BACK GROUND INFORMATION ON THE CONSERVATION STATUS OF BUBINGA AND WENGE TREE SPECIES IN AFRICAN COUNTRIES

Report prepared for the International Tropical Timber Organization (ITTO).

by

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ABREVIATIONS

API:	Pilot Integrated Management Project
CENADEFOR:	National Centre for Forestry Development
CIRAD:	Centre International des recherches agricoles pour le Développement
CITES:	Convention on the International Trade in Endangered Plants and Animal Species
CTFT:	Tropical Forests Technical Centre
COMCAM:	Database on trade wood
EC:	European Commission
EU:	European Union
FLEGT:	Forest Law Enforcement, Governance and Trade
FMU:	Forest Management Unit
GDC:	General Division for Customs
ITTO:	International Tropical Timber Organization
IUCN:	World Alliance for Nature/International Union for Nature Conservation
MED:	Minimum Exploitable Diameter
MED/ADM:	Minimum Exploitable Diameter fixed by the forest administration
MED/AME:	Minimum Exploitable Diameter proposed by the manager (forest company)
MINEF:	Ministry of Environment and Forest
MINEFI:	Ministry of Economy and Finance
MINFOF:	Ministry of Forestry and Wildlife
MMD:	Minimum Managed Diameter
NTFP:	Non Timber Forest Products
PSFE:	Forest and Environment Sectorial Program
PSRF:	Forest Revenue Enhancement Program
SIGIF:	Database on timber logging
TIAMA:	Computer treatment applied to forest management
UCC:	Central Unit for Control

ABSTRACT

This report summarizes the basic information on Bubinga (*Guibourtia* species) and Wengé (*Millettia laurentii*), their biological and ecological data, utilization and trade, and the management systems and legislations in Africa with reference to Cameroon. Data presented and discussed are based on the literature revue, internet research and discussions with different stake holders, and field observations.

Wengé (*Millettia laurentii*) and Bubinga (*Guibourtia tessmannii, G. demeusei, G.pellegriniana, G. ehie, G. arnoldiana*) tree species are important timber species in Africa. Cameroon (5 *Guibourtia* tree species), Congo (4), Democratic republic of Congo (4), Equatorial Guinea (4), Gabon (4), Ghana (4), Nigeria (4) appear to be in this order countries which host many species of *Guibourtia. Millettia laurentii* is found in Cameroon, Central African republic (CAR), Congo, Gabon, Mozambique, Tanzania, Democratic republic of Congo.

Excepted for *Guibourtia ehie* and *Millettia laurentii*, no clear information is given for other tree species for what concerns their global conservation status. *G. ehie* is vulnerable while *M. laurentii* is said to be endangered according to IUCN Redlist. The status of other tree species in the wild is currently listed as unknown due to insufficient information.

In Cameroon the distribution of Bubinga and Wengé tree species is largely restricted to the South and littoral regions, with some stands in the Centre and East region. Three out of the *Guibourtia* tree species found in Cameroon are largely known for their use as timber: *Guibourtia tessmannii* (Bubinga rose), *G. demeusei* (Bubinga rouge), and *G. ehie* (Ovengkol). Occurency maps of Bubinga and Wengé tend to show many dissimilarities in the results obtained by the same and/or different sources in different years (1985, 2004, 2011) in Cameroon. This makes it difficult to decide on the trend on Bubinga and Wengé tree species. In fact, in such a situation, it is difficult to say if the occurency/occupancy areas of Bubinga and Wengé tree species are increasing or decreasing.

Data gathered in different document of the management plans of the production forest tend to show that Bubinga species are less represented in their range area in Cameroon, where they occur with densities less than 0.04 stem/ha. Specific curves of Bubing species show irregular feature, which illustrates the problem of regeneration for those tree species.

Cameroon hosts five *Guibourtia* tree species. But it is only *G. demeusei* and *G. tessmannii* which are largely logged. *G. demeusei* is the three species which has the highest logging

volume requested between 2008 and 2012. Sale of standing volume appear to be the forest title which requested the high volume of Bubinga and Wengé tree species with 56.2% of the total volume between 2008 and 2012. They are followed by forest management units composed of definitive (52 010 m^3) and temporary (8 971 m^3) concessions. The problem here is that, sales of standing volume are titles where rigorous measures for sustaining the resource are not applied. A total of 60 061 m^3 of Bubinga and Wengé tree species was requested by forest management units (FMUs) between 2008 and 2012. *G. demeusei* and *Millettia laurentii* are the two most important tree species which were requested by FMU with about 28 900 m^3 each tree species. It is paradoxal to see that, some FMUs for which the document of the management plan outlined the threatening of Bubinga and/or Wengé species, have requested to log those species.

As a conservative measure, the Cameroon government has delimited a series of protected areas in the distribution area of Bubinga and Wengé. The national park of Campo ma'an being the protected area which hosts the high number of species including *Millettia laurentii* and fours Bubinga species. Nothing has been done for what concerns plantations and sylvicultural trials. The pressure on the Bubinga species is effective. The harvest zones are becoming more and more far from the villages, at 4 to 5 kilometers in the forest. This makes the transport of the wood quite difficult. The pressure on Bubinga arised since some three years ago, with the arrival of the asian people in the business. About 75% of the persons interviewed attributed the importance of illegal logging of Bubinga to the "asian phenomenal". Today, asian people use not only the wood, but also stem barks, leaves, and roots of Bubinga. Logs are more expensive than sawn wood. The importance of Bubinga market increased in two phases: in 2011, the products were only sawn wood. Since 2012, there are also logs. Operations of illegal logging of Bubinga are often conducted by night, with the high complicity of local villagers who perceive too much funds and who do not hesitate to beat everyone who wants to stop the logging of their Bubinga trees.

Some legal forest companies who do not get enough volume of Bubinga species in their concession cut the Bubinga that is found in the periphery of their forest and use their documents to convey the timber till the Douala port. Other timber companies declare the Bubinga as the Ebiara. Ebiara and Bubinga have similar features.

In the littoral and south regions of Cameroon, the volume of Bubinga seized or the amount of the revenues yielded by the illegal Bubinga seized in four months in 2012 is 1.4 times more important than that of all the Bubinga wood seized from January to December 2011. This

result illustrates the high pressure of illegal loggers on the Bubinga tree species. About 95% of persons interviewed declared that Bubinga and Wengé are under pressure in Cameroon due to the illegal logging.

At a regional level, the pressure on the Bubinga and Wengé species seems effective in different African countries including the CAR, Congo, DRC, Equatorial Guinea. The export volumes are increasing since a few years ago in each of those countries, with Asian countries importing huge volumes. Asian people are too many, and this will continue to increase the demand on Bubinga and Wengé products.

Based on what precedes, following recommendations are made to better ensure trade on Bubinga and Wengé tree species is not detrimental to their conservation in forests:

0. To conduct detail research on the biology, ecology, phenology, and sylviculture to better refine standards and management parameters that should sustain the exploitation and trade of Bubinga and Wengé species in Cameroon as far as in other African countries;
1. to conduct good and sound forest inventories to better appreciate the distribution area, density and the possibility (volume) of Bubinga and Wengé species
2. to promote the use and trade on other tree species with almost similar properties as to reduce the pressure on Bubinga and Wengé species;;
3. to define some quotas for export products;
4. to strengthen the forest control by increasing the number of controllers at the exit points (Douala port for exemple) and equipping forest officers with adapted materials (GPS, Turaya cell phones, vehicles, bikes, etc.) to better tackle illegal logging and export;
5. to strengthen the capacities of forest officers for the identification of Bubinga and Wengé species at all levels including logs and sawn wood;
6. to allow villagers to easily exploit their Bubinga trees by easing the procedures of getting “special permits” and/or promoting the development of community forests in the distribution area of Bubinga and Wengé;
7. to train both forest and custom officers in the procedures of control of forest products and to encourage their collaboration in the procedures of loading the containers and boarding;

8. to assess the real density and strengthen the conservation of Bubinga and Wengé in protected areas; Campo ma'an national park should be targeted;
9. to put in place a framework of collaboration between public and private stakeholders involved in the management and use of Bubinga and Wengé in Cameroon;
10. to list those tree species in the CITES appendix as to ensure their international trade is compatible with their conservation in their natural habitats.

0. INTRODUCTION

Rising concerns about over-utilization of timber species have been reported from Cameroun and neighbouring countries. Internationally traded species such as Wengé (*Millettia laurentii*) and Bubinga (*Guibourtia tessmannii, G. demeusei, G.pellegriniana*) have been mentioned in particular. Wengé is a valuable hardwood imported in large quantities to Europe, especially to Germany. Bubinga is also found on the German market, but to a lesser extend.

The objectives of the project are to - as a first step - analyze the situation of utilization, international trade and the conservation status of the above mentioned species. As a second step a regional workshop with political stakeholders is envisaged in order to initiate efforts towards sustainable management measures, especially the possible development of proposals to list one or more timber species in CITES Appendix II

This work aims to summarize the basic information on these tree species, their biological and ecological data, utilization and trade, and the management systems and legislations.

I. MATERIAL AND METHOD

This section presents the milieu and the method used to draft this report.

1.1. **Study area**

African forest epitomizes the dialectics of conservation and forest use for sustainable development. Because forests provide both a source of income and a life-supporting environment to many peoples, forest use and exploitation and even forest conservation pose more complex challenges.

Cameroon belongs to the Congo basin, it is located at the centre of Africa near the Equator and covers about 475,000 km^2. It totals about 16.5 millions ha of dense rainforests. From South to North, there are various types of tropical rainforests, humid savannah, forest galleries, dry forests, dry savannah, steppes and yaeres. Apart from these natural ecosystems, there are also man-made agro-ecosystems (Letouzey 1968, 1985). Cameroon's phytogeographical map can also be classified as follow: afromountain region, in South west, west and north west provinces, the soudano-zambezian region in the North and Far north provinces, the Guineo-congolease region found mainly in the Centre, South, south west and East provinces, the Dja Congolese district found in the East and south provinces, and the pery-forest savannah found in the Adamaoua province (Letouzey cit. Sonké 1998). Botanical research on the flora of Cameroon began in 1861 and to date, nearly 150 000 specimens have been collected, many being deposited in herbaria worldwide (Letouzey 1968, Onana 2010). In 2010, the collection of National herbarium of Cameroon (YA) has nearly 65 634 specimens (Onana 2011).

The forest sector of Cameroon contributes to some 30% of total non-oil export revenues. Presently, the timber industry ranks first in terms of exported goods deadweight and accounts for 20% of the total value of exported goods. Its contribution to GDP rose from 4.3% in 1992 to 8% in 1999 and is currently exceeding 12%. It directly and indirectly employs 90,000 persons. This development potential can only become sustainable within a participatory management plan articulated both outside and inside the country" (Ngolle Ngolle 2008).

The utilization of resources is not always rational and sustainable thus constituting a threat to biodiversity. Systems of farming such as slash – and – burn agriculture constitute the major cause of the destruction of the tropical forest, recognised as a real reservoir of biological diversity. It is also important to note that poaching which used to check animal populations has now become a real bane of wildlife. Activities of forest logging are viewed as one of the main cause of intensive poaching and commercial hunting (Betti 2004, MINEF 1995).

Among the ten regions of Cameroon, six, namely the Centre (Yaoundé being the capital), East (Bertoua), Littoral (Douala), South (Ebolowa), Southwest (Buea) and West (Bafoussam) regions, are situated in the forest zone where logging and "wild sawing" are restricted. The three Northern regions, namely the Adamaoua (Ngaoundéré), the North (Garoua) and the Far North (Maroua) regions, are situated in the savannah area, that is mostly concerned with sport hunting activities and, which are supplied with wood coming from Southern part of the country.

In Cameroon the distribution of Bubinga and Wengé species is restricted to the forest zone.

1.2. Method

Data presented in this report are based on the literature revue, internet research, discussions with different stake holders, and field observations.

Area of extent occurrence and area of occupancy of Bubinga and Wenge species were estimated based on the important work conducted by Vivien and Faure in 1985 on African trees (Vivien et Faure 1985). The map was completed and updated using results of the forest management inventories conducted by logging companies. Only data from production forests, from Forest management Units (FMUs) to be précised, were used for dressing the maps. It was difficult to assess inventory data from other forest titles including data from sales of standing volume and data from community forests. In many cases, there were no data. Logging volumes were produced by the database on timber logging (SIGIF) settled in the Cameroon's forest administration (MINFOF). Data on export volumes were provided by the Cameroon timber trade database based in Douala (COMCAM) for what concerns Cameroon country, from the database of the Economic and Monetary Community of the Central African Countries based in the Douala port (CEMAC 2010, 2011) and from reports prepared by forest administration and/or by CITES organs in each country for what concerns Equatorial Guinea, Congo, Central African republic (CAR) and the Democratic Republic of Congo (DRC). The importance of illegal logging was appreciated based on the volume of timber seized or the revenues yielded from the seized products by forest officers in Cameroon. General elements regarding the management plan and production forests were obtained from the forest law, and management plans. The arête *n° 0222/A/MINEF/ of the 25 may 2001* fixing the procedures of the elaboration, approbation, monitoring, and control of the implementation of the management plans of production forests was largely used (MINEF 2001).

Discussions were conducted with some resource persons at all levels of the forest administration to get their point of view and problems related to the state of management of

Bubinga and Wengé species in Cameroon. Direct observations were made on the way illegal logging is being tackled by the forest officers and data on illegal logging were gathered in different forest services. .

II. **BIOLOGICAL DATA**

2.1. Distribution of Bubinga *and Wengé species* in Africa

Figures 1a, b, c, d, e, f illustrates the distribution maps of Bubinga and Wengé tree species in Africa. These maps were dressed according to the woodexplorer data base (http://www.thewoodexplorer.com/maindata/we598.html). Cameroon (5 *Guibourtia* tree species), Congo (4), Democratic republic of Congo or DRC (4), Equatorial Guinea (4), Gabon (4), Ghana (4), Nigeria (4) appear to be in this order countries which host many species of *Guibourtia.*

Guibourtia demeusei (Figure 1a) is found in Cameroon, Central African Republic (CAR), Congo, Equatorial Guinea, Gabon, Liberia, Nigeria, South Africa, Uganda, Democratic Republic of Congo (DRC).

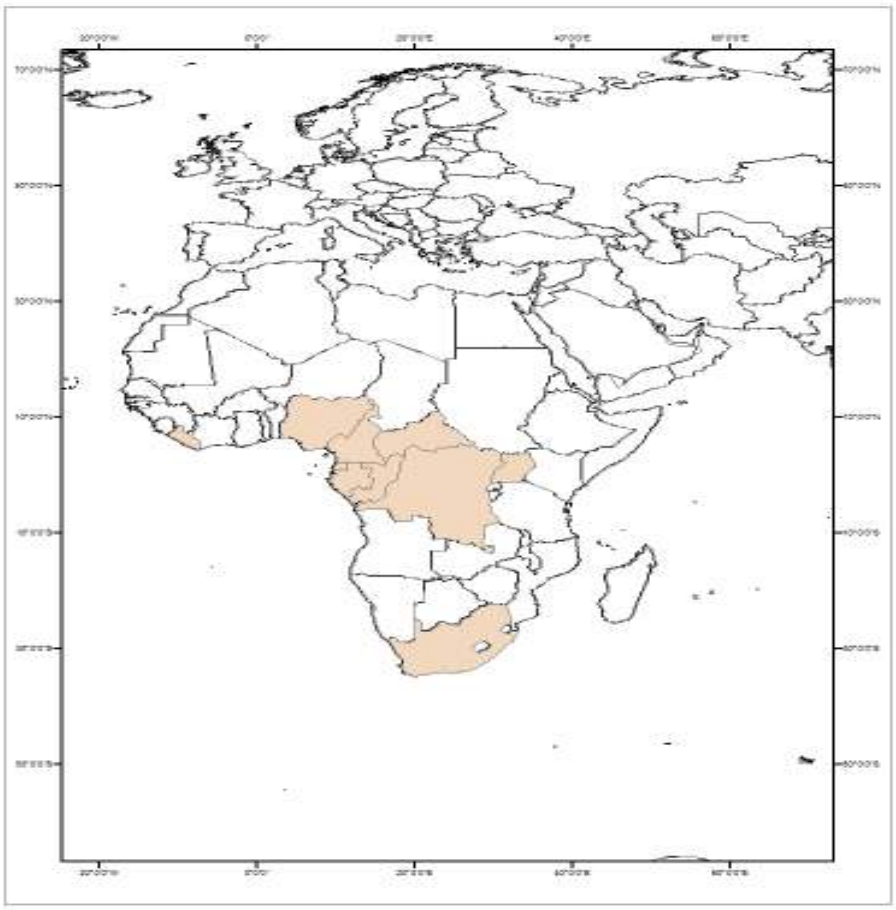

Figure 1a. Distribution map of *G. demeusei* in Africa

Guibourtia tessmannii (figure 1b) is found in Cameroon, Congo, Equatorial Guinea, Gabon, and DRC.

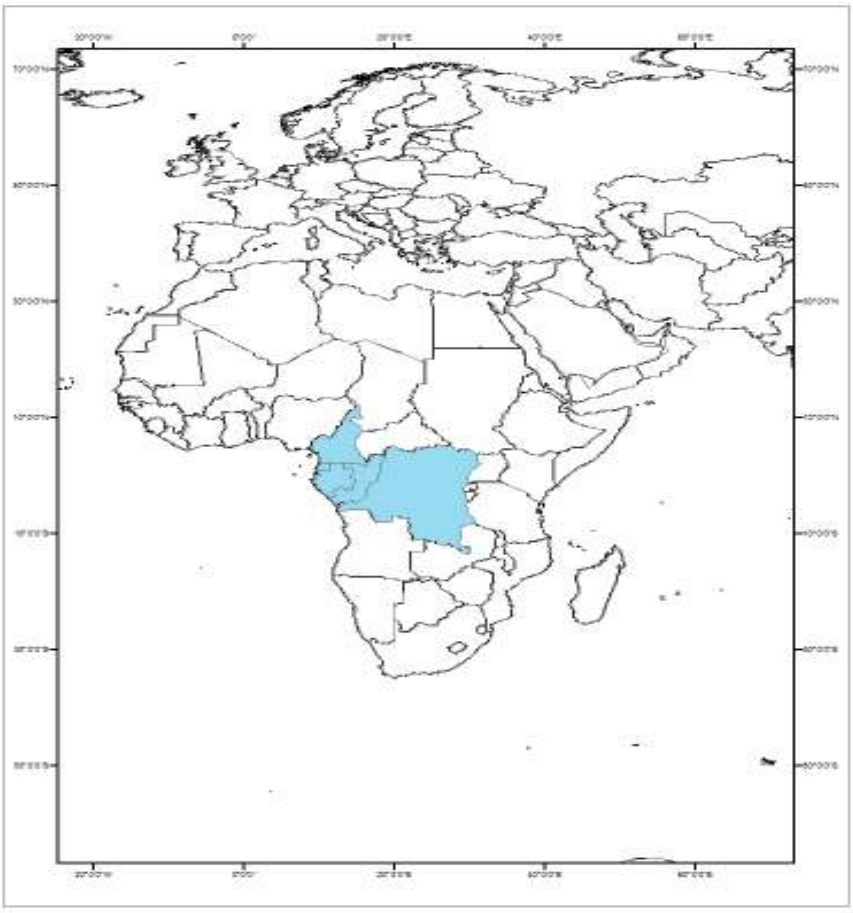

Figure 1b. Distribution map of *G. tessmannii* in Africa

Guibourtia pellegriniana (Figure 1c) is found in Angola, Cameroon, Congo, Equatorial Guinea, Gabon, Ghana, Nigeria, DRC.

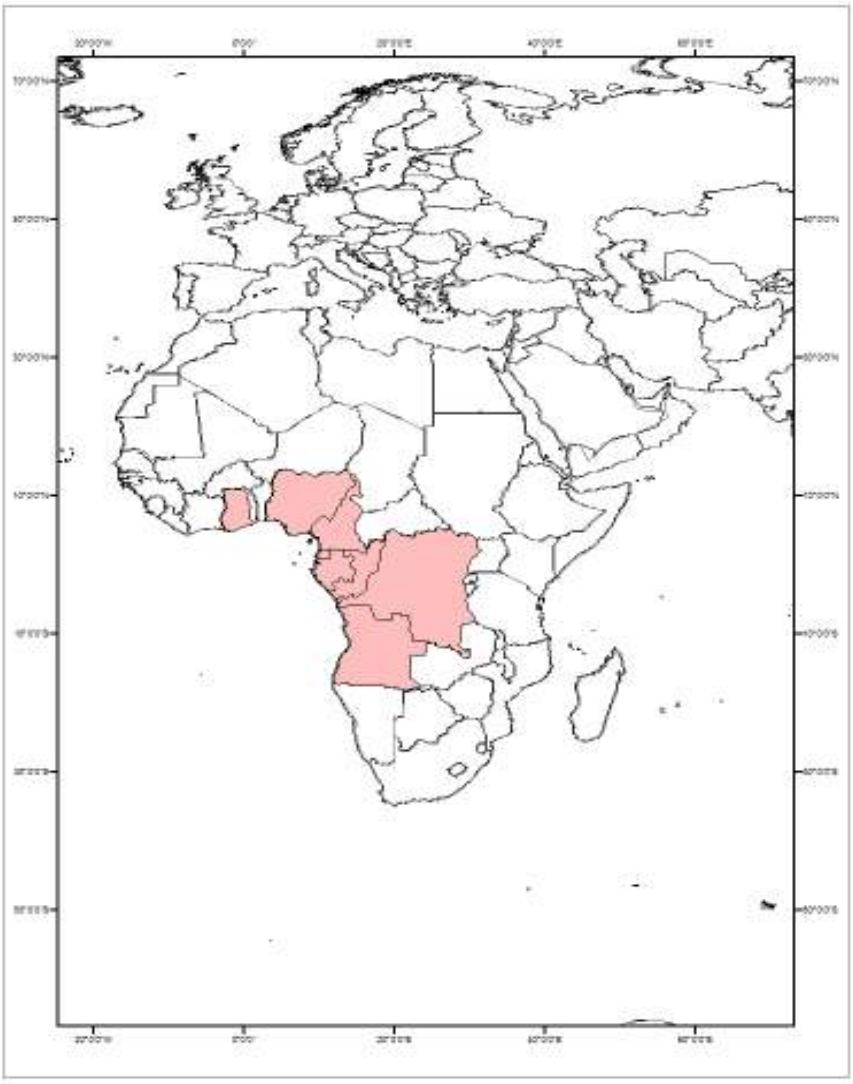

Figure 1c. Distribution map of *G. pellegriniana* in Africa

Guibourtia ehie (Figure 1d) is found in Cameroon, Equatorial Guinea, Gabon, Ghana, Ivory Coast, Nigeria. *Guibourtia ehie* grows in African lowland forest. It occurs in the upper Guinea forest block, in Côte d'Ivoire, Liberia and Ghana, is absent from the more arid and unforested Dahomey interval and then reappears in the lower Guinea forest block in Nigeria, Cameroon, Equatorial Guinea and Gabon.

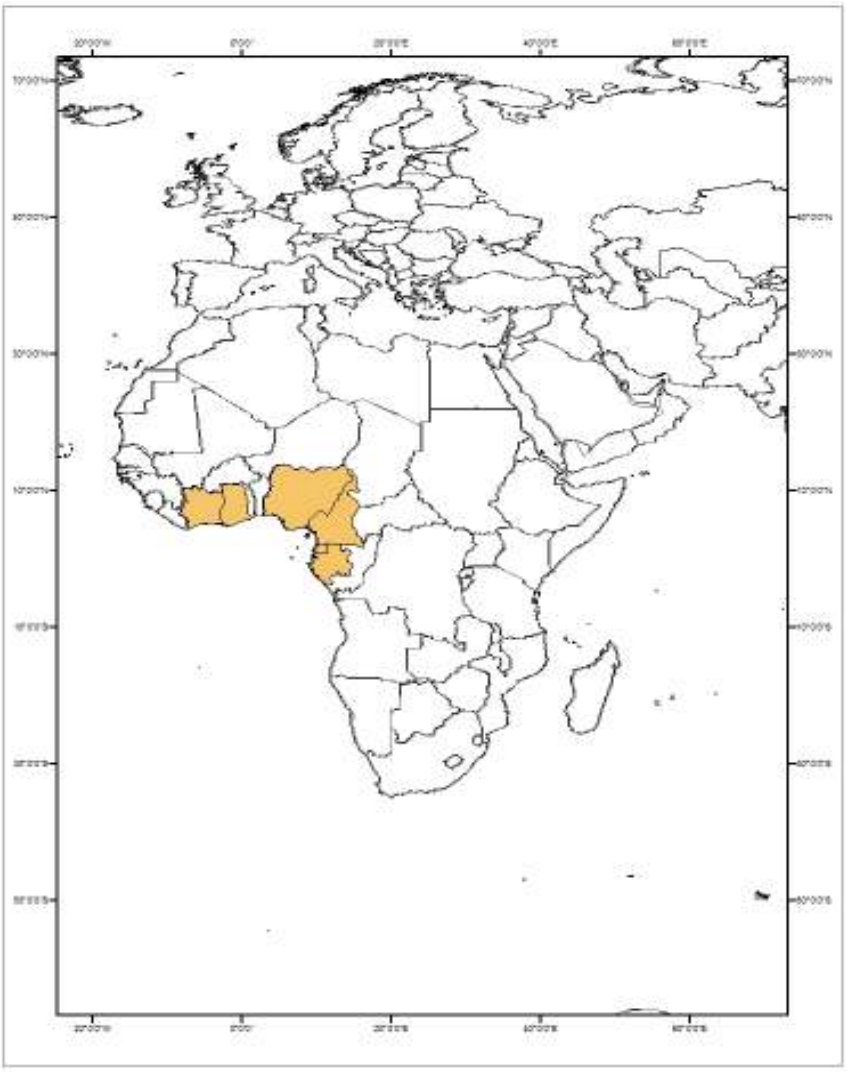

Figure 1d. Distribution map of *G. ehie* in Africa

Guibourtia arnoldiana (Figure 1e) is found in Angola, Cameroon, Central African Republic, Congo, Nigeria, South Africa, DRC .

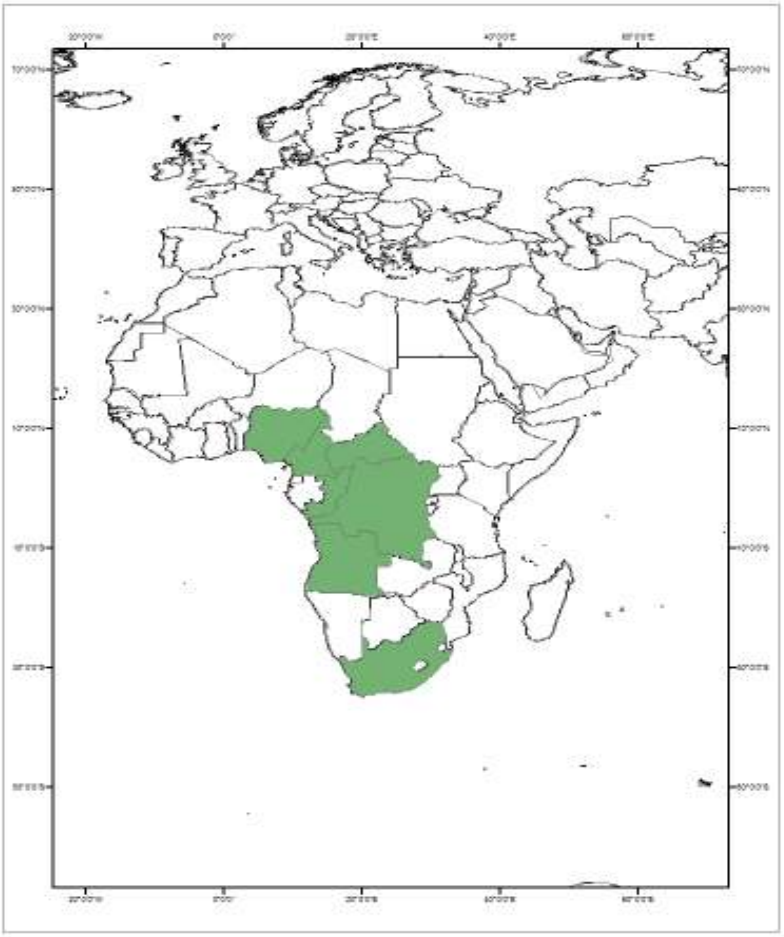

Figure 1e. Distribution map of *G. arnoldiana* in Africa

Millettia laurentii (Figure 1f) is found in Cameroon, CAR, Congo, Gabon, Mozambique, Tanzania, DRC.

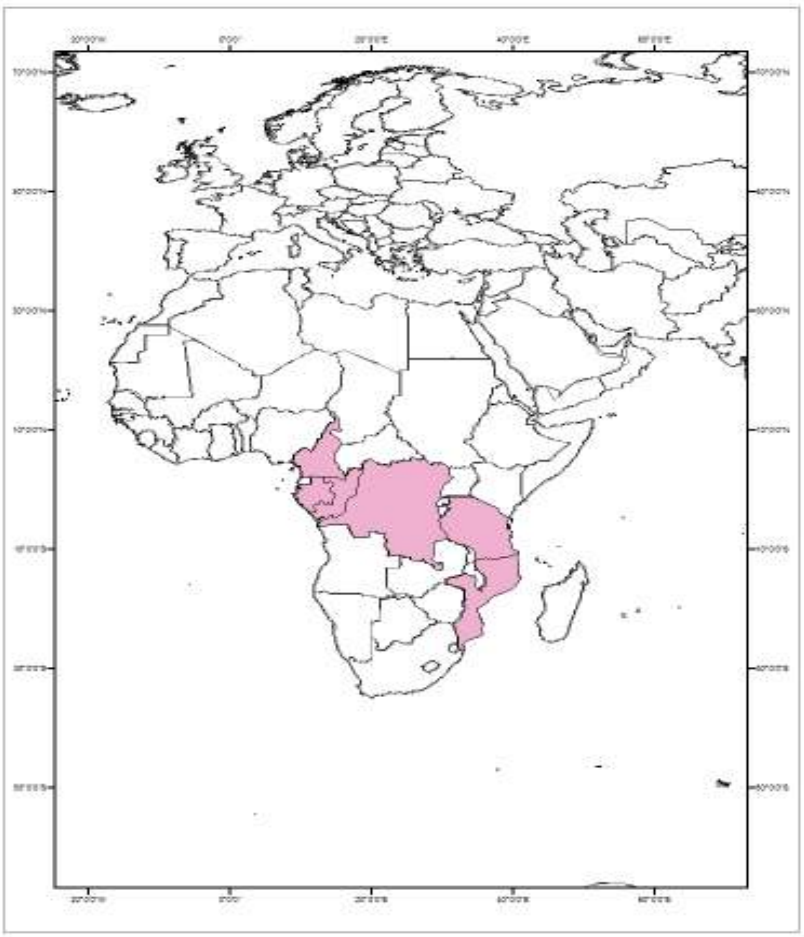

Figure 1f. Distribution map of *Millettia laurentii* in Africa

Cameroon appears to be the country which hosts all the six tree species, followed by Congo, DRC, and Gabon with five tree species each.

2.2. Scientific, trade and common names

Scientific name: *Guibourtia demeusei* (Harms) J.Léonard

Synonym: *Copaifera laurentii* De Wild.

Trade name: Bubinga

Common names for *G. demeusei*: Akume, Bubinga, Buvenga, Cameroons gum copal, Eban, Ebana, Essingang, Gabon kevazingo, Gum copal, Irun-nduk, Kasasesase, Kevazingo, Lianu, Lukunfu, Lusase, Mutenye, Ngulupang, Okweni, Ovang, Oveng, Waka, Waku

Scientific name: *Guibourtia tessmannii* (Harms) J.Léonard

Trade name: Bubinga

Common names for G. tessmannii: Akume, Binbinga, Bubinga, Buvenga, Essingang, Kevazingo, Lianu, Moubaka, Mouega, Mutenye, Ovang, Oveng, Waka, Waku

Scientific name: *Guibourtia pellegriniana* J.Léonard

Trade name: Bubinga

Common names for *G. pellegriniana*: Akume, Bubinga, Buvenga, Ebana, Essingang, Irun nduk, Kevazingo, Kevazingu, Lianu, Milne, Moubaka, Mouega, Mutenye, Ovang, Oveng, Waka, Waku

Scientific name: *Guibourtia ehie* (A.Chev.) J.Léonard

Trade name: Ovangkol

Common names for *G. ehie*: Amazakoue, Amazoue, Anokye, Bubinga, Ehie, Gabon ovanko, Ghana anokye, Hyedua, Hyedua-nini, Hyeduanini, Ivory Coast amazakoue, Mongoy, Mongoy walnut, Ovangkol, Ovengkol, Pallisandro

Scientific name: *Guibourtia arnoldiana*

Synonyms : *Copaifera arnoldiana, Copaifera ehie*

Trade name: Mutenye

Common names for G. arnoldiana: Benge, Benzi, Bubinga, Essingang, Kerazingo, Kevasingo, Kevazingo, Kouan, Libenge, M'benge, M'Penze, Mbenge, Mutenye, Non-eyen, Ntene, Olive walnut, Oliver walnut, Ovang, Tropical oliver, Waka

Scientific name: *Millettia laurentii* De Wild.

Trade name: Wengé

Common names for *Millettia laurentii*: Anong, Awong, Awoung, Bokonge, Bwengu, Dikela, Kiboto, Mboto, Mibotu, Monkonge, Mukonde mutshi, Mundambi, N'gondou, N'toka, N'toko, Nson-so, Nsou-so, Otogo, Palissandre du congo, Pallissandre, Tshikalakala, Wenge, Zai-wenge

2.3. Distribution of Bubinga and Wengé species in Cameroon

In Cameroon the distribution of Bubinga and Wengé tree species is largely restricted to the South and littoral regions, with some stands in the Centre and East region (Vivien et Faure

1985). Three out of the *Guibourtia* tree species found in Cameroon are largely known for their use as timber: *Guibourtia tessmannii* (Bubinga rose), *G. demeusei* (Bubinga rouge), and *G. ehie* (Ovengkol). The following analysis is limited to Wengé and the three *Guibourtia species*. Figure 2a, b, c shows the distribution maps of Bubinga and Wengé species in Cameroon according to Vivien et Faure (opcit.).

Guibourtia demeusei (Harms) J.Léonard or red Bubinga. According to Vivien et Faure (opcit.), *G. demeusei* known as red Bubinga in Cameroon is found in the Littoral (Douala – Kribi area) and East (South east, Sangha and Ngoko rivers to be precised) regions It may occur also in the north west, manfé area to be précised (Figure 2a).

Guibourtia tessmannii (Harms) Léonard or pink Bubinga. *G. tessmannii* known by Cameroonians as pink Bubinga is found in the Littoral and South regions of Cameroon (Figure 2b).

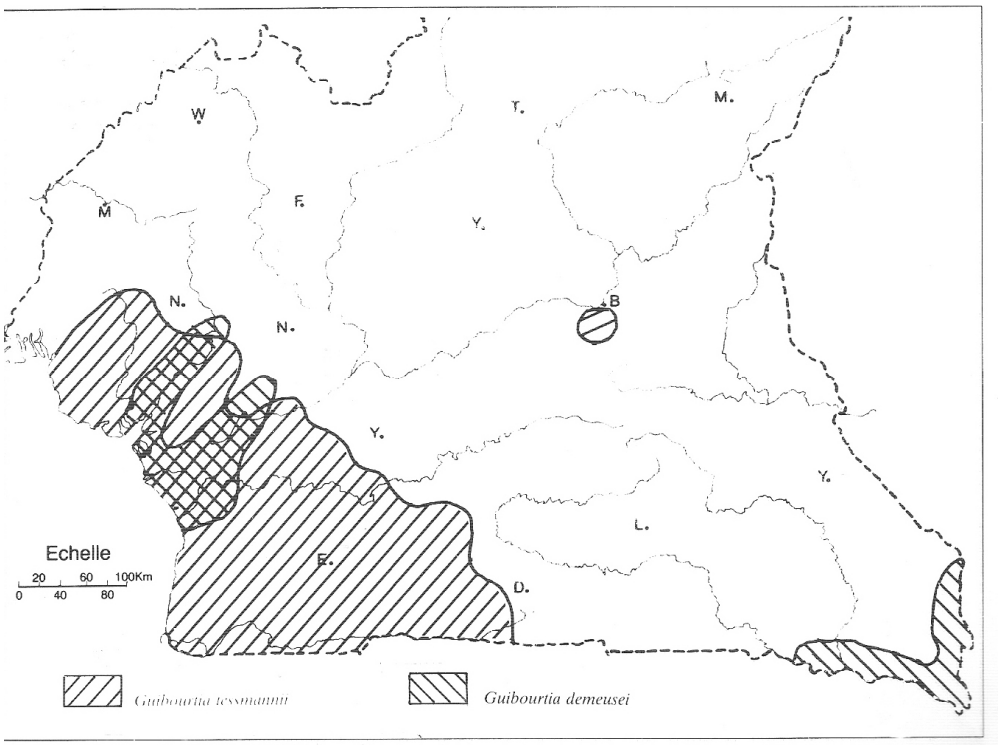

Figure 2a. Distribution map of *Guibourtia demeusei* et *G. tessmannii* in Cameroon (Vivien et Faure 1985)

Guibourtia ehie (A.Chev.) J.Léonard or Ovengkol is found in Littoral (Doula), North west (manfé) and South (Campo) regions of Cameroon (Figure 2b).

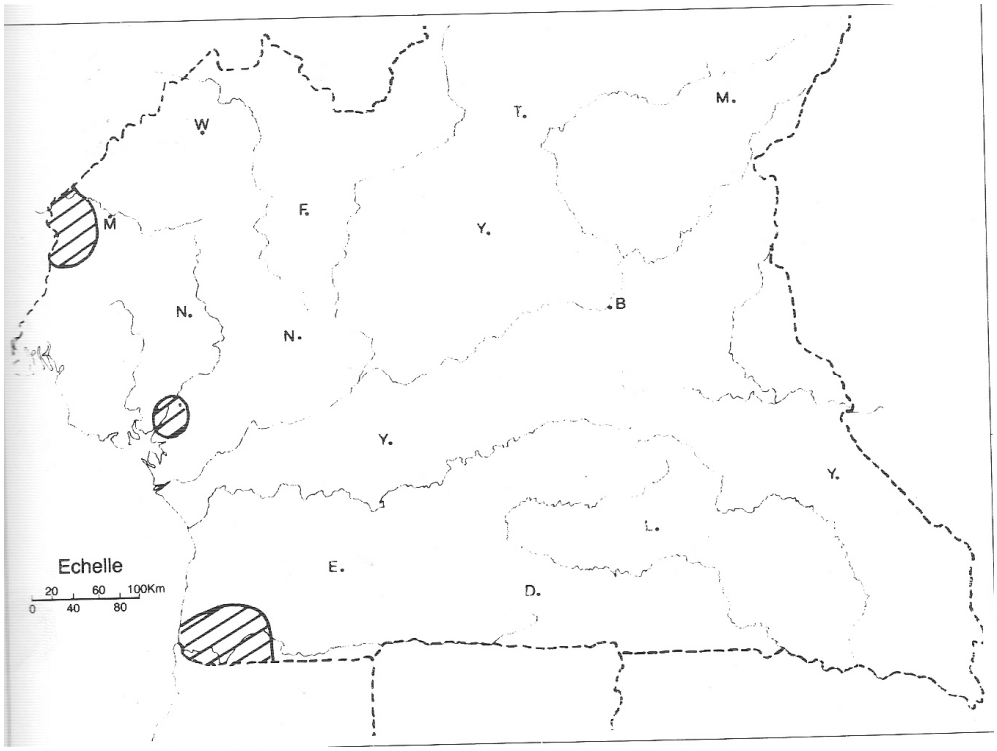

Figure 2b. Distribution map of *Guibourtia ehie* in Cameroon (Vivien et Faure 1985)

Millettia laurentii De Wild. or Wengé is found in East (south east, the confluent of Ngoko - Sangha) and South (Ma'an – Ebolowa – Sangmelima-Ambam) regions of Cameroon (Figure 2c).

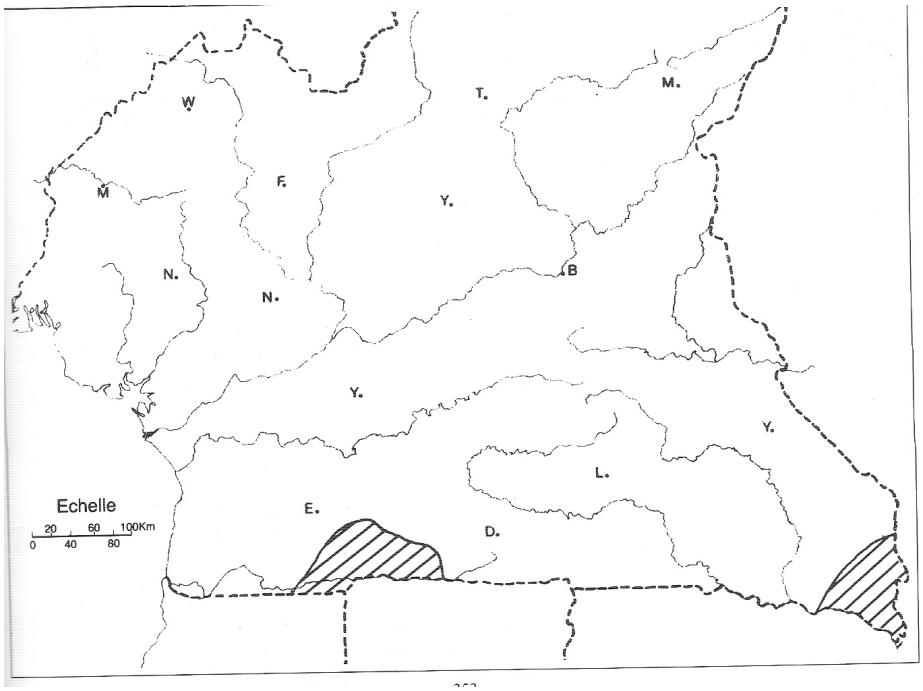

Figure 2c. Distribution map of *Millettia laurentii* in Cameroon (Vivien et Faure 1985)

2.4. Biological characteristics

2.4.1. Life history

2.4.1.1. ***Guibourtia demeusei***

Guibourtia demeusei is easily recognised by its leaves with 2 sessile, opposite, falciform leaflets, and its granular, brittle, reddish slash. *G. demeusei* is a large tree reaching 40 m in height and 100 cm in diameter. Crown widely spreading, dense, with branches apparently verticillate, upright. Bole straight, cylindrical, sinuous towards the top, having ramified plank-buttresses. The bark is light grey to olive-beige, smooth, superficially fissured, with numerous horizontal lenticels. Blaze about 1 cm thick; slash with outer layer reddish, granular, hard, brittle, inner layer lighter-coloured, fibrous. It exsudates transparent resinous, late, not abundant. Leaves are compound, alternate. Petiole 2 to 4 cm long, pulvinate at the base and at the apex. Two leaflets, opposite, subsessile. Blade oval-falciform, 7 to 20 cm by 3 to 8 cm, acuminate-cuspidate at the apex, cuneiform or rounded and assymetrical at the base, coriaceous, dotted with translucid points, glabrous. Midrib very eccentric, prominent on the undersurface, and slightly above. Height to 12 pairs of secondary nerves, 2 to 3 basilar,

camptodrome prominent beneath. Flowers are clusters of terminal or axillary spikes, about 15 to 20 cm in length; small white hermaphrodite flowers. Pods are elliptic to suborbicular, flat, 2 to 4 cm by 2 to 3 cm brown, opening in two thin valves. An oblong, flattened, dark brown seed. Sapood is hite. Heartwood bright red, mottle, hard, heavy, with fairly fine grain, shrinkage:medium (Souane Thikakul 1985).

2.4.1.2. ***Guibourtia tessmannii***

The blade of *G. tessmannii* has no translucid points, unlike that of *G. demeusei*. Gummy gelatinous, red exsudate. *G. tessmannii* is a very large tree, among the largest in the primary forest reaching 60 m in height and 200 cm in diameter. Cron umbelliform, sometimes parasol, dense, ith sinouous branches, upright. Bole straight, cylindrical, sometimes channelled, short; thin, high and irregular plank-buttresses. The bark is reddish bron, rough, scaly, flaking off in small circular patches leaving bright red depressions. Blaze about 1 cm thick; slash dark pink, granular, brittle. Gummy gelatinous red exsudate. The bark of the base of the bole is often removed for medicinal uses. Leaves are compound, alternate. Petiole 1.5 to 3.5 cm long, glabrous, pulvinate at the apex and at the base. 2 leaflets, opposite, subsessile. Blade ovate-falciform, 2 to 15 cm by 3 to 6 cm, acuminate to abruptly cuspidate at the apex, cuneiform to acute and asymmetrical at the base, coriaceous, glabrous. Midrib prominent on the undersurface; 5 to 7 pairs of secondary nerves prominent beneath, camptodrome. Floers are strong panicles, rusty-pubescent; small sessile floers. Pods are obliquely elliptic, straight on one side, convex on the other, 3 to 4 cm by 2 to 3 cm, thick, opening into 2 coriaceous valves, ith a finely folded and striated surface. Seeds are surrounded by an aril. The ood is pinkish bron, finely veined ith violet-red, hard, heavy (Souane Thikakul 1985).

2.4.1.3. Guibourtia ehie

Guibourtia ehie is a forest tree up to 45 m high with a trunk up to 1 m in diameter. The leaves are composed of two asymmetrical leaflets, each shaped like a half-moon. The outer side of each leaflet is at least three times as broad as the inner side, ending in a long, curved tip. The white flowers are scented and arranged along short axes, which in turn are combined with other flowering ‘spikes’ to form a branched flowering structure, which measures up to 25 cm long. The fruits (pods) are flat and papery, and their surfaces are covered with a network of fine veins; each fruit contains a single seed. Some species of *Guibourtia* have resin in the leaves that appears as translucent yellow dots when the leaves are held to the light and/or seeds that bear an aril (a soft, fleshy and often colourful layer covering part or all of the external seed surface), but *G. ehie* has neither gland dots nor arils. Source:

http://webcache.googleusercontent.com/search?q=cache:n3h5DV3hJ3YJ:www.kew.org/plants-fungi/Guibourtia-ehie.htm+Bubinga,+IUCN&cd=8&hl=en&ct=clnk&gl=cm

2.4.1.4. ***Millettia laurentii***

Millettia laurentii is a large tree with caduceous leaves, reaching 30 m in heigt and 90 cm in diameter. Crown globulose, wide, dense with large upright and drooping branches. Bole straight, cylindrical, short, having slightly developed enlarged base. The bark is grey with greenish white spots, smooth, lenticellate, spotted, with small protuberances aligned vertically. Blaze 1 to 1.5 cm thick; slash yellow-orange spotted with white, fibro-sclerous, hard. Exsudate reddish, aqueous, late, not very abundant. Tangential cut stripped with violet. Leaves are imparipinnate, alternate. Petiole and rachis 14 to 25 cm long. Petiole 4 to 7 cm long, slightly pulvinate at the base, glabrous. Midrib prominent beneath; 7 to 10 pairs of secondary nerves finely prominent on the undersurface, camptodrome. Neitwork of veins very visible on both faces. Flowers consist of long and terminal panicles, 20 to 40 cm long, prolifically flowering, pendant, fairly large violet-mauve flowers, hermaphrodite. Fruits consist of oblanceolate pods, 15 to 25 cm by 3 to 5 cm, flat, woody, acuminate at the apex, attenuate at the base, pale brown, pubescent in the young state, containing 2 to 4 smotth seeds, brown to dark purple. Sapwood is white. Heartwood is dark brown striped with black, finely striated on the quarter, very hard, heavy, with fine grain, shrinkage: low, elastic (Souane Thikakul 1985).

2.4.2. Habitat type

Guibourtia demeusei is a species of the closed forest, frequent in periodically inundated forest and in swamp forest (Vivien et Faure opcit., Souane Thikakul opcit.)..

Guibourtia tessmannii is a species of the forest on compact soil. It is found in the evergreen atlantic forest in Cameroon (Vivien et Faure opcit., Souane Thikakul opcit).

Guibourtia ehie or Ovengkol or Black hyedua is common in its natural habitat where it generally grows in small stands in a variety of forest types, from closed rainforest to drier semi-deciduous forest. The papery pods contain a single seed and are dispersed intact, mainly by wind. The thin pod walls soon rot away on the ground leaving the seed free to germinate

(http://webcache.googleusercontent.com/search?q=cache:n3h5DV3hJ3YJ:www.kew.org/plants-fungi/Guibourtia-ehie.htm+Bubinga,+IUCN&cd=8&hl=en&ct=clnk&gl=cm)

Millettia laurentii is a species of the moist semi-deciduous forest.

2.5. Population and trends

The best way for updating the distribution map or viewing the population trend of a given tree species is to compare data collected with similar methods in two different periods. This is not easy, since the methods used by different authors in forest inventories differ. Trend on Bubinga and Wengé can be examined in Cameroon through data presented in the document of management plans for production and community forests. Those inventories are often realized at the sampling rate of 0.3 – 1% in FMUs, and at least 2% in community forests.

2.5.1. Occurency map of Bubinga and Wengé species

Vivien and Faure revised their book in 2011 (Vivien et Faure 2011). *Millettia laurentii* and three *Guibourtia* species are presented in the new version of the book. The three *Guibourtia* species include: *Guibourtia tessmannii, G. pelligriniana*, and *G. ehie*. Nothing is said for what concerns *G. demeusei. G. tessmannii* and *G. pelligriniana* are said to have the similar geographic area in Cameroon in the new edition, while *G. ehie* and *Millettia laurentii* keep the same geographic area as illustrated in 1985. Does this observation illustrate the extinction of *G. demeusei* or is this a problem of identification? Why does *G. pelligriniana* appear in the new edition of the book? Have *G. ehie* and *Millettia laurentii* maintained the same geographic area? Here are a series of questions that should be asked following the results presented by Vivien et Faure (1985, 2011).

Forest management inventories data contained in simple management plans of community forests are not often completed and not well analysed. Only data of FMUs were used to appreciate the current map of Bubinga and Wengé in Cameroon. This means that, all the Bubinga and Wengé found in the non permanent forest domain including agroforests, sales of standing volume and community forests are not discussed in the following section.

Figure 3a, b, c, d, e, f illustrates the presence of Bubinga and Wengé species in different FMUs in Cameroon. Data are for the years 2003 – 2008, which is about 20 years after Vivien et Faure (1985).

G. demeusei (Figure 3a) is found in the South and North west regions but not in the South east and in the Littoral regions as suggested by Vivien et Faure (Opcit.) in figure 7. In the other hand, Vivien et Faure (opcit.) mentioned the presence of *G. tessmannii* (Figure 7) in the South and North west regions, while data from FMUs (Figure 3b) reveal the presence of that tree species in the South east (South of the Lobéké National park), South and North west regions.

Also, Vivien et Faure (opcit) mentioned the presence of *G. tessmannii* in the Littoral region, what is not the case for data collected in FMUs.

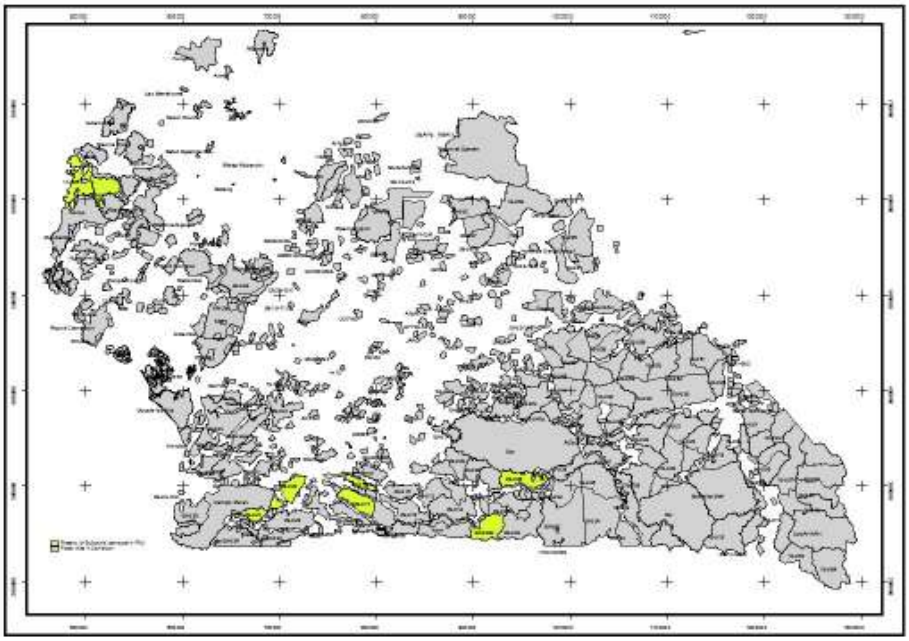

Figure 3a. Distribution map of *G. demeusei* in different FMUs in Cameroon.

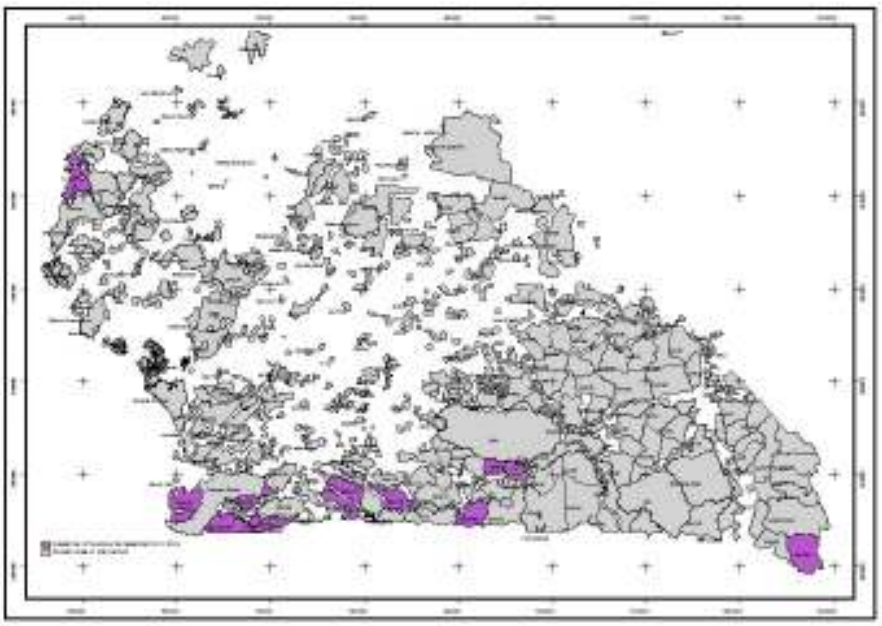

Figure 3b. Distribution map of *G. tessmanniii* in different FMUs in Cameroon.

Vivien et Faure (opcit) mention the presence of *G. ehie* in the South (Campo ma'an), Littoral (Douala), and North west (manfé) regions. Nothing is said for the presence of that tree species in the south of the Dja reserve and in the South east area. FMUs data reveal the presence of *G. ehie* in the South east (south of Lobéké National park), South (Dja area and Campo ma'an), and North west (Manfé) regions.

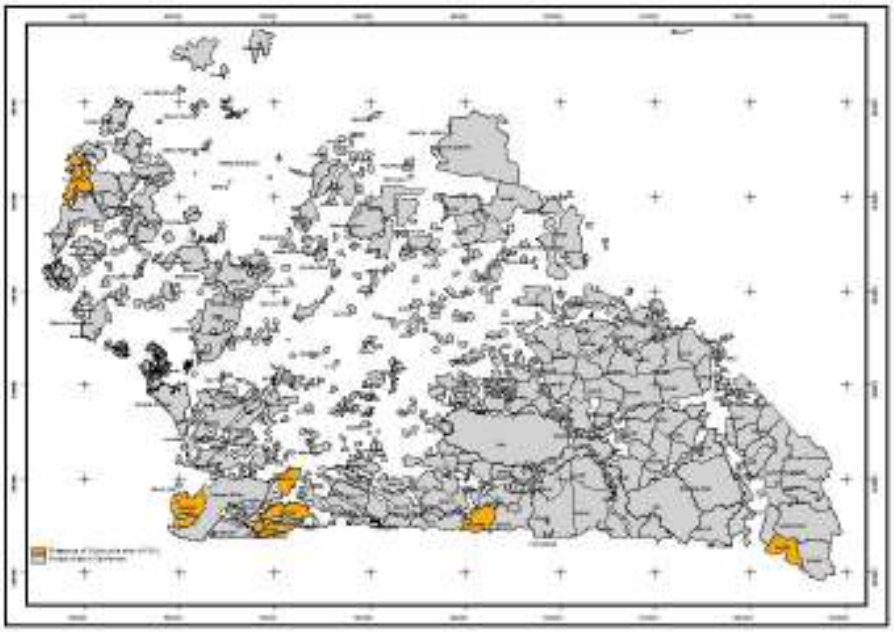

Figure 3c. Distribution map of *G. ehie* in different FMUs in Cameroon.

FMUs data (figure 3d) limits the distribution of *Millettia laurentii* in the South region, while Vivien et Faure (opcit) reveals the presence of that tree species in the South east area (South of the Lobéké National Park).

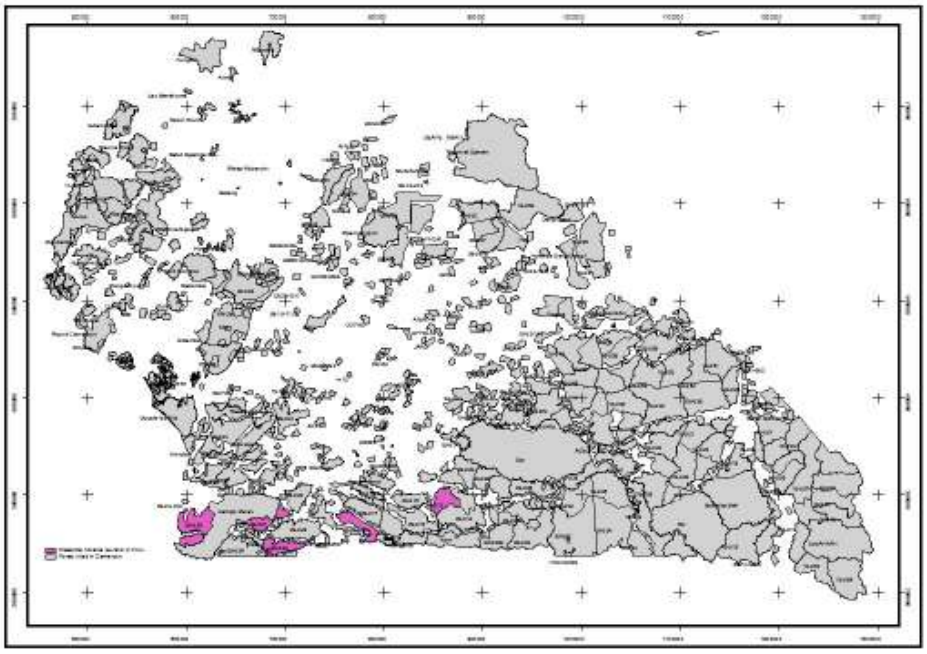

Figure 3d. Distribution map of *Millettia laurentii* in different FMUs in Cameroon.

There are similarities in the occurrency maps of Bubinga and Wengé species between Vivien et Faure (1985) and data contained in the documents of management plans for FMUs. For example, the two groups of data reveal the presence of *G. tessmannii* in the North west and South east regions, and that of *G. ehie* in the North west and South regions. There are also dissimilarities in the maps drawn from the two sources of data. Hence, Vivien and Faure (opcit.) limits the presence of *G. tessmannii* in the North west, Littoral and South regions, while FMUs delete that map in the Littoral and extend it in the South east region of Cameroon. In the other hand, Vivien et Faure extend the map of *Millettia laurentii* from South to the South east, while FMUs data limit that map in the South region.

To illustrate clearly these dissimilarities, we superposed the map of FMUs with that of Vivien et Faure (1985) for what concerns *G. demeusei* (Figure 4). Vivien et Faure (1985) limits the map of *G. demeusei* in the north west of the south region, while FMUs extends it in almost all the south region and also in the south east region.

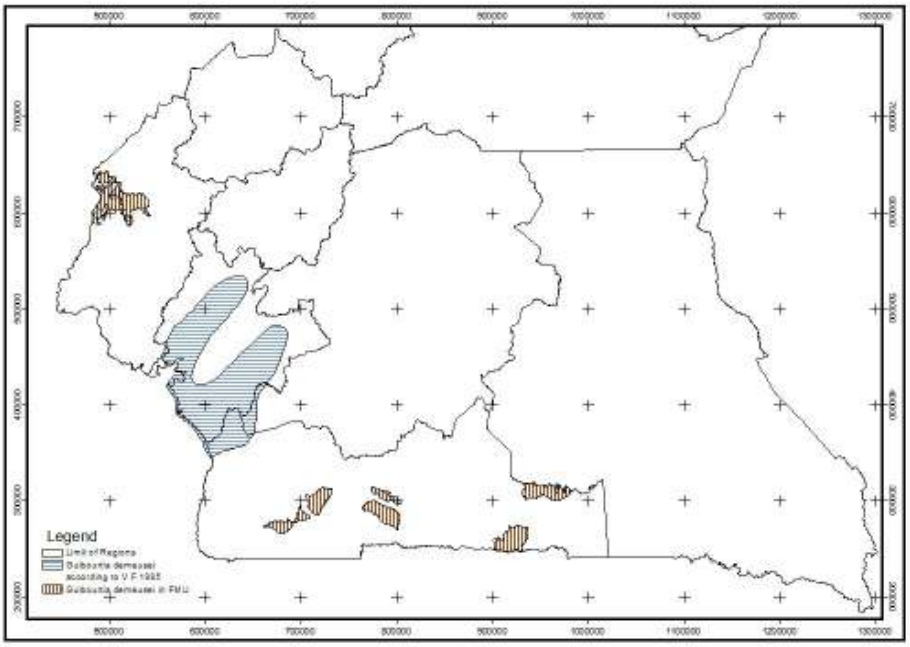

Figure 4. Comparative map of *G. demeusei* between Vivien et Faure (1985) and FMUs.

Following what precedes, I conclude that it is difficult to say if the occurency/occupancy areas of Bubinga and Wengé tree species are increasing or decreasing. Further investigations including data from sales of standing volume and community forests should aim to see if this is a problem of identification (confusion between *Guibourtia* species for example) or illustrates the reduction/or increasing of the occurency/occupancy areas of these tree species.

2.5.2. Densities

The national forest resources assessment conducted by FAO from 2003 to 2004 gives the density of 0.16 stem/ha for *Millettia laurentii* and 0.00 stem/ha for *G. demeusei*. Nothing is said for what concerns other *Guibourtia* tree species (MINEF - FAO 2005).

Before going to the definitive convention with the Government, each forest company has to develop a fair management plan of the forest concession. The document of the management plan is based on sound forest inventories, known as management inventories, with sampling rate ranging between 0.3% and 1%. According to Pilot Integrated Management project (API project) which has been working in the East province of Cameroon for a long time, a plant species is said to be less represented for logging when its average density is less than 0.05 stem/ha (Forni 1997, API 1995). Some concessionaires (timber companies) fixed their own

minimum density of exploitability (logging) in their document of management plan. Those minimum densities of exploitability cannot be more than the 0.05 stems/ha proposed by the API project. Table 1 presents for each tree species, its density and its conservation status according to the manager (timber company) and according to the API project. The inventories were conducted between 2003 and 2008. Data compiled from different management plans tend to show that Bubinga and Wengé are found in small densities in different FMUs. We can said that Bubinga species are less represented in their range area (locally) in Cameroon, where they occur with densities less than 0.04 stem/ha in all FMUs and for diameter classes ≥ 20 cm. Wengé is well represented in FMUs 09021 and 09023 found in the South region.

Table 1: Distribution of Bubinga and Wengé species in different Forest Management Units in Cameroon, data extracted from the management plans.

Tree species	Production forest (FMU = Forest Management Unit)	Year of publication	Density (diameter sup 20 cm, stems/ha)	Conservation status according to the timber company (the value gives the minimum limit fixed by the logging company)	Conservation status according to API project (minimum density = 0.05 stem/ha)
Guibourtia tessmannii or Bubinga rose	FMU09006	2004	0.0025	Minimum density is 0.01 stem/ha, not less represented and can therefore be logged	less represented and cannot therefore be logged
	FMU09016	2005	0.004	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09017-018	2004	0.03	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09021	2004	0.01	0.01, medium	less represented and cannot therefore be logged
	FMU09023	2004	0.006	0.05 not less represented and can therefore be logged	less represented and cannot therefore be logged
	FMU09024	2005	0.06	0.01, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09025	2004	0.01	0.02, less represented and cannot therefore be logged	less represented and cannot therefore be logged

Tree species	Production forest (FMU = Forest Management Unit)	Year of publication	Density (diameter sup 20 cm, stems/ha)	Conservation status according to the timber company (the value gives the minimum limit fixed by the logging company)	Conservation status according to API project (minimum density = 0.05 stem/ha)
	FMU09004B	2004	0.0018	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09019	2003	0.002	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU11005	2008	0.01	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU10064	2006	0.003	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
Guibourtia demeusei ou Bubinga rouge	FMU09006	2004	0.01	0.01, medium	less represented and cannot therefore be logged
	FMU090017-0018	2004	0.03	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09021	2004	0.004	0.01, not less represented and can therefore be logged	less represented and cannot therefore be logged
	FMU09004B	2004	0.0018	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09020	2007	0.005	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU11001	2008	0.0023	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU11005	2008	0.00	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
Guibourtia ehie ou Ovengkol	FMU09023	2004	0.033	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09025	2004	0.01	0.02, less represented and cannot therefore be logged	less represented and cannot therefore be logged

Tree species	Production forest (FMU = Forest Management Unit)	Year of publication	Density (diameter sup 20 cm, stems/ha)	Conservation status according to the timber company (the value gives the minimum limit fixed by the logging company)	Conservation status according to API project (minimum density = 0.05 stem/ha)
	FMU09004B	2004	0.003	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09020	2007	0.01	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09022	2009	0.01	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU11005	2008	0.00	0.05, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU10063	2005	0.117	0.05, not threatened	not threatened
Millettia laurentii ou Wengé	FMU09023	2004	0.312	0.05, not threatened	not threatened
	FMU09025	2004	0.00	0.02, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09021	2004	0.4	0.01, less represented and cannot therefore be logged	less represented and cannot therefore be logged
	FMU09013	2007	X		?
	FMU09019	2003	X		?

2.6. Conservation status

2.6.1. Global conservation status

Excepted for *Guibourtia ehie* and *Millettia laurentii*, no clear information is given for other tree species for what concerns their conservation status. Further research and fieldwork are required to verify the true conservation status of these species.

Guibourtia ehie or Ovangkol: Vulnerable A1c ver 2.3 (African Regional Workshop 1996)

Millettia laurentii or Wengé: Endangered A1cd ver 2.3 (African Regional Workshop 1996).

According to the World Conservation Monitoring Center, the status of *G. demeusei, G. tessmannii*, and *G. pelligriniana* in the wild is currently listed as unknown due to insufficient information (http://www.thewoodexplorer.com/maindata/we598.html).

Guibourtia arnoldiana: not threatened, globally secure (http://www.thewoodexplorer.com/maindata/we598.html).

2.6.2. National conservation status for Cameroon

In Cameroon, all Bubinga and Wengé tree species are classified as Least concerned (Onana 2011).

In April 2011, the Cameroon Government banned the exportation of Bubinga and Wengé, following the report dressed with empirical data by the National Forestry Development Agency (ANAFOR) acting as the CITES Scientific Authority. This decision has been revised and the Minister of Forestry and Wildlife banned the harvesting of Bubinga and Wengé species in FMUs where their density is low which is < 0.5 stem/ha. The minimum exploitable diameters are fixed as follow: *Guibourtia demeusei* (MED = 100 cm), *G. tessmannii* (60 cm), *G. ehie* (60 cm), *Millettia laurentii* (60 cm).

2.6.3. Main threats

Two main threats can be observed for Bubinga and Wengé species in Cameroon: habitat loss/degradation (human induced) and illegal logging.

Habitat loss through agricultural activities is considered as one of the main threat on forest biodiversity in Cameroon. Large-scale agriculture and other human activities in the area are leading to the degradation of primary forests (UICN, 1989), thus causing "vulnerability" of the wild plants. According to IUCN (1989), the rate of deforestation in Cameroon is the most high in the Congo basin, with an annual rate of 0.5%.

Illegal logging is the harvest, transportation, purchase or sale of timber in violation of laws. The harvesting procedure itself may be illegal, including using corrupt means to gain access to forests; extraction without permission or from a protected area; the cutting of protected species; or the extraction of timber in excess of agreed limits. Illegalities may also occur during transport, such as illegal processing and export; fraudulent declaration to customs; and the avoidance of taxes and other charges.

III. MANAGEMENT MEASURES IN CAMEROON

3.1. Management history

More than 25 years ago, Cameroon Government decided with the help of the international Community, to tackle the general problematic of sustainable forest development. The Government therefore first focused its efforts on the knowledge of the timber resource of the meridional or forest zone of the country. A national forest inventory has therefore been established, comprising 7 phases (figure 6). Four out of these phases have yet been finalised by the years 80, for a total forest bloc of 14 000 000 hectares, with the north limit situated at about 4th parallel. In fact, the basis work undertook within the national inventory conducted during the years 1980 (CENADEFOR – CTFT 1983, 1985) led to the elaboration of principal norms and technical tools for the management of the forest domain. These tools include: (1) the zoning plan of the meridional area (phases 1-4 of national inventory) which led to division of the forest zone in two main domain types, namely the permanent domain and the non-permanent domain, and (2) all norms related to the interventions in the forest milieu (production forests to be précised).

The non-permanent domain comprises the community forests, sales of standing volume (small forest concessions of not more than 2,500 ha), and mining zones. It is also composed of lands affected for agricultural and other agroforestry activities (République du Cameroun 1994, 1995). Rigorous management schemes are not applied to the non-permanent domain.

The permanent domain (République du Cameroun 1994, 1995) is divided into the domanial or state forests which belong to the State, and communal forests which belong to the private domain of the council. The states forests are themselves divided into production forests, protected areas, and forest reserves. Production forests are the most important in terms of surface area, 64% of the permanent domain, and 40% of the meridional zone. Production forests are mainly composed of big forest concessions. Each forest concession is composed of one or many forest of more than 5,000 ha, called the forest management unit (FMU). The process of establishment (classification) of a FMU includes three main steps: (1) data collection and local consultations, (2) confection of the file and signature of the decree of establishment (décret de classement in french), and (3) boundary stone (bornage).

The forest logging is conducted in the country through the logging convention for what concerns the permanent domain, and through the management convention for what is done in the non-permanent domain. The attribution of these different conventions is subordinated by

the validation of the management plan (forest concessions) or the simple management plans (community forests) by an Inter ministerial Committee presided by the forest administration.

Forest Management Units (FMU) are assigned to the sustainable production of the wood and other resources (non timber forest resources for example) in respect to the conditions that allow the preservation of ecological functions of the forest.

When allocating the FMU to a given company, a preliminary three years convention is signed between the Forest administration and the forest company. The terms of this preliminary convention precise that the forest company has to produce within the three-years of the convention and before the definitive convention has been signed, three types of documents in respect to the norms and rules indicated in the forest law, and including: a management plan for the whole concession (FMU), a five-years management plan (for the forest logging unit), and the operation plan of the first year of activity. At the end of the preliminary convention, a definitive convention is then signed between the forest Company and the Cameroon government for a renewable period of 15 years. At any step of the elaboration of the management plan, the forest administration verifies what has been realised in the previous step before giving his quitus (ok) for the next step.

The implementation of the management plan implies two main constraints for the company: the respect of specific part of the forest that has to be exploited (block of exploitation for 5 years, also called the forest logging units) and the respect of the minimum exploitable diameter (MED).

The forest law seeks to promote a sustainable exploitation of the timber (by the increase of the harvesting volume per hectare) and the non timber forest products, and also diversify and ensure high processing of forest resources. This does not only imply the settlement of appropriated and perform processing units (sawmills), but also requires the adequacy between the capacities of sawmills and the availability of the resources.

To ensure the contribution of the forest sector in the national economy, Cameroon government took two important measures: the allocation of FMU through a competitive bidding process namely adjudication, and the creation of the Forest Revenues Enhancement Program (FREP). The competitive allocation of FMU ensures high revenues, while the creation of the FREP in 1999 aimed to secure those revenues and to combat taxes frauds. Such measures are known as main conditions, required to improve forest or environment taxes (Scholl 2005).

3.2. Purpose of the management plan in place

The management plan of a FMU aims to exploit the timber resource in a sustainable manner. For Assamela, the management plan aims to ensure that the international trade in that plant species is non detrimental to its conservation in Cameroon.

3.3. General elements of the management plan

Elements of the management plan are précised in the arête *n° 0222/A/MINEF/ 25 may 2001.* This Arête sets the procedures of the elaboration and approbation of management plans, and the procedures for monitoring and control of the implementation of the management plans for the production forests, in the permanent domain.

The article 5 of the arête stipules that, the management plan is a document which aims to fix the forest logging activity in the permanent forests, through a fair planning of harvests in space and time, and by enhancing sylvicultural interventions, as to ensure a sustainable and equilibrium logging activity. This document is composed of five main sections including: (1) description of the natural milieu of the forest concession, (2) mapping, (3) management inventory, (4) affectation of soils and use rights, (5) Calculation of the forest possibility (stock).

The above sections contain following information.

1) Description of the natural milieu of the forest concession: it describes the biophysical characteristics of the forest, the socio-economic environment, and the history of the forest, based on appropriated studies.
2) Mapping:
    a. stratification of the forest territory at the 1/50 000 scale
    b. the produced map may contain following information: the final stratification realized beyond the management inventory, affectation of soils or delimitation in series, and the delimitation of five-year blocs (logging management units) in annual logging units.
3) Management forest inventory
    a. the list of tree species to assess obligatory are contained in the technical files (sheets) published by the forest administration. For those timber species, the inventory counts, measures and identifies all stems with diameter at Breast

High of over 20 cm. Stems are classed in 10 cm diameter classes (20-30, 30-40, 40-50, …).

b. Data analysis is done with a special computer package, validated by the forest administration. The package currently used by the Cameroonian forest administration is the TIAMA package (Computer treatment applied to forest management).

c. The sample rate for the management inventory should not be less than 1% for a forest concession less than 50,000 ha, and not less than 0.5% for a concession more than 50,000 ha (not less than 50,000 ha).

4) Affectation of soils and use rights: this consists of identifying and mapping the soil uses within the forest concession.

5) Calculation of the forest possibility: this item will be discussed in section 3.4.2.

3.4. Restoration and alleviation measures.

3.4.1. General provisions

The basis of restoration and alleviation measures is outlined in the arête *n° 0222/A/MINEF/ of 25th may 2001,* article 6 (element 5: calculation of the forest possibility) to article 10 as follow.

The possibility is the quantity of wood that can be harvested per hectare after each cutting cycle. The calculation of the annual cutting (logging) possibility is an iterative process of optimization, aiming to well determine the rotation (periodicity of cutting) and the minimum exploitable (or harvesting) diameters for managed trees (this is call the managed minimum exploitable diameter = MED/AME or the minimum managed diameter = MMD).

The management inventory (census) divides the tree species inventoried in five groups which are: (1) the managed tree species which will be used for the calculation of the forest possibility, (2) the complementary principal tree species, (3) the promotion tree species, (4) the special tree species which are subjected to particular sylvicultural regime, and (5) the remaining (other) tree species.

For analysis, all principal timber species are arbitrary classified in group 2. The forest manager may include in group 1 (managed tree species), a minimum of 20 tree species for which the exploitable volume is not less than 75% of the initial exploitable volume of the

principal tree species. Group 3 is composed of the promotion tree species, and group 4 contains tree species subjected to special sylvicultural regime.

The parameters used in the calculation of the forest possibility and the determination of the MED/AME include: the choice of the managed trees, the rotation, the growth rate in diameter of trees, the cubage tariff (tariff de cubage in french), the damage rate and the mortality rate.

Rotation is the delay between two successive harvests. It is the time spent between two successive logging years in the same space. In Cameroon, it is fixed at 30 years. However, this can increase in case of some specific constraints revealed by the analysis of the inventory data.

The growth rates in diameter used are published in the technical files (sheets) by the forest administration. For Bubinga and Wengé species, the growth rate is 0.45 cm/year.

The minimum exploitable diameter of managed trees MED/AME proposed by the manager (forest company), may not be less than the one (MED/ADM) fixed by the forest administration. The administrative minimum exploitable diameter (MED/ADM) fixed for Bubinga species in Cameroon is 80 cm.

For the managed species, stems with diameter high than MED/ADM + 40 cm, are retrieved from the initial population table which serves to simulate the forest possibility. These stems are called the “bonus”.

However, all trees of this group “bonus” are subjected to technologic inventory, aiming to appreciate the quality of the wood, and to allow the selection of mother trees (useful for seedlings production) which will be banned (forbidden) for any exploitation in the concession.

The rate of reconstitution (or the reconstitution rate) of species to manage, the managed minimum exploitable diameter (MED/AME), and the rotation time, interact one another towards the determination of the possibility.

The percentage of reconstitution (or reconstitution rate) is calculated using the following formula.

$$\%RE = (No\ (1-\Delta)\ (1-\alpha)^{T})/Np$$

Where:

No: number of stems of diameter classes < MED, which are used for the reconstitution (reestablishment) of the ligneous resource;

α: natural mortality (1%) per year;

Δ : mortality caused by logging damage. Forest logging implies destruction of some remaining (residual) tree species. Those damages vary according to different types of activities. The main activities causing damages on residual tree species are the settlement of the road network, the settlement of the logs parks, the extraction of stems or logs, the cutting of trees, the opening of transects, and many others. The forest administration had fixed the damage rate at 7% of the residual stock of the forest.

^{T} : rotation (30 years);

Np: total exploitable stems (MED + 3) to be reconstituted;

%Re: percentage of reconstitution (reestablishment).

The reconstitution (reestablishment) is good when %Re is more than 50%. The principle of the simulation consists of increasing progressively the administrative minimum exploitable diameter (MED/ADM) as to get a %Re ≥ 50%. The new minimum exploitable diameter which provides the best simulation (%Re ≥ 50%.) is called the managed minimum exploitable diameter (MED/AME).

The managed trees cannot be exploited under the MED fixed during the calculation of the forest possibility (MED/AME). All other tree species can be exploited in respect of the MED fixed by the forest administration (MED/ADM).

The forest delimitation is done on a map at 1/50 000 based on the results of the management inventory. It is realised in two steps:

Step 1. Firstly, the forest concession is divided into five-years blocs as to obtain a difference of less than 5% of the exploitable volume for the principal tree species (managed and complementary);

Step 2. Secondly, the five-year blocs are then divided as to allow a continuous progression of logging activity in the space and time. Each five-year bloc is divided in 5 logging units (assiette de coupe in French), contiguous and with equitable surfaces.

Sylvicultural treatments, rather than cutting in respect with the MED, must be conducted as to ensure the forest reconstitution (reestablishment) at the end of each rotation.

The nature, objectives, intensity, and the planning of sylvicultural operations are described in the documents of the management plan, and of the five-year management plan. The annual

operation plans precise the areas managed, the forest strata logged, and the planning of future interventions.

Research activities useful to complete the based data, which are necessary to ensure sustainable management are précised in the management plan.

As it was said in section 2.1.1., the approbation of the management plan implies two main constraints to exportation: the respect plots (five-year blocs) and the respect of MED.

The area constraint is determined by the respect of annual plots in space and time. Many plots can be opened to forest logging simultaneously, but they must be contiguous. A five-year management unit is definitively closed to forest logging, 6 years after its opening by the forest administration.

3.4.2. Application of management measures on Bubinga and Wengé species in Cameroon.

3.4.2.1. Distribution of stems per diameter classes

The distribution of stems per diameter classes for a tree species is important and fundamental for its management. It allows to visualise the structure of the present population, and to identify different anomalies and deficiencies related to the regeneration and the state of the population. It is on this basis that the adapted sylvicultural interventions will be proposed.

Table 2 shows the distribution of those stems per diameter classes for the three *Guibourtia* species in Cameroon

Table 2. Distribution of number of stems of Bubinga species per class of diameter in different FMUs in Cameroon. The diameter classes are as follow: class 1 = 25 cm, class 2 = 35 cm,…class 6 = 75 cm,…,class 9 = 105 cm, …, class 14 = 155 cm.

	Diameter classes															
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Total**
Guibourtia tessmannii	132	147	166	0	140	184	0	0	0	0	134	0	0	0	147	1051
Guibourtia demeusei	158	298	0	0	158	0	0	132	462	0	0	0	0	0	218	1426
Guibourtia ehie	140	141	0	0	0	0	0	0	0	0	0	0	0	0	0	281

Figure 5 illustrates the correspondent specific curves. All diameter classes are not well represented, which shows the threatening of those species. for *G. ehie*, no stems are found on the right side of the MED. According to documents of the management plan reviewed, all Bubinga species were excluded from the list of managed (or logged) species, due to their low densities. This means that, no harvesting and export volume on Bubinga and Wengé species should be found from those FMUs.

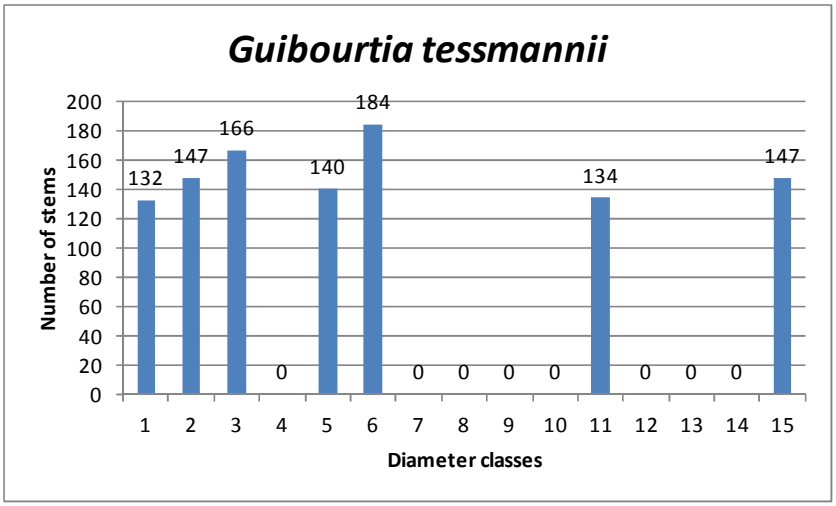

Figure 5.a. ***Guibourtia tessmannii*** **(Bubinga rose)**

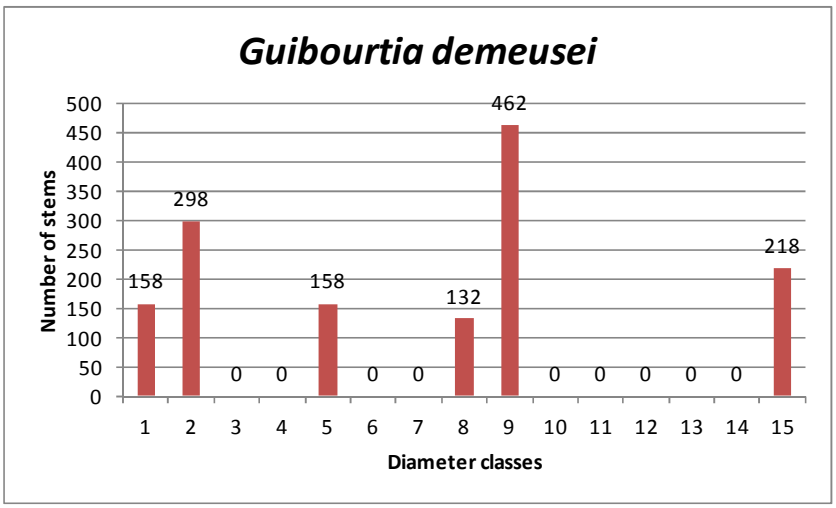

Figure 5.b. ***Guibourtia demeusei*** **(Bubinga rouge)**

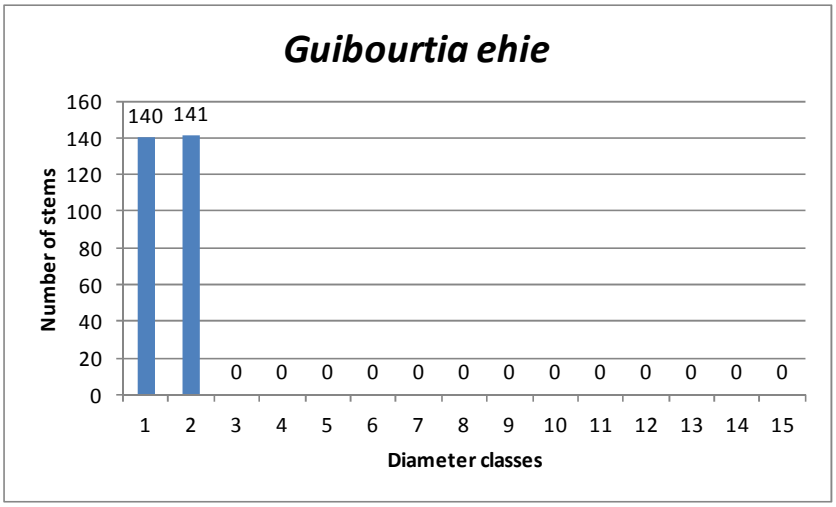

Figure 5.c. *Guibourtia ehie* (Ovengkol)

3.4.2.2. Logging volume requested and expressed in different annual certificate applications from 2008 to 2012.

3.4.2.2.1. Evolution of logging volume requested per tree species

At the end of the year, each logging company has to conduct a logging or systematic inventory in a specific annual plot. This inventory concerns only exploitable stems. The report is then used to apply for a given volume for the next fiscal year. Appendix 1 shows for each tree species and for each timber company and forest title, the corresponding volume requested for logging between 2008 and 2012. Timber companies cited are distributed in five different forest titles including: definitive concession, preliminary concession, sale of standing volume, special permit, and autorization of collecting timber. As stated before, Cameroon hosts the five *Guibourtia* tree species. But it is only *G. demeusei* (red Bubinga) and *G. tessmannii* (pink Bubinga) which are largely logged. *G. demeusei* is the three species which has the highest logging volume (120 843 m^3) representing 73.5% of the total volume (164 294 m^3) during the indicated period. Figure 6 shows how the red Bubing's volume increases since 2008. The year 2011 – 2012 appears to be the one which illustrates the high growth rate; the volume of *G. demeusei* was multiplied by two.

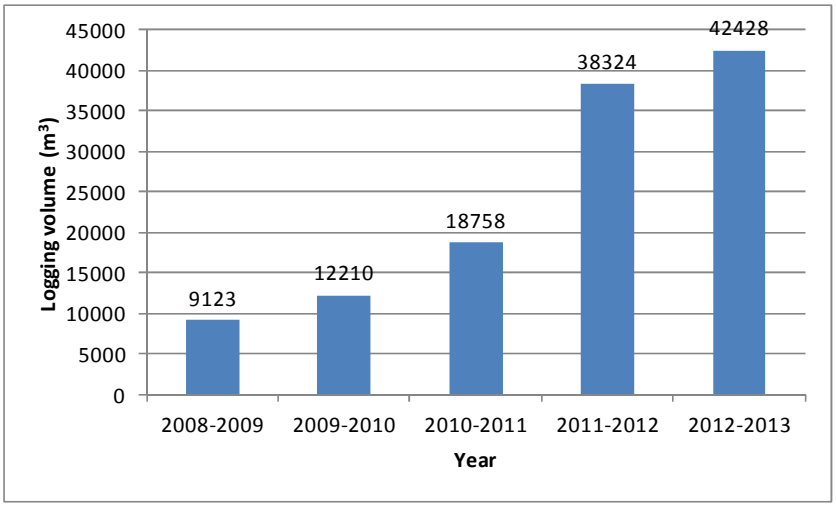

Figure 6. Evolution of requested logging volume of *G. demeusei* from 2008 to 2012 in Cameroon

A total of 3 304 m^3 of *G. tessmannii* was requested by timber companies from 2008 to 2012 in Cameroon. The evolution of the requested logging volume for *G. tessmannii* is illustrated in figure 7. The year 2010 – 2011 is the year which has the high logging volume of *G. tessmannii*.

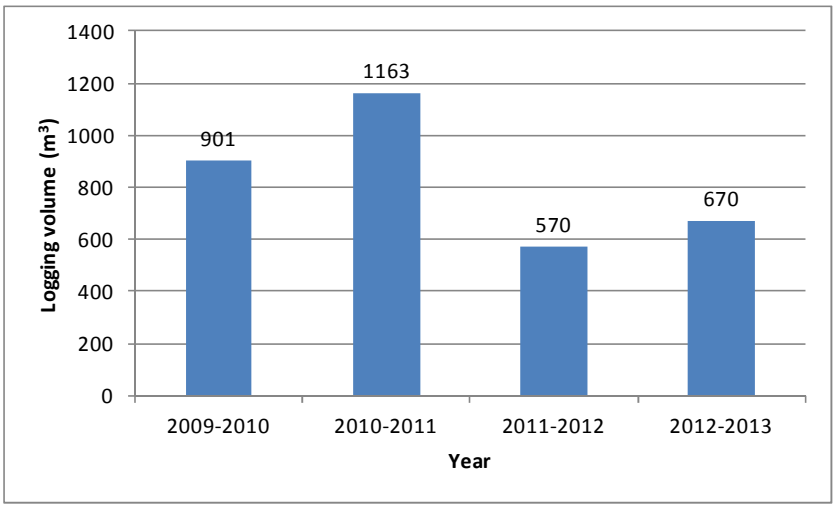

Figure 7. Evolution of requested logging volume of *G. tessmannii* from 2008 to 2012 in Cameroon

A total of 40 147 m^3 of Wengé (*Millettia laurentii*) was requested for logging by timber companies between 2008 and 2012 in Cameroon. Figure 8 shows the evolution of that volume. The high volume was requested in 2009 – 2010.

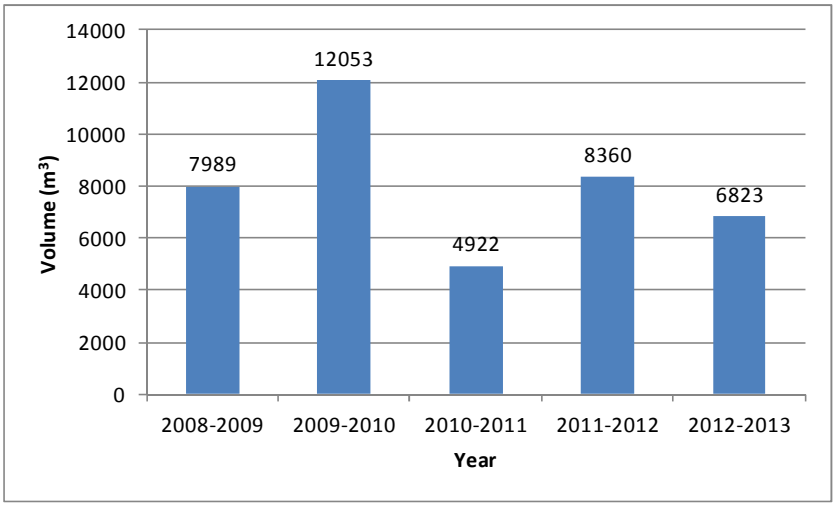

Figure 8: Evolution of requested logging volume of *Millettia laurentii* from 2008 to 2012 in Cameroon

3.4.2.2.2. Distribution of requested logging volume per forest title

The distribution of the requested logging volume for Bubinga and Wengé species in different forest titles between 2008 and 2012 is shown in figure 9. Sales of standing volume appear to be the forest title which requested the high volume of Bubinga and Wengé tree species with 56.2% of the total volume. They are followed by forest management units composed of definitive concession (52 010 m^3) and temporary concession (8 971 m^3). The problem here is that, sales of standing volume are titles where rigorous measures for sustaining the resource are not applied. They belong together with community forests to the non-permanent forest domain.

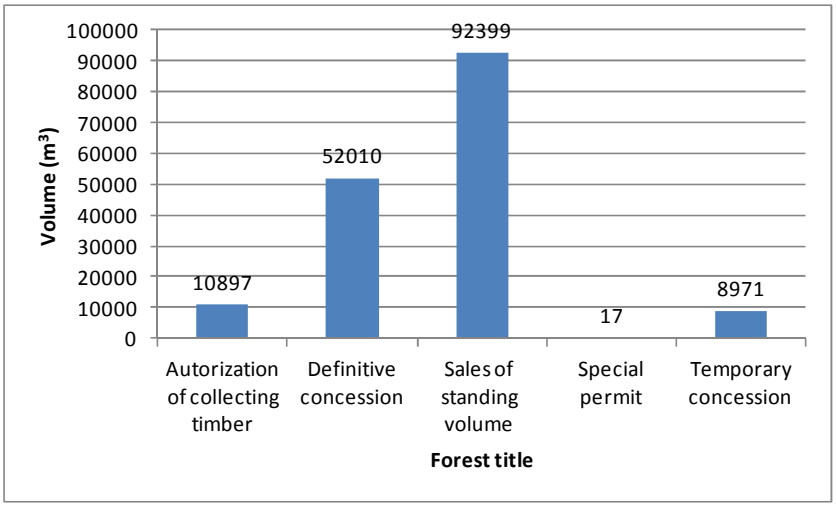

Figure 9. Distribution of Bubinga and Wengé requested logging volume in different forest titles between 2008 and 2012 in Cameroon.

3.4.2.2.3. Distribution of requested logging volume per FMU

A total of 60 061 m^3 of Bubinga and Wengé tree species was requested by FMUs between 2008 and 2012 (table 3). *G. demeusei* and *Millettia laurentii* are the two most important tree species which were requested by forest management units (FMU) with about 28 900 m^3 each. It is paradoxal to see that, some FMUs for which the document of the management plan outlined the threatening of Bubinga and/or Wengé species, have requested to log those species. For example, the FMU 09021 where *G. demeusei* was assessed with a density of 0.03 stems/ha which was less than the limit of 0.05 stem/ha, requested to log a total of 7 056 m^3 of that tree species. the FMU 09020 shows the density of 0.005 stems/ha for *G. demeusei*; but the concessionaire of that FMU requested a total volume of 1 720 m^3 of *G. demeusei*. Same observation can be made for FMU 09024 for *G. tessmannii* (711 m^3 requested).

Table 3. Requested logging volume of Bubinga and Wengé tree species requested in FMU between 2008 and 2012.

FMU	*Guibourtia demeusei*	*Guibourtia tessmannii*	*Millettia Laurentii*	Total volume (m^3)
9012	225			225
00-001	1214			1214
00-002	2895			2895
00-004	1605			1605
09-003			35	35
09-008	2105			2105
09-009	207		68	275
09-012	1167		2374	3541

FMU	*Guibourtia demeusei*	*Guibourtia tessmannii*	*Millettia Laurentii*	Total volume (m^3)
09-015	1286	369		1655
09-016			726	726
09-017	7056		13044	20100
09-019	5017		1824	6841
09-020	1720		604	2324
09-022	79	515	3770	4364
09-023	1121		1329	2450
09-024	70	711	2832	3613
09-026	2766			2766
09-028	187			187
09-04b			2174	2174
10-007			39	39
10-020			16	16
2E-RF	241	670		911
Total	**28961**	**2265**	**28835**	**60061**

3.4.3. Conservation of Bubinga and Wengé tree species in protected areas in Cameroon – precautionary measures

Apart from the production forests, protection areas are the other component of the permanent forest domain in Cameron. The main target of the Cameroon government regarding biodiversity conservation is the transformation of 30% of the total land area into protected areas. The creation of national parks, nature reserves and zoological gardens represented the first direct involvement of the public sector in biodiversity conservation in the early 1930s.

Based on the map (figure 10) dressed by Vivien et Faure (1985), *Guibourtia demeusei* is found in Four protected areas delimited in the Littoral region including: the national park of Ebo, the forest reserve of Douala Edéa, the forest reserve of the mount Lonako, and the forest reserve of Nkongsamba. *Guibourtia tessmannii* is found in the same protected areas, and also in the national park of Lobéké, east region. *G. demeusei, G. ehie, G. pelligriniana, G. tessmannii* and *Millettia laurentii* are found in the national park of Campo ma'an, in the south region (Tchouto 2004). The question to ask is are those protected areas well protected?

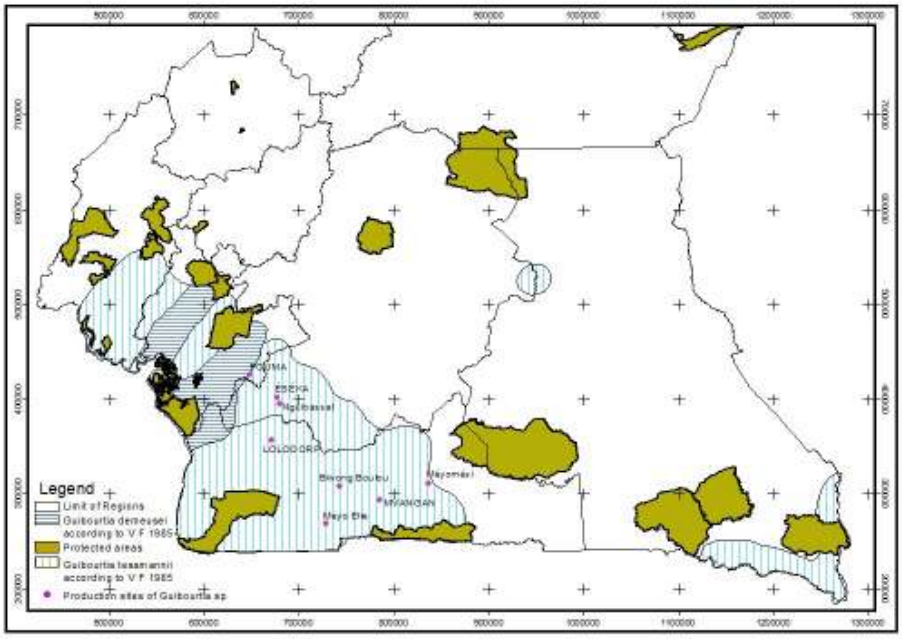

Figure 10. Distribution of protected areas in the distribution area of Bubinga species in Cameroon

Sylvicultural trials were realised in many forest species in Cameroon, but no specific action has been made for what concerns Bubinga and Wengé tree species (MINFOF 2004). These plant species have not been planted in forest plantations belonging to the ex-National Office For Forest Development (MINFOF 2004). This means that, it is not clear if the forest administration has developed sylvicultural standards for better conserving those tree species in Cameroon.

IV. UTILIZATION AND TRADE OF BUBINGA AND WENGE PRODUCTS IN AFRICAN COUNTRIES

This chapter presents data recorded on production and/or exportation volumes of Bubinga and Wengé products in different African countries including: Cameroon, Congo, Equatorial Guinea, Central African Republic (CAR), Democratic republic of Congo (DRC), and Gabon.

4.1. Utilization

Bubinga tree species are highly appreciated by forest exploiters because of its hard, red-coloured wood, which is used to make furniture or music instruments in Europe and Asia (http://www.foei.org/en/resources/link/95/e95benoit.html)

Guibourtia demeusei

Trade name: Bubinga

Common uses: Agricultural implements, Boat building (general), Boat building, Boxes and crates, Brush backs & handles, Cabinetmaking, Canoes, Carvings, Chairs, Chests, Concealed parts (Furniture), Decorative veneer, Desks, Dining-room furniture, Domestic flooring, Dowell pins, Dowells, Drawer sides, Figured veneer, Fine furniture, Floor lamps, Flooring, Furniture , Furniture components, Furniture squares or stock, Furniture, Handles, Hatracks, Heavy construction, Interior construction, Joinery, Kitchen cabinets, Lifeboats, Light construction, Living-room suites, Millwork, Mine timbers, Moldings, Musical instruments, Office furniture, Paneling, Parquet flooring, Plywood, Radio - stereo - TV cabinets, Railroad ties, Rustic furniture, Shafts/Handles, Shipbuilding, Stair rails, Stairworks, Stools, Stringers, Sub-flooring, Tables , Tool handles, Turnery, Utility furniture, Vehicle parts, Veneer, Veneer: decorative (http://www.thewoodexplorer.com/maindata/we598.html)

Guibourtia tessmannii

Trade name: Bubinga

Common uses: Boat building (general), Boat building, Boxes and crates, Brush backs & handles, Cabinetmaking, Canoes, Carvings, Chairs, Chests, Concealed parts (Furniture), Decorative veneer, Desks, Dining-room furniture, Domestic flooring, Dowell pins, Dowells, Drawer sides, Figured veneer, Fine furniture, Floor lamps, Flooring, Furniture , Furniture components, Furniture squares or stock, Furniture, Handles, Hatracks, Interior construction, Joinery, Kitchen cabinets, Lifeboats, Living-room suites, Millwork, Mine timbers, Musical instruments, Office furniture, Paneling, Parquet flooring, Plywood, Radio - stereo - TV cabinets, Railroad ties, Rustic furniture, Shafts/Handles, Shipbuilding, Stair rails, Stairworks,

Stools, Stringers, Sub-flooring, Tables , Tool handles, Turnery, Utility furniture, Vehicle parts, Veneer: decorative (http://www.thewoodexplorer.com/maindata/we598.html)

Guibourtia pellegriniana

Trade name: Bubinga

Common uses: Boat building (general), Boat building, Boxes and crates, Brush backs & handles, Cabinetmaking, Canoes, Carvings, Chairs, Chests, Concealed parts (Furniture), Decorative veneer, Desks, Dining-room furniture, Domestic flooring, Dowell pins, Dowells, Drawer sides, Figured veneer, Fine furniture, Floor lamps, Flooring, Furniture , Furniture components, Furniture squares or stock, Furniture, Handles, Hatracks, Heavy construction, Interior construction, Joinery, Kitchen cabinets, Lifeboats, Living-room suites, Millwork, Mine timbers, Musical instruments, Office furniture, Paneling, Parquet flooring, Plywood, Radio - stereo - TV cabinets, Railroad ties, Rustic furniture, Shafts/Handles, Shipbuilding, Stair rails, Stairworks, Stools, Stringers, Sub-flooring, Tables , Tool handles, Turnery, Utility furniture, Vats, Vehicle parts, Veneer: decorative (http://www.thewoodexplorer.com/maindata/we598.html).

Guibourtia ehie

Trade name: Ovangkol

Common uses: Bridge construction, Cabinetmaking, Chemical derivatives, Decorative veneer, Domestic flooring, Door, Fine furniture, Flooring, Furniture , Furniture, Joinery, Musical instruments, Paneling , Paneling, Plywood, Tables, Tool handles, Turnery, Veneer, Veneer: decorative (http://www.thewoodexplorer.com/maindata/we598.html)..

Guibourtia arnoldiana

Trade name: Mutenye

Common uses: Agricultural implements, Bent Parts, Billiard-cue butts, Boat building (general), Boat building, Boxes and crates, Cabinetmaking, Canoes, Chairs, Chests, Concealed parts (Furniture), Decorative veneer, Desks, Dining-room furniture, Domestic flooring, Dowell pins, Dowells, Drawer sides, Figured veneer, Fine furniture, Floor lamps, Flooring, Furniture , Furniture components, Furniture squares or stock, Furniture, Hatracks, Heavy construction, Joinery, Kitchen cabinets, Lifeboats, Light construction, Living-room suites, Mine timbers, Musical instruments, Office furniture, Parquet flooring, Plywood, Poles, Posts, Radio - stereo - TV cabinets, Railroad ties, Rustic furniture, Shipbuilding, Stools, Sub-

flooring, Tables , Turnery, Utility furniture, Vehicle parts, Veneer, Veneer: decorative, Wardrobes. (http://www.thewoodexplorer.com/maindata/we598.html)..

Millettia laurentii

Trade name: Wengé

Common uses: Bedroom suites, Boat building (general), Boat building, Boxes and crates, Brush backs & handles, Building construction, Building materials, Cabin construction, Cabinetmaking, Canoes, Carvings, Chairs, Chests, Concealed parts (Furniture), Construction, Desks, Dining-room furniture, Domestic flooring, Dowell pins, Dowells, Drawer sides, Drum sticks, Excelsior, Factory construction, Factory flooring, Fine furniture, Floor lamps, Flooring, Furniture , Furniture components, Furniture squares or stock, Furniture, Hatracks, Heavy construction, Joinery, Kitchen cabinets, Lifeboats, Light construction, Living-room suites, Mine timbers, Musical instruments , Office furniture, Organ pipes, Paneling, Parquet flooring, Piano keys, Pianos , Plywood, Posts, Railroad ties, Shipbuilding, Sporting Goods, Tool handles, Turnery, Vehicle parts, Veneer: decorative. (http://www.thewoodexplorer.com/maindata/we598.html)..

4.2. Trade

4.2.1. Cameroon

Appendix 2 presents the volume of Bubinga and Wengé products produced in Cameroon and exported in different countries. Data come from the Cameroon timber trade data (COMCAM), Douala. Data on importing countries are not completed.

Bubinga: there is no difference between Bubinga species at the level of Douala. In regard to what was say for logging volume, we can assume that the two species of Bubinga exported from Cameroon are *Guibourtia demeusei* and *G. tessmannii*. A total of 118 citations of exporting volume and countries were registered. More than fifty percent of the citations (50%) are not précised in terms of importing countries, which cannot allow to view the most important importing countries. Anyway, the pressure on the Bubinga species is effective and should probably come from the progressive arrival of Asian countries including China, Hongkong, Japan, Libanon, and Taïwan in the list of importing countries.

A total of 8 244 m^3 of Bubinga was exported from the Douala port between 2008 and 2012 (figure 11). The years 2010 and 2011 are in this order, the years when Cameroon exported high volumes of Bubinga species.

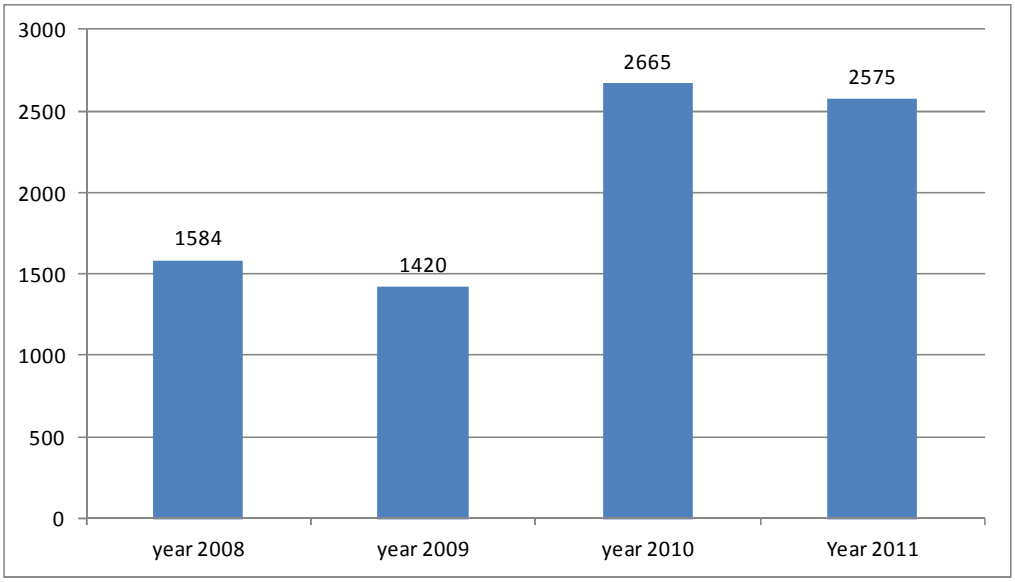

Figure 11. Exports volume of Bubinga species from Cameroon between 2008 and 2012.

Wengé: a total of 1972 m3 of Wengé species was exported from the Douala port between 2008 and 2012. The high volume was observed in 2011 (figure 12) with 34,9% of the total volume.

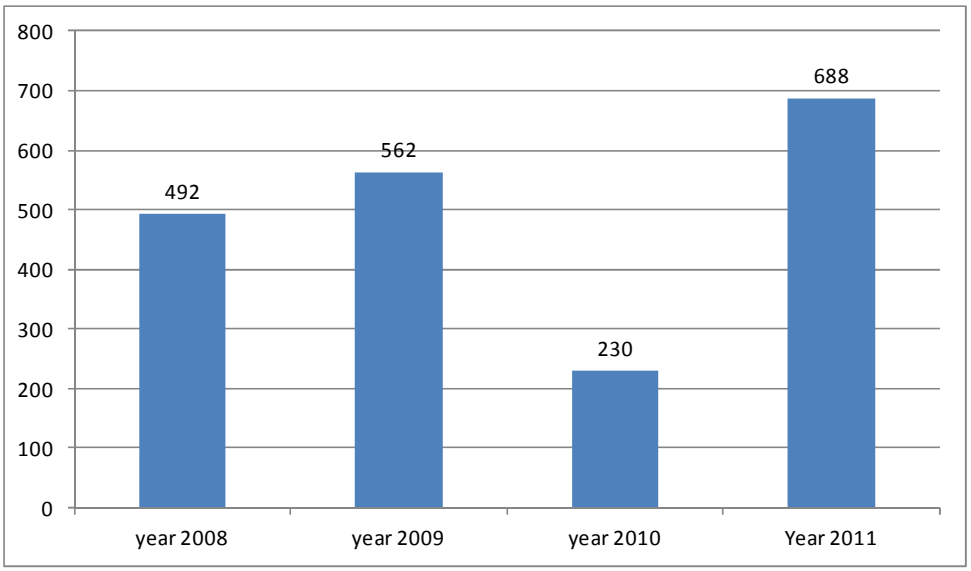

Figure 12. Exports volume of Wengé species from Cameroon between 2008 and 2012.

4.2.2. Republic of Congo

4.2.2.1. Densities of Bubinga and Wengé

Data recorded from management inventories realized in the North Congo reveal that Bubinga densities are comprised between 0.001 and 0.016 stems/ha, while those of Wengé are between 0.122 and 1.7 stems/ha (Banzouzi and Ngoma 2012).

4.2.2.2. Logging volumes of Wengé

Table 4 presents data obtained from four timber companies based in the North Congo between 2008 and 2011 (Banzouzi and Ngoma 2012). A total of 67 476 m^3 of Wengé was produced from which a total of 33 769.91 m^3 (50%) was exported.

Table 4. Production and export volume of Wengé species from Congo between 2008 and 2011..

	Year 2008		Year 2009		Year 2010		Year 2011	
Timber companies	Production	Exportation	Production	Exportation	Production	Exportation	Production	Exportation
CIB	4142,0	1220,7	242,4	1639,0	3366,3	1350,0	4536,8	2010,1
IFO	5402,0	5811,0	9241,0	3510,0	7750,0	6057,3	22402,0	7947,2
SEFYD	0,0	0,0	0,0	0,0	68,6	0,0	2322,0	237,7
SIFCO	692,0	201,0	2714,7	192,0	2371,9	678,3	2224,7	2915,6
Total	10236,0	7232,7	12198,0	5341,0	13556,7	8085,6	31485,4	13110,5

Figure 13 illustrates the logging (production) volume harvested between 2008 and 2011. The production volume increases since 2008, and doubled since 2010.

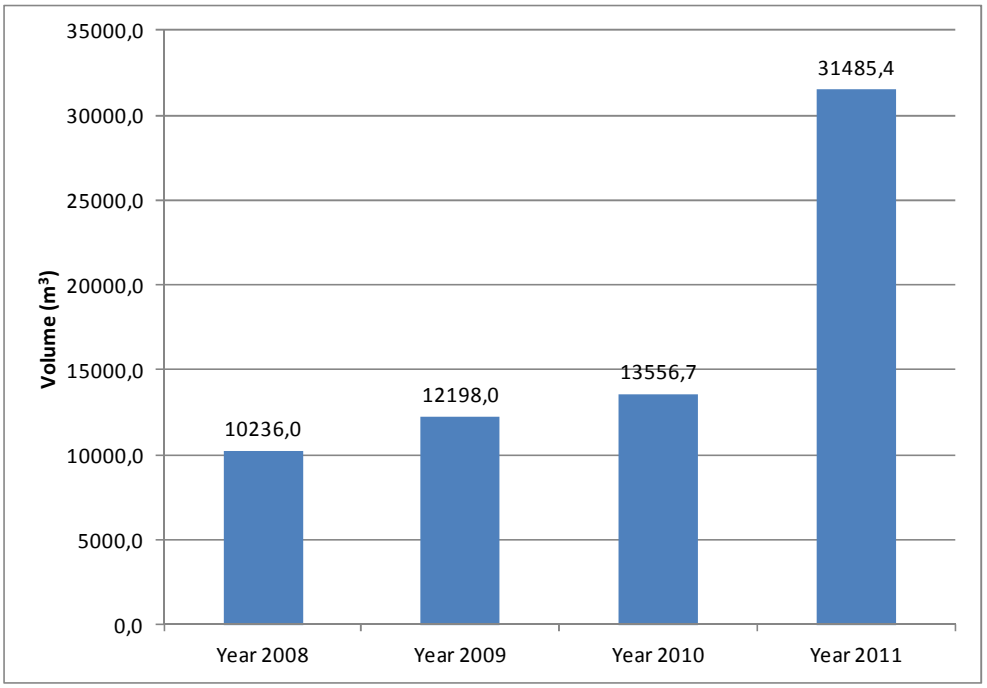

Figure 13. Evolution of logging volume for Wengé in the north of the Republic of Congo between 2008 and 2010.

4.2.2.3. Export volume of Wengé

The evolution of export volume of Wengé produced in the north Congo is illustrated in figure 14. The export volume is increasing since 2008.

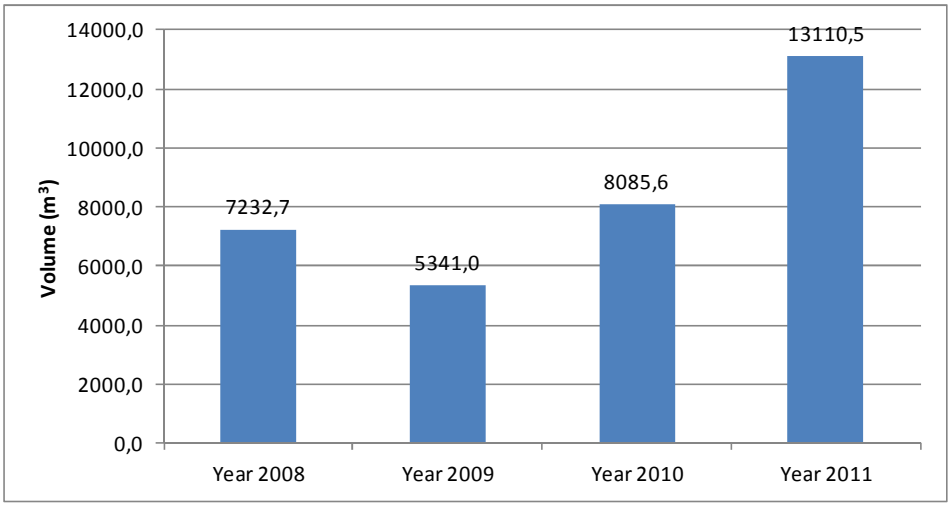

Figure 14. Evolution of export volume for Wengé in the Republic of Congo between 2008 and 2010

4.2.2.4. Export volume of Wengé and Bubinga from Congo according to the CEMAC database

Appendix 3 presents export volume of Bubinga and Wengé produced in Congo and registered in the database of the Economic and Monetary Community of the Central African Countries based in the Douala port (CEMAC 2010, 2011). This is a database which gathers data of the timber exported by surrounding countries including the Republic of Congo and Central African Republic from the Douala port in Cameroon.

A total volume of 31.96 m^3 of Bubinga produced in Congo was export from the Douala port in 2010 and 2011. All that volume was exported to China. The high volume (56.3%) was exported in 2011, which shows the augmentation.

Table 5 is extracted from Appendix 3 and represents the distribution of the export volume of Wengé from Congo between 2010 and 2011 in different countries. As observed in the COMCAM database case, some data representing 10% of the citations are not précised in terms of importing countries. A total of 2107.367 m^3 of Wengé coming from the Republic of Congo was exported from the Douala port in 2010 and 2011. This volume has increased as observed in figure 14, since 84% was exported in 2011. A total of 648.88 m^3 was used in Douala, Cameroon representing about 31% of the total volume of the Wengé arriving in Douala from Congo. China appears as the country which imported a huge volume of Wengé coming from Congo through the Douala port, 893.561 m^3, representing 42.4% of the total volume. A total of 788.676 m^3 (88.26%) of this volume was imported in China in 2011 against only 104.885 m^3 (11.74%) in 2010, which illustrates an increasing situation. France occupies the second place in term of the volume imported after China, with only 98.724 m^3 representing 4.7% of the total volume exported.

Table 5 Distribution of the export volume of Wengé from Congo between 2010 and 2011 in different importing countries.

Importing country	Year 2010	Year 2011	Total
Belgium		33.822	33.822
China	104.885	788.676	893.561
Danmark	5.482	8.104	13.586
Douala	11.943	636.937	648.88
France	4.077	94.647	98.724
Germany		30.408	30.408
Ghana		1.872	1.872

Importing country	Year 2010	Year 2011	Total
Great Bretain	14.71	7.726	22.436
Hong kong	9.605		9.605
Italy	43.324		43.324
Portugal		18.777	18.777
Spain		8.671	8.671
Switzerland	49.698		49.698
USA		3.24	3.24
No precision	93.454	137.309	230.763
Total	**337.178**	**1770.189**	**2107.367**

4.2.3. The Central African Republic

The Central African Republic (CAR) is located in the Centre of Africa and cover a total of 622 984 km². the humid and dense forest occupied about 5.4 millions of hectares in the south east and south west. Bubinga (*Guibourtia demeusei*) and Wengé (*Millettia laurentii*) of the CAR are often classified as secondary timber species by local timber companies. The minimum exploitable diameters are 60 cm. Bubinga is largely distributed in the country compared to Wengé (Ouangando 2012).

4.2.3.1. Density of Bubinga

The distribution of the density of stems in different diameter classes is illustrated for Bubinga in Figure 15. Data were compiled from 6 documents of the management inventories of local timber companies. The average density of Bubinga in CAR is 0.4 stems/ha (Ouangando 2012). This density seems important than what we observed in Cameroon. Also, the Bubinga seems to not encounter problems of regeneration. Almost all diameter classes are represented, and there are many young stems.

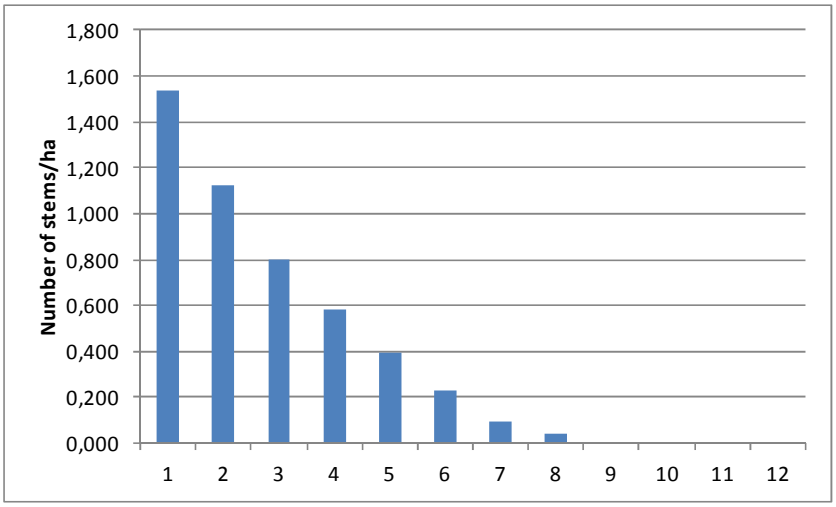

Figure 15. Distribution of desnity of Bubinga stems in different diameters classes in CAR

4.2.3.2. Logging volume of Bubinga

The figure 16 illustrates the logging volume of Bubinga of the CAR between 2007 and 2012 (Ouangando 2012). The logging volume of Bubinga is increasing, with the high volume being observed in four months in 2012.

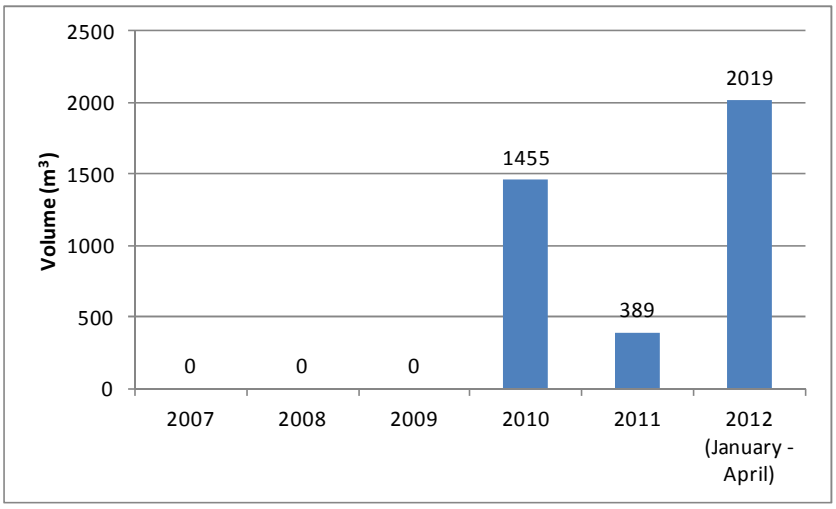

Figure 16. Evolution of the logging volume of Bubinga of CAR between 2007 and 2012

4.2.3.3. Export volume of Bubinga and Wengé of CAR

Appendix 4 presents export volume of Bubinga and Wengé produced in CAR and registered in the database of the Economic and Monetary Community of the Central African Countries

based in the Douala port (CEMAC 2010, 2011). A total volume of 1 727.925 m^3 of Bubinga and 35.402 m^3 of Wengé produced in CAR was exported from the Douala port in 2010 and 2011.

Table 6, extracted from appendix 4 shows the distribution of the Bubinga volume exported in different countries. In general, the exported volume of Bubinga has increased between 2010 and 2011. A total of 241.203 m^3 of the Bubinga representing 13.9% of the total was not précised in term of importing countries, while a total of 592.007 m^3 was used in Douala, Cameroon representing about 27.7% of the total volume of the Bubinga arriving in Douala from the CAR. The main importing destination of Bubinga from CAR are asian countries including the China (9.8%), Vietnam (5%) and Hong kong (4.1%).

Table 6. Distribution of the export volume of Bubinga from CAR between 2010 and 2011 in different importing countries.

Importing country	Year 2010	Year 2011	Total
China		170.054	170.054
Danmerk	60.051		60.051
Douala	113.122	478.885	592.007
France		64	64
Germany		23	23
Great Bretain		4.004	4.004
Hong kong	31	40.139	71.139
HS	37		37
Italy		22.231	22.231
to order		44.479	44.479
UTG	146.289	95	241.289
Vietnam		86.468	86.468
VSD		21	21
Not precised	217.193	24.01	241.203
European Commission	28	22	50
Total	**632.655**	**1095.27**	**1727.925**

4.2.4. Democratic Republic of Congo (DRC)

The DRC is one of the most important African countries in terms of the total area of forests and biodiversity. Bubinga is found in four provinces including: the Oriental province and in the territory of Basoko, the province of Equator in the Ingende, Bikoro and Lukolela territories, the province of Bandundu in the territories of Kutu, Oshwe, and Kwamouth, and in the province of low Congo, in the Mayombé forest to be précised.

Wengé is found in the Oriental province in the Basoko territory, Equator province in the Ingende, Bikoro and Lukolela territories, the Bandundu province in the territories of Kutu, Oshwe, Kwamouth, Inongo and Mushie, and in the the province of low Congo, in the Mayombé forest.

The logging and export volumes of Bubinga and Wengé from the DRC are presented in table 7 (Ipantua 2012).

Table 7. Logging and export volumes of Bubinga and Wengé from DRC between 2005 and 2011.

Species	Volume	Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Year 2010	Year 2011
Bubinga	Logging	14.915		238.256	41.213	41.213		
Bubinga	Exportation			130.735	122.592	743.573	1988.232	2040
Wengé	Logging	769.231	1690.466	51970.739	57987.254	61005.11	19694.752	
Wengé	Exportation		29391.87	47009.893	60646.479	14646.523	24680.47	

Figure 17 illustrates the evolution of the logging and export volumes of Bubinga of the DRC between 2005 and 2010. The logging volume decreases while that of export increases.

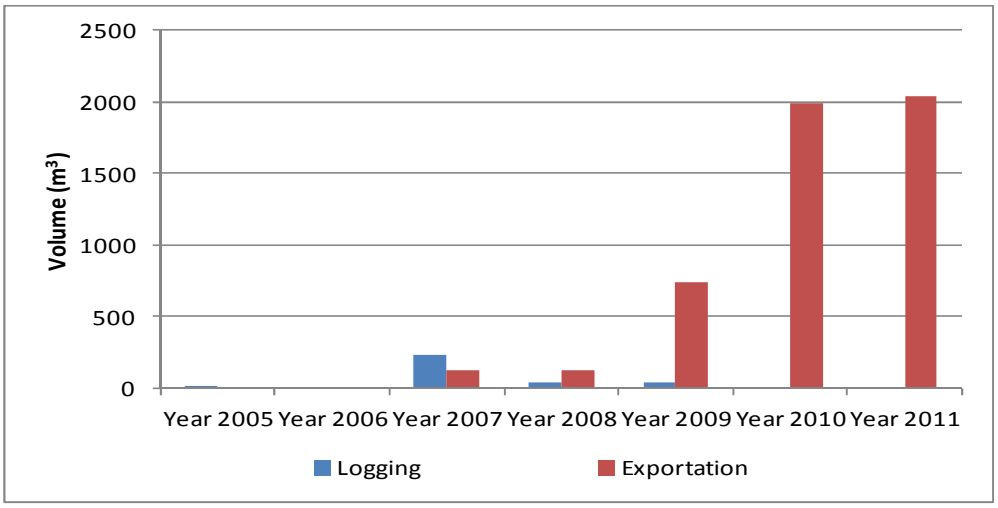

Figure 17. Evolution of logging and export of Bubinga products in DRC between 2005 and 2011.

The logging and export volumes for Wengé have a similar evolution.

4.2.5. Equatorial Guinea:

A total of 691.691 m^3 of Bubinga was exported from Equatorial Guinea between 2007 and 2011. The export volume has largely increased after 2009 (Figure 18).

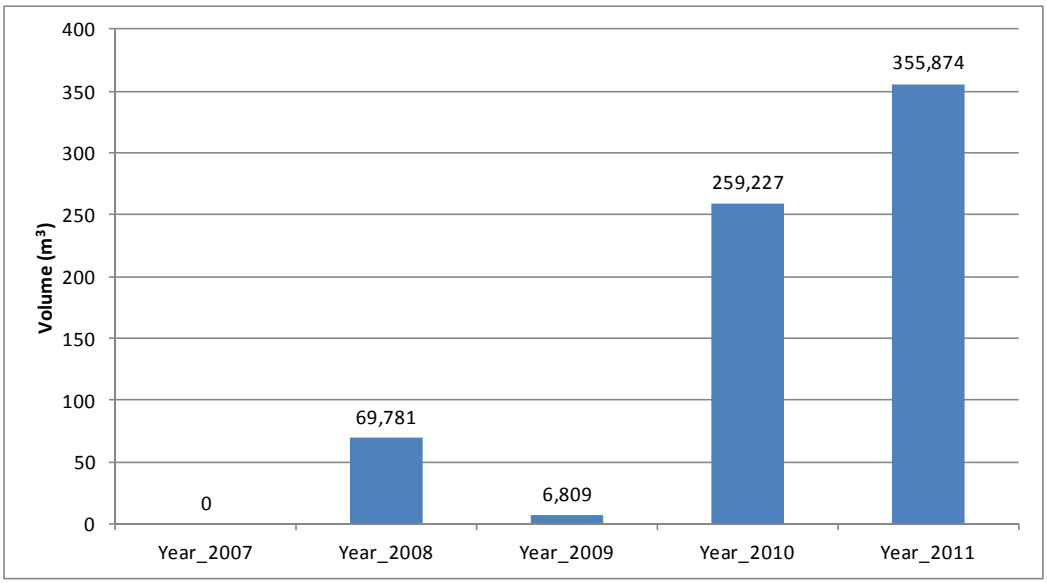

Figure 18. Evolution of the export volume of Bubinga in Equatorial Guinea between 2007 and 2011.

Figure 19 illustrates the evolution of the export volume for Wengé species from the Equatorial Guinea between 2007 and 2011. The high volume was exported in 2007.

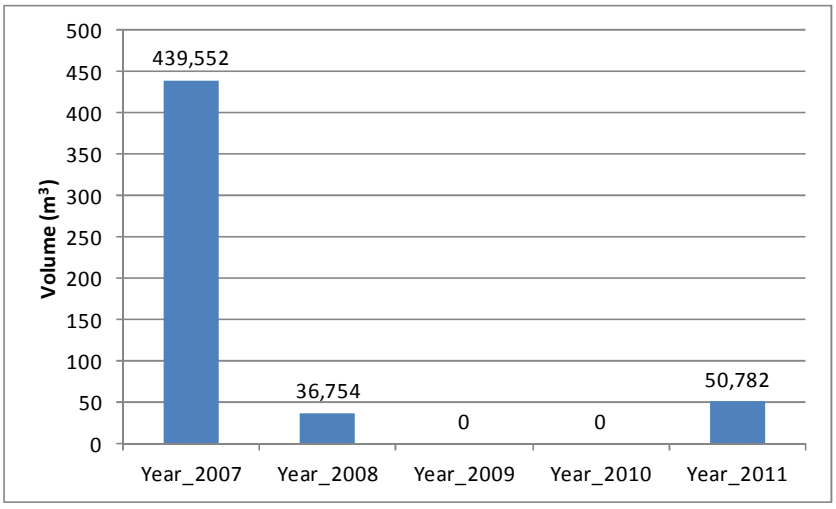

Figure 19. Evolution of the export volume of Wengé in Equatorial Guinea between 2007 and 2011.

4.2.6. Synthesis on utilization and trade of Bubinga and Wengé products in African countries

Bubinga and Wengé are two value timber species produced from African countries. This importance varies from one country to another. Although data compiled from different timber databases found in the Douala port are not completed in terms of importing countries, the pressure on the Bubinga and Wengé species seems effective in different African countries. The export volumes are increasing since a few years ago with Asian countries importing huge volumes. In fact, the pressure on Bubinga and Wengé tree species is probably coming from the progressive arrival of Asian countries including China, Hongkong, Japan, Libanon, and Taïwan in the list of importing countries. Asian people are too many, and this will continue to increase the demand on Bubinga and Wengé products.

V. MONITORING AND CONTROL

Control of timber exploitation, trade and exportation is the main responsibility of the Ministry of Forestry and Wildlife (MINFOF). Other services are concerned, such as the Ministry of Finance through the Forest Revenue Enhancement Program (FREP) and the General Division of Customs (GDC).

5.1. General elements of control as outlined in the arête n° 0222/A/MINEF/25 may 2001.

Before talking about the control and monitoring of Bubinga and Wengé species in Cameroon, it is important to first understand the general elements required by the forest administration. The basic elements of the monitoring or control system are précised in the arête 222, articles 25 - 49. The monitoring starts in the central administration by the attribution of the forest management unit, the approbation of the document of the management plan, till the external services (provincial delegations) of the forest administration.

The process of approbation of the management plan of the FMU comprises eight main steps: (1) attribution of the FMU on a competitive basis (adjudication), (2) signature of the preliminary convention (3) sampling design or protocol, to be approved by the forest administration, (4) the management inventory to be approved by the forest administration, (5) the document of the management plan, (6) sub-commission for analysis of the document of the management plan, in charge to examine and issue a technical avis on the contain of the document of the management plan (7), the inter-ministerial commission for approbation of the management plan assisted by one independent observer; (8) the definitive convention which aims to implement the management plan.

The management plan can be revised after every 5 years. Any modification of the management plan can imply the realization of new or complementary inventories.

The development, and implementation of the management plan is a fund demand and many companies have problem to get their forests. By the year 2003, some companies used to develop their management plan, using services of the consulting offices (consortium), and many of those companies did not get the technical know – how, necessary to implement their management plans. One of the innovation made in the forest sector there after, was the creation in each forest company, a management unit. This unit is directed by a forest engineer who is in charge of the development, the implementation, and the revision of the management

plan. The existence of this unit as far as the qualification of the person in charged to work on it are some criteria also appreciated by the Government for the approbation of the management plan.

During the preliminary convention, the beginning of activities in a new annual logging plot requires the obtention (detention) of an annual logging certificate. The maximal area to attribute within the year is fixed in conformity with the current legislation. Each annual plot cannot be attributed twice.

During the definitive convention, the beginning of logging activities in a new annual plot, or the renewable of a given annual plot requires the obtention (detention) of the annual operation permit. This permit also cannot be attributed twice.

All felled trees obtained during forest logging activities are noted in a logging book. Sheets of this book also called the "DF10 sheets", are filled every day by the forest company.

The annual plot is closed to forest logging at the 30th of June of the year. And the company must depose the annual report of forest interventions (RAIF) not late than the 31th of July of the same year.

5.2. Participative implementation of the management plan

The implementation of the management plan focuses on three different stake holders: forest administration, forest company, local population. The management plan must precise how the notion of participative management is applied at the level of the forest concession. It must also describe the mechanisms that should be develop to resolve conflicts.

Local populations are authorized to harvest some products in the forest concessions, mainly composed of non timber forest products such as wild fruits, vegetables, and medicinal plants. They are also allowed to undertake fishing and small scale traditional hunting of small mammals which are authorized by the forest law. Sometimes, local communities are also authorized to conduct small scale agricultural activities, with low impact on timber production. They are committed to work together with the timber company to combat poaching and illegal or "wild" sawing.

The forest logger has to pay regularly his forest taxes, and to contribute to development projects for the benefice of the community. In fact, the social and cultural dimension is one of the important innovations outlined in the Cameroon forest legislation. This dimension states that, the local people may participate to the management of forest resources and may gain

some profits of the exploitation of those resources. The concrete measures undertaken by the Cameroon government in this regard are for e.g., the obligation of forest companies to realise certain number of social activities (duties) such as the creation of schools, health centres, etc… for the benefit of local communities, the payment of the annual forest tax ("*Redevance forestière annuelle"* in French) by the exploiter. The annual forest tax is a specific tax that is settled on the surface area of the forest under exploitation. Revenues coming from this tax are shared between the public treasury or the forest administration (50%), the local council (40%), and the local communities (10%). When the permit is a sale of standing volume, local communities perceived additional informal tax of 1,000 FCFA/m^3 .

The parts of the forest tax allocated to the council and communities are destined to realise some small development projects at the local level. A specific arête was published by the forest administration to precise the modalities of using those funds. Number of dispositions have been put in place to ensure that the money is effectively used for such a projects. The activity reports of councils are regularly sent to the forest administration to monitor the management of the forest revenues.

The forest administration works to ensure the conservation and development of permanent forests all over the country. His job does not only consist of controlling and monitoring the forest logging activities; but also to protect the loggers against illegal sawing done by some villagers in the forest concessions. The forest administration is also committed to plant trees in zones were forests have been destroyed or degraded. All these tasks require lot of money. To enhance the contribution of the forest revenues in the conservation of forests, the Government of Cameroon created the Special Funds for Forests Development (FSDF). The main objective of this fund is to re-inject some parts of the forest revenues in the sustainable management of those forests. The decree n° 96-237-PM of 10 April 1996 fixing the modalities of functioning of this fund states that, the FSDF is a special fund of the public treasury destined to finance the management, conservation, and sustainable development operations of the forest resources. The revenues of the FSDF comes from different sources including: (i) the quote-part of revenues produced by the annual forest tax (RFA), the felling tax, the tax of transfer of a forest concession, the exit tax (at the port), the progressive surtax paid for the exportation of unprocessed or raw products, the price from selling the forest products, penalties, transactions, damages-interests, other selling forms such as selling the seized products, (2) the recuperation including authorization of gathering logs within the agricultural activities, roads construction, or abandoned logs in the forest, (iii) Revenues

affected by the law, (iv) selling of files by the forest concessionaires including forest agreements, permits, (v) selling of administrative documents including the DF10 sheets, the factory entrance book, the way bills book (for logs and for sawn wood), (vi) subventions, contributions, and dons, and others.

Revenues gained from the seized products are shared as follow: 35% go to feed the public treasury and 65% go to the FSDF. The 65% of the FSDF are furthermore shared as follow: 40% for buying different forest material and equipment (Global positioning systems, maps, tents, etc.), capacity building, or as the Government contribution in the financing of some forest projects (The forest administration has like this contributed to the financing of the recent National forest inventory together with the FAO), 25% are paid to the forest officers who have participated to the control mission that led to the payment of those revenues. Before, the money generated by the selling of seized products was collected by the forest officers and reversed in total to the General Directorate of Taxes (GDT) , with the repartitions showed above. The problem is that, the GDT did not used to send back the quote parts of the forest administration. That is why, since the month of March 2006, the forest administration has decided to retain the part belonging to its services. And since there, things seem to work well.

The expenditures supported by the FSDF include (i) management of forest reserves, (ii) regeneration of forests, (iii) forest inventory, (iv) materialization of limits of forest concessions and creation of infrastructures, (v) equipments for forest inventories, (vi) technical control and monitoring of forest management in concessions, (vii) dissemination of results of research on forest management, (vii) research in forestry, (viii) functioning of different committee (for agreements, permits, management plans, etc..), (ix) counterpart funds in the forest projects, (x) contribution of the Government to international Institutions, (xi) motivation of the forest agents and officers.

5.3. Other provisions

Cameroon has also taken ad hoc measures to ensure healthy trade practices and to meet the challenge(1) the allocation of logging titles by an inter-ministerial commission assisted by one independent observer, (2) the support of one independent monitoring organization (Global Forest Watch) to monitor the status of plant cover, (3) the publication of a national strategy document for forest and wildlife controls in Cameroon which is validated by all stakeholders, (4) the strengthening (securisation) of forest logging documents, (5), the enhancement of the forest revenues through the forest administration and the finances administration, (6) the

reinstatement of the visa to certify the legal origin of timber, (7) the suspension or rescission of concession agreements where applicable tax have not been paid or where the details of the forest management plan have not been validated, (8) the requirement to have an environmental impact study implemented before the start of any forest management work for all concessions exceeding 50 ha.

The Government of Cameroon is firmly committed to improving the national forest governance but is also committed to raise the level of confidence that already exists between the Cameroonian forest sector and its external partners who have been providing their long-standing support.

5.4. Control of logging

According to the forest law, two main documents are required before undertaking any forest logging activity in Cameroon: the forest logging agreement and the permit. The agreement gives access to the forest logging profession, while the permit gives access to the forest resource (timber in this case). One must have these two documents before extracting any log from the forest, and mainly from the permanent domain (Republic of Cameroon 1994, 1995).

In the control of logging, one can distinguish two types of controls: the technical control and the administrative control. Technical control consists of control measures at the point of felling and along transport routes.

In 2000, a Central Unit for Control/Unité Centrale de Contrôle (UCC) was set up by the forest administration to coordinate forestry controls nationally and to support provincial Brigades de Contrôle. Since 2004, that unit (UCC) became the National Brigade for Control (Brigade Nationale de Contrôle in French). To reinforce transparency in control measures the forest administration has appointed an independent observer, Global Witness (MINEF, 2002). Global Witness is currently working together with the National Brigade for Control to ensure the sustainable forest logging in Cameroon.

In the forest, the technical control consists of verifying the delimitation and the respect of the annual logging area, respect of MED/ADM, the logging inventory, the respect of the sylvicultural prescriptions, the verification of the cubage in the parks, the felling techniques. This is mainly done by the National Brigade for Control assisted by the independent Observer, but also by the provincial Brigade, the provincial chief of forest service, the divisional chief of forest service (chef de section forêts in french), the local chief of forest and wildlife post.

The administrative control consists mainly to the verification of different documents including management plans, DF10 sheets, and activity reports transmitted by the forest company to the forest administration.

5.5. Control of timber products along transport routes and in the points of export: circuit of timber from forest to abroad.

This section aims to present the regular circuit of timber, since the felling site, till the points of export by a legal forest company as outlined in the forest law (République du Cameroun 1994, 1995). Let us take the example of a given concessionaire who wants to convey his products to Douala, the economical capital of Cameroon.

Once a log has been confectioned in the logs park, the local chief of forest and wildlife post must deliver, after further verification, two documents to the exploiter: the certificate of origin and the way bill for logs transport. This log is then conducted in the saw mill for processing (here we suppose that the saw mill is not located in the same place of the felling site or wood park). At the processing operation (the entrance of the saw mill), there exists a check point of control. This is, an external service of the Forest Revenue Enhancement Program (FREP). This service aims to verify and to compile, the volume of timber at the entrance and at the exit of the manufactory. When the timber has been processed, the local chief of forest and wildlife post must deliver two other documents which shall convey the sawn wood to the points of export including the certificate of origin and the way bill for sawn wood. Along the road, there are many control forest posts and check points. In each post, the forest agent has to control the existence and the authenticity of the required documents for log or sawn wood transportation including: the forest agreement, the annual permit with volumes indicated, the certificate of origin, cubage, the way bill. He also has to verify the conformity of these documents with the real volume of timber transported, before putting his stamp on the way bill. Thereafter, the controller must record all the data in a register book, provided by the forest administration to this end. The summation of the sawn wood volume recorded at the end of the season should be done for further verifications.

Once in Douala, the company has two alternatives: selling the wood in the domestic market, or exporting this wood. Most of the wood produced by the timber companies in Cameroon is usually destined to export. The local market largely is furnished by the illegal or “wild sawn wood” (Betti 2007b). In the Douala port, the exporter has to deal with two main administrations: the forest administration and the customs administration. The forest

administration is mainly composed of three main services: the chief of forest and wildlife post n° 1, the chief of forest and wildlife post n°2, and the Trade wood database (COMCAM).

The exporter has first to present himself with his product to the Chief of forest and wildlife post n°1, settled at the entrance of the port, known as “port 1”. There, he has to present many documents including: the agreement, the annual permit, the certificate of origin of sawn wood, the way bill for sawn wood, the certificate for export, and the CITES certificate for what concerns the CITES listing products. The certificate for export is delivered by the Ministry of Forestry and Wildlife/Division of promotion and processing/Sub-direction of processing. This certificate is issued, after having verifying that the company has paid all taxes related to the volume and quality of the wood subjected to export (felling tax and saw mill entrance tax). The certificate for export provides information on the origin of the wood, the volume, the products (sawn wood, veneer, or flooring board,…), the country of destination, the address of the buyer in the importing country. The company may therefore present the payment receipts issued by the FREP. The CITES certificate is issued by the Ministry of Forestry and Wildlife/Division of forests/Sub-direction of forest management/service of intervention norms in forests. This service is also the one which plays the role of the CITES management authority. The CITES certificate is issued after having verifying that, the company has respect the requirements prescribed for the exportation of CITES products, including mainly the respect of the quotas allocated. Once the Chief of forest and wildlife post n°1 has verified the existence and the authenticity of all those documents in conformity with the product subject to exportation, he then delivers the specific bulletin. The specific bulletin records data on the origin of the product (FMU), agreement, permit, volume, products, destination (importing country). This bulletin is produced in many copies; some of which are given to the exporter and some to the trade wood database (COMCAM).

With his specific bulletin, the exporter has thereafter to present himself with his product to the Chief of forest and wildlife post n°2, settled in the port 2, together with the customs officers. These controllers (forest and custom officers) have to check the conformity of the declared products with what is mentioned in the specific bulletins. After these verifications (checking), the exporter has to pay the exit taxes (fees) (droits de sortie in French), before putting the product in the container for export.

5.6. Problems observed in the field of control

5.6.1. During logging activities

During the logging control, forest officers are often faced to problems. The most important being the lack of financial and logistical resources to appropriately conduct forest monitoring and achieve the several tiers of objectives ascribed to sustainable forest management (SFM). Many chiefs of forest and wildlife post do not get any bike, so they use to be transported in the forest by the forest concessionaire himself. In this condition, they are often sensitive to any "tentation" (corruption) coming from the forest company. Some of the forest officers who refused to make some arrangements with the concessionaire have been abandoned in the forest.

Another problem often observed in the control of timber logging in the forest, is that of the lack of coordination between different services of the forest administration. This problem which has already been outlined for non timber forest products (Betti 2007) is also observed in the timber sector.

Illegal logging constitutes together with poaching, the two serious problems of the forest sector in Cameroon (MINEF, 1995; MINEFI, 2006). Illegal logging is the harvesting of timber in contravention of a country's laws. Together with the associated international trade in illegally-harvested wood products, it causes environmental damage, costs governments billions of dollars in lost revenue, and is closely associated with corruption and organised crime. It also undermines the competitiveness of legitimate forest operations in both exporting and importing countries.

Different forms of illegal logging exist, including: exceeding allowed cutting boundaries, the non respect of the minimum exploitable diameter, the non respect of the volume of timber allocated, illegal felling, false declarations (Betti, 2004). Illegal felling and false declarations are said to be the two major types of illegal practices found in the forest sector in Cameroon (*http://www.idrc.ca/en/ev-28727-201-1-DO_TOPIC.html*). The importance of illegal logging has increased with the implementation of the new forest code. In fact, the more the forest activities are regulated, the more the number of infractions increases (Karsenty, 2006).

Although neglected by forest industries, the national need of wood covers by the informal sector represents some 300 000 m^3/year of timber (Koffi Yeboa, 2005). This sector is growing more and more and its economic impact is crucial at all levels including production, processing, distribution and employment (MINEFI, 1998; 2004).

Different reasons explain the proliferations of illegal logging or sawing sector in Cameroon. The main reasons include: the lack of motivations among the logging companies, the lack of clearance in the management of funds that have to be given to local communities, the complexity of the conditions required for allocating small permits and the economic crisis.

Timber companies export products according to the buyer's requirements.

5.6.2. Along transport routes

Along the transport routes, technical control consists of verifying relevant documents and their conformity with the product transported. The problems observed here include the lack of sufficient and qualified personal, the lack of material of control, the lack of motivation for the forest agents, the competence conflicts with other administration. Following the structural economic adjustment undertaken in the late 1990, the Cameroon government has stopped the recruitment of forest officers in the forest administration. This had a negative impact in the forest control and monitoring activities. In many forest posts and check points settled along the road, there are one, two or three forest agents who are currently doing control. This number is not enough to ensure the control of log trucks all days and nights (24 hours/24). Also, many of the agents affected in those posts are too old now and do not get sufficient material for staying awake and resisting to cold all night long. Due to the lack of motivation, following the reduction of the salary, most of the forest agents are sensitive to any corruption activities. Many of them do not record data from checking in their register book, as required by the forest administration. So many of these register books cannot be used, for further verifications. One cannot try to retrace the timber volume trade transported to Douala, through data recorded in those books (Betti 2007).

Another problem largely observed along the roads is that of conflict of competency with other administrations such as police forces. These persons use to stop cars for checking forest products (Betti 2007).

5.6.3. At the points of export

The Cameroon wood is exported from the ports of Douala, Kribi, Limbé, Tiko. The first and main problem observed here is the lack of synergy between the custom officers and the forest

officers. Often, the custom officers, who are posted at the end of the exportation chain, refuse to consider the specific bulletins dressed by the forest officers. Also, they used to refuse that the forest officers check the final container and consigns the transport document "connaissement in french". In this condition, some products are exported without the visa of the forest officers.

The second problem in export is at the level of the chief of post N°1. Normally, the chief of forest and wildlife post n°1 must transmitted all specific bulletins to the Trade Wood database. This is not always the case, since some specific bulletins do not exist or disappear. Such behaviour which is certainly link to corruption is detrimental to the monitoring, and checking of statistical data on the trade wood.

The third problem is that of the non existence of COMCAM in other ports. Only COMCAM Doula has work correctly till date. COMCAM Limbé, Kribi, Tiko have not been functioning in fair manner. COMCAM Kribi has just started working.

The fourth problem is that of lack of connection between the two forest database systems belonging to the Ministry of Forestry and Wildlife. As we can see, specific CITES requirements for *Pericopsis elata* are the responsibility of MINFOF which is the Cameroonian Management Authority for CITES. MINFOF records information on trade in timber through two database systems for the collection of revenue and to support law enforcement: SIGIF at Yaoundé and COMCAM at Douala. The problem is that, there is no connection between the two database systems. In Yaoundé, SIGIF records data on a log by log basis, while in Doula, COMCAM records data on sawn wood by sawn wood basis. Such a system cannot allow to monitor the circulation of timber in the whole country, and to make a linkage between the logs volume and the processed volume.

The fifth problem is that of lack of such a system for monitoring domestic trade in wood products. Till date, the forest administration has never developed a fair system for controlling and monitoring domestic trade, which cannot help to get a global trade volume of wood in the country.

5.6.4. Specific case of Bubinga species

5.6.4.1. Illegal logging of Bubinga

As outlined, discussions were conducted with some resource persons at all levels of the forest administration to get their point of view and problems related to the state of management of Bubinga and Wengé species in Cameroon. A total of 24 persons were interviewed comprising

23 forest officers and one villager in a production site of Bubinga. The 23 forest officers are composed of 15 forest and wildlife engineers and 8 forest technicians. Four officers are working in the central administration at Yaoundé, while 19 are working at the external services, at the Centre, Littoral, and South regions, considered as the three main regions hosting production sites of Bubinga and Wengé in Cameroon.

Twenty out of the persons commented on the current situation of illegal logging of Bubinga and Wengé in Cameroon (Appendix 5).

Bubinga is one of the most use wood by Cameroonians for confectioning their furnitures (tables, chairs, beds) and for internal decoration of houses. In Ebolowa (south region) for example, about 90% of the wood used in confectioning beds and furnitures are composed of the Bubinga wood. The main production sites of Bubinga are: the south region, the Centre region, and the littoral region. In Littoral, the high quantity of Bubinga comes from Puma. In the Centre region, productions sites comprise Eséka, Nguibassal. South is the main production area of Bubinga which is found in almost all areas including Mvangane, Mengong, Biwong Boulou, Ngoulemakong, Biwong Bané, Lolordorf, Oveng, and Meyo Messi.

The pressure on the Bubinga species is effective. The harvest zones are becoming more and more far from the villages, at 4 to 5 kilometers in the forest. This makes the transport of the wood quite difficult. The pressure on Bubinga arised since some three years ago, with the arrival of the Asian people in the business, the "Asian phenomenal" as qualified by forest officers. About 75% of the persons interviewed attributed the importance of illegal logging of Bubinga to the “Asian phenomenal”. In fact, Asian people do not hesitate to disburse enormous funds to get their Bubinga trees. Today, Asian people use not only the wood, but also stem barks, leaves, and roots of Bubinga. Before, one Bubinga tree was bought by illegal loggers at 60 000 FCFA to villagers. Today, Asian guys buy one tree of Bubinga to villagers between 1 - 1.5 millions of FCFA. One cubic meter (m^3) of Bubinga costs 1.5 millions of FCFA at Douala. Logs are more expensive thatn sawn wood. The importance of Bubinga market increased in two phases: in 2011, the products were only sawn wood. Since 2012, there are also logs.

Operations of illegal logging of Bubinga are often conducted by night, with the high complicity of local villagers who perceive too much funds and who do not hesitate to beat everyone who wants to stop the logging of their Bubinga trees. Illegal loggers are equipped with adapted materials (turaya cell phones, GPS, Bulldozer D7, big lorries etc.) provided by Asian people. The control is too complex in the forest. The illegal loggers use to work in the

periphery forests. These are forests which are found almost at the border of the subdivsion or at the border of the forest post area. They cut Bubinga trees in one area, cross the border and present false papers to the chief of forest post of the adjacent area. They do not use to come back, on the same road. There are many "big persons" who support the illegal logging of Bubinga, since it yields more money. The D7 is used for creating the road and for loading (pushing the logs on) the lorry (truck). When some logs of Bubinga have been confectioned in the forest, the loggers make a big and long hole in the ground. The lorry enters in the hole and the Bulldozer pushs the logs on the lorry which carries them directly to Douala. Another figure is that, the Bulldozer carries the logs and loads them directly inside the container that will be conveyed to the Douala port. When the team of illegal loggers have finished their task and left the area, the bulldozer (D7) closes the road by felling some big trees, as to avoid the arrival of forest officers for the control. One night is enough to evacuate huge quantities of Bubinga from the forest to Douala

Some legal forest companies who do not get enough volume of Bubinga species in their concession cut the Bubinga that is found in the periphery of their forest and use their documents to convey the timber till the Douala port. Other timber companies declare the Bubinga as the Ebiara. Ebiara and Bubinga have similar features.

One way to illustrate the pressure in one resource is to compare the importance of the volume seized or the revenues raised from the seized wood of that resource with other resources. This was done for the Littoral and South regions. Data on illegal Bubinga or wengé seized were not available for the Centre region. From January 2011 to April 2012, the regional delegation of forest and wildlife of Littoral (Douala) seized three types of forest products including: timber products, charcoal, and Yohimbé (*Pausinystalia johimbe*). Timber products can further be distinguished in three groups which are white wood, Bubinga wood, and other timber products. The total amount yielded by the seized products in the indicated period is 49 331 067 FCFA, with the Bubinga products yielding 22 066 575 FCFA, which is 45% of the total amount (Table 8).

Table 8. Revenues yielded by the illegal forest products seized by the regional Delegation of Forest and Wildlife of Littoral region, Douala from January 2011 to April 2012.

Product	Year 2011	Year 2012	Total
Other timber species	18080052	4186912	22266964
Bubinga	9205960	12860615	22066575

Product	Year 2011	Year 2012	Total
Charcoal	138175	0	138175
White wood	1115500	3122653	4238153
Yohimbé	421200	200000	621200
General total	**28960887**	**20370180**	**49331067**

Figure 20 illustrates per products, the evolution of the revenues yielded in 2011 and 2012. It is interesting to see that, the amount of the revenues yielded by the Bubinga wood in four months in 2012 is 1.4 times more important than that of all the Bubinga wood seized from January to December 2011. This result illustrates the high pressure of illegal loggers on the Bubinga tree species.

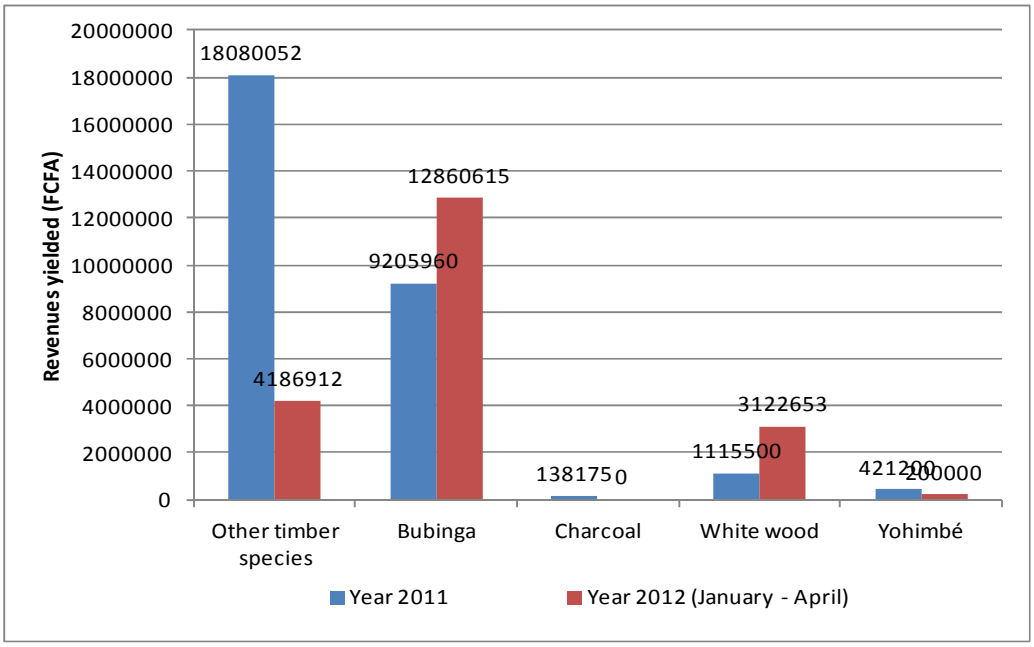

Figure 20. Revenues yielded from seized illegal forest products in the regional Delegation of the Littoral in 2011 and 2012

In the south region, the importance of illegal logging on Bubinga and Wengé tree species was appreciated based on data of volumes of seized wood of 2008, 2009, 2011 and 2012. A total of 1 200.329 m^3 of Bubinga and 123.87 m^3 of Wengé were seized in the south region between 2008 and 2012. The distribution of the illegal wood of Bubinga and Wengé seized in different forest services of the south region is illustrated in figure 21. The regional Delegation is the service which seized the high volume of Bubinga and Wengé during the indicated period.

This can be linked to the means allocated for control, which are important compared to divisional Delegation (high number of forest officers, vehicles, etc.).

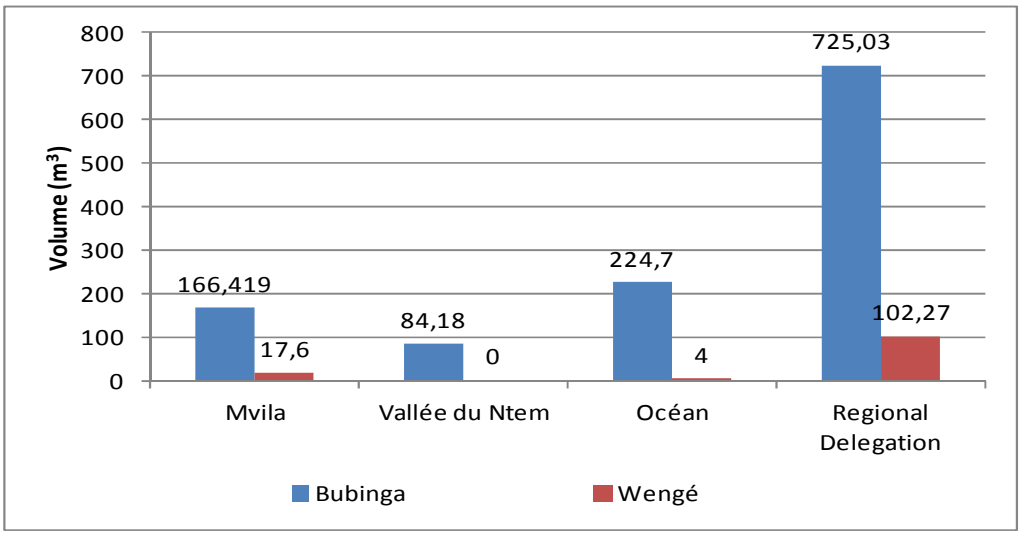

Figure 21. Distribution of illegal wood of Bubinga and Wengé seized in different forest services in the south region between 2008 and 2012.

Figure 22 illustrates Evolution of the volume of illegal wood of Bubinga and Wengé seized in the South region of Cameroon between 2008 and 2012. The volume of illegal Bubinga increases since 2008, while that of Wengé is decreasing. This can be explained by the value attributed to each timber species. For the moment, the value of Bubinga tree species is too high compared to other tree species. As observed for the Littoral region, it is interesting to see that the volume of the illegal Bubinga seized in four months in 2012, is 1.15 times more important than the one seized in the whole year of 2011. This once more, shows the high pressure observed on Bubinga tree species.

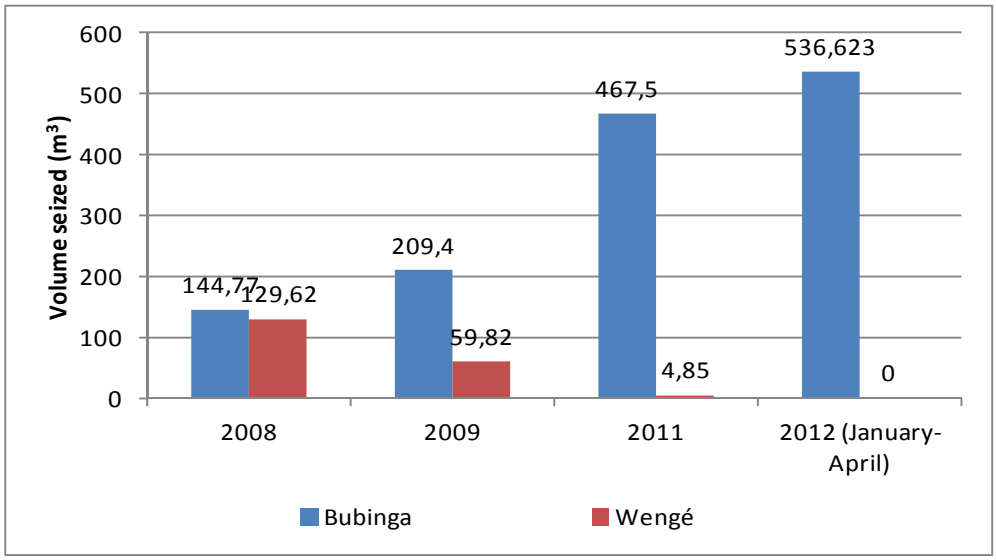

Figure 22. Evolution of the volume of illegal wood of Bubinga and Wengé seized in the South region of Cameroon between 2008 and 2012

This pressure on Bubinga trees seems more important in the Mvila division (Figure 23). In only four months of 2012, the Divisional Delegation of Forests and Wildlife of the Mvila has seized 124.419 m^3 of Bubinga, which is 5.5 times more important than the volume of the same tree seized in 2011.

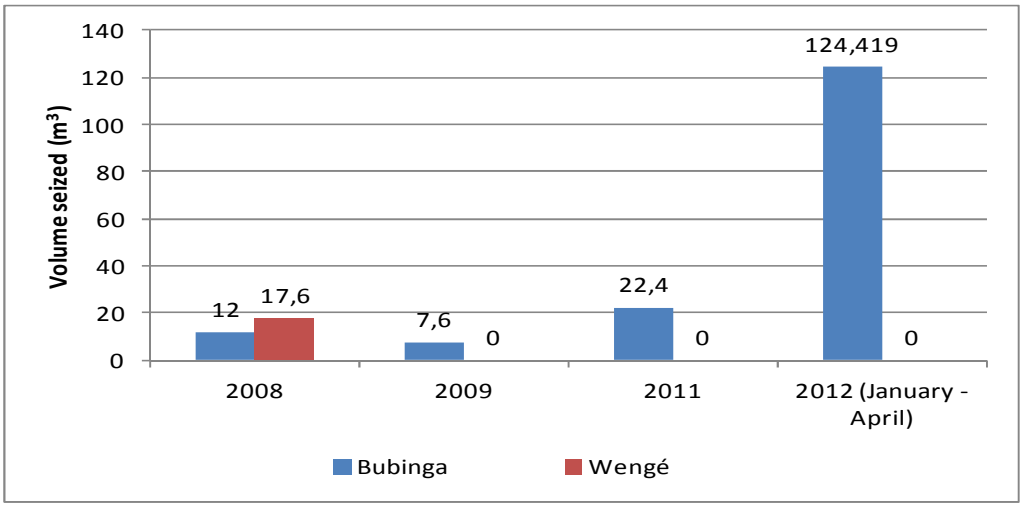

Figure 23. Evolution of the volume of illegal wood of Bubinga and Wengé seized in the Mvila division, South region of Cameroon between 2008 and 2012.

The regional Delegate of forest of Littoral informed the ministry of forests and wildlife on the difficulties encountered on the control of timber products in the Douala city. We know that many products enter in Douala via the Yassa check point (based at the entrance of the city, Yaoundé side), but we do not know how those products are used in Doula, which destination are they taking?

It is mainly during the procedures of putting the wood inside the container that the Bubinga wood is being exported illegally. There exists a text (decision) co-signed by the forest administration and the customs administration which regulates the work of forest and custom officers at the exit points, Douala port. This text stipulates that, the two administration should assist on the procedures of putting the wood in the containers and also to the boarding procedures of the container or the wood in the boat. Is this text applied in the field? That is the question. Forest officers are not allowed to make control in the Douala International Terminal (DIT). Customs agents still refuse to work with forest officers in the procedures of putting the wood in the containers and in the boarding procedures. In such a situation, they ignore almost totally the quality and the quantity of the wood that is being exported from the Douala port. The DIT is too vast, with many containers which are being loaded of products including wood every hours. Even, if the customs administration allows the forest officers to make the control inside the DIT, they will not be able to control all the containers, due to the low number of forest officers. The precision between the red and the pink Bubinga is not done, mostly with sawn wood. In many cases, the procedures of putting the wood inside the containers "empotage in french" is done out of the port, even out of Douala city; some times in the forest. The lorry that transports the containers goes directly inside the DIT. Normally, when the timber enters the port, it goes firstly to the chief forest post of Port I who initiates the boarding procedures. He verifies the conformity between the volume of the timber declared in the specific bulletins and the wood presented. There exists a sort of tracking system inside the port. The exporter can decide to export only one part of the volume declared at port I (entrance). The chief of post of the port II verifies that the volume of the wood retained finally is exactly the one that will be exported. But this is not always the case.

5.6.4.2. Pressure on Bubinga and Wengé in Cameroon

Forest officers were asked to pronounce themselves on the current fate of Bubinga and Wengé in Cameroon. Are these two timber species being under pressure or not? About 95% of persons interviewed declared that Bubinga and Wengé are under pressure in Cameroon

(figure 24). Bubinga's pressure comes mainly from illegal logging, while the Wengé treath is largely link to its very limited geographic area.

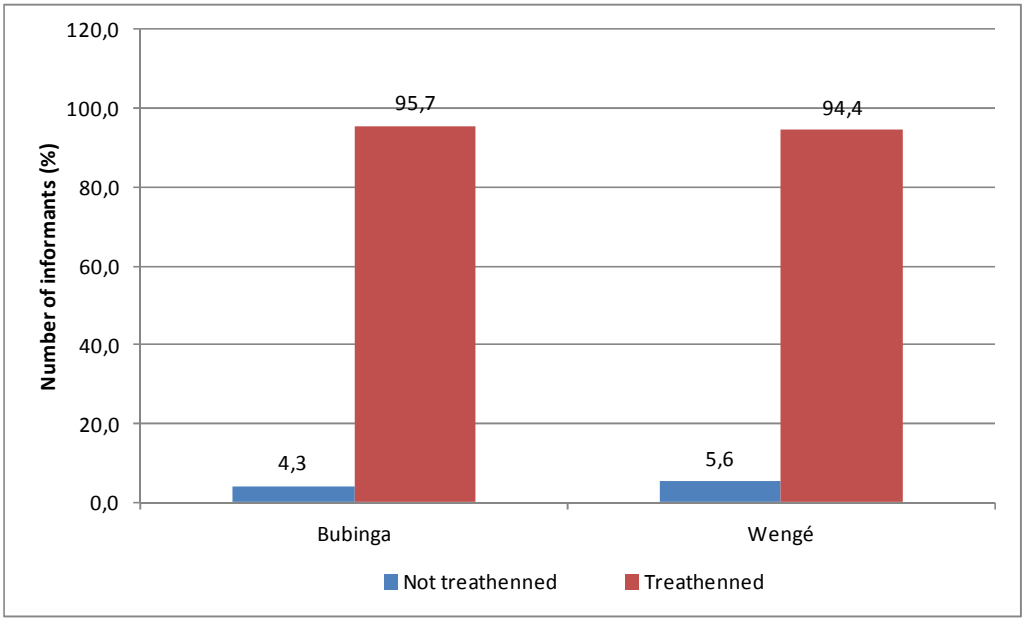

Figure 24. Perceptions of forest officers on the pressure on Bubinga and Wengé in Cameroon.

5.6.4.3. Solutions

Forest officers were asked to make some propositions to better tackle the problem of illegal logging and to sustain Bubinga and Wengé species in Cameroon. Results are presented in appendix 6. Responders can be distinguished in three main groups. The first group of forest officers (31.5%) proposed to conduct good and sound forest inventories at all levels including management and logging inventories to better appreciate the distribution area and the possibility (availability) of Bubinga and Wengé species in Cameroon. The second group proposed to regulate the exportation of Bubinga by limiting the exporting or logging volumes, increasing the minimum exploitable diameter (the current MED for Bubinga in Cameroon is 100 cm) and increasing the forest taxes. The last group of persons proposed to strengthen the forest control by increasing the number of controllers at the exit points (Douala port) and equipping forest officers with sophisticated materials to better tackle illegal loggers.

5.7. Perspectives

Although the control and monitoring system put in place in Cameroon faces many problems, there are some perspectives which need to be outlined here. The progressive implementation of the Forest Law Enforcement, Governance and Trade (FLEGT).

Illegal logging is a pervasive problem, causing enormous damage to forests, local communities and to the economies of producer countries. Despite the economic importance of trade in timber and forest products, major international timber consumer countries, such as the EU, have no legal means to halt the import of illegally sourced forest products, because the identification of illegally logged or traded timber is technically difficult. Therefore, a legal basis for normative acts against timber imports or other products manufactured out of illegal wood is missing. Scientific methods to pinpoint the geographic origin of timber are currently under development. Possible actions to restrict imports cannot meet with WTO regulations of non-discrimination. They must instead be arranged in bilateral agreements (http://en. Wikipedia.org/wiki/illegal_loging).

In May 2003 the European Commission presented an action plan on Forest Law Enforcement, Governance and Trade (FLEGT). This marked the beginning of a long process by which the EU aims to develop and implement measures to address illegal logging and related trade. The primary means of implementing the Plan is through Voluntary Partnership Agreements with timber producing countries.

Cameroon is currently engaged in negotiations with the European Union to reach a Voluntary Partnership Agreement (APV/FLEGT) to improve the governance and transparency of the timber trade between the two partners. The agreements will involve establishment of a licensing scheme to ensure that only legal timber from producing countries ("Partner Countries") is allowed into the EU. Unlicensed consignments from Cameroon would be denied access to the European market under the scheme.

The tracking system developed through the FLEGT process will commence in March 2013 in Cameroon. We hope, this will reduce illegal logging and trade on Bubinga, Wengé, and other timber products in Cameroon.

CONCLUSIONS AND RECOMMANDATIONS

Wengé (*Millettia laurentii*) and Bubinga (*Guibourtia tessmannii, G. demeusei, G.pellegriniana*) tree species are important timber species in Africa. Cameroon (5 *Guibourtia* tree species), Congo (4), Democratic republic of Congo (4), Equatorial Guinea (4), Gabon (4), Ghana (4), Nigeria (4) appear to be in this order countries which host many species of *Guibourtia. Millettia laurentii* is found in Cameroon, Congo, Gabon, Mozambique, Tanzania, Democratic republic of Congo. Excepted for *Guibourtia ehie* and *Millettia laurentii*, no clear information is given for other tree species for what concerns their global conservation status. The status of other tree species in the wild is currently listed as unknown due to insufficient information. In Cameroon the distribution of Bubinga and Wengé tree species is largely restricted to the South and littoral regions, with some stands in the Centre and East region. Three out of the *Guibourtia* tree species found in Cameroon are largely known for their use as timber: *Guibourtia tessmannii* (Bubinga rose), *G. demeusei* (Bubinga rouge), and *G. ehie* (Ovengkol). Data gathered in different document of the management plans of the production forest tend to show that Bubinga species are less represented in their range area in Cameroon, where they occur with densities less than 0.04 stem/ha. The pressure on the Bubinga species is effective and is mostly due to illegal logging supported by the Asian bisness men , “the Asian phenomenal” to be précised. This assumption is shared by many Cameroonian forest officers. At a regional level, the pressure on the Bubinga and Wengé species seems effective in different African countries. The export volumes are increasing since a few years ago with Asian countries importing huge volumes. Asian people are too many, and this will continue to increase the demand on Bubinga and Wengé products.

Based on the results obtained, following recommendations are made to better ensure trade on Bubinga and Wengé tree species is not detrimental to their conservation in forests:

- To conduct detail research on the biology, ecology, phenology, and sylviculture to better refine standards and management parameters that should sustain the exploitation and trade of Bubinga and Wengé species in Cameroon;
- to conduct good and sound forest inventories to better appreciate the distribution area, density and the possibility (volume) of Bubinga and Wengé species;
- to promote the use and trade on other tree species with almost similar properties as to reduce the pressure on Bubinga and Wengé species;;
- if necessary, to define some quotas for export products;

- to strengthen the forest control strategy by increasing the number of controllers at the exit points and equipping forest officers with adapted materials (GPS, Turaya cell phones, vehicles, bikes, etc.) to better tackle illegal logging and export;
- to strengthen the capacities of forest officers for the identification of Bubinga and Wengé species at all levels including logs and sawn wood;
- to train forest officers in the gathering and management of trade data on both legal and illegal wood;
- to allow villagers to easily exploit their Bubinga trees by easing the procedures of getting "special permits" and/or promoting the development of community forests in the distribution area of Bubinga and Wengé;
- to train both forest and custom officers in the procedures of control of forest products and to encourage their collaboration in the procedures of loading the containers and boarding;
- to assess the real density and strengthen the conservation of Bubinga and Wengé in protected areas; Campo ma'an national park should be targeted;
- to put in place a framework of collaboration between public and private stakeholders involved in the management and use of Bubinga and Wengé.

REFERENCES

African Regional Workshop 1996. Conservation & Sustainable Management of Trees, Zimbabwe, July 1996.

A.P.I. 1995 Généralités sur l'aménagement des forêts de production de la province de l'Est, *Rapport du Projet d'Aménagement Pilote Intégré de Dimako, Cameroun* 102 p.

Banzouzi J.C. & Ngoma A.2012 Statut de conservation des espèces Bubinga et Wengé en République du Congo. Ministère de l'Economie forestière chargé de la pêche et des ressources halieutiques.

Betti J.-L.2007 Plan d'action/stratégie pour une meilleur collecte des données statistiques sur les Produits forestiers non ligneux au Cameroun et recommandations pour les pays de la COMIFAC. *Projet Renforcement de la sécurité alimentaire en Afrique centrale à travers la gestion et l'utilisation durable des produits forestiers non ligneux, GCP/RAF/398/GER,FAO – COMIFAC - GTZ 180 p*.

Betti J.-L. & Bobo K.S. 2007 Illegal sawnwood in the East Province of Cameroon: an analysis of the economic behind illegal sawnwood trade. *ITTO Tropical Forest Update, 17/3, pp: 3 – 5*

CEMAC 2010 Volume de bois exporté par les pays de la CEMAC au niveau du port de Douala., Cameroun

CEMAC 2011 Volume de bois exporté par les pays de la CEMAC au niveau du port de Douala, Cameroun.

CENADEFOR-CTFT 1983 Inventaire des ressources forestières du Sud Cameroun (1ère tranche). Centre National de Développement des Forêts (CENADEFOR) et Centre Technique Forestier Tropical (CTFT). CTFT, 45 bis, avenue de la belle Gabrielle, 94 130 Nogent – Sur – Marne, France.

CENADEFOR-CTFT 1985 Inventaire des ressources forestières du Sud Cameroun (2ème tranche). Centre National de Développement des Forêts (CENADEFOR) et Centre Technique Forestier Tropical (CTFT). CTFT, Département Forestier du CIRAD, 45 bis, avenue de la belle Gabrielle, 94 736 Nogent – Sur – Marne, CEDEX, France.

Forni E 1997 Types de forêts dans l'Est du Cameroun et étude de la structure diamétrique de quelques essences. Mémoire présenté en vue de l'obtention du diplôme d'études approfondies en Sciences agronomiques et ingénierie biologique. *Faculté universitaire des sciences agronomiques de Gembloux.*

Ipantua G. 2012 Statut de conservation des espèces Bubinga et Wengé en République Démocratique du Congo. Institu Congolais pour la Conservation de la Nature (ICCN).

Koffi Yeboa A. 2005. Sciage artisanal, transformation et commerce du bois d'œuvre du Cameroun à destination de l'arc soudano-sahélien. Mémoire présenté en vue de l'obtention du diplôme d'ingénieur d'Agronomie Tropicale du CNEARC. ENGREF, CIRAD, CNEARC. 64 pages + annexes.

Letouzey R. 1985 Notice de la carte phytogéographique du Cameroun au 1/50 000. Institut de la carte internationale de la végétation. *Toulouse-France et IRA de Yaoundé-Cameroun, 24 p*.

Letouzey R. 1968 Etude phytogéographique du Cameroun : 511 p. Paris, *Editions P. Lechevalier*.

MINEF 2001. Arêté N° 0222/MINEF/A/25 MAI 2001 fixant les procédures d'élaboration, d'approbation, de suivi et de contrôle de la mise en œuvre des plans d'aménagement des

forêts de production du domaine forestier permanent. *Ministère de l'Environnement et des Forêts, République du Cameroun12 p.*

MINEF 2004 Etude des plantations de l'ex-ONADEF sur l'ensemble du territoire national. *Rapport – étude réalisée par le bureau d'étude ECOR – SARL. 175 P.*

MINEF-FAO 2005. Evaluation des ressources forestières nationales du Cameroun 2003 – 2004. *Ministère de l'Environnement et des Forêts, République du Cameroun 187 p.*

Ngolle Ngolle E. 2008 Efforts done by Cameroon to own and implement CITES regulations. Speech of the Cameroon Minister of Forestry and Wildlife, ITTO/CITES training workshop within the project "ensuring international trade on *Pericopsis elata* is not detrimental to its conservation in the Congo basin", 2-4 April 2008, Kribi, Cameroon.

Onana J. M. 2011 Vascular plants of Cameroon. A taxonomic checklist with IUCN assessments. Flore du Cameroun, volume 39 "occasional volume". Hobbs the Printers, UK.

Ouangando D. 2012 Statut de conservation des espèces Bubinga et Wengé en République centrafricaine (RCA). Ministère des Eaux, Forêts, Chasses et Pêche.

République du Cameroun 1994 Loi 94/01 du 20 janvier 1994 portant régime des forêts, de la faune et de la pêche, 57 p..

République du Cameroun 1995 Décret n° 95/531 du 23 août 1995 fixant les modalités d'application du régime des forêts, 66 p.

Scholl J. 2005. Environmental Fiscal Reform and National Forest Policies: An overview of forest fiscal revenue systems in 18 countries. *Schemmel J.P. & Dräger D.(eds.), GTZ.93 p.*

Souane Thikakul 1985. Manual of dendrology, Cameroon. Forestry institutional support project, National Centre for Forestry Development. Groupe Poulin, Thériault Ltée. Québec, Canada. 640 p.

Tchouto M.G.P. 2004 Plant diversity in a central African rain forest : implications for biodiversity conservation in Cameroon. *Ph.D Thesis, Wageningen University, the Netherlands. 206 p.*

UICN 2001 Categories et Critères de l'UICN pour la Liste Rouge : version 3.1. Commission de la sauvegarde des espèces de l'UICN, *UICN, Gland, Suisse et Cambrige, Royaume-Uni. ii + 32 pp.*

UICN 1989 La conservation des écosystèmes forestiers d'Afrique centrale. *UICN, Gland, Suisse, Cambridge, Royaume-Uni* .

Vivien J. & Faure J.J. 1985 Arbres des forêts denses d'Afrique centrale. Ministère des relations extérieures, Coopération et Développement - *ACCT, Paris. 551 p.*

Vivien J. & Faure J.J. 2011 Arbres des forêts denses d'Afrique centrale. *Imp. EDIPRINT – St Berthevin – 0243 665 670. 945 p.*

Links

http://www.thewoodexplorer.com/maindata/we598.html
http://webcache.googleusercontent.com/search?q=cache:n3h5DV3hJ3YJ:www.kew.org/plants-fungi/Guibourtia-ehie.htm+Bubinga,+IUCN&cd=8&hl=en&ct=clnk&gl=cm
(http://en. Wikipedia.org/wiki/illegal_loging).
http://www.foei.org/en/resources/link/95/e95benoit.html

Forest Management Units (FMU) for which the document of the Management plans were consulted:

FMU 09003

FMU 09006

FMU09013

FMU 09016

FMU 09017-018

FMU 09019

FMU 09020

FMU 09021

FMU09022

FMU09023

FMU09024

FMU09025

FMU 10063

FMU 10064

FMU 11001

FMU 11005

APPENDIX

Appendix 1. Logging volumes of Bubinga and Wengé species in Cameroon

ACT: Autorization of collecting timber; Def. conc.: Definitive concession; Temp. conc.: three years or temporary concession; SS-V: Sale of standing volume

Exercise	Title of the exercise	Timber company	FMU	Species	Logging volume (m^3)
2008-2009	ACT	FOREMO		*G. demeusei*	372
2008-2009	ACT	STF		*G. demeusei*	36
2008-2009	ACT	EFFA		*G. demeusei*	219
2008-2009	ACT	ZTN		*G. demeusei*	160
2008-2009	ACT	PEMACO		*G. demeusei*	484
2008-2009	ACT	IPL		*G. demeusei*	84
2008-2009	ACT	SOUTH-FILS		*G. demeusei*	55
2008-2009	ACT	SCDS		*G. demeusei*	864
2008-2009	ACT	LFM		*G. demeusei*	50
2008-2009	ACT	ENJC		*G. demeusei*	500
2008-2009	ACT	SCDS		*M. laurentii*	346
2008-2009	Def. conc.	CUF	09-023	*G. demeusei*	126
2008-2009	Def. conc.	TRC	00-004	*G. demeusei*	381
2008-2009	Def. conc.	CUF	09-019	*G. demeusei*	840
2008-2009	Def. conc.	FIPCAM	09-017	*G. demeusei*	2820
2008-2009	Def. conc.	CUF	09-023	*M. laurentii*	228
2008-2009	Def. conc.	SEBC	10-007	*M. laurentii*	39
2008-2009	Def. conc.	LOREMA	09-003	*M. laurentii*	35
2008-2009	Def. conc.	COFA	09-04b	*M. laurentii*	119
2008-2009	Def. conc.	CUF	09-019	*M. laurentii*	275
2008-2009	Def. conc.	SFEES	10-020	*M. laurentii*	16
2008-2009	Def. conc.	FIPCAM	09-017	*M. laurentii*	4000
2008-2009	Def. conc.	COFA	09-016	*M. laurentii*	726
2008-2009	SS-V	KIEFFER		*G. demeusei*	92
2008-2009	SS-V	EFMIC		*G. demeusei*	542
2008-2009	Special permit	MAGIVA		*G. demeusei*	17
2008-2009	Temp. conc.	CAMTRANS	9012	*G. demeusei*	225
2008-2009	Temp. conc.	CUF	09-020	*G. demeusei*	420
2008-2009	Temp. conc.	SEPFCO	00-001	*G. demeusei*	387
2008-2009	Temp. conc.	SFB	09-009	*G. demeusei*	150
2008-2009	Temp. conc.	CUF	09-026	*G. demeusei*	276
2008-2009	Temp. conc.	EFFA	09-028	*G. demeusei*	23
2008-2009	Temp. conc.	CAMTRANS	09-012	*M. laurentii*	200
2008-2009	Temp. conc.	CUF	09-020	*M. laurentii*	200
2008-2009	Temp. conc.	SFB	09-009	*M. laurentii*	63
2008-2009	Temp. conc.	GAU	09-022	*M. laurentii*	1742
2009-2010	ACT	GSRC		*G. demeusei*	137
2009-2010	ACT	EFFA		*G. demeusei*	219

Exercise	Title of the exercise	Timber company	FMU	Species	Logging volume (m^3)
2009-2010	ACT	FOREMO		*G. demeusei*	372
2009-2010	ACT	STF		*G. demeusei*	36
2009-2010	ACT	SBAC		*G. demeusei*	217
2009-2010	ACT	SOFOCAM Sarl		*G. demeusei*	189
2009-2010	ACT	ZTN		*G. demeusei*	20
2009-2010	ACT	NGO TOUCK		*G. demeusei*	488
2009-2010	ACT	PEMACO		*G. demeusei*	162
2009-2010	ACT	ABEGA/AJB		*G. demeusei*	50
2009-2010	ACT	IPL		*G. demeusei*	84
2009-2010	ACT	GRACOVIR		*G. demeusei*	70
2009-2010	ACT	JANABI		*G. demeusei*	12
2009-2010	ACT	SCDS		*G. demeusei*	864
2009-2010	ACT	SOUTH-FILS		*G. demeusei*	55
2009-2010	ACT	SBAC		*M. laurentii*	196
2009-2010	ACT	GSRC		*M. laurentii*	951
2009-2010	ACT	SCDS		*M. laurentii*	346
2009-2010	Def. conc.	CUF	09-023	*G. demeusei*	275
2009-2010	Def. conc.	TRC	00-004	*G. demeusei*	362
2009-2010	Def. conc.	CUF	09-019	*G. demeusei*	656
2009-2010	Def. conc.	FIPCAM	09-017	*G. demeusei*	2815
2009-2010	Def. conc.	CUF	09-020	*G. demeusei*	468
2009-2010	Def. conc.	SEPFCO	00-002	*G. demeusei*	517
2009-2010	Def. conc.	CUF	09-026	*G. demeusei*	252
2009-2010	Def. conc.	GWZ	09-024	*G. tessmannii*	344
2009-2010	Def. conc.	GAU	09-022	*G. tessmannii*	188
2009-2010	Def. conc.	CUF	09-023	*M. laurentii*	433
2009-2010	Def. conc.	CUF	09-019	*M. laurentii*	250
2009-2010	Def. conc.	FIPCAM	09-017	*M. laurentii*	6107
2009-2010	Def. conc.	CUF	09-020	*M. laurentii*	200
2009-2010	Def. conc.	GAU	09-022	*M. laurentii*	272
2009-2010	SS-V	KIEFFER		*G. demeusei*	92
2009-2010	SS-V	EFMIC		*G. demeusei*	24
2009-2010	SS-V	GAD		*G. demeusei*	3000
2009-2010	SS-V	GAD		*M. laurentii*	1751
2009-2010	Temp. conc.	SN COCAM	09-015	*G. demeusei*	438
2009-2010	Temp. conc.	CAMTRANS	09-012	*G. demeusei*	226
2009-2010	Temp. conc.	SFB	09-009	*G. demeusei*	57
2009-2010	Temp. conc.	EFFA	09-028	*G. demeusei*	53
2009-2010	Temp. conc.	SN COCAM	09-015	*G. tessmannii*	369
2009-2010	Temp. conc.	CAMTRANS	09-012	*M. laurentii*	1542
2009-2010	Temp. conc.	SFB	09-009	*M. laurentii*	5
2010-2011	ACT	SIBAL		*G. demeusei*	735
2010-2011	ACT	FOREMO		*G. demeusei*	372
2010-2011	ACT	STF		*G. demeusei*	36
2010-2011	ACT	KIEFFER		*G. demeusei*	500

Exercise	Title of the exercise	Timber company	FMU	Species	Logging volume (m^3)
2010-2011	ACT	ETAMFA		*G. demeusei*	378
2010-2011	ACT	SBAC		*G. demeusei*	217
2010-2011	ACT	ZTN		*G. demeusei*	20
2010-2011	ACT	Ing F		*G. demeusei*	115
2010-2011	ACT	JANABI		*G. demeusei*	12
2010-2011	Def. conc.	CUF	09-023	*G. demeusei*	220
2010-2011	Def. conc.	TRC	00-004	*G. demeusei*	215
2010-2011	Def. conc.	SN COCAM	09-015	*G. demeusei*	205
2010-2011	Def. conc.	CUF	09-019	*G. demeusei*	720
2010-2011	Def. conc.	CUF	09-020	*G. demeusei*	440
2010-2011	Def. conc.	MPACKO	09-008	*G. demeusei*	2105
2010-2011	Def. conc.	SEPFCO	00-002	*G. demeusei*	1318
2010-2011	Def. conc.	CUF	09-026	*G. demeusei*	420
2010-2011	Def. conc.	GWZ	09-024	*G. tessmannii*	158
2010-2011	Def. conc.	GAU	09-022	*G. tessmannii*	327
2010-2011	Def. conc.	CUF	09-023	*M. laurentii*	248
2010-2011	Def. conc.	COFA	09-04b	*M. laurentii*	2055
2010-2011	Def. conc.	CUF	09-019	*M. laurentii*	280
2010-2011	Def. conc.	CUF	09-020	*M. laurentii*	50
2010-2011	Def. conc.	GAU	09-022	*M. laurentii*	836
2010-2011	SS-V	SOFOCAM Sarl		*G. demeusei*	1121
2010-2011	SS-V	SOFOIE		*G. demeusei*	422
2010-2011	SS-V	NAMBOIS Sarl		*G. demeusei*	2403
2010-2011	SS-V	NGO TOUCK		*G. demeusei*	171
2010-2011	SS-V	SODETRA		*G. demeusei*	164
2010-2011	SS-V	GRACOVIR		*G. demeusei*	3090
2010-2011	SS-V	GAD		*G. demeusei*	3000
2010-2011	SS-V	FORESTCAM		*G. demeusei*	120
2010-2011	SS-V	MARVELLOUS		*G. demeusei*	162
2010-2011	SS-V	SCABOIS		*G. tessmannii*	678
2010-2011	SS-V	GRACOVIR		*M. laurentii*	202
2010-2011	SS-V	GAD		*M. laurentii*	1251
2010-2011	Temp. conc.	EFFA	09-028	*G. demeusei*	77
2011-2012	ACT	COMOCA		*G. demeusei*	20
2011-2012	ACT	SAPIENTIA		*G. demeusei*	599
2011-2012	ACT	Ing F		*G. demeusei*	115
2011-2012	ACT	EFAP		*G. demeusei*	13
2011-2012	ACT	CAMWA		*G. demeusei*	127
2011-2012	Def. conc.	CUF	09-023	*G. demeusei*	250
2011-2012	Def. conc.	TRC	00-004	*G. demeusei*	202
2011-2012	Def. conc.	SN COCAM	09-015	*G. demeusei*	388
2011-2012	Def. conc.	CUF	09-019	*G. demeusei*	1408
2011-2012	Def. conc.	FIPCAM	09-017	*G. demeusei*	539
2011-2012	Def. conc.	CUF	09-020	*G. demeusei*	392
2011-2012	Def. conc.	SEPFCO	00-001	*G. demeusei*	187

Exercise	Title of the exercise	Timber company	FMU	Species	Logging volume (m^3)
2011-2012	Def. conc.	SEPFCO	00-002	*G. demeusei*	1060
2011-2012	Def. conc.	GAU	09-022	*G. demeusei*	79
2011-2012	Def. conc.	CUF	09-026	*G. demeusei*	828
2011-2012	Def. conc.	CR MESSONDO		*G. demeusei*	920
2011-2012	Def. conc.	GWZ	09-024	*G. tessmannii*	209
2011-2012	Def. conc.	CUF	09-023	*M. laurentii*	210
2011-2012	Def. conc.	CUF	09-019	*M. laurentii*	520
2011-2012	Def. conc.	GWZ	09-024	*M. laurentii*	1704
2011-2012	Def. conc.	FIPCAM	09-017	*M. laurentii*	1768
2011-2012	Def. conc.	CUF	09-020	*M. laurentii*	154
2011-2012	Def. conc.	GAU	09-022	*M. laurentii*	663
2011-2012	SS-V	EFFA		*G. demeusei*	219
2011-2012	SS-V	SOFOCAM Sarl		*G. demeusei*	1121
2011-2012	SS-V	BMC		*G. demeusei*	595
2011-2012	SS-V	NAMBOIS Sarl		*G. demeusei*	2403
2011-2012	SS-V	CAFOREX		*G. demeusei*	340
2011-2012	SS-V	SODETRA		*G. demeusei*	385
2011-2012	SS-V	NGO TOUCK		*G. demeusei*	500
2011-2012	SS-V	SOFOCAM Sarl		*G. demeusei*	845
2011-2012	SS-V	SOFOCAM Sarl		*G. demeusei*	742
2011-2012	SS-V	LFIS		*G. demeusei*	1050
2011-2012	SS-V	SBAC		*G. demeusei*	420
2011-2012	SS-V	SODETRA		*G. demeusei*	146
2011-2012	SS-V	TAGNE DJODOM		*G. demeusei*	3290
2011-2012	SS-V	SIFCAM		*G. demeusei*	1421
2011-2012	SS-V	SBAC		*G. demeusei*	580
2011-2012	SS-V	AFC		*G. demeusei*	842
2011-2012	SS-V	FIPCAM		*G. demeusei*	319
2011-2012	SS-V	FIPCAM		*G. demeusei*	491
2011-2012	SS-V	SOFOIE		*G. demeusei*	520
2011-2012	SS-V	GRACOVIR		*G. demeusei*	2858
2011-2012	SS-V	GAD		*G. demeusei*	2935
2011-2012	SS-V	GRACOVIR		*G. demeusei*	2174
2011-2012	SS-V	MARVELLOUS		*G. demeusei*	1620
2011-2012	SS-V	FORESTCAM		*G. demeusei*	396
2011-2012	SS-V	FORESTCAM		*G. demeusei*	396
2011-2012	SS-V	GRACOVIR		*G. demeusei*	3432
2011-2012	SS-V	BANTOO		*G. demeusei*	250
2011-2012	SS-V	BANTOO		*G. demeusei*	380
2011-2012	SS-V	SETRAFOC		*G. tessmannii*	142
2011-2012	SS-V	FIPCAM		*G. tessmannii*	11
2011-2012	SS-V	SCABOIS		*G. tessmannii*	208
2011-2012	SS-V	FIPCAM		*M. laurentii*	551
2011-2012	SS-V	FIPCAM		*M. laurentii*	301

Exercise	Title of the exercise	Timber company	FMU	Species	Logging volume (m^3)
2011-2012	SS-V	SOFOIE		*M. laurentii*	242
2011-2012	SS-V	GRACOVIR		*M. laurentii*	282
2011-2012	SS-V	GAD		*M. laurentii*	1251
2011-2012	SS-V	BANTOO		*M. laurentii*	287
2011-2012	Temp. conc.	CAMTRANS	09-012	*G. demeusei*	493
2011-2012	Temp. conc.	EFFA	09-028	*G. demeusei*	34
2011-2012	Temp. conc.	CAMTRANS	09-012	*M. laurentii*	427
2012-2013	Def. conc.	CUF	09-023	*G. demeusei*	250
2012-2013	Def. conc.	TRC	00-004	*G. demeusei*	145
2012-2013	Def. conc.	TRC	00-004	*G. demeusei*	300
2012-2013	Def. conc.	SN COCAM	09-015	*G. demeusei*	255
2012-2013	Def. conc.	CUF	09-019	*G. demeusei*	1393
2012-2013	Def. conc.	GWZ	09-024	*G. demeusei*	70
2012-2013	Def. conc.	FIPCAM	09-017	*G. demeusei*	882
2012-2013	Def. conc.	SEPFCO	00-001	*G. demeusei*	640
2012-2013	Def. conc.	CUF	09-026	*G. demeusei*	990
2012-2013	Def. conc.	CUF	09-023	*M. laurentii*	210
2012-2013	Def. conc.	CUF	09-019	*M. laurentii*	499
2012-2013	Def. conc.	GWZ	09-024	*M. laurentii*	1128
2012-2013	Def. conc.	FIPCAM	09-017	*M. laurentii*	1169
2012-2013	Def. conc.	GAU	09-022	*M. laurentii*	257
2012-2013	SS-V	KIEFFER		*G. demeusei*	1300
2012-2013	SS-V	BMC		*G. demeusei*	595
2012-2013	SS-V	MARTIAL		*G. demeusei*	3189
2012-2013	SS-V	TTC		*G. demeusei*	557
2012-2013	SS-V	NAMBOIS Sarl		*G. demeusei*	2403
2012-2013	SS-V	CAFOREX		*G. demeusei*	340
2012-2013	SS-V	SEFECCAM		*G. demeusei*	11
2012-2013	SS-V	SODETRA		*G. demeusei*	385
2012-2013	SS-V	NGO TOUCK		*G. demeusei*	500
2012-2013	SS-V	SOFOCAM Sarl		*G. demeusei*	2845
2012-2013	SS-V	SOFOCAM Sarl		*G. demeusei*	2742
2012-2013	SS-V	SBAC		*G. demeusei*	398
2012-2013	SS-V	SOBOCA		*G. demeusei*	1200
2012-2013	SS-V	SODETRA		*G. demeusei*	146
2012-2013	SS-V	SCIFO		*G. demeusei*	180
2012-2013	SS-V	TAGNE DJODOM		*G. demeusei*	3290
2012-2013	SS-V	FEEMAN		*G. demeusei*	982
2012-2013	SS-V	SIFCAM		*G. demeusei*	523
2012-2013	SS-V	SBAC		*G. demeusei*	580
2012-2013	SS-V	AFC		*G. demeusei*	817
2012-2013	SS-V	SOFOIE		*G. demeusei*	428
2012-2013	SS-V	GRACOVIR		*G. demeusei*	2216
2012-2013	SS-V	GAD		*G. demeusei*	2500

Exercise	Title of the exercise	Timber company	FMU	Species	Logging volume (m^3)
2012-2013	SS-V	EEFCAM		*G. demeusei*	1829
2012-2013	SS-V	GRACOVIR		*G. demeusei*	2004
2012-2013	SS-V	FORESTCAM		*G. demeusei*	396
2012-2013	SS-V	FORESTCAM		*G. demeusei*	396
2012-2013	SS-V	GRACOVIR		*G. demeusei*	3432
2012-2013	SS-V	BANTOO		*G. demeusei*	250
2012-2013	SS-V	ITTC		*G. demeusei*	380
2012-2013	SS-V	SOFOIE		*M. laurentii*	242
2012-2013	SS-V	GRACOVIR		*M. laurentii*	282
2012-2013	SS-V	GAD		*M. laurentii*	1251
2012-2013	SS-V	EEFCAM		*M. laurentii*	920
2012-2013	SS-V	BANTOO		*M. laurentii*	210
2012-2013	SS-V	ITTC		*M. laurentii*	450
2012-2013	Temp. conc.	EQUATO BOIS	2E-RF	*G. demeusei*	241
2012-2013	Temp. conc.	CAMTRANS	09-012	*G. demeusei*	448
2012-2013	Temp. conc.	EQUATO BOIS	2E-RF	*G. tessmannii*	670
2012-2013	Temp. conc.	CAMTRANS	09-012	*M. laurentii*	205

Appendix 2. Export volumes for Bubinga and Wengé species in Cameroon

Year	Species	Society	Volume (m^3)	Importing country
year 2008	Bubinga	EAW	1	Taiwan
year 2008	Bubinga	PLACAM	1	Tunisia
Year 2011	Bubinga	CAFECO	1	
year 2008	Bubinga	SOCIAA	3	USA
year 2008	Bubinga	CDCS	5	Hongkong
year 2008	Bubinga	SOFIC	5	
year 2009	Bubinga	ESTNO	9	France
year 2009	Bubinga	EFMK	11	Egypte
year 2008	Bubinga	CCT	13	China
year 2010	Bubinga	CDCS	13	Ireland, Italia
year 2010	Bubinga	CCT	14	Grèce
year 2010	Bubinga	EFMK	15	
year 2008	Bubinga	NATION BOIS	17	Spain
year 2009	Bubinga	SOFIC	17	
year 2008	Bubinga	TAGNE DJODOM	20	
year 2008	Bubinga	EKF	24	
year 2010	Bubinga	SOFIC	24	
year 2010	Bubinga	ABC	25	China
year 2008	Bubinga	JTW	25	Netherlands
year 2010	Bubinga	IBUCO	25	USA
year 2008	Bubinga	SONAFI	26	
year 2008	Bubinga	TTS	26	
year 2010	Bubinga	FIPCAM	29	
year 2008	Bubinga	TRECOM SARL	30	
Year 2011	Bubinga	SN COCAM	30	
year 2009	Bubinga	GIS	31	Libanon
Year 2011	Bubinga	NANGUE ET FILS	32	
Year 2011	Bubinga	SODETRA REGENT	35	
year 2009	Bubinga	AC	36	Canada
Year 2011	Bubinga	CCT	38	
year 2010	Bubinga	ESTNO	39	Portugal
year 2009	Bubinga	KTB	39	Tunisia
year 2009	Bubinga	EBC	41	Côte d'Ivoire
Year 2011	Bubinga	SASBO	42	
Year 2011	Bubinga	ALPICAM	45	Ireland, Italia, Japan
year 2010	Bubinga	WOOD INDUSTRIES	45	
year 2008	Bubinga	SN COCAM	50	Turquie
year 2009	Bubinga	SN COCAM	50	USA
year 2010	Bubinga	SALCAM	50	
year 2010	Bubinga	SEEF	50	
Year 2011	Bubinga	ESTNO	55	Hongkong

Year	Species	Society	Volume (m^3)	Importing country
year 2008	Bubinga	ESTNO	56	Côte d'Ivoire
year 2009	Bubinga	SEEF	56	Turquie
Year 2011	Bubinga	MLC	57	
year 2009	Bubinga	CDCS	62	Hongkong
Year 2011	Bubinga	GWZ	65	
year 2010	Bubinga	CAFECO	71	France
year 2008	Bubinga	FIPCAM	75	Italia
year 2010	Bubinga	SN COCAM	89	
year 2009	Bubinga	GWZ	90	Netherlands
year 2009	Bubinga	JTW	93	South Africa
year 2008	Bubinga	MIB	94	
year 2009	Bubinga	ABC	100	Belgium
Year 2011	Bubinga	CANA BOIS	101	Portugal,Spain
year 2009	Bubinga	IBUCO	102	Portugal
Year 2011	Bubinga	AC	104	France
year 2010	Bubinga	ALPICAM	114	Hongkong, Taiwan
year 2010	Bubinga	KASA	119	
year 2009	Bubinga	CAMES	123	China
Year 2011	Bubinga	EFH	126	USA
year 2009	Bubinga	ALPICAM	127	
Year 2011	Bubinga	TRC	135	
Year 2011	Bubinga	NAMBOIS	136	
year 2010	Bubinga	AC	139	Egypte
year 2010	Bubinga	NANGUE ET FILS	144	
year 2010	Bubinga	GWZ	155	Spain
year 2010	Bubinga	TRC	157	
year 2008	Bubinga	KTB	164	Pologne
year 2009	Bubinga	TRC	201	
year 2010	Bubinga	JTW	207	
year 2009	Bubinga	FIPCAM	232	Italia
Year 2011	Bubinga	JM	234	
year 2010	Bubinga	JM	242	
year 2008	Bubinga	IBUCO	245	Lituanie
year 2010	Bubinga	GIS	276	Senegal
year 2010	Bubinga	SOFIBO	288	
year 2010	Bubinga	EFH	335	Pologne
year 2008	Bubinga	TRC	344	
year 2008	Bubinga	GWZ	360	Libanon
Year 2011	Bubinga	CUF	380	United Kindom
Year 2011	Bubinga	GIS	446	
Year 2011	Bubinga	SOFIBO	513	
Year 2011	Wengé	ALPICAM	1	Italia, Lituanie
Year 2011	Wengé	SBF	1	
year 2010	Wengé	GIS	3	Senegal
year 2009	Wengé	AC	5	Italia

Year	Species	Society	Volume (m^3)	Importing country
Year 2011	Wengé	CUF	6	United Kindom
year 2009	Wengé	WOOD INDUSTRIES	9	
year 2008	Wengé	TTC	10	
year 2009	Wengé	GIS	10	
Year 2011	Wengé	JM	10	
year 2008	Wengé	ESTNO	11	Côte d'Ivoire
year 2010	Wengé	IBC	11	
Year 2011	Wengé	GIS	11	
year 2008	Wengé	KR	12	
year 2009	Wengé	KTB	12	
year 2009	Wengé	ALPICAM	14	France
year 2008	Wengé	KTB	14	
year 2008	Wengé	TRECOM SARL	16	
year 2008	Wengé	CDCS	17	
year 2010	Wengé	CUF	25	
year 2010	Wengé	ALPICAM	26	Egypte
year 2010	Wengé	GWZ	26	
Year 2011	Wengé	MLC	26	
year 2010	Wengé	ABC	29	Côte d'Ivoire
year 2008	Wengé	ETG	31	
year 2008	Wengé	ERTECO	47	Belgium
year 2008	Wengé	FIPCAM	59	Italia
year 2008	Wengé	GWZ	64	Korea Democratic
year 2008	Wengé	KASA	64	Portugal
year 2009	Wengé	IBUCO	74	
year 2010	Wengé	FIPCAM	110	
year 2008	Wengé	IBUCO	147	Libanon
year 2009	Wengé	GWZ	176	Netherlands
Year 2011	Wengé	FIPCAM	195	
year 2009	Wengé	FIPCAM	262	
Year 2011	Wengé	GWZ	438	
year 2008	Wengé	JTW		Netherlands

Appendix 3. Export volumes of Bubinga and Wengé produced in the Republic of Congo and registered in the database of the Economic and Monetary Community of the Central African Countries based in the Douala port (CEMAC 2010, 2011), for 2010 and 2011

Year	Product	Society	Species	volumes	Export country
2010	Sawn wood	IFO	Wengé	3.516	china
2010	Logs	IFO	Wengé	2.457	china
2010	Logs	SIFCO	Wengé	5.587	china
2010	Logs	SIFCO	Wengé	4.778	china
2010	Logs	SIFCO	Wengé	4.13	china
2010	Sawn wood	IFO	Bubinga	13.959	china
2010	Sawn wood	IFO	Wengé	9.126	china
2010	Logs	CIB	Wengé	9.166	china
2010	Logs	CIB	Wengé	3.349	china
2010	Logs	SIFCO	Wengé	4.474	china
2010	Logs	SIFCO	Wengé	15.079	china
2010	Logs	SIFCO	Wengé	2.483	china
2010	Logs	CIB	Wengé	2.385	china
2010	Logs	SIFCO	Wengé	2.848	china
2010	Logs	SIFCO	Wengé	5.85	china
2010	Logs	SIFCO	Wengé	9.269	china
2010	Logs	SIFCO	Wengé	2.641	china
2010	Logs	SIFCO	Wengé	15.935	china
2010	Logs	SEFYD	Wengé	1.812	china
2010	Sawn wood	IFO	Wengé	5.482	Danmark
2010	Logs	SIFCO	Wengé	6.282	Douala
2010	Logs	SIFCO	Wengé	1.771	Douala
2010	Logs	SIFCO	Wengé	3.89	Douala
2010	Logs	SIFCO	Wengé	4.077	France
2010	Sawn wood	IFO	Wengé	5.406	Great Bretain
2010	Sawn wood	IFO	Wengé	2.157	Great Bretain
2010	Sawn wood	IFO	Wengé	7.147	Great Bretain
2010	Logs	SIFCO	Wengé	5.589	Hong kong
2010	Logs	SIFCO	Wengé	4.016	Hong kong
2010	Logs	SEFYD	Wengé	33.241	Italy
2010	Logs	SIFCO	Wengé	10.083	Italy
2010	Logs	CIB	Wengé	6.44	Switzerland
2010	Logs	IFO	Wengé	3.485	Switzerland
2010	Logs	IFO	Wengé	7.099	Switzerland
2010	Logs	CIB	Wengé	21.373	Switzerland
2010	Logs	IFO	Wengé	2.908	Switzerland

Year	Product	Society	Species	volumes	Export country
2010	Logs	IFO	Wengé	4.18	Switzerland
2010	Logs	IFO	Wengé	4.213	Switzerland
2010	Sawn wood	SIFCO	Wengé	5.951	
2010	Sawn wood	SIFCO	Wengé	2.773	
2010	Sawn wood	IFO	Wengé	4.582	
2010	Sawn wood	SIFCO	Wengé	5.913	
2010	Sawn wood	IFO	Wengé	6.019	
2010	Logs	SEFYD	Wengé	3.485	
2010	Logs	CIB	Wengé	11.301	
2010	Logs	SIFCO	Wengé	1.737	
2010	Logs	CIB	Wengé	6.099	
2010	Logs	SIFCO	Wengé	7.613	
2010	Logs	CIB	Wengé	5.729	
2010	Logs	CIB	Wengé	2.429	
2010	Logs	IFO	Wengé	29.823	
2011	Logs	SIFCO	Wengé	0.921	Belgium
2011	Logs	SIFCO	Wengé	22.015	Belgium
2011	Logs	CIB	Wengé	10.886	Belgium
2011	Logs	SIFCO	Wengé	20.154	china
2011	Logs	SIFCO	Wengé	20.088	china
2011	Sawn wood	CIB	Wengé	6.183	china
2011	Logs	SIFCO	Wengé	6.863	china
2011	Logs	SIFCO	Wengé	7.834	china
2011	Logs	SIFCO	Wengé	8.449	china
2011	Logs	SIFCO	Wengé	2.348	china
2011	Logs	SIFCO	Wengé	18.845	china
2011	Logs	SEFYD	Wengé	2.29	china
2011	Logs	SEFYD	Wengé	4.046	china
2011	Logs	CIB	Wengé	5.067	china
2011	Logs	SEFYD	Wengé	1.802	china
2011	Logs	CIB	Wengé	8.346	china
2011	Logs	SEFYD	Wengé	4.601	china
2011	Logs	SEFYD	Wengé	3.343	china
2011	Logs	SEFYD	Wengé	1.312	china
2011	Logs	SIFCO	Wengé	5.159	china
2011	Logs	SEFYD	Wengé	7.769	china
2011	Logs	SIFCO	Wengé	3.145	china
2011	Sawn wood	IFO	Wengé	2.642	china
2011	Logs	IFB	Bubinga	18	china
2011	Logs	SIFCO	Wengé	4.159	china
2011	Logs	SIFCO	Wengé	8.641	china
2011	Logs	SIFCO	Wengé	7.238	china
2011	Logs	SEFYD	Wengé	5.235	china

Year	Product	Society	Species	volumes	Export country
2011	Logs	SIFCO	Wengé	5.632	china
2011	Logs	SIFCO	Wengé	4.079	china
2011	Logs	CIB	Wengé	6.67	china
2011	Logs	SEFYD	Wengé	1.602	china
2011	Logs	SIFCO	Wengé	4.674	china
2011	Logs	SIFCO	Wengé	2.711	china
2011	Logs	SIFCO	Wengé	6.798	china
2011	Logs	SIFCO	Wengé	2.957	china
2011	Logs	SIFCO	Wengé	1.272	china
2011	Logs	SIFCO	Wengé	4.423	china
2011	Logs	SIFCO	Wengé	6.616	china
2011	Logs	IFO	Wengé	2.746	china
2011	Sawn wood	SIFCO	Wengé	17.723	china
2011	Logs	SIFCO	Wengé	22.307	china
2011	Logs	SIFCO	Wengé	22.205	china
2011	Logs	SIFCO	Wengé	21.377	china
2011	Logs	SIFCO	Wengé	3.443	china
2011	Logs	SIFCO	Wengé	22.526	china
2011	Logs	SIFCO	Wengé	22.177	china
2011	Logs	SIFCO	Wengé	21.43	china
2011	Logs	SIFCO	Wengé	20.995	china
2011	Logs	SIFCO	Wengé	21.995	china
2011	Logs	SIFCO	Wengé	20.601	china
2011	Logs	SIFCO	Wengé	20.966	china
2011	Logs	SIFCO	Wengé	19.9	china
2011	Logs	SIFCO	Wengé	21.049	china
2011	Logs	SIFCO	Wengé	20.974	china
2011	Logs	SIFCO	Wengé	24.355	china
2011	Logs	SIFCO	Wengé	23.303	china
2011	Logs	CIB	Wengé	4.269	china
2011	Logs	SIFCO	Wengé	20.455	china
2011	Logs	SIFCO	Wengé	21.072	china
2011	Logs	SIFCO	Wengé	22.075	china
2011	Logs	SIFCO	Wengé	2.69	china
2011	Logs	CIB	Wengé	1.892	china
2011	Logs	SEFYD	Wengé	1.144	china
2011	Logs	IFO	Wengé	4.617	china
2011	Sawn wood	SIFCO	Wengé	4.325	china
2011	Logs	SIFCO	Wengé	5.698	china
2011	Logs	SIFCO	Wengé	3.759	china
2011	Logs	SIFCO	Wengé	19.251	china
2011	Logs	SIFCO	Wengé	6.736	china
2011	Logs	SIFCO	Wengé	18.436	china

Year	Product	Society	Species	volumes	Export country
2011	Logs	SIFCO	Wengé	20.408	china
2011	Logs	SIFCO	Wengé	11.179	china
2011	Logs	SIFCO	Wengé	7.041	china
2011	Logs	SIFCO	Wengé	18.878	china
2011	Logs	SIFCO	Wengé	20.187	china
2011	Logs	SIFCO	Wengé	11.499	china
2011	Sawn wood	IFO	Wengé	5.318	Danmark
2011	Sawn wood	IFO	Wengé	2.786	Danmark
2011	Logs	SIFCO	Wengé	8	Douala
2011	Logs	SIFCO	Wengé	2.763	Douala
2011	Logs	SIFCO	Wengé	15.82	Douala
2011	Logs	SIFCO	Wengé	4.639	Douala
2011	Logs	SIFCO	Wengé	18.174	Douala
2011	Logs	SIFCO	Wengé	19.118	Douala
2011	Sawn wood	IFO	Wengé	3.408	Douala
2011	Logs	SIFCO	Wengé	1.52	Douala
2011	Logs	SEFYD	Wengé	3.088	Douala
2011	Logs	CIB	Wengé	13.933	Douala
2011	Logs	SEFYD	Wengé	2.543	Douala
2011	Logs	SEFYD	Wengé	3.215	Douala
2011	Logs	SEFYD	Wengé	1.263	Douala
2011	Logs	SEFYD	Wengé	3.502	Douala
2011	Logs	SEFYD	Wengé	2.625	Douala
2011	Logs	SEFYD	Wengé	3.831	Douala
2011	Logs	SEFYD	Wengé	3.584	Douala
2011	Logs	SEFYD	Wengé	5.974	Douala
2011	Logs	SIFCO	Wengé	21.683	Douala
2011	Logs	SIFCO	Wengé	21.218	Douala
2011	Logs	CIB	Wengé	2.587	Douala
2011	Logs	CIB	Wengé	29.132	Douala
2011	Logs	SIFCO	Wengé	29.268	Douala
2011	Sawn wood	IFO	Wengé	20.43	Douala
2011	Sawn wood	SCIFO	Wengé	57.42	Douala
2011	Logs	SEFYD	Wengé	2.121	Douala
2011	Logs	SEFYD	Wengé	2.364	Douala
2011	Logs	SEFYD	Wengé	3.216	Douala
2011	Logs	SEFYD	Wengé	20.15	Douala
2011	Sawn wood	SIFCO	Wengé	19.255	Douala
2011	Sawn wood	SIFCO	Wengé	11.64	Douala
2011	Logs	SIFCO	Wengé	1.931	Douala
2011	Logs	SIFCO	Wengé	1.274	Douala
2011	Logs	SIFCO	Wengé	18.641	Douala
2011	Logs	SIFCO	Wengé	0.609	Douala

Year	Product	Society	Species	volumes	Export country
2011	Logs	SIFCO	Wengé	4.913	Douala
2011	Logs	SIFCO	Wengé	14.74	Douala
2011	Logs	SIFCO	Wengé	1.632	Douala
2011	Logs	SIFCO	Wengé	1.761	Douala
2011	Logs	SIFCO	Wengé	1.61	Douala
2011	Logs	SIFCO	Wengé	1.996	Douala
2011	Logs	SIFCO	Wengé	17.722	Douala
2011	Logs	SIFCO	Wengé	18.943	Douala
2011	Logs	SIFCO	Wengé	19.307	Douala
2011	Logs	SIFCO	Wengé	18.67	Douala
2011	Logs	SIFCO	Wengé	19.785	Douala
2011	Logs	SIFCO	Wengé	18.648	Douala
2011	Logs	SIFCO	Wengé	18.105	Douala
2011	Logs	SIFCO	Wengé	18.615	Douala
2011	Logs	SIFCO	Wengé	19.278	Douala
2011	Logs	SIFCO	Wengé	19.203	Douala
2011	Logs	SIFCO	Wengé	21.244	Douala
2011	Logs	SIFCO	Wengé	20.826	Douala
2011	Logs	CIB	Wengé	7.6	France
2011	Logs	CIB	Wengé	12.951	France
2011	Logs	SIFCO	Wengé	10.848	France
2011	Logs	SIFCO	Wengé	10.223	France
2011	Logs	CIB	Wengé	4.34	France
2011	Logs	SIFCO	Wengé	8.133	France
2011	Logs	SIFCO	Wengé	5.234	France
2011	Logs	SIFCO	Wengé	6.269	France
2011	Logs	SIFCO	Wengé	1.232	France
2011	Logs	SEFYD	Wengé	5.249	France
2011	Logs	SIFCO	Wengé	3.9	France
2011	Logs	SIFCO	Wengé	2.858	France
2011	Logs	SIFCO	Wengé	7.766	France
2011	Sawn wood	IFO	Wengé	6.324	France
2011	Logs	SIFCO	Wengé	1.72	France
2011	Logs	CIB	Wengé	12.272	Germany
2011	Logs	SIFCO	Wengé	18.136	Germany
2011	Logs	SEFYD	Wengé	1.872	Ghana
2011	Logs	SEFYD	Wengé	5.88	Great Bretain
2011	Logs	SEFYD	Wengé	1.846	Great Bretain
2011	Logs	CIB	Wengé	11.048	Portugal
2011	Logs	CIB	Wengé	7.729	Portugal
2011	Logs	CIB	Wengé	1.858	Spain
2011	Logs	CIB	Wengé	4.453	Spain
2011	Logs	CIB	Wengé	2.36	Spain

Year	Product	Society	Species	volumes	Export country
2011	Sawn wood	IFO	Wengé	3.24	USA
2011	Logs	SIFCO	Wengé	17.302	
2011	Logs	CIB	Wengé	2.373	
2011	Logs	SIFCO	Wengé	1.872	
2011	Logs	SIFCO	Wengé	20.976	
2011	Logs	SEFYD	Wengé	1.849	
2011	Logs	IFO	Wengé	2.916	
2011	Logs	SEFYD	Wengé	29	
2011	Logs	SEFYD	Wengé	45.4	
2011	Logs	SIFCO	Wengé	4.297	
2011	Logs	SEFYD	Wengé	4.612	
2011	Logs	CIB	Wengé	3.72	
2011	Logs	SIFCO	Wengé	2.992	

Appendix 4. Export volumes of Bubinga and Wengé produced in the Central African republic (CAR) and registered in the database of the Economic and Monetary Community of the Central African Countries based in the Douala port (CEMAC 2010, 2011), for 2010 and 2011

Year	Product	Society	Species	volumes	Export country
2010	Logs	SCAD	Bubinga	28	European Commission
2010	Logs	SCAD	Bubinga	20	Danmerk
2010	Logs	SCAD	Bubinga	20.051	Danmerk
2010	Logs	SCAD	Bubinga	20	Danmerk
2010	Logs	IFB	Bubinga	31	Douala
2010	Logs	SCAD	Bubinga	28.122	Douala
2010	Logs	SCAD	Bubinga	28	Douala
2010	Logs	SCAD	Bubinga	26	Douala
2010	Logs	IFB	Bubinga	31	Hong kong
2010	Logs	VICA	Wengé	1.247	Hong kong
2010	Logs	SCD	Bubinga	19	HS
2010	Logs	SCD	Bubinga	18	HS
2010	Logs	IFO	Wengé	6.662	Switzerland
2010	Logs	IFB	Bubinga	19	UTG
2010	Logs	IFB	Bubinga	18	UTG
2010	Logs	IFB	Bubinga	17	UTG
2010	Logs	IFB	Bubinga	22	UTG
2010	Logs	IFB	Bubinga	29.289	UTG
2010	Logs	IFO	Bubinga	21	UTG
2010	Logs	IFO	Bubinga	20	UTG
2010	Sawn wood	IFB	Bubinga	22	
2010	Logs	IFB	Bubinga	21.09	
2010	Logs	IFB	Bubinga	21	
2010	Logs	IFB	Bubinga	20	
2010	Logs	IFB	Bubinga	17	
2010	Logs	IFB	Bubinga	22	
2010	Logs	IFB	Bubinga	31.103	
2010	Logs	SCAD	Bubinga	21	
2010	Sawn wood	SCD	Bubinga	24	
2010	Sawn wood	SIFCO	Wengé	14.704	
2010	Logs	SIFCO	Bubinga	18	
2010	Logs	SIFCO	Wengé	12.789	
2011	Logs	SCD	Bubinga	22.003	Douala
2011	Logs	IFB	Bubinga	22	China
2011	Logs	IFB	Bubinga	21.054	China
2011	Logs	IFB	Bubinga	23	China
2011	Logs	IFB	Bubinga	20	China
2011	Logs	SCD	Bubinga	22	China
2011	Logs	SCD	Bubinga	21	China

Year	Product	Society	Species	volumes	Export country
2011	Logs	SCD	Bubinga	21	China
2011	Logs	SCD	Bubinga	20	China
2011	Logs	IFB	Bubinga	21.978	Douala
2011	Logs	IFB	Bubinga	21	Douala
2011	Logs	IFB	Bubinga	20.881	Douala
2011	Logs	IFB	Bubinga	22	Douala
2011	Logs	IFB	Bubinga	21	Douala
2011	Logs	IFB	Bubinga	22	Douala
2011	Logs	IFB	Bubinga	22	Douala
2011	Logs	IFB	Bubinga	31	Douala
2011	Sawn wood	IFB	Bubinga	22	Douala
2011	Sawn wood	IFB	Bubinga	22	Douala
2011	Logs	IFB	Bubinga	21.41	Douala
2011	Logs	IFB	Bubinga	20.229	Douala
2011	Logs	IFB	Bubinga	21	Douala
2011	Sawn wood	IFB	Bubinga	22.089	Douala
2011	Logs	IFB	Bubinga	21.16	Douala
2011	Logs	IFB	Bubinga	21.135	Douala
2011	Logs	IFB	Bubinga	21	Douala
2011	Logs	IFB	Bubinga	22	Douala
2011	Logs	IFB	Bubinga	21	Douala
2011	Logs	IFB	Bubinga	21	Douala
2011	Logs	SCD	Bubinga	19	Douala
2011	Logs	IFB	Bubinga	22	European Commission
2011	Logs	IFB	Bubinga	21	France
2011	Logs	IFB	Bubinga	21	France
2011	Logs	IFB	Bubinga	22	France
2011	Logs	SCD	Bubinga	23	Germany
2011	Logs	SCD	Bubinga	4.004	Great Bretain
2011	Logs	IFB	Bubinga	21.139	Hong kong
2011	Logs	IFB	Bubinga	19	Hong kong
2011	Sawn wood	IFB	Bubinga	22.231	Italy
2011	Logs	IFB	Bubinga	22.195	to order
2011	Logs	IFB	Bubinga	22.284	to order
2011	Logs	IFB	Bubinga	26	UTG
2011	Logs	IFB	Bubinga	25	UTG
2011	Logs	SCAD	Bubinga	26	UTG
2011	Logs	SCD	Bubinga	18	UTG
2011	Logs	IFB	Bubinga	21	Vietnam
2011	Logs	SCD	Bubinga	23	Vietnam
2011	Logs	SCD	Bubinga	22	Vietnam
2011	Logs	SCD	Bubinga	20.468	Vietnam
2011	Logs	SCD	Bubinga	21	VSD
2011	Logs	IFB	Bubinga	20.01	

Year	Product	Society	Species	volumes	Export country
2011	Logs	IFB	Bubinga	4	

Appendix 5. Comments on how illegal logging of Bubinga and Wengé is observed in the field

Code of informant	Qualification	Region	Comments
I1	Forest and wildlife Engineer	Central administration	We finally realized that some of the data on management iventories were false. ANAFOR leaded the forest administration to ban the logging of Bubinga and Wengé without scientific and sound data on biology, ecology, etc.. For the specific case of Bubinga, we recognize that Cameroon encounters small problems of forest governance that can be easily tackled.
I2	Forest and wildlife Engineer	Central administration	Bubinga is threatened
I2	Forest and wildlife Engineer	Central administration	The distribution area of Wengé is too small
I3	Forest and wildlife Engineer	Central administration	The high presure on Bubinga is due to the arrival of the "Asian people " in the business
I3	Forest and wildlife Engineer	Central administration	The distribution area of Wengé is too small
I4	Forest and wildlife Engineer	Central administration	The treathenning on Bubinga species is due to the "Asian phenomenal".
I4	Forest and wildlife Engineer	Central administration	The distribution area of Wengé is too small
I5	Forest and wildlife Engineer	Centre	Asian people use Bubinga not only for its precious wood, but also for its leaves and roots. The Government should invite Asian business men in Cameroon to discuss how to better valorise Bubinga products. The importance of Bubinga market increased in two phases: in 2011, the products were only sawn wood. Since 2012, there are also logs.
I6	Forest technician	Centre	Here is an example of the multiple schemes of illegal logging in Cameroon: Some legal forest companies who do not get enough volume of Bubinga species in their concession cut the Bubinga that is found in the periphery of their forest and use their documents to convey the timber till the Douala port.
I7	Forest technician	Centre	The high presure on Bubinga species is due to the "Asian phenomenal".
I8	Forest technician	Centre	Some six years ago, there were many Bubinga and Wengé products that were passing through this forest post. But this is no longer the case today. The main production sites of the Bubinga passing through our post are Nguibassal and

Code of informant	Qualification	Region	Comments
			Eséka
I9	Forest and wildlife Engineer	Littoral	We assist to a high level of illegal logging of Bubinga here in the Douala region. One cubic metter (m^3) of log of Bubinga costs actually in Douala, about 1.5 millions of FCFA. In the villages, Illegal logging increases with the "Asian phenomenal". In fact, asian people do not hesitate to disburse enormous funds to get their Bubinga trees. Asian people also harvest stem barks of Bubinga. The villager who indicates a good tree of Bubinga is paid at 2 00 000 FCFA/tree. The driver who succeeds in transporting Bubinga till the Douala port without any problem with forest officers will be paid at 300 000 FCFA. Some timber companies use their documents (way bills) to convey the illegal Bubinga to Douala. Other timber companies declare the Bubinga logs as the Ebiara logs. Ebiara and Bubinga have similar features. The main production sites of Bubinga are: the south region, the Centre region (Eséka), the littoral region (Puma).
I10	Forest and wildlife Engineer	Littoral	There exists a high sollicitation of the Bubinga products by asian guys. Today, one piece of 2.20 m x 40 cm x 5 cm of Bubinga costs about 12 000 FCFA. Some 5 to 6 years ago the same piece of wood costed 6 000 FCFA. In 2011, we realized about 30 millions of FCFA from the seized wood, composed mainly of the Bubinga. There exists a text (decision) co-signed by the forest administration and the customs administration which regulates the work of forest and custom officers at the exit points, Douala port. This text stipulates that, the two administration should assist on the procedures of putting the wood in the containers and also to the boarding procedures of the container or the wood in the boat. Is this text applied in the field? That is the wuestion. The regional Delegate of forest of Douala informed the ministry of forests and wildlife on the difficulties encountered on the control of timber products in the Douala city. We know that many products enter in Douala via the Yassa check point (based at the entrance of the city, Yaoundé side), but we do not know how those products are used in Doula, which destination are theu taken? The tracking system of the Forest law enforcement, governance and trade (FLEGT) will start

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Code of informant	Qualification	Region	Comments
			by March 2013. Exportations of Bubinga are done by non registered societies. Normally, before exporting its product, a society must obtain the certificate of export issued by the forest administration.
I11	Forest and wildlife Engineer	Littoral	One timber company, SIFOCAM exported illegally the wood of Bubinga to China a few months ago. That wood arrived in the port, already in the container. Forest officers are not allowed to make control in the Douala International Terminal (DIT). Customs agents still refuse to work with forest officers in the procedures of putting the wood in the containers and in the boarding procedures. In such a situation, they ignore almost totally the quality and the quantity of the wood that is being exported from the Douala port. The DIT is too vast, with many containers which are being full of products including timber products every hours. Even, if the customs administration allows the forest officers to make the control inside the DIT, they will not be able to control all the containers, due to the low number of forest officers. The precision between the red and the pink Bubinga is difficult, mostly when we are in front of sawn wood. In many cases, the procedures of putting the wood inside the containers "empotage in french" is done out of the port, even out of Douala city; some times since the forest. The lorry that transports the containers goes directly inside the DIT. Normally, when the timber enters the port, it goes firstly to the chief forest post of Port I who initiates the boarding procedures. He verifies the conformity between the volume of the timber declared in the specific bulletins and the wood presented. There exists a sort of tracking system inside the port. The exporter can decide to export only one part of the volume declared at port I (entrance). The chief of post of the port II verifies that the volume of the wood retained finally is exactly the one that will be exported. But this is not always the case.
I12		South	The Bubinga harvested illegally comes mainly from the non-permanent forest domain. The threatening on Bubinga comes from the "asian phenomenal". Asian people are now also using leaves and stem barks of Bubinga tree. All the operations of felling and transporting

Code of informant	Qualification	Region	Comments
	Forest and wildlife Engineer		Bubinga trees occur often at night. One night is enough to evacuate huge quantities of Bubinga from the forest to Douala. One cubic meter of the log of Bubinga costs about 1.5 millions FCFA at Douala. The question to ask is: Why asian people do not want to get their Bubinga from the legal forest companies?
I13	Forest and wildlife Engineer	South	Threatening on Bubinga comes from the "Asian phenomenal". One cubic meter of the log of Bubinga costs about 1.5 millions FCFA at Douala.
I13	Forest and wildlife Engineer	South	The Bubinga harvested illegally comes mainly from the non-permanent forest domain. About 50% of the Bubinga harvested in the south region comes from non-permanent forest (agroforest) domain. Asian people are now also using leaves and stem barks of Bubinga. All the operations of felling and transporting Bubinga trees occur often at night. One cubic meter of the log of Bubinga costs about 1.5 millions FCFA at Douala. Logs are more expensive than the sawn wood.
I14	Forest technician	South	It is mainly during the procedures of putting the wood inside the container that the Bubinga wood is being exported illegally.
I15	Forest technician	South	I'm here in Mvangan since 9 months and I seized about 35 m^3 of Bubinga, harvested illegally.
I16	Forest technician	South	Bubinga is the wood that is largely used in Ebolowa. About 90% of the wood used in confectioning beds and furnitures are composed of the Bubinga wood.
I16	Forest technician	South	Wengé is being more and more scarce in this area.
I17	Forest and wildlife Engineer	South	The Wengé is scarce now
I17	Forest and wildlife Engineer	South	The illegal logging of Bubinga is largely conducted by people who do not get legal papers (forest agreement and forest titles). It is good to strengthen (enfore) the forest control by providing forest officers with fair means including vehicles, GPS, mobile phones such as "Turaya" which can be used even in the forest. In fact, illegal loggers are equipped with sophisticated materials (turaya, GPS, etc.) provided by asian people guys. They use to work by night, and in most of the cases, with the complicity of the villagers to who they disburse important funds. The control is too complex. The illegal loggers use to

Code of informant	Qualification	Region	Comments
			work in the periphery forests. These are forests which are found almost at the border of the subdivsion or at the border of the forest post area. They cut Bubinga trees in one area, cross the border and present false papers to the chief of forest post of the ajacent area. They do not use to come back, on the same road. There are many "big persons" who support the illegal logging of Bubinga, since it yields more money. Asian people started working on Bubinga tree species since three years ago. Three years ago, one Bubinga tree was bought to villagers at 60 000 FCFA. Today, the tree costs 1.5 millions FCFA due to the "Asian phenomenal".
I18	Forest and wildlife Engineer	South	The pressure on the Bubinga species is effective. People appreciate that wood for confectioning their furnitures (tables, chairs, beds) and for internal decoration of houses. The harvest zones are becoming more and more far from the villages, at 4 to 5 kilometers in the forest. This makes the transport of the wood quite difficult; and we think it will discourage illegal operators. It is no longer evident to find one Bubinga tree on the border (corner) of the road. Most of the Bubinga harvested illegally are coming from the agroforest areas. The FMUs being contigues, villagers enter inside the FMUs to work their farms. They also cut and sell the Bubinga found in those farms. Legal timber companies cannot sell their Bubinga to Asian people since they use to get their contracts long time in advance. This makes difficult the integration of the new commers in the sector. Bubinga represents about 60% of the wood seized in our subdivision. But I'm not favourable for its listing in the CITES appendix. We should first check if the quantity of the Bubinga tree found in the agroforest zone is threatenned or not. We should also first try to check if the Bubinga found in FMUs is sustainly harvested before taking any kind of decision.
I19		South	I'm working here in the regional delegation of forest and wildlife of the South since 10 years ago. The pressure on Bubinga is evident. Since three years ago, about 60% of the wood seized in the regional delegation are composed mainly of Bubinga. Bubinga wood comes from Mvangane, Mengong,

Code of informant	Qualification	Region	Comments
	Forest and wildlife Engineer		Biwong Boulou, Ngoulemakong, Biwong Bané, Lolordorf, Oveng (Dja et Lobo), and Meyo Messi. the presure increased with the "asian phenomenal". In fact, asian people buy on tree of Bubinga to villagers between 1 - 1.5 millions of FCFA. One m^3 of Bubinga costs 1.5 millions of FCFA at Douala. Operations of illegal logging of Bubinga are often conducted by night, with the high complicity of local villagers who perceive too much funds and who do not hesitate to beat every one who wants to stop the logging of their Bubinga trees. Illegal loggers get important logistics including GPS, Turaya, Bulldozer D7, and Big lories. The D7 is used for creating the road and for pushing the logs on the lorry. In fact, when some logs of Bubinga have been confectioned in the forest, the loggers make a big and long hole in the ground. The lorry enters in the hole and the Bulldozer pushs the logs on the lory which carries them directely to Douala. Another figure is that, the Bulldozer carries the logs and loads them directly inside the container that will be conveyed to the Douala port. When the team of illegal loggers have finished their task and crossed, the bulldozer (D7) closes the road by felling some big trees, as to avoid the arrival of forest officers for the control.
I20	Villager	South	Bubinga has become scarce in these villages. To be able to find one Bubinga tree, we are now obliged to go far in the forest, at least 5 km in the forest. It is the Anglophone and the Bamiléké guys who come to buy the Bubinga here in our villages. They deal with asian people.

Apendix 6. Propositions on how to sustain Bubinga and Wengé species in Cameroon

Code of informant	Region	Propositions
I1	Central administration	Conduct detail studies in biology, ecology and sylviculture. Analyse the data of the logging inventories submitted by timber companies before deciding
I4	Central administration	Conduct detail forest global knowledge or management inventories. This will require big funds
I5	Centre region	Examine data obtained from previous forest inventories conducted in 1980 by the CENADEFOR and CTFT, examine data obtained from forest inventories realized by the FAO in 2004, conduct detail forest management inventories, get the real situation for what concerns the biology, regeneration, sylviculture before deciding
I6	Centre region	The Government should ban the logging of Bubinga species in all forests, including in those for which the concessionaires gets valid forest titles.
I9	Littoral region	The Government should ban the logging of Bubinga, Moabi, Dabéma, Ebiara species.
I10	Littoral region	The Government should check seriously the density of Bubinga and Wenge tree species. Data presented in many management plans are false. Same for what concerns logging inventories. Often, timber companies request the revision of their logging (systematic) inventories to the forest administration. This occurs often when they have some markets on Bubinga, which is not enough in their forest. Once the request is approved by the forest administration, the companies insert wrong data to show that they get enough Bubinga trees in their logging plot. Then, they go out of their plot/forest to harvest the Bubinga that will be conveyed till the Douala port with the normal way bills. I propose that the Government realizes itself forest inventories at both levels: management and logging inventories.
I11	Littoral region	Bubinga should be banned for export, and authorized only for domestic use. Bubinga is one of the most popular and used timber species in the domestic market of Cameroon. By banning its export, the Government will bring two solutions: resolving the needs of cameroonians on that tree species, and sustaining it. In fact, the volume sollicited for the local usages are not too much, compared to what is being exported.
I21	Littoral region	The exportation of Bubinga and Wengé should be regulated through a quota system to better securize the resource
I12	South region	The Government should increase the MED at least at 1.6 m and increase the FOB value.
I13	South region	The Government should recommend a detail management inventory to better know the real density and distribution area of Wengé in Cameroon. The Government should increase the MED at least at 1.6 m and increase the FOB value.
I14	South region	The Government should increase the MED at least at 1.6 m and increase the FOB value.
I15	South region	The Governement should recommend fair management inventories to better know the possibility of Bubinga and Wengé
I16	South region	The Government should strengthen (enforce) the forest control
I17	South region	The Government should strengthen (enforce) the forest control
I18	South region	The Government should manage to make "legal", what is now considered as "illegal". The Government should ease the

Code of informant	Region	Propositions
		process of issuing small forest titles, as to allow to villagers who get one or two Bubinga trees in their farm, to pay a small forest tax and exploit legally their trees. This will allow forest officers in the field to have a sort of tracking system for that tree species. It is also interesting to promote community forests. Community forests were supposed to fill the needs of the domestic market. Today, most of those forests export their wood.
I19	South region	The Government should ban the logging of Bubinga species in all forests, including in those for which the concessionaires gets valid forest titles.