ANALYSIS OF TRENDS IN FOREST CHARGES AND GOVERNMENT EXPENDITURE ON FORESTRY IN AFRICA
A THEMATIC STUDY

BY

AJEWOLE OPEYEMI ISAAC

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EXECUTIVE SUMMARY

This work is one of the studies commissioned by the EC-FAO Partnership programme on sustainable forest management in African ACP countries to investigate the impacts of fiscal policies on sustainable forest management in Africa. Its main purpose is to evaluate in quantitative terms the forestry fiscal policies in Africa, by examining the factors that might explain the different levels of charge collection and expenditure on forestry in different countries in Africa.

Seventeen countries were selected out of the 28 that submitted country reports for the study. These seventeen countries were selected on the basis that their reports contained adequate data on forest revenue, forest charges and expenditure within the specified period of time (1990-2000). Data for industrial roundwood production for the period of time under consideration in the selected African countries were obtained from FAOSTAT- the FAO database. While data on the Gross Domestic Product (GDP), GDP deflator and Exchange rates of the selected countries were obtained from the International Monetary Fund's (IMF) and World Bank's websites. Other information sources include FAO's State of the World Forests (2001), and some other relevant literature.

All the countries investigated with the exception of Côte d'Ivoire (-1%), Ghana (-2%), and Madagascar (-10%), recorded increase in their industrial roundwood production. The annual changes in real prices of forest charges is lower compared to the changes in current prices in all the countries studied. However, forest prices are worst hit by inflation effect in Sudan, Ghana, Nigeria, Tanzania, and Malawi which recorded 73%, 34%, 30%, 29% and 25% differences respectively between the average annual changes in their current and real forest charges within the studied period of time. All the countries recorded less than 10% increase in their nominal forest charges with the exception of Ethiopia, Gambia, Ghana, Sudan and Tanzania, which had more than 20% increase in their nominal forest charges during the period of study. Only Ghana and Tanzania can be said to review their forest charges once in almost every two years. But more importantly, only three countries: Gambia, Ghana and Guinea representing 17.65% of the selected countries, recorded increased changes in their charges in real terms throughout the period of study. All the countries studied recorded increased changes in their current revenue over the studied period of time, except Burkina Faso which did not record any change in its current revenue, and then Côte d'Ivoire and Kenya which had negative average annual changes of -9% and –19% respectively in their current revenue. Only 58.82 % of the countries improved their efficiency of revenue collection. Furthermore 58.82% collected on the average 10% or less of the revenue expected from industrial roundwood production.

Econometric analysis revealed that 1% increase in the forest revenue collected will lead to 0.53% increase in domestic expenditure for forestry development in the selected African countries; also 1% increase in population will bring about 0.58% increase in government expenditure to forestry development and 1% increase in the GDP will lead to 0.18% increase in domestic expenditure while establishment of forest funds will improve forest revenue-government expenditure relationship by only 0.04%. However, donor funding has an inverse relationship with domestic expenditure on forestry in Africa. Thus 1% increase in foreign funding will bring a corresponding 0.05% decrease in domestic expenditure for forestry development in the selected African countries. A similar inverse relationship exists between the forest cover of the African countries studied and government expenditure on forestry development. Therefore, for every 1% decrease in forest cover the government in the selected African countries studied will increase expenditure on forestry by 0.20%.

The greatest need for sustainable forest management in Africa within the context of fiscal policies, centres on strengthening the forestry departments of African countries as well as building a strong inter sectorial linkages with all the other sectors of the economy. Moreover, setting and collection of appropriate forest fees will require as much political as economic or technical input.

1 INTRODUCTION

1.1 BACKGROUND

Africa with a total land area of 2978million hectares and total forest cover of 650 million hectares, has 21.8% of its land area covered with forests, and represents 23% of the World total land area, 17% of forests and 4% of forest plantations (FAO 2001). It is made up of three major vegetation zones: arid and semi-arid forest zones, tropical high forest, and sub-tropical high forest. This classification can be further sub-divided into eight eco-geographic zones, which are characterised by great diversity of environmental and forest conditions (FAO 2000). Geographically, about 97% of Africa's forest cover is found in tropical Africa. This is distributed as follows: Central Africa, 205million ha, Tropical Southern Africa, 141million ha; East sahelian Africa; 58million ha; moist West Africa, 46million ha; West Sahelian Africa, 40million ha; Insular Africa, 15million ha; while the remaining 15% is found in North Africa and non-tropical Southern Africa.

Virtually all the forests of Africa are publicly owned, by central governments, state and provincial governments, or by local communities. Therefore the government plays a dominant role in the administration of forest resources in Africa. These roles include legislation of appropriate policy frameworks and creating enabling environment for the implementation of the policies. Therefore the government is saddled with the responsibility of harnessing the wealth of the forests in a profitable and sustainable manner for the benefit of the society at large, bearing in mind the fragile or delicate nature of these renewable biological resources.

Sustainable forestry development is of central importance to the development of the African continent, which largely consists of agrarian and under-developed economies. FAO (2000) reported that forestry contributes an average of 6% to GDP in Africa, which is far and above the 2% world average contribution of forestry to GDP. Moreover, Africa comprises 18 of the 24 countries in the world whose forestry contribution to GDP is 10% or higher.

Emphasising the primordial importance of forestry to the African economy, Goumandakoye (1996) reiterated that the forest is the largest and sometimes the sole source of domestic energy in Africa. Besides the provision of wood and raw materials for industries, and fuelwood for rural dwellers and the urban poor, Africa's forests are an important source of a variety of non-wood products like berries, mushrooms, fruits,

meats and medicine which are important for the socio-economic well-being of the African populace in general, and the rural population in particular.

However, the great potential of Africa's forests to contribute to the economic and social development of the continent is being grossly undermined by deforestation and degradation. FAO (2001) put the rate of deforestation in Africa between 1990-2000 at 0.8%, which is the highest in the World and far exceeds those of Asia, and North and Central America, of 0.1% each, as well as those of Oceania and South America which have 0.2% each. The World deforestation rate is put at 0.1%, with Europe having an increase in forest cover of 0.1% in its forest cover.

The causes of deforestation and degradation of forest in Africa are from within and outside the forestry sector. For instance, the introduction of Structural Adjustment Program (SAP) in many African countries resulted in the withdrawal of subsidies on alternatives to traditional fuelwood energy, such as electricity and kerosene, which consequently forced many people back to wood energy for their domestic needs.

In addition, political problems often caused by military conflicts and incursion to governance, conflicts of interests between communities and the government, and inter tribal wars have also caused untold havoc to the forests of Africa. In this regard, the growing number of displaced people due to political conflicts and military struggles ravage forest resources and sometimes even beyond national boundaries. In addition, high annual population growth rates, large rural populations, accelerating urbanisation and low per capital incomes, which characterise many countries in Africa, do severally and collectively exert pressures on the Africa's forests to supply fuelwood, poles, food and medicine at unsustainable rates.

More importantly, deforestation and degradation have been highly exacerbated in many African countries by inappropriate forest management and harvesting practices and the inability of current policies and institutions to manage the forest resources sustainably. Grut et al (1996), Barbone and Zalduendo (2000) and FAO (2000) considered the policies and institutions responsible for the planning and management of forest resources in many countries in Africa to be very weak and of capacity far below the minimum requirements for sustainable forestry development

These policies and institutions have few linkages and little influence over other agencies with responsibilities for land use policies, and generally low level of economic activity which tend to lead to low economic returns and under-funding of most forestry projects. Therefore forestry policies in Africa need to be reviewed and if

necessary reformed appropriately, while the credibility and technical capacity of public forestry institutions need to be reinvigorated in order to achieve sustainable forestry development.

1.2. FORESTRY FISCAL POLICIES IN AFRICA: AN OVERVIEW.

Fiscal policies in forestry are the mechanisms put in place by the government, to set and collect charges on forest resources, and to efficiently administer the funds thereafter generated, for the sustainable development of forestry in particular, and the economy in general. From the foregoing, three principal elements are of paramount importance in forestry fiscal policies: charges or prices of the forest resources, the revenue collected from the production of these resources, and the allocation or expenditure of the economic returns for continuos and sustainable production of the resources.

The objectives of fiscal policies in forestry might vary from country to country in weight and importance, but in broad terms include the following:

a) Revenue - maximisation of revenue generation is often the primary and the most obvious objective of forestry fiscal policies in most countries
b) Improved and Sustainable Forest Management- to provide incentives for efficient forest management, forest renewal and environmental management, and to minimise damage to the residual stand and the forest.
c) Improved Utilization- to provide incentives for increased utilization in the forest (of species and trees), in logging (fuller utilization of trees felled), and in processing plants (increased recovery).
d) Finance Sustainable Forest Management- to finance forest management of areas managed for timber production, to finance the production of non-market, non-commercial forests outputs from managed forests and to finance forest protection of areas not managed for production.
e) Development Goals which can include:
    i. industrial development and diversification through domestic processing
    ii. Increased foreign exchange earnings to offset import demand, or to pay for imports of technology, capital and services, or to reduce foreign debts.
    iii. Development of low income, underdeveloped or remote regions in the country.
    iv. Creation of employment, not only in the forest industry, but also in the forest management and reforestation activities.

v. Income generation in the country or region.

It is important to say that out of all these objectives, optimum generation of revenue often forms the fundamental basis for formulating forestry fiscal policies. Nevertheless, forestry fiscal policies are still potent instrument employed in influencing logging activities and better utilization of forest resources. By encouraging utilization of currently under-utilised species, they shift harvesting pressures away from species that are overcut, determine the rate of logs' export and encourage further processing of logs domestically.

In economic terms, forest charges serve two distinct functions. First, they enable the government to capture a share of the economic rents associated with the natural forests. Second, they affect the harvesters 'behaviour and as a result may play a role in the sustainability of forest exploitation. Thus, forest charges may act as Pigouvian taxes by internalising the long term, non-wood, and off-site values of the forests under exploitation.

Forest pricing can also be a strong conservation tool, supporting and reinforcing the policy objectives of sustainable forestry. Proper forest pricing of timber and concessions can discourage acquisition or retention of large concession areas, and can discourage extensive logging activities and "high grading" extending over large forest areas. On the other hand, proper forest pricing can encourage more intensive and sustainable forest management, and direct timber production to more productive and accessible forest areas, leaving other forest areas for non-timber and preservation uses.

Barbone and Zalduendo (2000) argued that deforestation in countries with governance deficiencies (as in many parts of Africa) could be better controlled through market forces rather than bureaucracies. Market-based incentives could help control deforestation by internalising negative externalities. Moreso that deforestation can result from or be encouraged by under pricing of forest resources through outdated forest fees and taxes. This in turn gives false signals concerning the value of the forest, leading to severe waste in harvesting and processing/conversion of forest.

Apart from negative implications on government revenue, low forest charges encourage inefficiencies, distort forest management decisions, which can cause difficulties for forest management and impose additional burdens in the enforcement of regulations. For instance, if charges are set much lower than the market value of the resources, those harvesting or processing the resources may collect part of the

value. And if these producers are foreign owned or multi-national corporations, part of this value may be transferred out of the country via profits or through lower export prices.

On the other hand, if charges are set too high above the market value of the resources, harvesting or production of the forest resources may fall considerably, which subsequently brings less revenue to the forest owner. Hence in either case forest revenue will be less than the maximum. To overcome these problems, forest fees and taxes may be increased preferably as close as possible to the value of the economic rents, or different fees and taxes may be combined.

Each of these options has its weakness and strength. Thus whichever approach that will be adopted, will have to take into account the ease and cost of its administration, as well as the social, cultural and ideological dispositions of the socio-economic environment within which the collection of such charges will be carried out.

In spite of the increasing role of forest fees and taxes as a source of revenue for African governments since the early 1980s, to meet the revenue needs of African countries with serious fiscal accounts imbalances (Barbone and Zalduendo 2000), forest resources management in most countries in Africa is still characterised by low forest fees and low collection rates (Gray1997). For instance Gray (Op-cit) cited the case study of Cameroon where total forest revenues (area and volume-based fees) were only 2% to 4% of log prices and well below the stumpage value of the timber. He also reported the World Bank report of Guinea in 1989, which found out that forest fees were less than 1% of the local price of sawnwood.

Similarly, the World Bank report of Côte d'Ivoire in 1990 revealed that forest fees represented about 0.5% of FOB price of logs. Gray (Op-cit) further cited another World Bank study in Ghana in 1990, which showed that total forest revenue collected were less than 0.5% of the delivered price of logs at processing plants and that total forest revenue collected were only one-sixth of what should have been collected

Forest charges in developing countries can be classified according to the base upon which they are levied; (the area of forest exploited, the volume or value of wood harvested, or the anticipated loggers' profits based on certain known indices). They can be classified by the point or location at which they are collected (in the forest, at roadside, at a processing plant, or at the port). They can also vary by the procedure employed in determining their values (by negotiation/consultation, competitive auction, or administrative decision). Furthermore, they vary by the timing or the

period of collection (initially, annually or as timber is cut.) and lastly by the purpose for which they are levied (as stumpage fees, royalties, reforestation fees, silvicultural fees, research fund contribution, public works charges etc.) (Gray 1983).

Likewise, forest charges in Africa can also be classified by the type of the forest ownership (public, community, or private}, by the type of the activity (production or harvesting of raw materials, conveyance, processing, or trade}. They can also be classified by the type of the forest product (woodfuel, industrial roundwood, processed wood product, non-wood product, or other products and services) and lastly by the type of the producer (commercial roundwood producer, subsistence roundwood producer, or non-wood forest producer).

In short, fiscal policies can have both positive and negative impacts on forest management. On the positive side, they can subsidise the production of social and environmental benefits (e.g. biodiversity and watershed protection) or penalise the production of undesirable outputs. However, on the negative side they can also have unintended effects which are detrimental to forest management.

1.3. THE PURPOSE AND SCOPE OF STUDY

One of the components of the EC-FAO Partnership programme on sustainable forest management in African ACP countries is the review and reform of forestry fiscal policies in Africa. To this effect a number of studies are commissioned to investigate the impacts of fiscal policies on sustainable forest management in Africa. This constitutes one of such studies, and its main purpose is to evaluate in quantitative terms the forestry fiscal policies in Africa, by examining the factors that might explain the different levels of charge collection and expenditure on forestry in different countries in Africa.

To achieve this, the study examined:

I. The annual percentage changes and interaction among the levels of production, charges, and revenue generation from industrial roundwood in the selected African countries.

II. Whether the amount of revenue collected, foreign funding, availability of forest funds, the gross domestic product (GDP), the level of forest cover and the population in the selected African countries has significant effect on government expenditure on forestry in Africa.

These investigations put together would enhance the assessment of the forestry fiscal policies in the selected African countries.

The scope of the work spans through 17 countries in Africa, selected out of the 28 that submitted country reports for the study. These 17 countries were selected on the basis that their reports contained adequate data on forest revenue, forest charges and expenditure within the specified period of time (1990-2000). These countries are: Benin, Burkina Faso, Burundi, Central African Republic, Côte d'Ivoire, Ethiopia, Gambia, Ghana, Guinea, Kenya, Madagascar, Malawi, Mauritius, Niger, Nigeria, Sudan, and Tanzania.

2. METHODOLOGY

2.1. SOURCES OF DATA

Twenty-eight country's reports were reviewed for extraction of relevant data on forest revenue, charges and expenditure. However the study made use of seventeen which are found to contain adequate required information on these variables. Data for industrial roundwood production for the period of time under consideration in the selected African countries were obtained from FAOSTAT- the FAO database. While data on the Gross Domestic Product (GDP), GDP deflator and Exchange rates of the selected countries were obtained from the International Monetary Fund's (IMF) and World Bank's websites. Other information sources include FAO's State of the World Forests (2001), and some other relevant literature.

2.2. ANALYTICAL PROCEDURE

The data in the country's reports were first collated to constitute a body of cross sectional and time series data and then segregated into various components of each of the variables under study. Thereafter appropriate conversions and calculations were made to get standard and uniform units for data analysis. This is very imperative since selected African countries studied are both Anglophone and Francophone with different currencies and measuring units within each and between the two groups. Statistical and econometric methods were then employed to carry out various aspects of the analysis.

2.3. STANDARDISATION TO CUBIC METER

Many of the Francophone countries in the selected countries gave their revenue and charges figure for industrial roundwood in such units as "*Un Madrier, Un Perche and*

Une Planche", which are units of measurements on their own, while some anglophone countries reported their figure in cubic feet (ft3). All these were appropriately converted to cubic meters using the following conversion factors:

Un Madrier =0.045m^3.

Un Perche=0.026m^3.

Une Planche=0.0216m^3

1 cubic foot=0.02832m^3

2.4. CONVERSION TO REAL VALUES

Calculating a real value of a sum in economics is also known as adjusting for inflation. In this study, this was done in two parts. First the nominal/current values of charges and revenue given in the country's reports were converted to real/constant values in their local currencies. Furthermore since an aspect of the analysis required standard currency, the charges and revenue figures were also converted to real US Dollar values as a uniform currency for modelling.

Thus Real Dollar value was obtained as:

i. **RDV= Xn*(GDb/GDn)/ERb...Equation** (1)

Where:

RDV= Real Dollar value

Xn= nominal or current value in local currency in the current Year

n= index of the current year in the period of years under study, which ranges from 1990 to 2000.

GDn=Gross Domestic Deflator in year n

GDb= Gross Domestic Deflator for the base year (which is 1999 in this case).

ERb=Exchange Rate for the base year.

The real value in local currency was also obtained as:

ii. RCV=Xn*(GDb/$GDn)...Equation (2)

Where:

RCV= Real Value in local Currency.

Other variables are as defined in Equation (1)

To calculate the Gross Domestic Product (GDP) Deflator:

iii. GDP Dn =NGDPn/RGDPn ...Equation (3)

Where

GDP Dn = Gross Domestic Deflator for the current year

NGDPn =Nominal GDP

RGDPn =Real GDP.

3. EFFICIENCY OF REVENUE COLLECTION ON INDUSTRIAL ROUNDWOOD PRODUCTION IN SELECTED AFRICAN COUNTRIES

In broad terms forest charges are several, varying in purpose, ease, cost and method of administration. Nonetheless forest charges in the general context, encompass all prices and tariff placed on the exploitation, utilisation, processing, transporting and exporting of forest goods and services. However because of the central importance of industrial roundwood production to sustainable forest management, being a principal forest revenue source for most developing countries, this section of the study would place major emphasis on such charges and revenue that have direct bearing with the volume of wood or the number of trees exploited for industrial roundwood production. This becomes very imperative since in many developing countries, production of industrial roundwood yields government revenues, export earnings, and a base for economic development through further processing (Gray 1983). In essence, any policy change on the fixing and collection of stumpage fees will substantially affect forest management as a whole. Furthermore, virtually all countries have some considerable volume of data on industrial roundwood production, which the FAOSTAT built upon. The situation is not the same for other forest products, thus their production statistics are mostly estimated by models. Hence data on industrial roundwood has been used in order to minimise the effect of error associated with estimation of data on the other forest products.

In this study, stumpage fees, forest fees and forest charges are used interchangeably. They refer to the sum of money that the owner of a standing tree used for industrial roundwood production will receive in exchange for surrendering ownership and the right of harvest of the wood resource.

3.1. TRENDS IN FOREST CHARGES AND REVENUE COLLECTION.

Changes in revenue generation are often affected by the interplay of three major factors, viz.: changes in charge levels, changes in production level / mix, and changes in the efficiency of revenue collection. Changes in each of these factors needs be examined, in order to assess their impact on the trends in forest revenue collection in

the selected African countries. Hence the procedures below were employed to calculate the annual percentage changes of each of the parameters.

i. ANNUAL PERCENTAGE CHANGES

Annual percentage changes were calculated for charges, revenue, and industrial roundwood production as:

C = ((Xb/Xa) ^ (1/c)-1)...Equation (4)

Where

C = Percentage Annual Change

Xb = Value in Year b

Xa = Value in Year a

c=b-a

ii. CHANGES IN EFFICIENCY OF REVENUE COLLECTION.

Changes in efficiency of revenue collection were estimated by dividing changes in revenue with the product of changes in the production of industrial roundwood and changes in charges. Thus:

ERC =Rir/(Cir*Pir)...Equation (5)

Where:

ERC = Efficiency in Revenue Collection

Rir = Changes in Revenue collected on Industrial Roundwood

Cir = Changes in Charges of Industrial Roundwood

Pir = Changes in Industrial Roundwood Production

The results of these procedures give rise to the table below.

Table 1: Impact of Production Levels and Prices of Industrial Roundwood on Revenue Collection in the Selected African Countries.

Country and time period		Changes in Industrial roundwood Production	Changes in Current Prices.	Changes in Real Prices	Changes in Current Revenue.	Changes in Real Revenue	Changes in Efficiency of Revenue Collection.
Benin	1996-2000	2%	0%	-9%	60%	45%	57%
Burkina Faso	1993-1999	5%	0%	-8%	0%	-8%	-5%
Burundi	1993-1999	22%	12%	-2%	55%	35%	13%
Central African Rep	1996-00	14%	0%	-6%	43%	35%	25%
Cote dÍvoire	1990-1999	-1%	5%	-4%	-9%	-16%	-12%
Cote d'Ivoire[1]	*1992-1999[1]*	*2%*	*7%*	*-5%*	*7%*	*-4%*	*-2%[b]*
Ethiopia	1993-1999	2%	20%	12%	76%	64%	44%
Ethiopia [1]	*1994-1999*	*0%*	*0%*	*-8%*	*5%*	*-3%*	*3%[b]*
Gambia	1995-2000	0%	90%	84%	26%	21%	-34%
Gambia[1]	*1996-2000*	*0%*	*9%*	*5%*	*4%*	*0%*	*-5%[b]*
Ghana	1990-1999	-2%	59%	25%	40%	11%	-10%
Guinea	1994-2000	1%	8%	4%	164%	152%	142%
Kenya	1995-1999	1%	1%	-11%	-19%	-28%	-21%
Madagascar	1998-2000	-10%	0%	-18%	89%	55%	110%
Malawi	1990-1999	2%	4%	-20%	21%	-8%	14%
Mauritius	1996-1999	16%	7%	-8%	9%	0%	-12%
Niger	1992-1999	3%	0%	-7%	7%	-1%	4%
Nigeria	1991-1999	2%	1%	-29%	11%	-22%	8%
Sudan	1997-2000	2%	42%	-31%	24%	-36%	-14%
Tanzania	1990-1999	2%	18%	-11%	37%	4%	14%

Table 1 above shows the average annual changes in production levels, charges, revenue collection and efficiency of revenue collection on industrial roundwood in the selected African countries. The first column shows the countries with the respective period of time in which their countries' reports possess adequate data on the required variables. The second column shows the annual changes in industrial roundwood production in each of these countries. Data on industrial roundwood production was extracted from FAOSTAT database.

[1] countries that contain data outliers in some years

[b] changes less the years that contain data outliers

In this context, industrial roundwood encompasses saw and veneer logs, pulpwood, and poles. Apart from Côte d'Ivoire (-1%), Ghana (-2%), and Madagascar (-10%), all the other countries recorded increase in their industrial roundwood production. However, annual production changes in Burundi (22%), Central African Republic (14%), and Mauritius (16%) are impressive, moreso that none of the other countries recorded more than 5% change in their annual production over the considered period of time.

The next two columns reveal the annual changes in forest charges at both the current and real prices. Real price average charges have been adjusted for inflation by dividing them with the GDP deflator for each country, using 1999 as the base year. Consideration for inflation is very important in sustainable forest management, because during inflation the value of a current stumpage fee will be worth less in the later years. Inflation effect becomes more pronounced as the inflation rate increases, as can be observed in columns two to four in the above table.

As expected the annual changes in real prices of forest charges is lower compared to the changes in current prices in all the countries studied. However, forest prices are worst hit by inflation effect in Sudan, Ghana, Nigeria, Tanzania, and Malawi which recorded 73%, 34%, 30%, 29% and 25% differences respectively between the average annual changes in their current and real forest charges within the studied period of time. Madagascar, Mauritius, Burundi, closely follows these and Kenya, which had 18% 15% 14% and 12%, differences respectively. Other countries recorded less than 10% differences between the current and real prices of their forest charges. These differences are equal to the average rate of inflation in each country.

Grut, Gray and Egli (1991) and Gray (1997) gave a vivid illustration of the effect of even a modest inflation rate of 5% per year on legislatively set forest fees revised once in every 10 years. According to them, such fees would shrink in real terms to almost half (54%) of their original level. Reviewing such fees proportionately means it would have to be almost doubled just to get back to their previous real value, not to talk about increasing the fees

The magnitude of these differences makes the practical feasibility of proportionate review of these forest fees to its real present value dwindling, if we take into

cognisance the likely attendant outcries from the forest industry. In this case the forest managers might be forced at best to prevent only a fraction of further revenue loss. Thus inadequate and infrequent review of forest fees does not only bring loss in current revenue, but also prevent proportionate adjustment once it has not been reviewed for a considerable long time

From these trends, it is obvious that administration of forest revenue systems need to bear it in mind, that it is not only sufficient to review forest charges regularly, but also of paramount importance to make provision for effect of inflation when setting or reviewing forest charges. For instance, forest charges were not reviewed at all throughout the studied period of time in Benin, Burkina Faso, Central Africa Republic, Madagascar and Niger. Even in countries like Burundi, Côte dívoire, Kenya, Malawi, Mauritius, Nigeria, and Sudan where forest charges were reviewed, the changes are not substantial enough to overcome the effect of inflation.

Apart from Ethiopia, Gambia, Ghana, Sudan and Tanzania, which had more than 20% increase in their nominal forest charges during the period of study, all other countries actually recorded less than 10% increase in their nominal forest charges. In the case of Ethiopia and Gambia, the changes are as a matter of fact informed by the sudden and astronomical review of their nominal charges. For instance Ethiopia reviewed their charges from 35 Birr in 1993 to107 Birr in 1994 up till 2000, while Gambia reviewed from 23(Dalasis) in 1995 to 420(Dalasis) in 1996 and then to 585 in 2000. In these cases, if their base years for analysis are shifted from 1993 to 1994, and from 1995 to 1996 for Ethiopia and Gambia respectively, the actual change in their nominal forest charges will be 0% and 9% respectively, while changes in the real prices will be –8% and 5% respectively for Ethiopia and Gambia. (See the italicised figures in the table).

From the foregoing, only Ghana and Tanzania can be said to review their forest charges once in almost every two years. But more importantly, only three countries: Gambia, Ghana and Guinea representing 17.65% of the selected countries, have increased changes in their charges in real terms throughout the period of study. Irregular review of forest charges is tantamount to underpricing, since it makes the forest resources far cheaper relative to other items in the economy. This portends gross adverse implication for sustainable forestry management, as it encourages waste and under utilization of the forest resources. In addition, it will equally reduce the revenue collectable on forestry and ultimately reduce available funds for forestry development.

Furthermore, the annual average changes in total current and real revenue collected in each of these African countries are shown in the third and fourth column of the table. Asides Burkina Faso which did not record any change in its current revenue, and then Côte d'Ivoire and Kenya which had negative average annual changes in their current revenue (-9%and –19% respectively), all other countries studied recorded increased changes in their current revenue over the studied period of time.

However, Benin, Central African Republic, and Madagascar present very impressive performance, recording tremendous increased changes (60%, 43%, 89% respectively) in their current revenue, despite zero percent change in their current charges. Niger's performance too is worthy of mention in this regard, although the change (7%) is not as high as the aforementioned countries. The case of decreased annual changes in revenue collection in Côte d'Ivoire can be explained by the fall in its production by 1%, but Kenya presents a somewhat unusual situation, since it recorded increased though small changes in both its production and charges.

As can be observed from the table changes in revenue collected from industrial roundwood production in the African countries can be grouped into four categories. The first group which comprises those with tremendous increased changes include: Benin (60%), Burundi (55%), Central African Republic (43%), Ethiopia (76), Ghana (40%), Guinea (164%) and Madagascar (89%). The second group is made up of those with medium changes, comprising Gambia (26%), Malawi (21%), Sudan (24%), and Tanzania (37%) follow this. The third group consists of those countries with little changes (being less than 20%). Included in this category are Mauritius (9%), Niger (7%), and Nigeria (11%). The last group consists of the countries previously mentioned with decreased or no annual changes in revenue collection.

Apparently, out of the seventeen countries studied, seven or 41.18% had more than 40% annual changes in their revenue collection, four or 23.53% had more than 20% changes, three or 17.65% had less than 20% changes, one or 5.88% had no change at all while two or 11.76% recorded decreased changes.

In all, 82.36% of the countries studied recorded increased nominal revenue over the period of time considered. Be that as it may, the question that arises is whether this increased revenue are substantial enough in real terms to make any significant impact on forestry development, taking into consideration the level of inflation and the continuos downward plunge in the value of currencies in many African countries.

Increased revenue will ordinarily suggest an improvement or some sort of efficiency in charge collection. However, a cursory look at the increased trends of revenue will not be sufficient to assess the efficiency of revenue collection. Revenue collection can increase as a result of many factors acting severally and collectively. For instance, revenue from production of industrial roundwood can change because of either changes in production, or price/charge of the product.

In addition, the ease and cost of administering the charges, the incentives given to charge collectors, as well as the product mix i.e. whether emphasis of production is placed on highly priced product, can equally contribute to revenue changes. Therefore, the last column in the table shows the changes in the efficiency of revenue collection on industrial roundwood production. This is an index of the improvement in revenue collection over time. It seeks to establish the proportion of the changes in revenue from industrial roundwood production that can be jointly attributed to changes in the charges and production, and the other factors mentioned above.

Looking at this column one can see that efficiency in revenue collection diminished in seven or 41.18% of the seventeen countries studied. These include Burkina Faso (-5%), Côte d'Ivoire (-12%), Gambia (-34%), Ghana (-10%), Kenya (-21%), Mauritius (-12%) and Sudan (-14%). In these countries, the changes in revenue collected can not fully account for the joint changes in charges and production. For instance, the impact of a 5% production increase could not be accounted for in Burkina Faso's constant revenue generated over this period of time. Also in Côte d'Ivoire, the 9% decrease in the revenue collected far outweighs the 1% reduction in production, moreso that the charges had a 5% increase in this same period of time.

Likewise in Ghana, the 40% change in revenue collection can not fully account for 59% increased changes in the charge for industrial roundwood. The real situation of Gambia will be better appreciated if the period of study for this country is taken to cover between 1996-2000,as earlier done above. In this case the change in the current price and revenue collected on industrial roundwood are 9% and 4% respectively. Consequently, its change in efficiency becomes 5%, which is a completely different situation from the present. Kenya, Mauritius and Sudan present worst cases of having increased changes of both the production and charges, and yet recorded lower relative changes in revenue. The above trend indicates low fees collection, which may be due to tax evasion or lack of incentives for optimum revenue drive. The effect of forest

fees evasion is not limited to the huge loss of revenue, but also prevents the opportunity to use forest fees as incentives in forest management or conservation.

On the other hand, ten or 58.82 % of the selected countries studied recorded increased changes in efficiency of revenue collection. These comprise Benin, Burundi, Central African Republic, Ethiopia, Guinea, Madagascar, Malawi, Niger, Nigeria, and Tanzania. Benin, Guinea and Niger have exemplary performance in this case. In these countries, little or no increase in either or both production and charges has unexpectedly brought about huge changes in revenue collected. A more impressive case is that of Madagascar where the production reduced by 10% and the charge did not change within the period of study, but which however recorded 89% increase in revenue collection. The other factors affecting revenue collection are of crucial importance when we look at the countries that have increased changes in revenue collection. This simply means that in these countries, the changes in revenue collected from industrial roundwood is greater than the joint changes in production and charges on industrial roundwood. In such a case, the effects of such factors like the ease and cost of charge administration, motivations or incentives given to charge administrators, as well as level of corruption or commitment on the part of charge administrators become very apparent.

The available data did not give enough information about countries product mix. However, the available information indicates differential pricing of some species in most of the countries, where different species are charged differently, with prices presumably responding to market forces. Therefore, product mix might be one of the factors responsible for these increases at least in some of the studied countries. Regardless of the above mentioned factors, greater efficiency in revenue generation calls for regular and appropriate review of current prices of forest charges in order to compensate for inflation, even though this has to be in conjunction with all these factors.

In summary, this result reveals that Guinea (142%), Madagascar (110%), Benin (57%), Ethiopia ((44%), and Central African Republic (25%), which represent 29.4% of the countries studied, have improved tremendously in their revenue collection while another 29 .4% comprising Malawi (14%) Tanzania (14%) Burundi1 (13%), Nigeria (8%) and Niger (4%) have fairly improved their revenue collection. Thus a total of about 60% have somehow improved their revenue collection while the remaining 40% encompassing Burkina Faso (-5%), Côte d'Ivoire, (-12%), Ghana

(-10%), Kenya (-21%), Mauritius (-12%) and Sudan (-14%), have been inefficient in their revenue collection.

The Table (2) below link the different changes in revenue collection and efficiency of revenue collection.

Table 2: SUMMARY OF IMPROVEMENTS IN REVENUE COLLECTION BY COUNTRY

	Efficiency has Fallen	**Efficiency has Increased**
Real Revenue Collection has fallen	Burkina Faso: -8%, -5% Côte dÍvoire: -16%, -12% Kenya: --28%, -21% Sudan: -36%, -14%	Malawi: -8%, 14% Niger: -1%, +4% Nigeria: -22%, +8%
Real Revenue Collection has increased	Gambia: +21%, -34% Ghana: +11%, -10% Mauritius: +0%, -12%	Benin : +45%, +57% Burundi : +35%, +13% CAR : +35%, +25% Ethiopia : +64%, + 44% Guinea : +152%, + 142% Madagascar :+55%, +110% Tanzania : +4%, +14%

COMPARATIVE ANALYSIS OF EXPECTED AND ACTUAL FOREST REVENUE COLLECTED IN THE SELECTED AFRICAN COUNTRIES.

One other way to assess efficiency in revenue collection is to examine the proportion of the expected revenue that is being actually collected at a point in time. This can be used in estimating the amount of revenue that is being lost annually by the forestry sectors in the selected countries. While changes in efficiency of revenue collection previously discussed measured the rate and direction of changes in revenue collection with respect to rate and direction of changes in industrial roundwood prices and quantity produced, comparative analysis of expected and actual revenue collected on the other hand, looks at the differences between what is collected and what should be collected at any point in time. In essence, the former measures efficiency of revenue collection in relative terms, while the latter measures it in absolute terms.

Expected annual revenue can be estimated as the product of the average price per cubic meter of industrial roundwood and quantity produced per annum. Thus, data on

average price per cubic meter, and actual annual revenue collected were obtained from the country's reports. Average price per cubic meter was obtained by calculating the average of stumpage fees of the different species as given in the country's reports. In this regard, weighted average was used in the cases where there the range in the prices of species is differential pricing according to species, and where the range of prices of species involved is too wide. Weighted average was also obtained by considering the proportion of contribution of each species into the total production. Data for total annual industrial roundwood production was obtained from FAOSTAT, which serves as a uniform and standard database for all the countries.

This becomes very imperative since virtually none of the country's reports contained production data on industrial roundwood. However, one might want to ask if all the quantity of industrial roundwood produced should be charged and thus be used in the estimation of expected revenue. In answering this question, cognisance has to be taken of the main essence and the economic importance of industrial roundwood production. And since the primary essence of its production is to improve the economic wellbeing of the nation, then all the quantity produced should be charged, more so that its production is a main source of income for the forestry sector in many developing countries. Table 3 below shows the proportion of the expected revenue that are actually collected on industrial roundwood, over the studied period of years in the selected African countries

This table reveals that ten countries representing 58.82% and comprising Benin (3%), Burkina Faso (3%), Burundi (1%), Ethiopia (2%), Gambia (10%), Guinea (4%), Malawi (3%), Niger (3%) Nigeria (1%), and Tanzania (10%), collected on the average 10% or less of the revenue expected from industrial roundwood production. Furthermore, Central African Republic, Ghana and Kenya collected 22%, 38% and 30% respectively of the expected revenue from industrial roundwood production, while Côte d'Ivoire, Madagascar, Mauritius, and Sudan collected 113%, 59%, 107%, and 114% respectively of the expected revenue from industrial roundwood production.

The above result presents two extremes, where at one end are the countries which collected incredibly low proportion of expected revenue, and at the other end are countries that collected extremely high proportion of the expected revenue, in the middle are the countries with moderate performance. This may have to do with under or over estimation of industrial roundwood production in the FAOSTAT for these

countries. Hence a sensitivity analysis will have to be carried out to make provision for probable problem of erroneous estimation.

The result further shows that three countries; Côte d'Ivoire, Mauritius, and Sudan collected over 100% of the expected revenue which is practically impossible. However, the reason for this might be due to overlapping of revenue accounts, where the part of the revenue in the previous year is added to the present year due to delayed payment in situations where payments are paid after the trees must have been exploited. It may also be due to delay in remitting revenue from the field/ zonal forest officers, in situations where revenue is collected in various zonal offices.

Be that as it may, a more realistic result will be achieved if the years with extreme figures are disregarded. For instance, Côte dÍvoire will have collected 80.10%, if the base year of consideration is moved to 1992. Also, disregarding the first two years with extreme figures in Mauritius will equally make its base year to shift to 1998, and it would show that it has collected 83% of the expected revenue. In this same manner, Sudan will have collected 97% of its expected revenue, if the value for 1997 is disregarded. The same goes for Madagascar, which will have actually collected 30% if the extreme value for year 2000 is disregarded. With this adjustment, three countries will now have collected between 30%-40% of their expected revenue, while another three will have collected between 80%-100% of their expected revenue.

SENSITIVITY ANALYSIS FOR EXPECTED FOREST REVENUE COLLECTED IN SELECTED AFRICAN COUNTRIES.

Out of all the selected countries, Côte d'Ivoire is the only country whose report contained data on its industrial roundwood production. This data was used to compare with the FAOSTAT data on industrial roundwood production and it was found out that FAOSTAT figure was 20% less than the production figure quoted by Côte d'Ivoire. Since underestimation of production will result in underestimation of the theoretical or expected revenue, which will result in actual revenue collected being far greater than the expected revenue. In effect, the estimated percentage of expected revenue actually collected could be extremely high, as it's being observed in some of the countries studied, especially Côte d'Ivoire. Overestimation of production will have exactly opposite effect of underestimation. Based on this, it is assumed that production figures for industrial roundwood production in the FAOSTAT, might have been either over estimated for countries which according to the result collected very

low proportion of expected revenue, or on the other hand, under estimated for countries which collected extremely high proportion of the expected revenue. A sensitivity analysis is then carried out to investigate possible significant differences in the result obtained.

Therefore, based on the difference between FAOSTAT and Côte d'Ivoire production figures, the FAOSTAT production figure for industrial roundwood for these selected African countries is adjusted downward by 20%, for countries which the previous analysis showed to have collected less than 50% of their expected revenue. Similarly, the production statistics were adjusted upwardly for those that were shown to have collected more than 50% of the expected revenue.

The italicised figures in Table3 are the estimated expected revenue and percentage of expected revenue actually collected after adjustment for under or over estimation of industrial roundwood production in the selected African countries. Apparently, the adjustment has made significant impact on the result of those countries with extremely high percentage of expected revenue actually collected Consequently, Côte d'Ivoire dropped from 113% to 95%, Mauritius from107% to 89%, and Sudan from 114% to 95%. Even though the results obtained after the adjustment are still relatively high, they appeared more realistic, than the previous result, which suggested that these countries actually collected more revenue than theoretically achievable. The present high estimate suggests that these countries actually collected almost the maximum revenue possible from their industrial roundwood production.

The foregoing notwithstanding, overall efficiency in forest revenue collection within the context of this study will be assessed by the combination of these two indices of efficiency. In this regard, the trend in the distribution of proportion of expected revenue actually collected in the selected African countries does not significantly differ after the adjustment from the situation before the adjustment except for a swap, wherein Ghana moved from 38% to 51% and Madagascar dropped from 59% to 49%. Therefore, the number of countries whose results showed to have actually collected less/more than 50% of the expected revenue remained the same after adjustment.

Several reasons could be responsible for marked differences between the expected and actual revenue collected. In the first instance, FAOSTAT statistics on industrial roundwood is largely estimated and might not adequately represent the actual production in some countries. Hence, there might be an overestimation of the expected revenue in countries where substantial portion of their industrial roundwood

production is in these other industrial roundwood. In essence the FAOSTAT might not represent appropriate production mix of some countries. Secondly, since revenue generated from private forestry does not go into government purse, there could be a problem of overestimation of the expected revenue in countries with considerable amount of private forestry. This will be attributable to the fact that FAOSTAT production statistics on industrial roundwood, on which the estimated expected revenue was based, comprises total industrial roundwood produced from both the public and private forests. Meanwhile the actual revenue presented is on industrial roundwood produced from the public forests. With this background, the results can be taken as an idea of magnitude or range rather than exact value.

Be that as it may, it is nonetheless very important in view of the incredibly great differences observed between the expected and actual revenues in most of the selected African countries, to critically examine and completely overhaul the forest revenue systems in these countries. It might be difficult to excuse 80-95% shortfall in the expected revenue, on under/ overestimation of production figures, or product mix. This notwithstanding, It is still very imperative to examine how well each of the countries has performed in revenue collection over the period of time, using the two indicators of efficiency in revenue collection.

According to the first indicator, which measures changes in the efficiency of revenue collection, Benin's forest revenue collection improved over the period of time under consideration, since its changes in revenue was more than the combined changes in the price and production of its industrial roundwood. However, looking at the second indicator reveals that despite the overwhelming increased changes (60%) in revenue collected and consequently significant changes (57%) in the efficiency of revenue collection, Benin only collected 3-4% of what it is expected to collect over this period of time. Thus, the overall efficiency of forest revenue collection in Benin is negative.

The same for Burundi, Ethiopia, Guinea, Malawi, and Tanzania which also have overwhelming increased changes of 55%, 76%, 164%, 21%, and 37% respectively in their forest revenue collected over the period of time, and subsequently significant changes of 13%, 44%, 142%, 14%, and 14% respectively in efficiency of revenue collection. These countries nevertheless collected less than 15% (post adjustment) of the expected forest revenue over the considered period of time. As a matter of fact, with the exception of Tanzania the other countries in this group collected less than 5% each of the expected forest revenue.

Although Nigeria and Niger Republic did not record as much changes in their revenue collection-11% and 7% respectively, and also in their efficiency of revenue collection (8% and 4% respectively), nevertheless they also collected less than 5% of the expected revenue. Burkina Faso and Gambia had a woeful performance with both indicators of efficiency.

Despite low progressive improvement in their revenue collection, Côte d'Ivoire, Mauritius, and Sudan, still collected very high (95%, 89%, and 95% respectively) proportion of their expected forest revenue for the studied period of time. Also, Ghana, Kenya, and Madagascar which have similar cases collected on the average about half (51%, 37%, and 59% respectively) of their expected forest revenue for the considered period of time.

In summary, Central African Republic is the only country that performed moderately well in the two indices of efficiency of revenue collection. This country has 25% changes in efficiency of revenue collection the first index that measures progressive improvement, and equally collected 22% (27%- post adjusted) of the expected revenue. None of the remaining sixteen African countries studied performed creditably well in the two indices of efficiency of forest revenue collection used for assessment. However, the following countries: Côte d'Ivoire, Mauritius, Sudan which collected between 80% and 95% of the expected on industrial roundwood can be said to be very efficient, while Kenya, Ghana, and Madagascar, which collected between 35% and 60% of the expected revenue on industrial roundwood production, can be said to be fairly efficient, based on the available data.

Table 3: ACTUAL REVENUE COLLECTED IN RELATION TO EXPECTED REVENUE FROM INDUSTRIAL ROUNDWOOD PRODUCTION IN THE SELECTED AFRICAN COUNTRIES. (IN MILLION)

	YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average
													Percentage
Benin	Production	274000	300000	296000	303000	310000	300000	304000	315000	326000	332000	332000	
	Actual Revenue							3	18	17	19	22	
	Expected revenue							459	476	492	501	501	
	%							0.7	3.8	3.4	3.7	4.4	3
	Expected Revenue:Adj							***367.36***	***380.65***	***393.94***	***401.19***	***401.19***	
	% : Adj							***0.93***	***4.75***	***4.21***	***4.65***	***5.51***	***4***
Burkina Faso	Production	399400	410400	421400	433400	449400	462500	475000	490000	500600	592000	594000	
	Actual Revenue				45.31	45.31	45.31	45.31	45.31	45.31	45.31		
	Expected				1589	1648	1696	1742	1797	1836	2171	2178	
	%				2.85	2.75	2.67	2.60	2.52	2.47	2.09		3
	Expected Revenue:Adj				***1271***	***1318***	***1357***	***1393***	***1437***	***1468***	***1737***	***1742***	
	% : Adj				***3.56***	***3.44***	***3.34***	***3.25%***	***3.15***	***3.09***	***2.61***		***3***

Table 3 continues:

Burundi	Production	48700	52200	53200	96750	106900	114500	111500	145000	291000	326000	333000	
	Actual Revenue				0.63	0.90	1.34	0.27	3.03	6.33	8.74	23.49	
	Expected Revenue				205	86	204	223	622	1247	1398	1428	
	%				0.31	1.05	0.66	0.12	0.49	0.51	0.63	1.65	1
	Expected Revenue: Adj				***164***	***68***	***153***	***178***	***497***	***998***	***1118***	***1142***	
	%:Adj				***0.38***	***1.32***	***0.82***	***0.15***	***0.61***	***0.63***	***0.78***	***2.06***	***1***
Central African Republic	Production	425000	379000	484000	441000	578000	611000	596000	758000	831000	861000	1011000	
	Actual Revenue							869	1723	2475	3041	3660	
	Expected Revenue							7652	9732	10670	11055	12981	
	%							11.35	17.70	23.20	27.51	28.19	22
	Expected Revenue: Adj							***6122***	***7786***	***8536***	***8844***	***10385***	
	%:Adj							***14.19***	***22.13***	***29***	***34.39***	***28.19***	***27***
Cote d'Ivoire	Production	3548000	2977000	2777000	2770000	3248000	3150000	2952000	2941000	3146000	3138000	3416000	
	Actual Revenue	5193	4466	1423	1379	1796	1605	2178	2354	2407	2311		
	Expected Revenue	2129	1786	1666	1662	1949	2940	2755	2745	2936	2929	3188	
	%	244	250	85	83	92	55	79	86	82	79		113
	Expected Revenue: Adj.	***2555***	***2143***	***1999***	***1994***	***2339***	***3528***	***3306***	***3294***	***3524***	***3515***	***3826***	
	%:Adj	***203***	***208***	***71***	***69***	***77***	***46***	***66***	***71***	***68***	***66***		***95***

Table 3 continues:

Ethiopia	Production				2145000	2219000	2295800	2430000	2397800	2397300	2461600	2459000	
	Actual Revenue				0.23	5.51	7.00	5.84	4.84	5.85	7.04	5.07	
	Expected Revenue				75	238	246	260	257	257	263	263	
	%				0.31	2.31	2.84	2.25	1.89	2.28	2.67		2
	Expected Revenue: Adj				***60.06***	***190.54***	***197.13***	***208..01***	***205.25***	***205.21***	***210.71***	***210.49***	
	%:Adj				***0.39***	***2.89***	***3.55***	***2.81***	***2.36***	***2.85***	***3.34***	***2.41***	***3***
Gambia	Production	66600	81600	96600	109700	112700	112700	112700	112700	112700	112700	112700	
	Actual Revenue						0.90	2.44	2.17	2.57	2.63	2.82	
	Expected Revenue						2.63	47.33	47.33	47.33	47.33	65.93	
	%						34	5	5	5	6	4	10
	Expected Revenue: Adj						***2.10***	***37.87***	***37.87***	***37.87***	***37.987***	***37.87***	
	%:Adj						***43***	***6***	***6***	***7***	***7***	***5***	***12***
Ghana	Production	1440000	1379000	1300000	1832000	1864000	1283000	1255000	1278000	1227000	1191000	1087000	
	Actual Revenue	781	496	490	1463	2178	4004	8545	8750	11326	15887	6008	
	Expected Revenue	1585	1518	6052	8528	17827	12271	12003	12223	11735	82916	75675	
	%	49	33	8	17	12	33	71	72	97	19		38
	Expected Revenue: Adj	***1268***	***1215***	***4841***	***6823***	***14262***	***9816***	***9602***	***9778***	***9388***	***66332***	***60540***	
	%:Adj	***62***	***41***	***10***	***21***	***15***	***41***	***89***	***89***	***121***	***24***	***10***	***51***

Table 3 continues:

Guinea	Production	541000	560000	582000	604000	624000	669000	677000	671000	650000	651000	651000	
	Actual Revenue					2.39	3.54	8.99	33.43	53.49	790.89	816.45	
	Expected Revenue					3952	4237	6860	6799	6587	6597	6597	
	%					0.06	0.08	0.13	0.49	0.81	11.9	12.38	4
	Expected Revenue: Adj					***3162***	***3390***	***5488***	***5440***	***5269***	***5277***	***5277***	
	%:Adj					***0.08***	***0.10***	***0.16***	***0.61***	***1.02***	***14.99***	***15.47***	***5***
Kenya	Production						1887000	1912000	1935000	1956000	1977000	1977000	
	Actual Revenue						191.99	187.58	181.76	178.32	156.99	81.85	
	Expected Revenue						587	595	602	628	635		
	%						33	32	30	28	25		30
	Expected Revenue: Adj						***469.49***	***475.71***	***481.43***	***502.30***	***507.69***		
	%:Adj						***41***	***39***	***38***	***36***	***31***		***37***
Madagascar	Production	807000	807000	807000	617000	466000	433500	381000	373000	115000	115000	93000	
	Actual Revenue									589	748	2112	
	Expected Revenue									2232	2232	1805	
	%									26	34	117	59
	Expected Revenue: Adj									***2678.72***	***2678.72***	***2166.27***	
	%:Adj									***22***	***28***	***97***	***49***

Table 3 continues

Malawi	Production	422000	429000	476000	481000	481000	484000	490000	499000	509000	520000	520000	
	Actual Revenue	0.89	1.13	1.22	0.94	1.07	3.71	4.04	3.38	4.85	4.85		
	Expected Revenue	53	54	60	60	60	61	86	88	90	92		
	%	2	2	2	2	2	6	5	4	5	5		3
	Expected Revenue: Adj	***42***	***43***	***48***	***48***	***48***	***49***	***69***	***70***	***72***	***73***		
	%:Adj	***2***	***3***	***3***	***2***	***2***	***8***	***6***	***5***	***7***	***7***		***4***
Mauritius	Production	11100	14100	12450	12750	10800	6190	8260	8260	12000	13000	13000	
	Actual Revenue							**5**	**5**	**6**	**6**	**5**	
	Expected Revenue							4	4	6	8	8	
	%							121	127	100	81	68	107
	Expected Revenue: Adj							***4.84***	***4.83***	***7.30***	***9.28***	***9.32***	
	%:Adj							***101***	***106***	***83***	***67***	***57***	***89***
Niger	Production	306000	316000	327000	338000	350000	362000	374000	386000	399000	411000	411000	r
	Actual Revenue			79	132	140	168	164	124	134	126	128	
	Expected Revenue			4660	4817	4988	5159	5330	5501	5686	5857	5857	
	%			2	3	3	3	3	2	2	2	2	3
	Expected Revenue: Adj			***3727.8***	***3853.2***	***3990***	***4126.8***	***4263.6***	***4400.4***	***4548.6***	***4685.4***	***4685.4***	
	%:Adj			***2***	***3***	***4***	***4***	***4***	***3***	***3***	***3***	***3***	***3***

Table 3 continues

Nigeria	Production	8263000	8263000	8263000	8263000	8263000	8263000	8479000	9079000	9418000	9418000	9418000	
	Actual Revenue		108	91	93	142	197	158	309	270	247		
	Expected Revenue		15188	15188	16923	16923	16923	17365	18594	19288	19288		
	%		0.71	0.60	0.55	0.84	1.16	0.91	1.66	1.40	1.28		1
	Expected Revenue:		***12150***	***12150***	***13538***	***13538***	***13538***	***13892***	***14875***	***15431***	***15431***	***18783***	
	%:Adj		***0.88***	***0.75***	***0.68***	***1.05***	***1.45***	***1.14***	***2.08***	***1.75***	***1.60***		***1***
Sudan	Production	1809000	1749000	1784000	1820000	1962000	1999000	2038000	2077000	2131000	2173000	2173000	
	Actual Revenue								340	282	417	645	
	Expected Revenue								203	407	365	606	
	%								167	69	114	107	114
	Expected Revenue: Adj								***243.88***	***488.25***	***438.49***	***726.95***	
	%:Adj								***139***	***58***	***95***	***89***	***95***
Tanzania	Production	1946000	1988000	2269000	2168000	2131000	2173000	2211000	2246000	2280000	2314000	2314000	
	actual Revenue	117	180	197	247	475	823	962	1528	1734	2049	2386	
	Expected Revenue	4048	4135	2650	2532	2695	2748	19744	20057	20360	20664	64389	
	%	3	4	7	10	18	30	5	8	9	10		10
	Expected Revenue: Adj	***3328***	***3308***	***2120***	***2026***	***2156***	***2199***	***15795***	***16045***	***16288***	***16531***	***51511***	
	%:Adj	***4***	***5***	***9***	***12***	***22***	***37***	***6***	***10***	***11***	***12***	***5***	***13***

EXPENDITURE MODEL

Changes in government or domestic expenditure in forestry can be severally and collectively affected by many factors. For instance the levels and changes in revenue generated from forestry can serve as incentives for more spending on forestry, so as to consolidate or enhance the levels of revenue generation. So also can donor funding in terms of grants aids, and loans, affect expenditure by stimulating the government to spend more on funding through counterpart funding. In the other hand serve as incentive for government to reduce domestic expenditure on forestry development so as to put such saved funds in other areas of perceived urgent domestic needs. The gross domestic product (GDP) of a country, which indicates how rich an economy is can also determine how much the government will spend on forestry development. in this case, it is expected that all things being equal, countries with high GDP will spend more on forestry development.

Similarly, the establishment of special accounts or funds dedicated to forestry development has been argued to have great potential to contribute to domestic expenditure in forestry development in Africa. The idea is that revenue collected can be put in such accounts for the use of forestry development whenever the needs arise. This will guarantee availability of adequate and timely release of funds for forestry development. It is believed that such funds will not be readily available for other uses apart from forestry development, since its establishment will have incorporated some high level control on the flow of funds in and out of the account.

According to Rosenbaum and Lindsay (2001), national forest funds in their most basic forms are designed to set aside a portion of national revenues for forestry purposes. Usually they exist for more than a single government budget cycle, segregating specific forestry-related revenues and earmarking them for investment in the forest sector. Income sources for forest funds may be from general government revenues, sales from government forests, forest-related taxes, forest law enforcement, donations, fund-supported projects, loans and innovative fees tied to forest environmental services.

The uses of forest funds in forestry development are varied and several. They include supporting general administration of the forest bureaucracy, management of public lands, market promotion, research, public education, insect and disease control, and fire fighting. Forest funds may also be used to support public participation in government forest policy, private or community forestry projects, or even finance

reforestation and afforestation, management planning, and plan implementation. They can also be used to promote non- commodity use of forests, such as production of environmental services.

The main advantages of forest funds include meeting the needs for long-term investment. This is very crucial to sustainable forestry development, which requires long planning horizons and rotation period. Furthermore, forest funds can shield the forestry sector against the fluctuations and unpredictability of national budgets by serving as insulators for forestry programmes from changing political winds. Forest funds can also help stimulate more effective forest management by government agencies, by creating a pool of money that will not be forfeit if unspent at the end of a budget cycle. This will enhance more efficient spending and better planning.

Lastly, forest funds can make bureaucracies more accountable, since their establishment entails the creation of dedicated accounts, setting up of record keeping requirements, and independent auditing.

The population of a country can also affect the amount of money spent on forestry development in either of two ways. First, in the countries where the government provides or highly subsidizes social services like education and primary healthcare, high population implies bigger sectoral budget allocation for education and health, to cater for the increasing number of citizens that will go to school and receive medical care. Invariably the amount of money that will be left for other sectors of the economy will be reduced. This can have gross adverse effects on expenditure on forestry development, especially if the political equation at that point in time does not feature forestry development as priority.

On the other hand, high population can increase the consumption of forest goods and services. The type of goods that will be affected in this case will depend on the economy is growing or receding. In a growing economy, consumption of all categories of industrial roundwood will likely increase, so as to cater for housing and other forms of construction needs of the people. Whereas in countries with economic recession, the impacts of population growth will be felt more on forest goods like fuelwood, fruits and other forms of foods available in the forests, medicinal plants etc. Whichever way is the direction of economic growth, population increase will put pressure on the forest and this might force the government to spend more on forestry development. Either as an effort to meet the needs of the rising population or for

abatement of forest's degradation resulting from the pressure of the teeming population on the forests.

In like manner, the extent of forest cover in a country can also affect the amount of money spent on forestry development. Although the total forest cover in the country does not directly mean the total forest under management, particularly in Africa where active forest management is primarily focused on the protected area which often is a small part of the total forest cover of the country. However, countries with low forest cover or endowment may spend more on forestry development in order to increase their forest cover. This can be very important in arid and semi arid areas where forest goods and services like firewood, fruits. Medicinal plants, fodder, shelterbelts etc, are in high demand for the day to day need of the population.

With this background, a model was specified:

i. To examine the most important factors among forest revenue, GDP, Population, Forest cover and Donor funding affecting government expenditure in forestry in the selected African countries.
ii. To test the hypothesis of a link between forest revenue collection and government expenditure in forestry in the selected African countries.
iii. To investigate the possible effect of forest funds on the link between forest revenue and government expenditure in forestry in the selected African countries.
iv. To investigate the possibility of donor funding being "Fungible" in the selected African countries.

THE MODEL

Based on exploratory data analysis (EDA), the model for the study was specified as:

$$LnE_d = Ln\mathbf{a} + B_1LnR + B_2LnDF + B_3LnGDP + B_4LnP + B_5LnFC + B_6TFLnR + Ln\mathbf{e} \quad ...(6)$$

Where: E_d =Domestic Expenditure on Forestry.

R = Revenue collected in Real US$ value

DF = Donor Funding in Real US$ value

GDP = Gross Domestic Product in Real US$ value

P = Population

FC = Forest Cover

TFLnR = The Product of the Dummied Forest Trust Fund and Logarithm of Revenue

$\mathbf{e}$ = Error Term

Ln = Natural Logarithm

a = intercept

$B_1 ... B_6$ = Regression Coefficients

All the variables in this model with the exception of forest trust fund which is a dummy variable, were log transformed to remove or reduce as much as possible their skewness, having investigated the nature of their distribution through exploratory univariate analysis.

RESULTS OF THE MODEL

The results of the model are summarised in tables 4 and 5 below.

Table 4: ANALYSIS OF VARIANCE (ANOVA)

	df	SS	MS	F	Significance F
Regression	6	236.8644	39.4774	51.8931**	1.5E-28
Residual	100	76.0744	0.7607		
Total	106	312.9388			

Table 5: THE FULL REGRESSION MODEL

	Coefficients	Standard Error	t Statistics	P-Value
Intercept	-2.4332	1.3966	-1.7422	0.085
Ln Revenue	0.5245	0.0530	9.8921**	1.7E-16
Ln Donor Funding	-0.0502	0.012	-4.222**	5.3E-05
Ln GDP	0.1816	0.046	3915**	0.00017
Trust Funds LnRevenue	0.0410	0.014	2.923**	0.00428
Ln Forest Cover	-0.2031	0.075	-2.698**	0.00819
Ln Population	0.5797	0.1233	4.7005**	8.3E-06

**: Significant at P <0.01

R Square =0.756903

Adjusted R Square =0.742317

Often times the essence of an econometric model is to test some hypotheses based on some a-priori expectations or theoretical underpinnings. In this regard the fundamental hypothesis implied is that none of the above-specified independent variables has any significant effect on the variation on domestic expenditure on

forestry in Africa. Establishing the truth or otherwise of this statement will require examining the figures in columns 5 and 6 of Table 4. The F value which is 51.89 in column 5, is significant at P= 0.01 as column 6 shows. This implies that at least one of the independent variables specified has a significant influence on the dependent variable (government expenditure).

The second stage is to examine which of these variables has significant effect on the domestic expenditure, and what is the nature of the relationship that exists between each of these factors and government expenditure on forestry in the selected African countries. The figures contained in columns 4 and 5 of Table 5 shows the effects each of these variables has on domestic funding of forestry development in the selected African countries.

The t statistics for each of these variables is highly significant at P=0.01.The values in column 2 of this table indicate the nature or the direction, and also the magnitude of influence of these factors on the domestic funding of forestry development.

Accordingly, Table 5 can be summarised mathematically with a regression equation model as:

LnEd = -2.433 + 0.525LnR - 0.050LnDF** + 0.182LnGDP**+0.041TFLnR** - 0.203LnFC** + 0.580LnP**...Equation 8**

From this equation, it can be observed that 1% increase in the forest revenue collected will lead to 0.53% increase in domestic expenditure for forestry development. This implies that 53% of marginal increase in forest revenue generated is ploughed back to forestry development as domestic funding. It is then deductive that if domestic expenditure for forestry development in Africa is small, as is being generally believed (FAO 2000}, then the low forest revenue generation is largely responsible. It goes without saying therefore, that one major way to increase domestic funding of forestry development in Africa is by increasing forest revenue generation. This is very important within the context of sustainable forest management. A production based forest estate should be a self sustaining enterprise yielding considerable economic returns for its sustainable development and a reasonable profit for the owners.

Some of the problems of low revenue generation in Africa forestry development include underpricing of forest resources which is often informed by incredibly low administratively set charges, coupled with inadequate and irregular review of forest charges. And in addition, inefficient charge collection occasioned by weak and complex forest revenue system. These consequently direct the forest wealth into

private hands rather than to the society through the government which holds the forest in trust for the society in most parts of Africa.

The result of the model also shows that 1% increase in population will also bring about 0.58% increase in government expenditure to forestry development in the selected African countries. As it's been said earlier, one of the major causative factors of deforestation in Africa is the very high increasing rate of population growth. Africa has a population growth rate of 2.4% from 1995-2000(FAO, 2001), which is the highest in the world, compared to 1.4% in Asia, 0.0% in Europe, 1.6% in North and Central America, 1.3% in Oceania, 1.5% in South America and 1.3% for the World FAO (2000) equally reported that sub-Saharan countries in Africa exhibit high annual population growth rate, large rural populations, accelerating urbanisation and low per capita incomes. In such a basic agrarian, underdeveloped and unstable economy which typifies most countries in Africa, where 70-90% of total energy consumption is derived from wood (Goumandakoye, 1996; FAO, 2000), high population growth rate potentially carries along the dangers of forest degradation and deforestation, to meet the agricultural, housing, and energy needs of the burgeoning population. Therefore abatement of the consequential environmental degradation inherent in high population growth rate in Africa can inadvertently increase government expenditure to forestry development as population increases.

Furthermore domestic funding of forestry development in the selected African countries is found from the model to be significantly and directly affected by the level of the economic well being of the countries. The result shows that 1% increase in the GDP will lead to 0.18% increase in domestic expenditure. This readily points to how the performance of the other sectors of the economy and the robustness of the general economic indices in a country can affect forestry development.

Incidentally, the economic outlook of many African countries is frightening. According to FAO (2000), 32 countries in Africa are listed among the heavily indebted Poor Countries (HIPCs) in the world. Many African countries have gone through and many are still going through Structural Adjustment Programmes (SAP), which resulted in the devaluation of their currencies, erosion of the people's purchasing power, and the subsequent impoverishment of the general populace. These are in addition to political instability, multi dimensional conflicts, gross industrial capacity under-utilization, high inflation rate and very poor infrastructural facilities, which are apparent indices of distress economies. Since domestic funding of forestry

development has a direct bearing with the economic health of the countries, then part of the reasons for poor domestic funding of forestry development in Africa is obviously deductive.

The model also revealed that donor funding has an inverse relationship with domestic expenditure on forestry in Africa. Thus from the model, every 1% increase in foreign funding, will bring a corresponding 0.05% decrease in domestic expenditure for forestry development in the selected African countries. Although the relationship is highly significant, the magnitude is very negligible. This result somewhat confirms the a-priori expectation that domestic funding of forestry development in Africa might decrease with increased donor funding. However, since the magnitude of such possible reduction in domestic funding is so negligible, it can be regarded as being inconsequential.

A similar inverse relationship exists between the forest cover of the African countries studied and government expenditure on forestry development. The model reveals that for every 1% decrease in forest cover the government in the selected African countries studied will increase expenditure on forestry by 0.20%. This implies that African countries with relatively low forest cover or higher rate of deforestation will spend a little more on forestry development than countries with more forest cover or lower rate of deforestation. As it has been previously mentioned, the African populace highly depends on the forests for their day to day living. And this is likely to increase owing to the low incomes, abject poverty, and generally recessed economies that characterise most parts of Africa. Therefore the situation of high dependence of the teeming population on a relatively small forest area will likely force the government to increase expenditure on forestry development, in order to either increase the forest cover or to sustainably manage the available ones to be able to meet the needs of the populace

However, another interpretation of this result is that government in the selected African countries will increase their expenditure by 0.20% to recover a 1% decrease or loss in forest cover. Bearing in mind the generally low forestry expenditure in African countries due to combination of many factors that have been previously mentioned, then how much of afforestation and reforestation can be achieved with a mere 0.21% of a meagre domestic forestry budget of African countries, to recover an enormous 1% loss or reduction in the forest cover.

The last parameter tested for influence is the possible effect of National forest funds on the links between forest revenue and government expenditure on forestry in Africa. The result of the model shows that the effect though significant, is negligible. From the model, establishment of forest funds will only improve forest revenue-government expenditure relationship by 0.04%. However forest funds can improve domestic expenditure in forestry development in Africa if the sources of funds can be widened to include foreign funding and other mechanisms to raise funds locally. More importantly, its success will require transparency, accountability and discipline on the part of the government and forest managers.

CONCLUSION AND RECOMMENDATION

The study has identified two basic problems confronting sustainable forest management in the selected African countries, from the fiscal policy's point of view. First is that of low forest fees which is informed by irregular and infrequent review, therefore allowing inflation to make their real value fall to a fraction of what it was, and also forest fees being administratively set without proper cognisance and consideration for prevailing economic indices. Second is that of low forest fee collection, which stems from weak and inefficient collection system.

The consequences of low forest fees on timbers and concessions are diverse and far-reaching. It provides completely wrong incentives, signalling abundance rather than future scarcity and a need for conservation. Low forest fees on timber make commercial logging and processing profitable and attractive for entry and expansion, encouraging entry, over harvesting, and depletion. Low concession fees and generous concession policies make forest concessions profitable and attractive, and encourage expansion of concessions into areas more appropriate for non-timber use, forest conservation and preservation.

These problems can be surmounted by appropriate adoption of some of the following strategies. Application of which will be based on the prevailing socio-economic situations of each country. These are:

1. Automatic inflation adjustment procedures, written into legislation establishing or amending forest fees. Such adjustment being based on a readily available price indices, such as countries' consumer price indices, GDP price deflators, etc

2. . Increased use of competitive sales of timber by sealed tender or by oral auction. This can provide a direct, market-based measure of stumpage value, based on the buyer's "willingness to pay".
3. Development of competitive log markets, initially in the most suitable locations, to test their feasibility, measure their benefits, as well as employ them to provide information for setting charges by other methods. Log markets can serve as sources of information on log prices to buyers and sellers and to the government and the public alike. The development of log markets will enhance the setting of forest fees that better reflect the stumpage values. Log markets can also bring market efficiencies in the allocation of logs among processing plants and uses.
4. Regular surveys of forest product prices, and of contractors' rates for logging and hauling to provide information on forest product prices, logging and hauling costs as inputs to setting and adjusting of forest charges.
5. Collection of minimum forest fees on every category of forest charges on industrial roundwood, which can be used to cover the administrative cost of selling the standing timber, supervising and inspecting logging operations, environmental cost of logging, and the cost of regenerating the forest.

Furthermore, since many African countries do not posses the requisite machinery for optimum collection of volume-based forest charges, concession fees which are more easier to collect than the volume- based stumpage fees, can be used to supplement the difficult to collect, easily evaded, volume- based stumpage fees. However, concession fees, like fees on timber harvested, should be adjusted at regular intervals, indexed to forest products' prices, or adjusted for inflation. In using concession, the following things are imperative:

1. An annual area-based concession fee at rates that generate significant revenues and incentives for forest management
2. Modest initial concession fees that will cover administrative costs in granting concessions and that will discourage frivolous or speculative acquisition.
3. A concession should be based on competitive bidding either by sealed tender or by auction
4. A forest management concession that require forest management and regeneration as a condition of tenure.

Higher forest fees and improved rate of collection would make forest management sustainable and economically attractive. Moreso that improved revenue collection will

increase government expenditure to forestry development in Africa. In this regard, establishment of forest trust fund becomes very crucial to sustainable forestry development in Africa. Establishment of forest trust funds will equally serve as incentives for forest managers for improved revenue drive, knowing fully well that part of the money so collected will be promptly available for their budgetary needs for forestry development as situations arise.

Having said these, the greatest need for sustainable forest management in Africa within the context of fiscal policies, centres on strengthening the forestry departments of African countries. First of all, formulation and implementation of a successful forestry fiscal policies requires sound understanding of macro and microeconomic principles and how these, and economic policies from all other sectors of the economy put together, will affect the overall management of the forest resources. To play such a role effectively, the forest managers in African countries need specialised training in the collection, analysis and interpretation of socio-economic data, from time to time. This implicitly calls for the establishment of an economic survey unit, which will be responsible for collection of good quality data.

Secondly, sustainable forest management in Africa will require strong inter sectoral linkages with all other sectors of the economy. High level forest managers need to be well integrated and linked to contemporary high level officers in other government agencies, as well as policy and decision makers in other sectors of the economy. This is very imperative for forest managers to have first hand information on likely policies from these sectors, review their probable implication on forestry, and then take appropriate action that can allay or prevent such impact on the forests, per adventure it is negative.

More importantly, setting and collection of appropriate forest fees require as much political as economic or technical input. Since forest resources merchants who have been making huge “abnormal” profits from the cheap forest fees will protest against an upward review. Moreso, if the review has not been a regular activity, forest managers will have to develop and rally round broad-based political support for any changes to forest levy systems amongst other government agencies, politicians and civil society.

All these will result in higher forest fees and a higher collection rate, which would provide funds for management, protection, and regeneration of the resource, and

finance a strengthening of forestry departments. Then will the forests become financially and politically worth preserving.

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