

## Forest Management and Deforestation in central African Republic

DIMA Francis Auguste Fleury Junior<sup>1</sup>, Prof Yi Jing Wu 吴宜进<sup>2</sup>, DIMA Francis<sup>3</sup>,  
TOUANDIRO Martine<sup>3</sup>, MAKI Robert<sup>4</sup>, SOMSE MISSILI Francine Chericia<sup>5</sup>,  
DIMA Christian<sup>6</sup>

*School of Sciences Environmental, Central China Normal University, Wuhan*

**ABSTRACT:** Nestled in the heart of Africa, Central African Republic is a vast country of 623 000 km<sup>2</sup>. It has 4.5 million inhabitants, nearly half (49.4) is 18 years and 62% live in rural areas. The country has vast and varied natural resources: A good rainfall, a dense Hydrographic network, rich soil, a basement with significant mining potential, drills and a variety of savannah, a diverse and abundant wildlife. Despite these potentials, economic and socio-health situation continues to deteriorate, resulting in increased pressure on natural resources and accelerated environmental degradation. In general, from year to year to another biodiversity is declining; watersheds dry up periodically. The scale of poaching and excessive logging result in the drastic reduction of tanks woody species and non-timber, which leads to a large-scale deforestation that leaves room for a gradual desertification.

**Keywords:** Forest, Management, Deforestation, Central African Republic

### I. INTRODUCTION

The Central African Republic since the Rio Conference in 1992, was aware of the urgency of a policy to promote sustainability principles in the management of national development, universal and cross-border nature of environmental issues and the need to take relevant safeguard measures, concerted and coordinated locally, nationally and regionally with neighboring countries to cope. It has ratified three major binding treaty instruments to engage in a show of solidarity with other countries of the world in favor of sustainable management of resources of the planet and its ecosystems. These three instruments are the Convention on Biological Diversity, the fight Convention against Desertification and the Convention on Climate Change. Since the signing of these three agreements, the country is experiencing many difficulties in their implementation. He faces many constraints that prevent it to include issues related to land degradation and ecosystem has desertification and adaptation to climate change.

To carry out this policy the Ministry of Water and Forests, Hunting and Fishing and the Environment was restructured in 2003.

A Development Fund Forestry and Tourism (DFT), today called Special Account allocation of Forest Development and Tourism (AS-FDT) created in 2000 to support the government's actions in the field of forest management

In the 90s, the Development Project of Natural Resources (DPNR) conducted inventories of recognitions throughout the massive southwestern Central African. This allowed for a complete inventory of forests and also improve the general knowledge of this medium.

Today, thanks to the Project to Support the Achievement of the Forest Management Plans (PSAFMP), CAR has provided Development of National Standards Management Plans adopted in 2001 and updated in December 2005 and validated July 5, 2006.

Despite all the means, methods and projects set up to improve the management of forest areas in CAR, this sector already inspected by several researchers and several scientists for the purpose of development and ownership of a holding means adequate, but this area remains problematic, incomprehensible, difficult and unresolved today.

**Presentation Of Central African republic**

The Central African Republic(CAR),with an area of623 000km<sup>2</sup>, is located in the heartof Africa.The country extendsfrom 14° 30 'to 27 ° 30' east longitude (over1400km from east to west)and 2 °



20 'to 27 ° 30' north latitude (about1 000 kmthe extremenorth to south). It has a largetropicalforestestimated at57%of the total areaof the country,which is partof the greatforests of the CongoBasin,the secondlargestglobalforestafter the Amazon forest.The relief, very littlerough, is dominated by a centralridge thatseparates the twomajor river systemsin the country:the Chad Basinin the north andsouthof theCongo. CAR issituated on thePrecambrian Shieldand includes twomountain ranges:•in the northwest, Mount "Ngaoui" in the massive Yadéreached1400meters.

•In the northeast, the mountains of "Bongo" peak at1,330meters(solidDarChalla).

**II. AREASFORESTINCAR**

**2.1 The presentationof forest areasandtheir potential**

**2.1.1 Areaof the national territory**

The Central African Republic(CAR)is a landlocked countrywith nocoastline.It is boundedon the west byCameroon,Chadto the north, Sudan and South Sudanto the east,the Democratic Republic ofCongoand the Republic ofCongo to the south.It coversan area of623,000km<sup>2</sup>divided into 4major ecological zonesorareasPhytogeographyincluding:

-Congo-Guinean area ofdense rainforests, savannasandperi-forest;-TheSudano-Guineandomain;-Themid-field andSudan;-TheSudano-Sahelianarea.

Table 1: Ecological Areas and phytogeography CAR

ENVIRONMENTALFIELD	VEGETATION	AREA(km <sup>2</sup> )	OBSERVATIONS
Congo-Guinean	Moist forests-Southeast-Southwestsavannahforestperished	10.000 37.500 56.400	Production forest
Sudano-Guinean Mid-field and Sudan	savannah woodlandsand treeseimi-moist forestsandforest galleries	(290.000 + 170.000) 460.000	All the central part, eastern and western Central African Republic, more than 2/3 of the territory
Sudano-Sahelian area	Shrubbysavannas, grassysavannaonarmoredsteppes	58.000	FarEastcountry
<b>TOTAL AREA</b>		<b>621.900</b>	

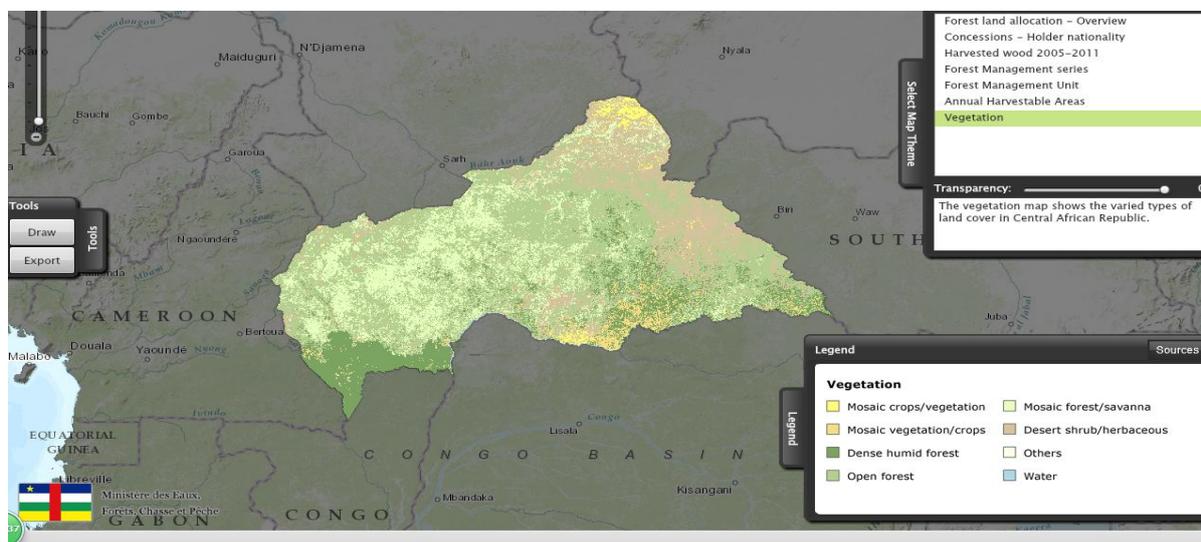
Source: Boulvert, Y. 198

The extent ofthese areasis estimated at621,000km<sup>2</sup>, approximatelythe total areaof the country,shouldbe disaggregatedaccording to differentoccupations(forestry,agriculture,grazing, hydrography, town and village, etc.). A national surveyof theStatistics Departmentof the Ministryof Agricultureand Livestock(1988),the forestas definedin C.A.Rrepresents57.5%of the national territory; However, agriculture, pasture, river systems, roads, urbanization (cities,villages) share the remaining42%.

Table 1: Estimated surfaces of the different classes of land cover of CAR (ha)

CLASS OF LAND OCCUPATION	AREA (ha)	%
Lowland forest	6.915.231	11,18
transition forest	8.364	0,01
mountain forest	0	0
forest édaphique	95	0,0001
mangrove swamp	0	
<b>TOTAL DENSE FOREST</b>	<b>6.923.690</b>	<b>11,19</b>
Mosaic forest-savanna	11.180.042	18,08
Rural complex and young secondary forest	713.892	1,15
clear dry forest and / or dense dry forest	3.430.842	1,15
woody and / or savanna savannah	34.381.438	5,55
shrubby savannah	4.002.258	6,47
grassland	62.015	0,10
water meadow	96.531	0,16
marshy meadow	0	0
Low vegetation cover	0	0
Mosaic cropland / natural vegetation	977.811	1,58
Agriculture	8.994	0,01
irrigated agriculture	26.362	0,04
Without vegetation cover	0	0
urban areas and associated	7.199	0,01
water	35.452	0,06
<b>TOTAL</b>	<b>61.846.529</b>	<b>56,68%</b>

Source: State forest, Verhegghen& Defourny,



Source: atlas Central African Republic

## 2.2 The ecological area

### - Ecological region of the dense semi-deciduous rainforest

It covers almost the entire forest in the Southwest is 90% of the area and contains almost half the forest area of RCA. It consists of the following species: OHIA, BOMBA, DAMA, and AYOUS FRAKE.

### - Ecological region of evergreen rainforest

Poorly represented in the CAR, bordering the area in the southwest, Bayanga region. The most common species of evergreen rainforest are: ILOMBA, MONGHINZA SILVER, AZOBE, ESSESSANG, ESSIA and DIBETOU. However, these are the stands of Limbali that distinguishes the middle. It represents 10% of the Southwest forest area of the country.

### - Ecological region of the semi-rainforest

Very poorly represented in the Southwest forest in the country, less than 1% of the area, it represents shreds of dense forests on the edge of the savannah. Its importance is more or less in the Southeast forest (Bangassou forest) and in the Sudano-Guinean domain. It includes species characteristic of savannas as *Burkea africana* *Lophira lanceolata*, *Daniella oliveri* and *Terminalia laxiflora*.

2.3 Ecological Districts

The South West forest belonging almost entirely to the ecological region of the semi-deciduous dense forest now understand ecological districts 7, also called Management Units (noted in capital letters and Roman numerals, Unit MU Planning)

.. **Plateau Bilolo (MU I)**  
 Primary forest occupies almost 60% of the unit while secondary forest is 27%. The FRAKE species BOUMBA and BEAST are among the most important species. Less abundant, there is AYOUS, EMIEN, OHIA, PONGUI and ESSIA;

.. **Plateau Gadzi, Watershed Mambéré (MU II).**  
 The forest is dominated by the following species: ESSIA, OHIA, DOBANGO, PONGI, MONGHINZA SILVER, ESSESSANG, MOSSOME and MOBAI;

.. **The Plain Sangha (MUIII).**  
 The most important species consist of OHIA PARALLEL AYOUS, BOMBA. Among the less abundant species constants included: FRAKE, OHIA, ESSIA, SAPELI, SIPO PADOUK RED.

.. **Plateau Gadzi, Watershed Bodingué (MU IV).**  
 The most abundant species are: MONGHINZA SILVER, ESSIA, NIOVE, MODIENGUE, SIPO, and OHIA DIANA PARALLEL. Other species remain constant but not abundant, such as: SAPELI and TCHITOLA;

.. **Plateau Gadzi, Watershed Mbaéré (MU V)**  
 Primary forest all combined facies occupies three quarters of the unit while the secondary swampy forests are equally 15%. The most abundant species are: ESSIA, MONGHINZA SILVER and OHIA;

.. **Plateau Boukoko (MU VI).**  
 The forest is estimated to over 60%. Alongside the species of secondary forest as the umbrella tree and MEPEPE persist OHIA, AYOUS, FRAKE, PONGUI and ESSIA;

.. **Lowlands Lobaye (MU VII)**  
 The forest district is characterized by the following species: AYOUS, FRAKE, OHIA and is distinguished by the following species: SAPELI, MAHOGANY, AND ILOMBA ANINGRE. This is the forest district where the vegetation has been most deeply disturbed as a result of logging and slash and burn shifting cultivation. Forty-three percent of the unit is occupied by secondary forest as evidenced by the capacity table below.

2.4 Theplant biodiversity.

Table2: Numberofstanding stalks(in thousands)

	ESSENCE				
Unites	PRIMARY1	PRIMARY 2	SECONDARY	OTHERS	TOTAL
Management					
I	53.147	66.658	98.956	306.348	525.136
II	29.646	86.789	100.044	228.178	444.859
III	28.538	58.656	68.684	223.840	379.718
IV	--.	--.	--.	--.	403369
V	22.657	67.763	120.762	214.006	425.188
VI	21.938	36.634	55.016	134.979	248.567
VII	34.046	83.889	74.209	207.002	399.146
TOTAL	190.201	400.384	517.671	1.314.353	2.422.614
Relative strength %	8	17	21	54	100

Source: DPNR, 1994

III. FOREST POLICY AND IMPLEMENTATION

Compared to other countries in the region, the CAR's forest area is relatively low because it covers about 5 million hectares, accounting for 8% of the national territory. But in terms of commercially valuable species such as Sapelli, Ayous and Sipo, forests are among the richest in Africa. In addition, from an ecological point of view, they are the intersection where the biogeographic regions of Central Africa meet. The timber industry in CAR is the smallest volume of the Congo Basin, but it still represents 16% of the

country's export earnings. The export of wood is hampered by transportation problems due to CAR's isolation which often increases the cost of production by 60%. The wood is transported by waterway and railway to Pointe Noire in Congo Brazzaville in neighboring countries by road to Douala in Cameroon. Cameroon route today represents the main road because of the difficulties of the railway in Congo (Brazzaville) transport. This country (CAR), lack of working tools and means of transport to foster its development in its forestry sector. What constitutes a blockage, despite the estimated values of such resources, this sector is more beneficial to the countries of the sub region or private companies that operate and make the resources in place to export, on one hand, the government of Central Africa republic, despite some good provisions governing the forestry code of 9 June 1990 and certain sections of the 1995 Finance Act, but the department responsible for forestry, the Ministry of Environment, water, forests, hunting and fishing, has not the means to monitor and enforce legislation properly, roles and rights of private companies and local authorities are ill-defined. The Department also suffers from poor planning.

In recent years, efforts have been made to ensure that the treatment of the beads is done mainly in the country. The Forest 1990 established that the companies code are required to create a wood processing unit and convert 60% or more of their production from the third year of operation. However, the Finance Act of 1995, established that logging companies had to convert at least 85% of the logs in the CAR. A 1996 budget law goes further by banning the export of logs if the company does not meet several conditions, such as investment in the country of 4 million dollars in two years and the contribution to social initiatives. There are also tax incentives to process timber in the country: raw wood exports are taxed at 20%, while processed timber exports are 10%. However, despite the legislation, log exports continue to dominate the sector.

Companies and European capital dominate the CAR's forest sector. The French company, Italian, Greece, Lebanon and Chinese company also settled in the South-eastern of CAR to exploit the forest resources. In the fight against illegal logging in Central Africa, illegal logging results in lost income of millions of dollars every year, worsening poverty in forest-dependent communities, accelerates degradation of ecosystem forests and undermines efforts to invest in the sustainable management of forests in the long term. World Resources Institute, in collaboration with the International Union for the Conservation and Inter Forest Industries Association, has developed a set of legal standards that assesses whether the wood products produced and exported by Central African Republic are legal.

#### **IV. MANAGEMENT OF FOREST GENETIC RESOURCES**

In recent years there appears a global awareness regarding the limited aspect of forest resources, the degradation and destruction of tropical forests. In this context, the cuts without planning go management can no longer be accepted. Any use of forest resources should be based on the principle of sustainable management. The Ministry of Forests therefore responsible for establishing management plans to control the subcontractor that operates the species under each license and development.

Table 3. Status of protective areas

Appellations	Localization	Area (km <sup>2</sup> )	Year of creation
National parks	BAMINGUI-BANGORAN	10 700	1933
	MANOVO-GOUNDA SAINT-FLORIS	17 400	1933
	ANDRE-NDOKI	1 700	1940
	DZANGA-NDOKI	1 200	1990
Full national reserves	VASSAKO-BOLO in National Park <u>Bamingui Bangoran</u>	860	1933
	MBAERE-BODINGUE ( <u>Lobaye prefecture</u> )	450	1996
Special reserves	DZANGA-SANGHA ( <u>Sangha-Mbaéré prefecture</u> )	3 159	1990
Presidential park	AVAKABA ( <u>Bamingui-Bangoran prefecture</u> )	1 700	1968
Biosphere reserve	BASSE-LOBAYE ( <u>Lobaye prefecture</u> )	146	1951
Wildlife reserves	ZEMONGO ( <u>Haut-Mbomou</u> )	10 100	1925
	OUANDJA-VAKAGA ( <u>Vakaga</u> )	4 800	1939
	AOUK-AOUKALE ( <u>Vakaga</u> )	3 300	1939
	GRIBINGUI-BAMINGUI ( <u>Nana-Gribizi</u> )	4 500	1933
	KOUKOUROU-BAMINGUI ( <u>Bamingui-Bangoran</u> )	1 100	1940
	NANA-BARYA ( <u>Ouham</u> )	2 300	1953
	YATA-NGAYA ( <u>Bamingui-Bangoran et Vakaga</u> )	4 200	1940
<b>Total</b>	<b>16</b>	<b>67 615</b>	

Sou

rice: DPNR, 1994

Regarding the classified forests (Table 4 below), the rankings were made before independence, to the point that most of these classified forests no longer exist in name only.

### 1- Estimates of Woody Biomass

As part of the assessment of forest biomass in tropical countries, FAO (1990) defined biomass as the total quantity of air organic matter in trees either expressed in tons per hectare (t / ha) in the case a biomass density, or simply ton for total biomass estimation at regional or national level.

Again, estimates of biomass in the Central African Republic will address only the south - west that experienced inventory recognition.

The equation for estimating biomass density (BD) is so stated:

$B.D. (t / ha) * WD = VOB * BEF$  where,

VOB = volume over bark of all trees with at least 10cm in diameter.

WB = average wood density (t / m<sup>3</sup>) values from the reference document was 0.56 for the average tropical trees.

BEF Factor = biomass expansion is 1.74.

Drawing on data from the DPNR, we can estimate the biomass from the equation.

Table 4. Biomass density

		MANAGEMENT UNITS							
	Parameters	MU I	MU II	MU III	MU IV	MU V	MU VI	MU VII	MOY.
A	Volume (VOB) (1000m <sup>3</sup> )	375024	266640	238466	N.D.	199378	131711	247665	
B	Biomass density (t/m <sup>3</sup> )	0,56	0,56	0,56	0,56	0,56	0,56	0,56	
C = A x B	Standing Biomass (1000t)	210013	149318	133541	N.D.	194274	128339	241324	
D	BEF	1,76	1,76	1,76	1,76	1,76	1,76	1,76	
E = C x D	Total Biomass (1000 t)	365423	259813	232361	N.D.	194274	128339	241324	
F	Area (ha)	553870	600286	453833	751197	531407	309558	584627	
G = E/F	Biomass density (t/ha)	660	433	512	N.D.	366	414	413	466

Source: DPNR, 1994

### 1.1- Estimated volume of harvestable trees

Table: 5 the volume of harvestable trees

SPECIES	ZONE 1		ZONE 2		ZONE 3		TOTAL
	VOLUME	V/ha m <sup>3</sup> /ha	VOLUME	V/ha	VOLUME	V /ha	VOLUME
SAPELLI	429,8	15,1	215,7	5,1	375,2	4,8	1020,7
DIBETOU	186,3	6,5	108,7	2,5	295,1	3,7	590,1
KOSSIPO	53,5	1,9	121,1	2,9	146,3	1,9	320,9
PADOUK	79,4	2,8	57,8	1,4	183,6	2,3	311,8
AZOBE	73,5	2,6	35,3	0,8	102,5	1,3	211,3
TIAMA	39,8	1,4	71,2	1,7	72,0	0,9	183,0
IROKO	35,8	1,3	19,3	0,5	22,0	0,3	77,1
SIPO	21,9	0,8	24,5	0,6	29,0	0,4	75,4
EBONY	15,4	0,5	16,0	0,4	15,5	0,2	46,9
CLAIRE BUMP	4,4	0,2	20,7	0,5	7,6	0,1	32,7
BUMP DARK	10,8	0,4	0	0	1,5	0	12,3
DOUSSIE	3,0	0,1	0,8	0,0	5,3	0,1	9,1
MILIACEAE	731,3	25,6	641,2	12,7	917,6	11,6	2190,1
MARKETED SPECIES	953,7	33,4	705,3	16,5	1258,3	15,9	2917,3
Marketable SPECIES	126,7	4,4	377,3	8,8	153,1	1,9	657,1
SPECIES COMMERCIAL VALUE	666,3	23,3	997,5	23,3	1342,0	17,0	3005,8
ALL SPECIES	4247,3	148,8	5672,3	132,8	5809,8	86,2	16729,4

Source: ECOFAC, 1997

The volume of harvestable trees of this forest reached 16,729,400 m<sup>3</sup>. This forest which has rich in Meliaceae and especially in Sapelli been a great lust loggers. The Meliaceae, a family of very fine woods, alone account for 2,190,100 m<sup>3</sup> 1,020,700 m<sup>3</sup> which returns to Sapelli. This confirms the importance and dominance of the species.

## 2- Open forest of Sudano-Guinean and mid-Sudanese areas

The central part of the country, Sudano-Guinean domain and mid-Sudanese area is dominated by woodland, sometimes called open forests (Trochain 1980) and wooded grassland in grass cover more and more abundant,

the trees whose size and the density drops significantly, as and as we move from south to north. The training area was estimated at 271 760 km<sup>2</sup> (CPCI, 1999) includes an offset for 44,700 km<sup>2</sup> of closed forest. The open forest is thus estimated at 227,060 km<sup>2</sup>.

Table 7: Disintegration other Southwest woodlands

CLASSIFICATION FAO	CLASSIFICATION OU STRATIFICATION NATIONALE	AREA (KM <sup>2</sup> )							TOTAL
		MU I	MU II	MU III	MU IV	MU V	MU VI	MU VII	
~ Unproductive (clear Forest)									
Other lands	Bare dry	13	-	9	-	-	-	-	22
wooded	Raphiale	85	19	119	9	3	-	114	348
	Wet bare	3	1	-	4	1	1	-	48
<i>TOTAL Other Wooded Lands</i>		101	20	119	13	4	1	114	418
<i>TOTAL AREA OF AU</i>		7.512	5.539	5.314	6.003	4.568	3.096	5.846	37.878

Source: DPNR, 1994

**3- forest Massif du Sud-Ouest: areas of other wooded land**

The inventory above mentioned was used to estimate the areas of different types of natural formations that could be grouped under the typology other wooded land. Wet barrens although treeless were considered in this category.

Table 6: Disintegration Forest Southwest Massif Central African Open

CLASSIFIED FAO	CLASSIFIED OR NATIONAL STRATIFICATION	SUPERFICIE (KM <sup>2</sup> )							TOTAL
		MU I	MU II	MU III	MU IV	MU V	MU VI	MU VII	
a) FOREST LAND									
Closed forest	~ Productive (dense Forest)	-	-	-	-	-	-	-	-
	~ unproductive (clear Forest)	-	-	-	-	-	-	-	-
Open forest	1) grassy savannah	51	18	202	41	13	69	108	503
	2) Savannah	144	443	13	252	73	166	299	1390
	3) bare dry	-	-	-	-	-	-	-	-
	4) Raphiale	-	-	-	-	-	-	-	-
	5) Wet bare	-	-	-	-	-	-	-	-
<i>TOTAL OPEN FORET</i>		195	461	215	293	86	235	407	1.893
<i>TOTAL AREA OF UA</i>		7.512	5.539	5.314	6.003	4.568	3.096	5.846	37.878

Source: DPNR, 1994

**4- The Southwest forest: Guinea-Congo area.** The South West forest having been a reconnaissance survey, the area of open forest is well-defined and appears in the table below. The area of open forest Southwest is estimated to 1893 ha or 5% of the total area of the MU.

**V. IMPACT**

**I- Social and Environmental Impacts**

Because of the difficulties and high transport costs, logging in CAR is very selective. Only trees whose value is the most important are sought. This selective targeting leads to damage opening large forest areas by businesses and penetrate deeper into the forest in search of the best wood. Sapelli, Ayous and Sipo are the main species, causing damage to surrounding trees, some estimated that this phenomenon has caused damage to about 30% of the CAR's forest. These practices give way to poaching as a considerable impact on the fauna of CAR, in Lobaye region where logging and mining is concentrated, is little wildlife, especially along the Berberati /

Bayanga road. Forest companies every day, but their social impacts are not against ephemeral. The social impact of logging in the area around Bayanga in southwest CAR is characteristic by the arrival of workers from other provinces and other regions including North and savannah of Congo (Brazzaville) neighboring country. Which creates an intense immigration and population growth in the area and Bayaka pygmies are often particularly affected.



Source: Beafricatimo.over-blog.com

The forest of the Central African offer livelihood to millions of people living there or live near (food, pharmacopoeia, fuel, fiber, non-timber forest products). They also fulfill social and cultural functions.



Source: Beafricatimo.over-blog.com

These forests contribute indirectly to feed millions of people living in urban centers.



Source: Beafricatimo.over-blog.com

## VI. FACTORS DEFORESTATION

The most serious threats to the Central African forests are urban demographic pressure, economic crisis, poverty, slash and burn agriculture, and bush fires; opens logging access to the colonization of formerly uninhabited areas and facilitates intensive clearing of forests through the introduction of chain saws and development professionals logging. The decline of the rainforest around Bangui was estimated at 1,200 ha /yr. between 1982 and 1989 and 2,400 ha / yr. between 1989 and 1992 (DPNR 1994). This process will continue if not accelerate under the combined effect of the causes cited above. The degradation of forest cover due to industrial exploitation is highlighted in the description of AU above.

Several factors are directly or indirectly responsible for deforestation in Central Africa.

### ➤ *Slash and burn agriculture: first factor of deforestation*

Although the country has no reliable statistics on the rate of deforestation due to slash and burn agriculture, many longitudinal studies on CAR canopy revolution showed that it is replaced by agricultural plots (Ouessebanga 2006; Gonda 2008 Madou 2008 Mokpedie 2009). According to the Ministry of Environment and

Ecology (MEE 2011), the rate of deforestation for agriculture is estimated at 0.40% per year. The results of DPNR of the forest inventory currently at the rate of deforestation in the forest near Bangui to 2500 ha per year, while Beina (2000) gives a figure of 5,000 ha per year. These deforestation rates are also related to legal and political weaknesses (MEE 2011). Koyo (1998) noted that “the main cause of deforestation and degradation of forests in Central Africa essentially lies in the difficulty that experience policymakers design and, implement rural development policies both consistent is to say, designed to meet current and future human needs and consistent with the production capacity and regeneration of forest resource”.

➤ ***The production of wood energy: the second factor of deforestation***

In CAR, the wood remains the main source of energy for the Central African households. It is used in rural areas to 99% for cooking and lighting in the yard at night, and about 8% for lighting boxes (Djangala1997). In Bangui, the political capital of the country, the wood is used in over 90% for cooking by households (Marien 2009). While it was obtained from the clearing fields or in nature (dead trees), exploitation of firewood is now a real informal industry. While some people gather together to produce firewood and charcoal, others make available to young people, chainsaws for the circumstance.

➤ ***The diamond mining: a threat to riparian forests and aquatic flora***

Of all the mineral resources that abound CAR (diamonds, gold, uranium, iron, copper, etc.), only the diamond and gold are operated. These are products in the Northeast (prefecture of Haute-Kotto) and South West (prefectures of Mabere- Kadei, Sangha-Mbaere and Lobaye). Annual production is estimated at 500 000 carats of diamonds and an important source of foreign exchange for the country (Ankogui-Mpoko, 2008a). This production accounts for 51% of export earnings. This is a mainly artisanal alluvial diamond. Riparian forests and gallery forests are systematically destroyed. In some localized cases, artisanal mining has diverted watercourses or contaminates water, damaging the local ecosystem (World Bank 2010).

➤ ***The timber and NTFPs: an indirect driver of deforestation***

The Central African Republic has experienced the first industrial exploitation of its forests in 1946 (MEDDES 2000). Since then, several operating companies have succeeded on Central African territory, notably in the South West. Today, the country has a dozen, all based in the South West (WRI and MEFCP 2010). Conventionally, the operating method of logging companies is to first create a life-base located close to or within the assigned concession.

➤ ***Forest governance: indirect factor in deforestation***

Despite improvements in forest governance with the new provisions of the Central African Forest Code, fraud still plague the sector (MEE 2011). They question the sustainable management of natural resources in CAR. Indeed, several fraudulent behavior are notes, coming from some loggers. Breaches of the PEA specifications are diverse: no definition of agricultural series, operating outside the limits of felling even PEA, overtaking fixed exploitable volumes, back on the same plate cutting, etc. (MEE 2011).

➤ ***Extreme poverty and population growth: indirect drivers of deforestation***

CAR has an average annual growth rate of 2.5% (RGPH 2003). In urban centers, the annual growth rate of Bangui example is 3.88, with a spatial growth of 328% between 1986 and 2000 (Ouessebanga 2006). This urban growth is due to the rural exodus has impoverishment and insecurity in inland areas. However, the rate of economic growth over the last 20 years is estimated at 0.4% (UNDP 2008). This lack of economic performance reflects widespread poverty.

## VII. CONSEQUENCES OF DEFORESTATION

Deforestation of the forests of Central Africa has many implications in various fields, in addition to the future irremediable disappearance of the forest if deforestation content at this rate. We have studied what might be the effects of the intensive deforestation.

### 1) Biodiversity.

The main threats to biodiversity in the CAR are from deforestation and forest degradation, poaching, uncontrolled use of biological resources, the lack of national inventory of biological resources and taxonomic reference center.

The uncontrolled introduction of invasive alien species, loss of agro biodiversity, the lack of an early warning system to climate change and armed conflict.

### 2) Climate.

Locally, the climate has changed: the temperature rose and rainfall decreased. The tropical rainforest climate

normalizes: large quantities of water evaporate trees, clouds condense and fall as rain. Furthermore, trees store heat and sunlight. Felling trees, it limits the energy reflected back to the atmosphere and can have variations in temperature (up to 12 ° in some places occasionally).

### 3) Carbon

Felled trees are often burned, and they release carbon that was stored in the trunk. This carbon supply will lead to changes in global climate and increase the greenhouse effect.

Today deforestation rejects as much CO<sub>2</sub> as the United States.

### 4) Soil erosion

transformation of the forest soil in agricultural area exposed to precipitation. The destruction of the vegetation and especially the roots will cause soil erosion. Of hectares of land were damaged as well. Unique ecosystems are rendered sterile.

The water runs off and no longer infiltrate to supply groundwater.

Soils covered with forest absorb and filter 10 times more water than pastures.

An estimated 6% of the land Central African Republic forests would be used for agriculture.

### 5) The water pollution.

The use of pesticides in soya cultivation, and mining pollute the river.

Runoff on unprotected by vegetation land leads to the presence of a large amount of suspended particles in water.

This increased sedimentation will lead to a reduction of fish catch in rivers. Local people will have difficulty feeding.

This is not to mention mining which rejected many of its waste into the local river

## CONCLUSION AND SUGGESTIONS

The entire Central African territory is still covered by a green mantle consists of forest resources (approximately 300 species) more or less threatened at present. Partial threats mainly concern the plant formations that are around urban centers. It is basically:

- Bushfires regularly roam the savannas and are often linked to agricultural activities and hunting.
- The opening of gaps in dense forest through logging, which although somewhat selective and destructive, is in most cases followed by the uncontrolled installation of new cultures.

The supply of the population of the capital and major cities in firewood, food products and non-controlling wood marketing induces a threat of disappearance of woodland which are on the outskirts of these cities, and therefore the disappearance forest species. Added to this is the problem of being landlocked, CAR has well protected natural resources which are key resources for its development. For this, we need the development plans are designed, good management of forest resources, must nevertheless have to stop almost significant regression of vegetation cover due to agricultural pressure, as well as this decline is less dramatic than in many countries in Africa and a true integrated development engages.

#### ▪ Plant formations inventories

Taxonomic knowledge and inventories are essential to the study of species diversity, especially in area of savannas where inventories have not been seriously implemented. These inventories designed to map the geographical distribution of species.

#### *Planning.*

Creating artificial stands is justified only very locally and in areas of savannah. Research must continue to determine technically and economically acceptable rules to act on forest dynamics in favor of noble species and increase production without threatening the sustainability of massive and therefore conserve forest genetic resources.

#### *Research.*

It must both be pursued in the field of dynamics of woody vegetation, phenology, breeding endangered species and also can target the field of intra-specific genetic variability.

#### ▪ In-situ Conservation

Protected areas and forest reserves exist for most since colonial times. Unfortunately, no evaluation of forest genetic resources therein were made. Therefore, the following actions are essential;

- Redefinition of the boundaries of protected areas and forest reserves and revaluation of their actual area;
- Redefining the objectives of such protected areas;
- Assessment of their forest genetic resources through inventories.

#### ▪ **ex situ Conservation**

The country still lacks tree seed center or service that takes care of that seed like the others. Thus, the ex situ conservation mode for artificial plantations of exotic tree species, some collections of herbarium and small living collections. It is therefore to:

- Conduct the assessment of forest species in artificial plantations and strengthen the protection against natural and anthropogenic risks (bush fires, cultivation, grazing, harvesting, etc.);
- Increase the number of living collections with endangered native species;
- Continue the reproduction tests of priority species (germination, nursery, plantation);
- Domesticated wild fruit.

#### ▪ **Complementary actions**

The other actors that contribute to the conservation of forest genetic resources in CAR are:

- Fire wood consumption surveys to update the wood energy consumption data in large cities and rural areas for economic use of the resource;
- Improving farming techniques;
- Research on phenology, reproduction, genetics following distribution of priority species *Entandrophragma cylindricum*, *Aningeria altissima*, *Triplochiton scleroxylon*, *Dacryodes edulis* and *Vitellaria paradoxa*.

### REFERENCES

- [1] Ake Assi, the abbey, J., Guinko, S., Giguët, R., Bangavou, X. 1980. Contribution to ethnobotanical and floristic studies in the Central African Republic. ACCT, Paris.
- [2] Boulevet, Y. 1977. Catalogue of the flora of Central Africa. Summary Ecology. Volumes 2 and 3: Strate herbaceous savannas and savanna woody stratum.
- [3] Boulevet, Y. 1986. Phytogeography Central African Republic. ORSTOM.
- [4] Cassagne, B. 1981. Survey consumption of fuelwood and service in Greater Bangui (CAR).
- [5] Guignonis, G. List of trees and shrubs alive in the dense forest and the galleries of CAR
- [6] Lanly J.P. 1966. The Central African rainforest. Wood and Forest Tropiques. 108.
- [7] Department of Finance. 2001 Finance Law, 2002, 2003, Bangui.
- [8] Department of Agriculture. Agricultural Master Plan 2002-2012, Bangui.
- [9] Department of Forestry. Statistical Yearbooks of forest and hunting sector, Bangui.
- [10] Norman, D. 1965. Identification of trees and woods of the main forest species in CAR.
- [11] Nouvelet, Y. 1977. Study of the consumption of fuelwood and service in the town of Bambari (RCA). C.T.F.T.
- [12] Regner, J.P. 1984. Vegetation and wildlife in Atlas of the Central African Republic. Ed Young Africa and ACCT. Paris, 18-19 p.
- [13] Teya, J.H. 1990. Law No. 90,003 with Central African Forest Code.
- [14] Tisserant, Rev. P.Ch. 1950. Catalogue of the flora of the Ubangi-Shari. IEC memory, Brazzaville. # 2.