrated, no FMC is profitable under this scenario. Only the TSCs are profitable. This lack of profitability is directly related to the Annual Bid Premium and value-added processing component of the contracts as they relate to the annual harvest volume and current FOB price.

The next graph, **Figure 8**, Projected Government Revenue, compares the projected GoL revenue to the Concession holders profit based on an annual harvest rate double of the previous graph, at 15 m3/ha, holding the FOB at $170 /m3.

The results are similar showing that the fees and taxes are not synchronized with actual production or with what is considered sustainable.

**Figure 7—Projected Government Revenue—15 m3, FOB $170**




Forestry is defined in the NFRL as the science, art, and practice of the conservation of forest resources. Taking this one step further, conservation is defined as the sustainable management and protection of forest resources to achieve maximum environmental, social, economic, and scientific benefits for present and future generations.

An allowable exceeding the growth estimate does not meet the basic tenet of the law; e.g., sustainable management.

If the harvesting operation is not viable, the economic conditions force the industry to find new ways to make money. Given the current market condition, the lack of a profit margin, and the enforcement of policies, the condition encourages illegal extraction.

# VI. FINDINGS & RECOMMENDATIONS

## FINDINGS

- It is impossible to assess the sustainable potential of the forests of Liberia as there has been no complete, robust forest inventory in Liberia since 1968. Evidence suggests the commercial forestry sector is not sustainable.
- The science behind the GoL's 25-year felling cycle for concession areas is questionable.
- Based on the data available, forest growth is projected at less than 1 m3/ha/yr. (The available data are unreliable and incomplete at best.)
- Pre-conflict extraction rates averaged 7 m3/ha/yr. and were four times that during the conflict.
- Current extraction rates range from 10 to 30 m3/ha/yr.
- As the commercial forestry sector's contribution to GDP has increased, the per unit m3 contribution to Liberia's GDP has declined by over 80%. This decline reflects the shift in the market from Europe to Asia, and suggests historic over-cutting of primary species as lesser-used species that now carry the market. This shift is also reflected in current extraction rates.
- The current tax and fee structure is based on both area and production, with area-based fees front-loaded. Concessions tend to be large, but production is limited to one block per year (1/25th of the concession). Thus the fees and taxes are not synchronized with actual production.
- The concession holder is paying for the opportunity to harvest timber on the total area of the concession but not getting the benefit due to inoperable lands.
- Average per m3 GoL fees are 40% of average Free on Board (FOB) price.
- Average harvest cost is roughly 68% of average FOB price, excluding corporate tax.
- Capacity constraints and limited budgets translate to a lack of effective monitoring and enforcement of existing laws governing forest harvest practices. The current market, profit margin, fee and tax regime, and lack of enforcement encourage illegal extraction.
- GoL royalties, taxes, and fees are primarily front-loaded, area-based fees that cause undue financial pressure on concessionaires prior to selling timber; in combination with value-added processing requirements, several concessions are not viable.

- An argument can be made that the FOB price reflects only the higher quality price (LM quality) and not the average commercial value of logs usually exported from Liberia.

**RECOMMENDATIONS:**

- The FDA does not have the tools it requires to properly manage the forest sector. The FDA requires the following:
  - A comprehensive base map of the entire country over which it can lay maps of forests and forest concessions, and
  - A comprehensive inventory of Liberia's forests – two options:
    - Out of house—timely & costly
    - In-house—Education of a future work force, & job creation
- Reform the tax and fee structure (1) to allow the forest sector to become financially viable and (2) to move away from log exports and to production of finished lumber for both domestic and export markets by:
  - Equalizing the fee and tax burden on the commercial concession holders vis-à-vis community sawmills,
  - Expanding the length of time concession holders have to complete installation of wood processing facilities from three years to five years,
  - Ensuring concessionaires have fixed rights in the economic value of their concessions for a 25-year period, and
  - Allowing concessionaires to purchase wood on the open market in order to realize economies of scale in wood processing.
- Re-allocate a portion of the forest concession revenue from the general fund directly to the FDA and NBC so those agencies have full knowledge of the future budget and sufficient resources to conduct and ensure effective concessions monitoring and enforcement of existing laws.
- Close the loop on log tracking by expanding the Chain of Custody system to include additional site monitoring and domestic log tracking (while simultaneously protecting the livelihoods of local charcoal producers and pit sawyers).

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## ANNEX 3. GLOSSARY

*Annual Coupe*—The portion of Forest Land subject to an FMC or TSC that can be sustainably harvested each year, as specified in that contract, the Code of Forest Harvesting Practices, or controlling Regulations.

*Basal Area*—The basal area of a stem is the cross-sectional area under bark at breast height, in units of square metres. It is usually calculated by assuming the stem has a circular cross-section:

$$BA = \pi d^2 / 40\,000$$

where $d$ is diameter, measured in cm.

*Block*—100 ha harvesting area, forming part of annual coupe measured 1000m by 1000m

*Buffer strip*—Strip of vegetation left intact along a watercourse or other sensitive area

*Chain of Custody*—The channel through which products are distributed from their origin in the forest to their end-use

*Cutting (or felling) cycle*—The number of years between successive harvests on an area of forest

*Diameter at Breast Height (DBH)*—1.4m up the stem from the ground, measured from the uphill side on the tree from the level of mineral earth.

*Ecosystem*—A community of all plants and animals and their physical environment, functioning together as an interdependent unit

*Forest management/manager*—The people responsible for the operational management of the forest resource and of the enterprise, as well as the management system and structure, and the planning and field operations

*GIS*—Geographical Information System captures, stores, manages, and analyses data and attributes spatially referenced to the earth

*GPS*—Global Positioning System is a world-wide radio navigation system formed from a constellation of 24 satellites and their ground stations. GPS uses these satellites to triangulate positions accurate to a couple of metres. Hand-held GPS units are accurate to within a few metres under an opens sky, but this accuracy can be reduced depending on the height and density of forest canopy.

*Inventory*—An instance of sample tree data which may consist of strata, plots, trees, and tree/stem features

*MAI*—The Mean Annual Increment, or volume of wood growing on one hectare of forest during one year (m3/ha/year) on average since the forest has been established

*Operable Area*—The effective working forest area in hectares based on the harvesting limitations identified in the Code of Forest Harvesting Practices of the FDA, e.g., slope, wet areas, buffer zones, buffer strips

*Plot*—A collection of trees representing a single sample. A bounded plot collects information on all trees within a given distance of the plot centre; it is therefore circular and has a defined area.

*Site Index*—The site index of a stand is defined as the mean top height at a given reference age. It is an easily measured estimate of productivity. However, the relationship between site index and productivity varies between species and from region to region, thus care should be taken when making comparisons. Site indices may be broadly classified as ranging from poor through to good. Extremes of low and high stocking affect the site index value, but otherwise, site index is believed to be independent of silvicultural regime.

*Stand*—A population of trees with a homogenous crop and yield at harvest age, as defined in the stand record database (e.g. group of trees with same age, silvicultural history, height, volume, etc.)

*Taper*—the amount by which diameter varies with change in stem height or log length. Taper functions estimate the inside bark diameter at any point on the stem

*Volume Function*—A mathematical function for estimating stem volume from DBH and height

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