



# WOOD ENERGY STUDY REPORT IN THE FRAMEWORK OF THE IMPLEMENTATION OF THE NATIONAL DETERMINED CONTRIBUTION (CDN) OF CONGO IN THE LAND USE AND FORESTRY SECTOR

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Emilien DUBIEZ, François PINTA, Philippe KARPE, Christian MOKA

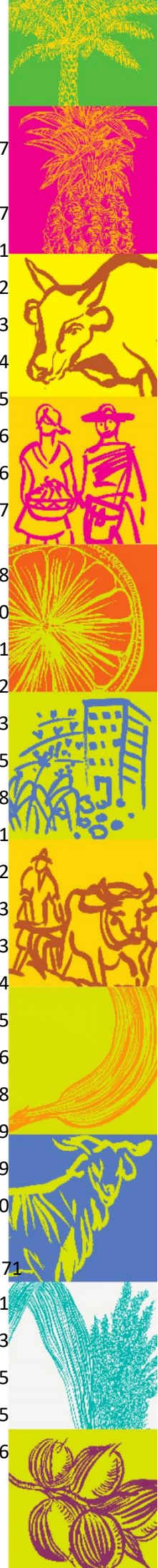


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## List of acronyms

AC: Central Africa

C: Carbon

CDN: National Determined Contribution

CEC: Cation exchange capacity

CNIAF: National Center for Inventory and Development of Forest and Wildlife Resources

Eq. Wood: Fuelwood equivalent

FFEM: French Fund for the Global Environment

FONABES: Management of Natural Forests and Sustainable Wood-Energy Supply of Sahelian Cities

GHG: Greenhouse Gas

GIE: Economic Interest Group

MEF: Ministry of Forest Economy

MJ: Megajoule

N: Nitrogen

PDRSO: Development Project of the South-West Region of the Central African Republic

PSG: Simple Management Plan

DRC: Democratic Republic of Congo

RNA: Assisted Natural Regeneration

SAF: Agroforestry system

S&B: Slash and burn

SDAEB: Master Plan for Wood Energy Supply

SNR: National Reforestation Service





## Glossary

**Wood energy**, by definition, represents any type of solid, liquid or gaseous fuel from the wood material. It is a renewable energy when the resource is managed sustainably, that is to say if the withdrawals do not exceed the possibilities of renewing the resource in a natural environment or if the plantations are dedicated to the production of wood energy. and that these are managed sustainably. In Africa, fuelwood mainly incorporates fuelwood which can be packaged in different ways (bundles, logs, logs etc.) and charcoal.

**Charcoal** is obtained by carbonizing wood in a controlled atmosphere (in the absence of oxygen). The process removes moisture and any volatile organic or vegetable matter from the wood, leaving only carbon and a few minerals.

**Firewood** is wood in its raw state (from the trunks and branches of trees) intended for combustion purposes for cooking, heating and energy production.

**Sawmill waste**, in different forms (sawdust, solid wood, veneers, slabs, sections, abutments, etc.), can also be used for the production of fuelwood in the form of charcoal, fuelwood or energy briquettes.

**Fuelwood equivalent (Eq. Fuelwood)** corresponds to the quantity of fuelwood added to the quantity of fuelwood necessary for the production of charcoal. In the present study, we considered that in order to produce 1 kg of charcoal, it is necessary to have 8.3 kg of fuelwood (carbonization efficiency of 12%). This data (Eq. Fuelwood) makes it possible to know the overall quantity of wood which makes it possible to meet the demand for fuelwood (fuelwood + charcoal) in the two cities studied (Brazzaville and Pointe-Noire).

**Domestic Energy Supply Master Plan (SDAED)** is a diagnostic and planning tool which aims to put in place the conditions for a sustainable and stable urban supply of domestic energy (including gas and electricity). In particular, this involves (i) assessing the supply / demand balance for wood energy at the level of each supply basin; ii) to propose measures allowing to adjust the withdrawals to the possibilities of the agro-forestry resource, (iii) to improve the output of the sectors, from production to consumption, (iv) to ensure that the exploitation wood energy becomes a factor in rural development and the fight against poverty and (v) develop alternative energies to meet urban domestic energy needs by reducing pressure on forest resources.

## Introduction

The objective of the implementation of the national determined contribution (CDN) of the Republic of Congo in the sector of land use and forestry is to develop investment projects reducing



GHG emissions while generating economic and environmental benefits for local populations in three intervention zones initially targeted (Sangha-Likouala, Pool-Plateaux, Kouilou-Niari departments). The objectives of the project are in particular to:

- Create sustainable sources of wood energy supply near major urban centers (Brazzaville, Pointe-Noire, Dolisie, Nkayi, etc.);
- Help replace shifting slash-and-burn agriculture with stabilized and sustainable agricultural practices, particularly agroforestry, which generate sustainable income.

With a relatively low historical rate of deforestation estimated at 0.05% annually (2000-2012), the Congo is now subject to increasing human pressure to meet the economic and energy development needs of its population. Woodfuel collection, mining and agro-industrial development, development of public infrastructure, unsustainable forest management, and shifting agriculture are among the main causes of deforestation and forest degradation. According to the Congo Forests Reference Emission Level, this deforestation rate could double over the next few years, mainly due to the pressures exerted by the mining and agro-industrial sector on forests. According to the CDN,

In order to reverse this trend, the Congo has proposed a series of enabling interventions (political, legal and regulatory framework) and large-scale sectoral investments in three priority intervention zones (Sangha-Likouala, Pool-Plateaux, Kouilou- Niari), in order to tackle the main causes of deforestation and forest degradation, and to replace unsustainable woodfuel with a green supply source that will significantly reduce the pressure on forests and help fight poverty in a rural area.

This pre-feasibility study, commissioned by the FAO, aimed to define the modalities of intervention in the wood energy sector in the supply basins of the cities of Brazzaville and Pointe Noire.

## 1. State of play of woodfuel consumption in certain cities of Central Africa

The woodfuel consumption data for certain cities in Central Africa are presented in Table 1 on page 12. The data were collected on the basis of a bibliographic review or data available to CIRAD in the context of its expertise and research activities carried out in the Central African sub-region.

From these studies, we can present major trends. The average consumption per capita in the city is 1.4 kg Eq firewood / day (we have excluded the consumption of the city of Kisangani since this consumption is very low compared to the others and that of the city of Lubumbashi or the consumption is much higher than the others, without one having certain explanations on the origin of these anomalies). The percentage of the population consuming woodfuel in cities in Central Africa is high and often reaches 90%. However, within the framework of this study, we took into account the data presented in the study of the CN REDD Congo on household consumption of woodfuel (CNREDD, 2014). We have retained the fuel distributions in households in Brazzaville and Pointe-Noire by applying a share of wood-fuel consumption for households using alternative energies (gas, oil and other) and those using wood-energy as main energy. In Central Africa, the share of charcoal in the consumption of urban households and large towns is greater than that of fuelwood in fuelwood equivalent. The use of charcoal is more and more important because of the progressive remoteness of the places of production (charcoal is lighter than wood and therefore less expensive to transport). It is also easier to package and store it. Moreover,

In addition, charcoal is a more energy-dense fuel than wood. The NCV (Lower Calorific Value) of wood is 14 MJ / kg while that of charcoal is 31 MJ / kg or about double that of wood. However in Central

Africa the traditional methods of carbonization are not very effective. Depending on the country, it takes between 7 kg and 10 kg of wood (98 MJ and 140 MJ) to produce 1 kg of charcoal (31 MJ). Carbonization therefore causes a high loss of primary energy. 1 kg of wood produces 14 MJ if it is directly burned in a fireplace. It only produces about 3 MJ if it is burned as charcoal after traditional carbonization.

Butane gas has a PCI of 49 MJ / kg, 3.5 times higher than the PCI of fuelwood and 16 times higher than that of charcoal after traditional carbonization.

In order to measure the energy produced during combustion within a household, it is preferable to measure the useful energy which is the energy used by the end user. Useful energy corresponds to the final energy (energy made available for final use) multiplied by the efficiency of use (depends on the efficiency of the stoves, the type of stoves used, etc.). The latter is difficult to assess because it depends on the type of fireplaces used for combustion.

In terms of quantities (in Eq Fuelwood), we can estimate that the share of charcoal in the consumption of urban households is greater than 80%. But in terms of final energy, coal would only meet about 50% of household energy needs. Most households continue to use wood as a primary or back-up fuel.

Regarding the estimate of the urban population of Brazzaville, we used data from the United Nations (UN Data, 2017). The population of Brazzaville is estimated at 1,887,600 inhabitants in 2017 with an urban population growth rate of 3.2%, bringing the number of inhabitants to 1,948,000 in 2018.

For the city of Pointe-Noire, considering the figures presented in the CN REDD report (Boundzanga et al., 2014) and considering an urban population growth rate of 3.2%, the population in 2018 is estimated at 1,011,550 inhabitants.





**Board 1: General data on woodfuel consumption of certain cities in Central Africa**

Country	City	Populations (UN data) at the date of the study	% of the population consuming wood energy	Charcoal market (Tons / year)	Carbonization rate retained	Fuelwood market (Tons / year)	Firewood Eq market (Tons / year)	Share of charcoal in ton Eq fuelwood	Urban individuals consumption (kg Eq wood / day)	Year	Source
DRC	Kinshasa	8,805,000	87%	490,000	15%	60,000	3,325,000	98%	1.19	2010	EU Makala Project
DRC	Kisangani	934,000	95%	16,000	15%	32,000	139,000	77%	0.43	2010	EU Makala Project
DRC	Lubumbashi	1,750,000	92%	320,000	15%	69,000	2 202 350	97%	3.45	2014	Münkner et al. (GIZ)
RCA	Bangui	815,000		22,500	10%	212,000	437,000	51%	1.49	2018	PDRSO / CIRAD
Congo	Black Point	891,800 *	48.5%	19,500	12%	26,500	189,000	86%	1.19	2014	CN REDD Congo
Congo	Brazzaville	1,712,180 *	67.1%	66,100	12%	82,300	633,000	87%	1.51	2014	CN REDD Congo
<b>Average</b>									<b>1.35</b>		

## 2. Estimation of wood energy consumption in the cities of Brazzaville and Pointe-Noire

On the basis of data and analysis of the bibliography, the following hypotheses have been retained to measure the consumption of wood energy in the cities of Brazzaville and Pointe-Noire:

- The average consumption per capita in the city is estimated at 1.4 kg Eq firewood / day for people using wood fuel as main energy;
- People who use gas, oil or electricity as their main source of energy still use wood energy. It was assumed, in consultation with the National REDD Coordination, that the latter consume 0.7 kg Eq. Fuelwood / day due to gas supply difficulties or for reasons of load shedding;
- The share of charcoal consumed in Pointe Noire represents 86% of total wood energy consumption and that of Brazzaville is 87%. The traditional carbonization rate of return is 12% (Boundzanga et al., 2014);
- The urban population of Brazzaville is estimated at 1,948,000 inhabitants in 2018 (UN Data, 2017);
- The urban population of Pointe-Noire is estimated at 1,011,550 inhabitants in 2018 (Boundzanga et al., 2014; UN Data, 2017);

On the basis of these assumptions, we assess the wood energy consumption, in 2018, of the cities of Brazzaville (Table n ° 2) and Pointe-Noire (Table n ° 3). The projections over time, over the duration of the project, are presented in tables n ° 4 and n ° 5 below.

**Board 2 : Estimate of the wood energy consumption of the city of Brazzaville based on the data collected and hypotheses formulated**

Energy	Distribution in% of the main energies used in households in Brazzaville	Number of individuals <sup>1</sup>	Urban individuals consumption (kg Eq wood / day)	Firewood Eq market (Tons / year)	Charcoal market (Tons / year)	Fuelwood market (Tons / year)
Wood energy	67.1%	1,307,000	1.4	667,900	69 729	86,827
Gas	21.3%	415,000	0.7	106,050	11 072	13 787
Oil	9.9%	193,000	0.7	49,300	5 147	6,409
Other	1.7%	33,000	0.7	8450	882	1,099
Total	100%	1,948,000	/	831 700	86,829	108,121

<sup>1</sup>Data from UN Data (2017) for the city of Brazzaville and Boudzanga et al. (2014) for the city of Pointe-Noire. The data has been updated using an urban population growth rate of 3.2% (UN Data, 2017).

**Board 3: Estimate of the wood energy consumption of the city of Pointe-Noire based on the data collected and hypotheses formulated**

Energy	Distribution in% of the main energies used in households in Pointe-Noire	Number of individuals	Urban individuals consumption (kg Eq wood / day)	Firewood Eq market (Tons / year)	Charcoal market (Tons / year)	Fuelwood market (Tons / year)
Wood energy	48.5%	490,600	1.4	250,700	26 173	32,591
Gas	40.2%	406 650	0.7	103,900	10,847	13,507
Oil	8.5%	86,000	0.7	22,000	2 297	2,860
Other	2.8%	28,300	0.7	7230	755	940
Total	100%	1,011,550	/	383 830	40,072	49 898

**The city of Pointe Noire would consume approximately 384,000 tonnes of fuelwood equivalent in 2018 and the city of Brazzaville around 832,000 tonnes of fuelwood equivalent in 2018.**

Based on UN Data (2017), the growth rate of the urban population is estimated at 3.2%, we make projections of the demand for woodfuel according to the increase in the population over the duration of the installation. implementation of the project, ie 7 years in the event that consumption patterns do not change.

**Board 4: Projected demand for wood energy in the city of Brazzaville for the duration of the project (7 years) without change in consumption practice**

Year	2018	2019	2020	2021	2022	2023	2024	2025
Chronogram	Study year	Projection over the duration of the future project (7 years)						
Population	1,948,000	2,010,336	2,074,667	2 141 056	2 209 570	2,280,276	2 353 245	2 428 549
Market Eq. Fuelwood (Tons / year)	831 700	858 314	885,780	914 125	943 377	973 566	1,004,720	1,036,846

**In 2024, the fuelwood supply needs would be greater than 1,000,000 tonnes of fuelwood equivalent for the city of Brazzaville.**

**Board 5: Projected demand for wood energy in the city of Pointe-Noire for the duration of the project (7 years) without change in consumption practice**

Year	2018	2019	2020	2021	2022	2023	2024	2025
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Chronogram	Study year	Projection over the duration of the future project (7 years)						
Population	1,011,550	1,043,920	1,077,325	1,111,799	1,147,377	1 184 093	1 221 984	1 261 087
Market Eq. Fuelwood (Tons / year)	383 830	396,113	408 788	421,869	435,369	449,301	463 679	478,478

**In 2024, the fuelwood supply needs of the city of Pointe Noire would be greater than 460,000 tonnes of fuelwood equivalent.**

### 3. Organization of wood energy sectors in the Republic of Congo

A supply chain is a system made up of people, organizations and activities necessary for the production, processing and delivery of products or services, via suppliers, to the end consumer. In the case of wood energy, the sector includes the production of wood (planting and / or felling), its transformation into charcoal or its fragmentation, its transport and its final use in urban areas. It involves both direct actors (producers, transporters, sellers and consumers) and indirect actors (traditional land chiefs, village committees, state technical support or forest and road control services, projects, NGOs, etc.).

The woodfuel sectors of cities in the Central African sub-region are informal but very well organized in order to meet urban demand and generate income for a whole set of actors who have specific roles throughout. of the sector. The cities of Pointe-Noire and Brazzaville are no exception to this observation.

Analyzing a sector involves i) analyzing its structure and operation: actors, roles, exchanges throughout the chain; ii) its macroeconomic impact: values produced, jobs generated, taxes collected, importance in the national economy; and iii) analysis of the mechanisms of interdependence, potential conflicts and the challenges of different actors. These comprehensive analyzes require the conduct of specific surveys to understand the organization of the sectors, characterize the practices of the actors and estimate the flow of woodfuel entering the city. In the following parts, we present elements of the functioning of the wood-energy sectors of the Republic of Congo on the basis of a bibliographical review.

#### 3.1 Structures and functioning of wood energy sectors in the Republic of Congo

The cities of Central Africa are supplied, for the most part, by wood energy from natural formations (more or less old forest fallows, secondary forests, etc.).

The wood-fuel production zones are concentrated near the roads and the hydrographic network because of the high costs of transport. The logic is similar for food products resulting from agricultural practices. In Kinshasa, transport represents more than 30% of the value of a bag of charcoal. In Pointe-Noire, transport represents 15% to 20% of the value of the bag of charcoal.

Depending on demand, the supply basin can extend over several tens or hundreds of kilometers. In Kinshasa, a city of more than 10 million inhabitants, the supply basin extends over more than 250 km and over a longer distance upstream of the Congo River (river transport being very inexpensive, especially downhill) . In Pointe-Noire, the supply basin extends over more than 100 km.

In natural formations (forest fallows, secondary forests, etc.), we distinguish two methods of exploitation, i) the production of fuelwood from wood from slash-and-burn and ii) exclusive cuts dedicated to production of wood energy. In Pointe-Noire, 4/5 of the fuelwood, from natural formations, supplying the city comes from slash-and-burn and only 1/5 comes from selective

exploitation (Nkoua & Gazull, 2010). These production methods were also observed in the fuelwood supply basin of the city of Kinshasa where 2/3 of the wood for the production of fuelwood came from slash-and-burn and 1/3 came from a exploitation exclusively dedicated to the production of wood energy (Schure et al., 2010). We believe that this trend is similar in the Brazzaville wood-fuel supply basin for lack of recent study on the issue of wood-fuel in Brazzaville. It is important to take into account the fact that woodfuel production is closely linked to agricultural practices in the majority of cases.

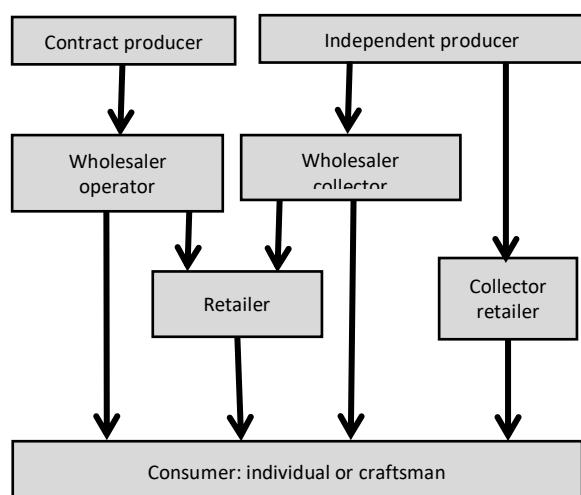
In the Republic of Congo, there are three methods of accessing the resource. The first concerns individual owners of a space that they can use themselves or more generally delegate production on the basis of an agreement with producers against remuneration or remuneration for part of the production. The second concerns non-natives who rent a portion of land to access wood resources from land chiefs, called "landowners", in villages located in supply basins. And the third concerns indigenous producers (belonging to the lineage or to the clan) who have free access to the wood resource because of their descent.

We distinguish three types of producer organization, i) individual businesses, ii) family businesses and iii) groups. In the majority of cases, exploitation is carried out on an individual basis. Indeed, mistrust, modes of access to the resource, divergence of objectives, the temporary nature of production practices, etc. promote the emergence of individual practices. Nkoua and Gazull (2010) indicate that i) sole proprietorships are dominant (85%), ii) poorly represented family businesses (13%) and iii) traditional groups are marginal (2%) within the timber sector. energy in the supply basin of the city of Pointe-Noire. The difficulty of collective organization has already been observed in the context of the implementation of community forests, for example. In Kinshasa, most producers work individually. Sometimes the producers come together in "likelemba" to help each other collectively. In this case, the group members take turns working for each of them to facilitate the different production jobs. In Kinshasa, only 5% of producers are members of an organization linked to the production of wood energy. The organization of producers in Brazzaville presents a similar organization where a majority of producers work individually. Sometimes the producers come together in "likelemba" to help each other collectively. In this case, the group members take turns working for each of them to facilitate the different production jobs. In Kinshasa, only 5% of producers are members of an organization linked to the production of wood energy. The organization of producers in Brazzaville presents a similar organization where a majority of producers work individually. Sometimes producers come together in "likelemba" to help each other collectively. In this case, the group members take turns working for each of them to facilitate the different production jobs. In Kinshasa, only 5% of producers are members of an organization linked to the production of wood energy. The organization of producers in Brazzaville presents a similar organization where a majority of producers work individually.

Wood-energy sectors are now largely dominated by charcoal, which is easier to transport, pack and store and more appreciated by cooks. The charcoal is made from a traditional grindstone where the carbonization yields can vary from 8% to 17% depending on the mastery of techniques and the mastery of the different stages of wood carbonization.

Once the charcoal has been produced or the fuelwood conditioned, the producer can hire a means of transport and take his production to town for sale. In the other case, it is the wholesale collectors who get their supplies at the production sites by purchasing the products or sometimes by pre-financing the producers.





Caption: → Wood or charcoal stream

**Figure 1: Vertical and general organization of sectors wood energy in Central Africa**

In cities, the sector is organized through wholesalers, warehouse managers and resellers (retailers) who organize the offer to consumers. Consumers can be classified into three categories, i) households, ii) restaurateurs and iii) artisans (blacksmiths, founders, etc.). Note that in Pointe Noire, a specific sector supplies smokers with fish made from “green” firewood to facilitate the production of smoke.

### 3.2 Economic weight of the wood-energy sectors of the Republic of Congo

The sectors generate several thousand jobs distributed throughout the production sector (coalmine, slaughterers, etc.), transport (carriers, loaders, etc.) to the place of marketing (wholesalers, retailers, resellers, etc.) etc.) and generate significant income for all those involved in these sectors. In Kinshasa, the number of people involved in the wood-energy sector is estimated at more than 300,000 people (Schure et al., 2010). In Pointe Noire, the number of jobs is estimated at more than 10,000 (Nkoua & Gazull, 2010). In Bangui, the number of jobs generated in the wood-energy sector is estimated at more than 40,000 people (Gazull et al., 2018)

The table below presents some economic data for the fuelwood and charcoal sectors for the city of Pointe Noire. These data were collected by the national consultant in a few markets in the city of Pointe-Noire.

**Board 6: Economic data of the wood-energy sector of the city of Pointe Noire in kg of charcoal or fuelwood**

Average price / kg	Charcoal1	Fuelwood (bundle) 2
Production cost	25 FCFA	4 FCFA
Sale at the place of production		
Roadside sale	60 FCFA	20 FCFA
Transport fee	30 FCFA	12 FCFA
Water and Forests Tax	2.5 FCFA	0.2 FCFA
Storage at depot	2.5 FCFA	0 FCFA
City sale	90 FCFA	40 FCFA

- 1: average of charcoal: 41 kg & 2: average weight of the bundle: 25 kg
- In Brazzaville

weight of a bag

The table below presents some economic data for the fuelwood and charcoal sectors for the city of Brazzaville. These data were collected by the national consultant and the international expert in four Brazzaville markets (Total, Yoro, Mikalou and MOUNGALI) on April 28, 2018.



**Board 7: Economic data of the wood-energy sector of the city of Brazzaville in kg of charcoal or wood**

Average price / kg	Charcoal (bag) 1	Fuelwood (large bundle) 2
Production cost		
Sale at the place of production	62.5 to 75 FCFA	6 to 8 FCFA
Roadside sale		
Transport fee	25 to 37.5 FCFA	4 FCFA
Water and Forests Tax	2.5 FCFA	0.2 FCFA)
Storage at depot	2.5 FCFA	1 to 2 FCFA
City sale	112.5 to 162.5 FCFA	40 FCFA

- 1: average weight of a bag of charcoal: 40 kg
- 2: average weight of a large bundle: 25 kg

### 3.3 Pointe-Noire's woodfuel supply chains

The supply of Pointe-Noire differs from that of Brazzaville by the large proportion of wood from the Eucalyptus forest massif adjacent to the city.

The supply basin of the city of Pointe Noire is located in the department of Kouilou.

This department is characterized by the forest of Eucalyptus with a current area of 36,000 ha which is however in decline due to land pressure linked to the expansion of the city of Pointe-Noire and unregulated logging. stands for the production of charcoal. Savannahs and bare soils represent an area of 324,615 ha. The heterogeneous forest environment, made up of the natural formations of Mayombe and more or less old fallows, covers an area of 1,075,575 ha (SOFRECO, 2012).

The Kouilou department is also characterized by the presence of two Protected Areas: i) The Dimonika Biosphere Reserve which is located in the Mayombe forest massif and which covers an area of 136,000 ha and ii) the Konkouati National Park. Douli which covers an area of 504,950 ha (OFAC, 2015).

#### 3.3.1 Wood-energy sector from the Eucalyptus forest massif

In the Eucalyptus massif, the production of fuelwood from the logging residues of eucalyptus wood began in 1988. This production was carried out under management with the creation of a production structure called UVD (unit of various valuations). The production of charcoal started with five (05) metal furnaces (capacity 6 m3) of the Magnien type to reach 70 furnaces by the 1990s. The average rotation of these furnaces was about 2.66 batches per week with an average production per batch of 25 bags of 25 kgs of charcoal or 625 kg of charcoal per batch. The daily staff, used, was distributed in a team of three (03) people for two (02) ovens. The yields were of the order of 25% on anhydrous wood (more than 6 months of air drying). Indeed, the drying of wood is an important element in the improvement of the carbonization yields and allows to obtain better carbonization yield. The sale of charcoal was done locally at Pointe-Noire in depots set up for this purpose in two entrances to the city, at Nkouikou entrance north and Mpaka entrance south-east but also through a wholesaler installed in the city. large central market in Pointe-Noire. This experiment with metal ovens lasted nearly four years and the equipment, through repetitive gunfire (intense heat at the base of the oven) and without specific maintenance, gradually deteriorated. Coal was sold locally at Pointe-Noire in depots fitted out for this purpose in two entrances to the town, at Nkouikou north entrance and Mpaka south-east entrance but also through a wholesaler installed in the city. large central market in Pointe-Noire. This experiment with metal ovens lasted nearly four years and the equipment, through repetitive gunfire (intense heat at the base of the oven) and without specific maintenance, gradually

deteriorated. Coal was sold locally at Pointe-Noire in depots fitted out for this purpose in two entrances to the city, at Nkouikou entrance north and Mpaka entrance south-east but also through a wholesaler based in large central market in Pointe-Noire. This experiment with metal ovens lasted nearly four years and the equipment, through repetitive gunfire (intense heat at the base of the oven) and without specific maintenance, gradually deteriorated.

It was after this that the company turned to private operators who took over the activity with the use of traditional grindstones. The operations were carried out by subcontracting to a specialized operator (experienced charcoal craftsmen). The charcoal was then produced from large-sized grindstones (12-15 m X 3m X 2m) with an average production of 4 bags of charcoal of about 25 kg per m3 of enstered wood, i.e. a carbonization yield of 1 'order of 16%.

Secondly, the operating residues were put up for auction. Faced with the growing demand for fuelwood from eucalyptus wood, the methods for allocating logging residues for the production of fuelwood have evolved. The plots used were now divided into lots of one hectare each and auctioned at the floor price of 25,000 CFA francs / ha. A preliminary visit of the lots was then carried out for the attention of the operators in order to enable them to appreciate the richness of each lot put up for auction.

From 2003, the attribution model has evolved further. One hectare of residual plot was delivered to each operator and in return, the operator had to pay - a price - (royalty, or tax, etc.) on each type of fuelwood produced at the rate of: 40 CFA francs / bundle of wood and 500 CFA francs / bag of charcoal, before the release of these products from the massif under the close supervision of the company's agents. Depending on the evolution of the prices of wood-energy products on the market, these amounts have gradually evolved to reach 1,500 CFA francs / bag of charcoal and 300 CFA francs / bundle of wood

At the same time as the allocation of lots to private operators, the company organized the populations into an Economic Interest Group (GIE) to enhance the exploitation residues of plots located near the villages. The EIGs were constituted according to the size of the villages and the number of households. Households were grouped into GIEs. Entire plots were allocated to these EIGs who in turn shared the lots made available to them in proportion to the members of the EIG. Each member of the EIG, after highlighting the lot that was allocated to him, had the obligation to return - like the other operators - the amount of the "quota" required for each type of product produced before leaving the massif. Unlike other operators,

This is how the resources generated by this organization allowed the construction of dispensaries, boreholes, meeting rooms (a sort of common house ...) in villages bordering the massif which did not have any. These EIGs operated from 2008 to 2015, the year in which this system was interrupted after the company was taken over by other (Chinese) shareholders who no longer pursued this form of organization.

In 2010, more than 50% of the wood energy supplying the city of Pointe-Noire came from the Eucalyptus plantation located on the outskirts of the city.

Eucalyptus plantations are now under the management of the National Reforestation Service (SNR) following the withdrawal of the company. Discussions and field visits confirm that woodfuel production practices in the Eucalyptus massif continue, that they have intensified and that they are less regulated in the absence of a private operator. We can assume that in the absence of control and non-application of management methods, the flow of fuelwood from the Eucalyptus massif has increased and that in the medium term the plantation is in danger in the absence of regulation. timber harvesting and land claims related to the expansion of the city of Pointe Noire.



### 3.3.2 Wood-energy sector from natural forest stands

Regarding the supply of wood energy for natural formations, the latter comes mainly from the forest of Mayombe. The four main axes of woodfuel supply in Pointe-Noire are:

- the axis of the national road n ° 1 or road of Brazzaville which covers the sub-basin of Hinda-Makola;
- the axis of the national road n ° 4 or road of Cabinda which covers the sub-basin of Tchiamba-Nzassi;
- the axis of the national road n ° 5 or road of Gabon which covers the sub-basin of lower Kouilou-Madingo Kayes;
- the axis of the Kissoko forest track which covers the Tchissoko sub-basin;

Wood energy is mainly obtained from abattis for the development of agriculture. The production of charcoal is done via the traditional carbonization technique and all the wood is used for the production of charcoal. The wood energy produced is then transported to Pointe Noire to be sold through wholesalers and retail traders.

### 3.3.3 Wood energy from the transformation of sawmill waste

Part of the fuelwood supplying the city of Pointe-Noire comes from sawmill waste, but few studies have quantified this contribution. However, the latter seems much lower than the two sectors described above, especially since part of sawmill waste is used by factories for cogeneration and another part is recovered by joineries to produce sawnwood which can be sold on the markets of Pointe-Noire. However, the study on the recovery of waste from the timber industry in Congo (case of Pointe-Noire) conducted by the FRMi study office in 2015 with funding from the UNDP provides some information.

According to the authors, three types of actors can generate recoverable waste in the city of Pointe Noire. These are two medium-capacity industrial units (SICOFOR and TAMAN), five small-capacity industrial units (Afriwood, Global Wood, Miraf, La Plage and Cofibois), and the informal secondary processing sector.

Waste comes in different forms (sawdust, solid wood, veneers, slabs, sections, abutments, etc.). Some of these wastes are used as fuelwood such as sawdust which can be used in fish smoking operations and wood waste which can be rediscovered as fuelwood or used for charcoal production. The table below presents the estimate of the residue deposit in m3 of the actors generating these residues (FRMi, 2015).

**Board 8: Estimation of the sawmill residue deposit in m3 from three types of actors in Pointe Noire (FRMi, 2015)**





Sources	Log	Dosse	Falls	Sawdust	Shavings	Total
SICOFOR	-	-	6000	8000		14000
TAMAN	-	-	7500	2500		10,000
GLOBAL WOOD	-	1200	2000	600		3800
MIRAF	-	300	300	140		740
COFIBOIS	-	-	-	-		-
AFRIWOOD	-	300	360	120		780
THE BEACH	-	200	200	100		500
Joinery	-	-	-	2500	7500	10,000
Subtotals	-	2000	16360	13960	7500	39 820

Within the framework of their investigation, the authors did not obtain information allowing to specify the share of residues used for the production of wood fuel. However, they indicated that the LA PLAGE sawmill marketed its sawmill residues as fuelwood. The slabs and offcuts, in 2015, were transformed into firewood after having been cut into lengths of 1 m and sold in stère (0.6 m<sup>3</sup> solid) at 7,000 FCFA (or 15 € / m<sup>3</sup>) to fish smokers.

They did not obtain additional information from the other players. However, as indicated above, a large part of the residues are recovered for cogeneration and a part is also sold to local joineries.

### 3.4 Brazzaville's wood energy supply chain

The Brazzaville wood-fuel supply basin is located in the Pool department. This department is characterized by savannahs and bare soils representing an area of 3,028,662 ha. The heterogeneous forest environment is made up of gallery forests (405,764 ha) and degraded gallery forests (20,971 ha) (SOFRECO, 2012). In this degraded forest complex, there are also more or less old fallows.

#### 3.4.1 Wood-energy sector from natural forest stands

The wood energy, which supplies the city of Brazzaville, comes from forest formations in the southern zone of Brazzaville (South Pool) and gallery forests located on the Batéké plateau (North Pool). Charcoal also comes from the departments of northern Congo which comes from the transformation of sawmill waste. The main supply axes for the city of Brazzaville are as follows (Boudnzanga, 2004):

- The Mayama axis and its straps;
- The Kinkala axis and its straps;
- The Nganga lingolo - Mbanza Ndounga axis;
- The Imvoumba axis and its ramps;
- The fluvial axis and Mbamou island;

Wood energy is mainly obtained from abattis for the development of agriculture. The production of charcoal is done via the traditional carbonization technique and all the wood is used for the production of charcoal. The wood energy produced is then transported to Brazzaville to be sold via wholesalers and retail traders.

### 3.4.2 Fuelwood from sawmill waste

As for the city of Pointe Noire, part of the charcoal supplying the city of Brazzaville comes from the recovery of sawmill waste but this contribution has not been quantified. However, this contribution seems low compared to the quantity of wood energy from natural formations. According to the study conducted by ONFi (2012), several economic operators were involved in energy recovery from sawmill waste in 2012. These were:

- Likouala Timber (LT, Betou) which promoted the production of charcoal from the waste of its sawmill (the villagers produced charcoal which they sold to the company which transported it to Brazzaville). In 2012, the company wanted to develop a cogeneration process that will use a significant portion of wood residues;
- CIB OLAM (Pokola) had an agreement with charcoal makers but the quantities made available should not be very large because of the cogeneration implemented;
- IFO (Ngombé) produced about 84,000 m<sup>3</sup> of wood residues, or about 67,200 t of wood. According to the authors, 30% (20,000 t) was used for carbonization, ie an estimated production of 2,400 t of charcoal.

Due to the lack of updated data, we cannot estimate the contribution of this sector to the woodfuel supply of the city of Brazzaville. We believe that these quantities have undoubtedly decreased due to the establishment of cogeneration processes in some of the factories in North Congo, which leads to the reuse of sawmill waste to produce energy.



**Figure 2: Charcoal sacks in Bétou (photo on the left) and cargo bags awaiting loading on the Oubangui River (Photo on the right) (Photos: E. Forni)**



## 4 Current charcoal production practices in the study areas

### 4.1 Current carbonization practices

Current practices in Congo-Brazzaville consist of building a carbonization wheel in earth. As with all traditional artisanal processes, the load of wood to be charred is placed inside an enclosure with controllable sealing (earth for the millstones or pits, bricks or metal for the ovens). Carefully placed openings allow the admission of the air just necessary for carbonization. These systems can reach yields of the order of 20% (by mass on a dry basis) if they are correctly implemented, but the yields can fall to 8-14% in the case where the conduct of carbonization is not is not fully mastered.

In the present study, for the departments pre-identified as supply basins for the large cities of Pointe Noire and Brazzaville, two types of soil stack are used: i) semi-buried millstones with a pit (height dug into the ground about 0.4 m on average, but which can range from 0.3 to 0.7 m) and the ground grindstones, generally rectangular and without pit. Although the nature of the soil plays a role in the choice, it clearly seems that the type of wheel depends above all on the know-how of the charcoal maker, that is to say according to his experience and his preference for carrying out the carbonization.

This method of carbonization in an earthen stone requires a great deal of experience from operators and the yield of conversion of wood into charcoal from a traditional wheel can be very variable: ranging from single to double (from 8% to 17%). This yield depends on a large number of factors which translate into the greater or lesser success of the cooking. In Congo, the recent bibliography indicates an average yield of 12% (Boundzanga et al., 2014) which is well within the range of data known for this type of carbonization practice.

The main characteristics of a traditional carbonization wheel in Congo are:

- A rectangular shape on the ground and a parallelepipedic volume;
- Dimensions depending on the volume of wood to be charred, an average grindstone is approximately 3 to 5m long and 1.5 to 3m wide and more or less 1.8m high;
- A transversal and meticulous classification of the wood to limit the preferential air passages;
- Covering with a layer of foliage and soil;
- Air inlets formed by vents placed at the base of the grinding wheel;
- A significant amount of labor (for example a 45 ster grinding wheel can be assembled and driven by a team of 5 people);
- The mastery of know-how is necessary to obtain a good carbonization yield;

Concerning the size of the grindstones, the quantities of wood placed to be carbonized in a grindstone are very variable, ranging from a few m<sup>3</sup> to several tens of m<sup>3</sup>. It should be noted that the size depends on the type of operator and the organization of production-marketing:

- The grindstones of professional charcoal burners - as well as those of operators subcontracted by traders pre-finance production - are generally made to optimize the cost of transport to town: the size of the grinding wheel is defined according to the number of bags to be produced. to fill the truck with 150 bags (eg TRM 2000 type truck) or 200 - 225 bags for larger vehicles.
- The size of the grindstones made by occasional charcoal-burners (farmers, other operator, etc.) is very variable because it is adapted to the charcoaler's objective, which is to obtain rapid monetary income to pay for financial expenses (back to school fees , health costs, etc.). This type of production takes place mainly outside of crop establishment periods and outside of agricultural harvest periods.





Regarding the duration of carbonization, we can retain that the carbonization in earthen stone is relatively long since a professional charcoal maker makes about 5 to 6 kilns per year. In order to give an idea of the duration of charcoal production from the earthen grindstone technique, we will retain that a 45 ster grindstone requires between 37 to 55 days distributed as follows:

- Felling, grouping, and wood preparation: 20 to 30 days
- Carbonization: 13 to 18 days depending on the type of wood and its humidity;
- Cooling: 2 to 4 days;
- Unloading and bagging: 2 to 3 days.

In summary, current carbonization practices in the Congo are conducted using traditional earthen millstones with or without a pit. These techniques allow easy adaptation to different field conditions. They do not require financial investment but an abundant labor force for certain stages such as shaping and grouping of wood, making the pit, mounting and covering the load of wood. They require a good qualification and a great experience of the charcoal maker for the constitution of the wood pile and the conduct of the cooking: all of this know-how is essential to obtain good technical performance; high carbonization efficiency, low quantity of incuits, and good quality of the coal. In addition, the use of the traditional grinding wheel,

#### 4.2 Improvement of traditional carbonization practices

The actions to be taken to improve the traditional carbonization technique aim to improve and facilitate the working conditions of operators, increase their production yields and ensure the optimal use of the raw material. These actions are described in section 7.3.3 of this report. This involves i) drying the wood better before carbonization, ii) selecting dense woods, iii) improving the construction of the grinding wheel and iv) managing a good carbonization process.

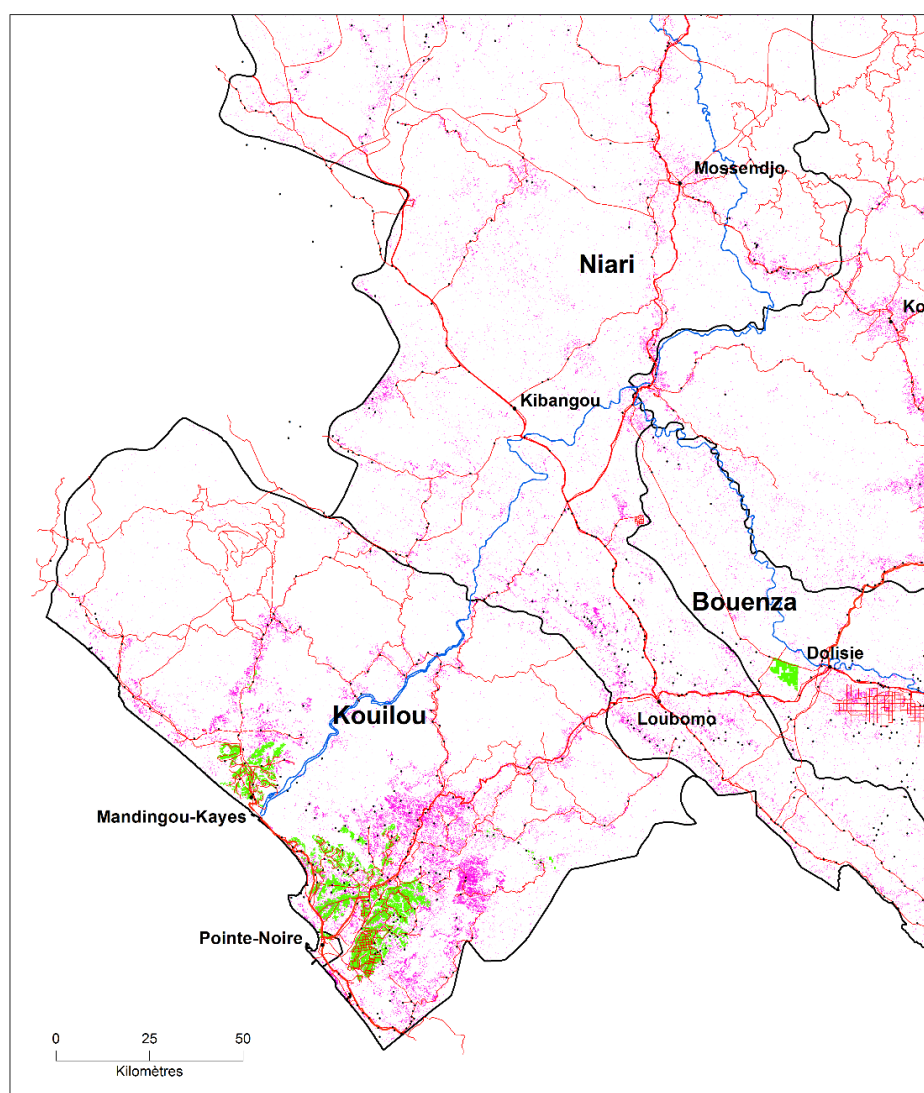
## 5 Deforestation dynamics in the supply basins of the cities of Pointe Noire and Brazzaville

### 5.1 Deforestation in the supply basin of the city of Pointe Noire

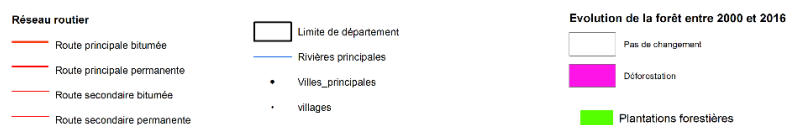
According to the spatialization and weighting of the causes of deforestation and forest degradation carried out within the framework of REDD + (CN REDD, 2014), the net deforestation rate at the national level between 1990 and 2010 is estimated at 0,77% or a net annual deforestation rate of 0.04%. The departments of Pool and Kouilou come in second and third position with net deforestation rates estimated at 3.66% and 3.29% respectively for the period 1990-2010, i.e. a net annual deforestation rate of 0.18% respectively. and 0.16%. The department of Bouenza has a net deforestation rate, over this period, estimated at 6.45%, or a net annual deforestation rate of 0.32%. The document presenting the reference level of emissions for forests (NERF, 2017) indicates that the average annual loss rate is 0.052%,

Based on deforestation maps produced by the University of Maryland (Hansen, 2016), we find that deforestation in the department of Kouilou is mainly located along national roads 1, 4, 5 and 6. However, deforestation appears to be localized. concentrated at the entrance to the Mayombe massif on national road 1 at Makola and Masséka. We can also observe deforestation in the department of Niari at the level of the transition zone between the forest and the grassy savannas and in the department of Bouenza on the outskirts of Loudima.





**Figure 3:**



Source : Hansen/JMCD/google/USGS/NASA

**Deforestation map of the supply basin of the city of Pointe-Noire (Hansen et al., 2016)**

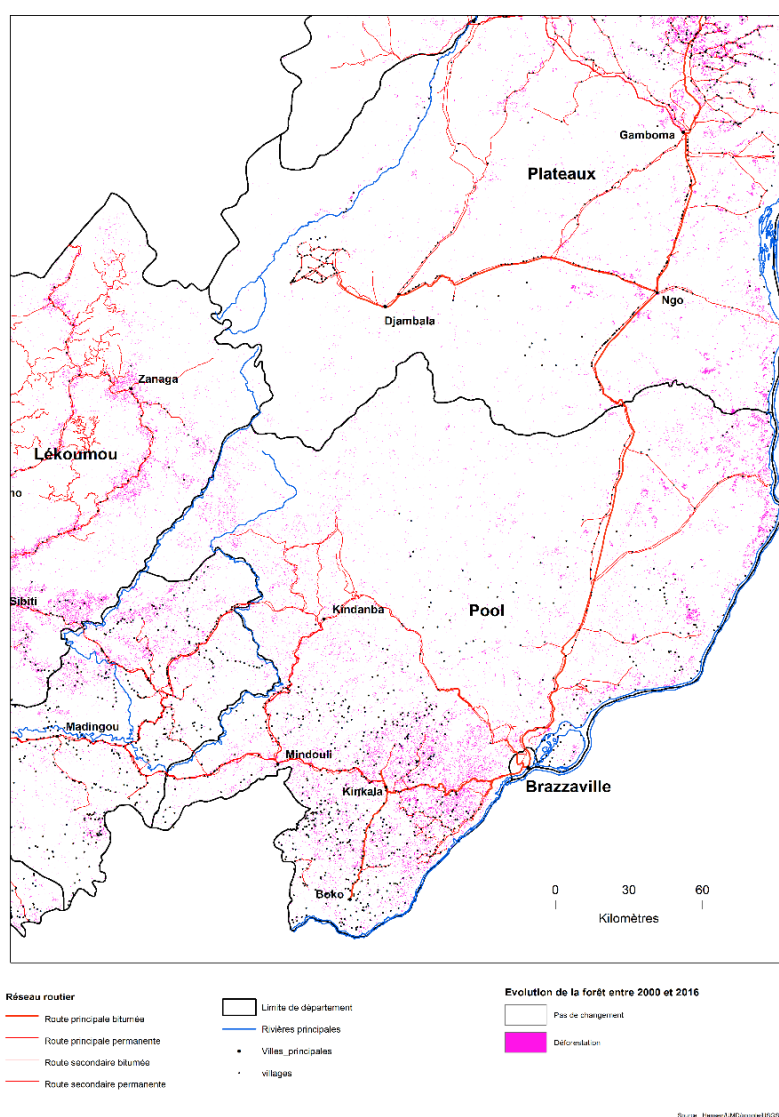


During the February 2018 mission, it was noted that the road between Pointe-Noire and Dolisie (163 kilometers) is marked by phenomena of deforestation and forest degradation on either side of the road. On the first 50 kilometers, these are groves and forest galleries which are systematically exploited. The main reason for this exploitation / deforestation is the search for fertile soils for the development of food crops, mainly cassava.

Beyond, on the portion which crosses the forest of Mayombe (100 kilometers), the same phenomenon is observed but still there with much more acuity; entire mountainsides are still "deforested" for agricultural purposes.

## 5.2 Deforestation in the supply basin of the city of Brazzaville

In the department of Pool, we note that deforestation is localized along road axes, along the Congo River and is mainly located in the southern part of the department of Pool south of Brazzaville where the most important forest formations are located. On the Batéké plateau, the deforestation zones are located along the waterways where there are gallery forests and which are exploited for cultivation and for the production of fuelwood.



**Figure 4 : Deforestation map of the supply basin of the city of Brazzaville (Hansen and *al.*, 2016)**



## 6 Consumption of wood energy at the level of the departments

The level of annual woodfuel consumption per person in the departments of Kouilou and Pool is presented in table 9 on the following page. These data come from the consumption calculations carried out within the framework of this report for the cities of Brazzaville and Pointe Noire and from the study report on the consumption of woodfuel from CN REDD for the rural populations of the departments of Kouilou and du Pool (Boundzanga et al., 2014).

Considering a population growth rate of 2.6% (UN Data, 2017), we update the consumption data. In 2018, we consider that the population in the departments of Kouilou and Pool is respectively 127,035 inhabitants and 326,853 inhabitants outside the cities of Brazzaville and Pointe-Noire.

From these data, it emerges that the share of coal consumption in the departments studied is very high. This information raises some questions since it is generally accepted that in rural areas households mainly use fuelwood as a source of energy for cooking food. Consumption per person in fuelwood equivalent per day is twice as high in the department of Kouilou than in the department of Pool.

If we consider that at the level of the departments (apart from the towns of Pointe Noire and Brazzaville), that consumption per person and per day in rural areas is identical to that in urban areas, we can take as a reference the figure of 1.4 kg Eq wood / person / day.

**We thus estimate that the overall consumption of wood-fuel (Firewood equivalent) for the department of Kouilou is estimated at 56,476 Tons Eq. Firewood per year outside the city of Pointe Noire. For the Department of Pool, the quantity of wood energy consumed annually is estimated at 146,979 Tons Eq. Firewood per year outside the city of Brazzaville.**

Considering the consumption estimates in the cities of Pointe Noire and Brazzaville, the consumption estimates in the departments of Kouilou and Pool are respectively 440,306 Tonnes Eq. Fuelwood per year and 978,679 Tonnes Eq. Firewood per year. It is these figures that we will use to propose different models of wood-energy resource management at the scale of supply basins.



**Board 9: Household consumption of wood energy by the populations of the departments of Kouilou and Pool in 2018 according to figures from CN REDD (2014)**

Department	Population <sup>1</sup>	% of the population consuming wood energy	Charcoal market (Tons / year)	Carbonization rate retained	Fuelwood market (Tons / year)	Firewood Eq market (Tons / year)	Share of charcoal in tonnes Eq fuelwood in household consumption	Urban individuals consumption (kg Eq wood / day)
Consumption across the Kouilou department								
<b>Black Point</b>	1,011,550	48.5%	24,538	12%	19,706	188,751	87%	1.19
<b>Kouilou 1</b>	127,035	87%	6 933	12%	10,758	68,302	84%	1.69
<b>Total</b>	<b>1,138,585</b>	<b>53%</b>	<b>31,471</b>	<b>12%</b>	<b>30,464</b>	<b>257,053</b>	<b>88%</b>	<b>1.17</b>
Consumption at the level of the Pool department								
<b>Brazzaville</b>	1,948,000	67.1%	66,028	12%	82,219	632 454	87%	1.51
<b>Pool 1</b>	326,853	88%	7 889	12%	27,139	92 617	71%	0.88
<b>Total</b>	<b>2,274,853</b>	<b>70%</b>	<b>73,917</b>	<b>12%</b>	<b>109,358</b>	<b>725 071</b>	<b>85%</b>	<b>1.25</b>

<sup>1</sup>: Data from the CN REDD report (2014) adjusted to the year 2018 based on population growth (UN Data)



**Board 10: Household consumption of wood fuel by the populations of the departments of Kouilou and Pool in 2018 according to the estimates of this study**

Department	Population1	% of the population consuming wood energy	Charcoal market (Tons / year)	Carbonization rate retained	Fuelwood market (Tons / year)	Firewood Eq market (Tons / year)	Share of charcoal in tonnes Eq fuelwood in household consumption	Urban individuals consumption (kg Eq wood / day)
<b>Consumption across the Kouilou department</b>								
<b>Black Point</b>	1,011,550	48.5% (main energy) 51.5% (secondary energy)	40,072	12%	49 898	383 830	87%	1.4 (main energy) and 0.7 (secondary energy)
<b>Kouilou 1</b>	127,035	87%	-	12%	-	56,476	-	1.4
<b>Total</b>	<b>1,138,585</b>	<b>/</b>	<b>-</b>	<b>12%</b>	<b>-</b>	<b>440,306</b>	<b>-</b>	<b>/</b>
<b>Consumption at the level of the Pool department</b>								
<b>Brazzaville</b>	1,948,000	67.1% (main energy) 32.9% (secondary energy)	86,829	12%	108,121	831 700	87%	1.4 (main energy) and 0.7 (secondary energy)
<b>Pool 1</b>	326,853	88%	-	12%	-	146,979	-	1.4
<b>Total</b>	<b>2,274,853</b>	<b>/</b>	<b>-</b>	<b>12%</b>	<b>-</b>	<b>978 679</b>	<b>-</b>	<b>/</b>





## 7 Recommendations to improve the management of wood-energy resources and the organization of sectors in the cities of Brazzaville and Pointe-Noire

In order to meet the woodfuel demands of the cities of Pointe-Noire and Brazzaville, to improve the management of wood resources in supply basins and to improve the organization of sectors, we recommend adopting an approach that reconciles the management of the resource upstream of the sector, the improvement of the sector and the reduction in demand for woodfuel downstream of the sector. The recommendations, described below, are as follows:

- **Develop Master Plans for the Supply of Domestic Energy;**
- **Dedicate part of the Eucalyptus massif of Pointe Noire to the production of charcoal;**
- **Develop Acacia agroforestry plantations and Acacia x Eucalyptus mixed plantations in fuelwood supply basins;**
- **Improve the management of natural forest formations by setting up Simple Management Plans and by developing the practice of Assisted Natural Regeneration in agricultural complexes;**
- **Improve carbonization practices to optimize carbonization yields and limit losses;**
- **Contribute to the dissemination and appropriation of improved stoves within urban households;**
- **Study the possibility of deploying alternative energies (domestic gas) to limit dependence on wood energy;**

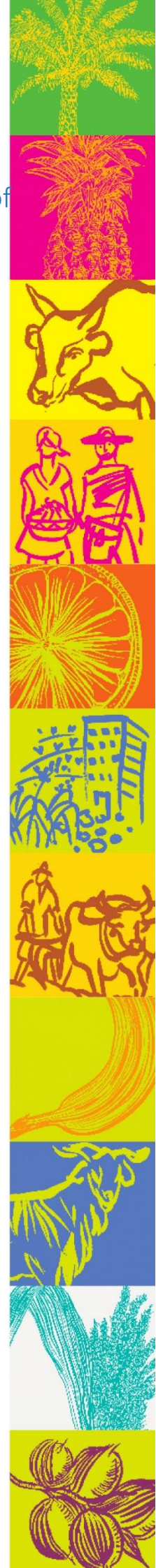
These proposed actions are interconnected, there is no single solution and the question of wood energy must be dealt with in its entirety, from the management of the wood resource to its consumption by urban households and artisans. However, we consider that as a first step, it is important to concentrate the efforts on the management of the resource and to ensure that the latter is managed sustainably. It is only under these conditions that it will be possible in a second step to formalize and organize the wood-energy sectors.

### 7.1 Master Plan for Domestic Energy Supply

In order to set up an integrated approach to the management of woodfuel resources in the two large cities of the Republic of Congo, we recommend that the activities of the future project be oriented towards the establishment of a Master Plan for Supply of each of the two large agglomerations of the Republic of Congo.

A Master Plan for the Supply of Domestic Energy (SDAED) is a diagnostic and planning tool that aims to put in place the conditions for an urban supply of domestic energy (including gas and electricity also) that is sustainable and stable. . In particular, this involves (i) assessing the supply / demand balance for wood energy at the level of each supply basin; ii) to propose measures making it possible to adjust the withdrawals to the possibilities of the agro-forestry resource, (iii) to improve the output of the sectors, from production to consumption,

Due to the compartmentalisation of the ministries and the difficulties of intersectoral consultation, it would be possible initially to develop a master supply plan for each energy considered (wood energy, gas and electricity).



In the event that it is decided to work only on wood energy, it would be a question of setting up a Master Plan for Wood Energy Supply (SDABE).

In the rest of this document, we will only deal with the issue of wood energy.

This approach has been developed in several West African capitals including Bamako and Niamey where this approach was initiated more than 20 years ago. Currently, the FFEM is funding the FONABES project which aims to develop or update the Domestic Energy Supply Schemes for the cities of Bamako, Niamey and Ouagadougou. The Republic of the Congo would be one of the first countries in Central Africa to develop and implement this approach which integrates the challenges of land use planning in peri-urban spaces in constant mutation and evolution. However, this type of approach requires a strong commitment from the administrations involved in these sectors (Ministry in charge of forests, Ministry of Energy, Ministry in charge of regional planning, etc.).

The implementation of such a scheme makes it possible to prioritize and coordinate the various actions both at the level of the offer (development of dedicated plantations, rules of management and exploitation of natural forest environments, improvement of carbonization yields), than at the demand level (distribution of improved stoves, access to alternative energies, etc.).

The implementation of such an approach requires the creation of a framework for consultation between the various stakeholders, including by integrating the urban municipalities of Pointe-Noire and Brazzaville as well as all the actors involved in the timber sectors. energy (producers, traders, transporters, administration, land managers, etc.). If this option is chosen within the framework of the future project, the latter will be able to facilitate the establishment of this platform for intersectoral and multi-stakeholder consultation.

**The stages of implementation and the information to be provided are as follows to develop a Wood-Energy Supply Master Plan (SDABE) for a city:**

#### 7.1.1 Determine the limits of the city's fuelwood supply basin

It seems relevant to us to work at the level of supply basins. However, technical activities and action research actions will have to be set up at different scales, from the plot to the customary finages and integrating the municipalities. Indeed, the transfer of powers to the decentralized level is not yet effective, however the relevant application texts have existed since 2003. The management of natural resources still remains a prerogative of the central administration (personal communication, April 2018).

In the texts, the bodies in charge of developing local development are the decentralized administrations of the departmental and municipal councils which are elective bodies (voted by local suffrage).

In the context of the future program, for the development of the SDABEs and for interventions in customary territories, it seems essential to rely on these decentralized territorial entities which play the role of relay with the local population and associations present in the Department. These structures must be included in the consultation platforms dedicated to the management of the wood-energy resource.



### 7.1.2 Evaluate the woodfuel supply in supply basins based on forest inventory work and interpretation of satellite images

As part of the development of SDABE, inventories should be set up to estimate more precisely the available resources and extrapolate these results to the scale of supply basins from satellite images characterizing the different types of forest formations present. . This work will make it possible to estimate the supply (possibility of sustainable annual production of the different formations within the supply basin from productivity data) and to compare it with the demand for wood energy. More precisely, this work will make it possible to identify areas potentially presenting geographic imbalances (demand > supply) and conversely less exploited areas (demand < supply) and to identify the practices which do not allow the resource to regenerate. : lights, too frequent cutting, lack of fallow management; very significant wood loss (poor carbonization).

### 7.1.3 Evaluate the consumption of domestic energy in cities (fuelwood, charcoal and other sources of energy), analysis of the modes of use of different energies and the evolution of consumption

The work carried out by M. Nkoua and L. Gazull in 2010 provides valuable information on the functioning of the wood-energy sector in Pointe-Noire. Since 2010, the latter has undoubtedly evolved particularly with regard to wood energy from the Eucalyptus massif due to the departure of the industrialist which must lead to difficulties in management of the massif, control etc. In Brazzaville, the work of Boundzanga (2004) provides information but it should be updated. It also seems important to take a closer look at the types of stoves used by households, test their efficiency and come up with improved stoves that would be easily appropriated by the population and which would reduce the amounts of charcoal and fuelwood consumed.

In order to improve current knowledge on the sectors, studies should be carried out to:

- Quantify the flow of wood energy and alternative energies in urban households and assess the use of improved stoves;
- Identify the most important areas of wood energy production to identify areas under strong pressure and future areas of project intervention;
- Identify the various energy options for the substitution of wood energy by proposing a study for the development of domestic gas;

Three main types of methods are used to assess the consumption of woodfuel by cities: the first method consists of monitoring consumption at household level, reducing it to the individual and extrapolating it to the entire population. population of the city studied. The second method consists in evaluating the quantities of woodfuel entering the city by developing a survey device making it possible to assess the flows of woodfuel. The third method consists in evaluating the quantities of woodfuel sold in the markets and depots of the city. We consider that the second method is the most robust to obtain valid and quantified data of woodfuel flows entering the cities.

### 7.1.4 Make a diagnosis of the environmental social contexts of wood fuel production and consumption (demographic changes, role of women, land tenure security, food security, etc.)

The diagnostics will make it possible to adapt activities to social and environmental contexts so as to promote the sustainability of actions and better ownership by target groups (private, farmers, charcoal makers, urban households, etc.). This diagnosis should be sufficiently substantiated by





relevant information on the impact of demographic change, the role of women, land tenure security, food security and poverty specifically on the wood-energy sector. This work will make it possible to better argue the social and environmental diagnosis of the production and consumption of wood energy.

#### 7.1.5 Match supply and demand and calculate Productions / Withdrawals at the level of departments and customary territories

Conducting a forest inventory in the areas constituting the wood-fuel supply basin of the two target towns should help identify the production possibilities of the various forest formations. These inventories must be associated with the use of satellite imagery to refine and extrapolate the results and obtain potential maps at the level of supply basins. It is from these maps that production activities can be oriented and practices improved.

#### 7.1.6 Estimate of the cost of drawing up the Wood Energy Supply Master Plan

##### 7.1.6.1 Analysis of woodfuel supply chains in the cities of Brazzaville and Pointe Noire

The objectives of the studies and surveys are to:

- assess with as much precision as possible the quantities of energy consumed by households and artisans in urban areas;
- assess the importance and location of urban withdrawals;
- understand how the demand for domestic energy is constructed and expressed in order to drive energy transitions towards alternative solutions.
- establish in detail the price structures for wood energy in order to improve the efficiency of the sectors;
- gather the data necessary to assess the impacts of the program (baseline + monitoring);
- identify the profile of producers, production practices, terms of access to the resource and terms of sale;
- analyze the feasibility of a Permanent Information System on the energy consumption and supply of cities.

**These studies require the recruitment and training of investigators who will conduct the flow surveys on the various entry points for woodfuel in the cities and the surveys to characterize the organization of the sectors with the various actors involved.**

To collect this information, four major phases of investigation must be carried out:

**Phase 1: Consumption practices**(baseline) and potential change requests. This analysis is carried out at the start of the program. It is based on rapid surveys of a stratified sample of households and artisans.

**Phase 2: Sectors and market.** This analysis aims to assess the economic importance of the sector and to estimate the distribution of the long value of the different chains (from producer to consumer). Surveys of producers will also be conducted.

**Phase 3: Supply flow.** This analysis aims to quantify the inflows. Such an analysis makes it possible to quantify the woodfuel flows and to understand the origin of the fuels (production areas) and therefore the pressures exerted on the resource. The surveys are carried out during a day and night week in the dry season and in the rainy season, ie two weeks of monitoring per identified supply axis. This work is necessary in order to understand the variations in flows between the days of the week and between the seasons.



**Phase 4: Technical and economic study of alternative energies.** This analysis aims to estimate the pre-feasibility of alternative solutions (cooking energies and stoves) to wood energy.

Carrying out this work requires a budget of 70,000 euros per city, ie a total of 140,000 euros for the cities of Brazzaville and Pointe Noire. It is also necessary to include the support of a short-term expert in the conduct of surveys on woodfuel who will participate in the identification of supply axes, the development of the survey system, recruitment and training of interviewers, data analysis, etc.

**Board 11: Details of costs for the analysis of woodfuel supply chains in the cities of Brazzaville and Pointe Noire**

	Number (unit)	Short term expert	Project Engineer (1) or NGO	Interviewers (5 pairs per city)	Supervisors (2)	Cost
<b>Task 1: realization of the baseline + potential demand</b>	<b>2 cities</b>					
Preparation of surveys: methodology, sampling, recruitment of interviewers	days	20	20	0	0	<b>15,000</b>
Conduct of the survey at the start of the program	days	0	15	150	15	<b>7,350</b>
Investigation processing + reports	days	10	10	0	8	<b>7 820</b>
International travel	Flights	1	0	0	0	<b>1,200</b>
Perdiem	Units	20	20	0	0	<b>2,000</b>
National travel	Flights	1	2	0	0	<b>390</b>
Local travel	Flat rate					<b>2,000</b>
<b>Sub Total (nb days)</b>						<b>35,760</b>

Market and industry analysis		2 cities				
Preparation of surveys: methodology, sampling, recruitment of interviewers	days	5	6	0	0	3 900
Carrying out the start-up survey	days	0	15	150	15	7,350
Carrying out village survey (production)	days	0	10	100	10	4,900
Investigation processing + reports	days	10	10	0	8	7 820
Perdiem	Units	0	10	100	10	6500
National travel	Flights	0	2	0	0	260
Local travel (field + survey)	Flat rate					2,000
<b>Sub Total</b>						<b>32 730</b>
Estimation of flows		2 cities				
Preparation of surveys: methodology, sampling, recruitment of interviewers	days	20	20	0	0	15,000
Conduct of the survey	days	0	30	300	30	14,700
Investigation processing + reports	days	15	15	0	8	11 570
International travel	Flights	1	0	0	0	1,200
Perdiem	Units	20	20	0	0	6,000
National travel	Flights	1	2	0	0	520
Local travel	Flat rate					4000
<b>Sub Total</b>						<b>52,990</b>
Technical-economic study of alternative energies		1 survey				
Bibliographic study of regional alternatives	Days	5	0	0	0	3000
Investigations into existing alternatives on the market	Days	0	15	0	0	2,250
Estimation of the costs of developing alternatives in each city	Days	0	10	0	0	1,500
Investigation processing + reports	days	5	10	0	0	4,500
Local travel	Flat rate					1000
<b>Sub Total</b>						<b>12,250</b>
<b>TOTAL</b>						<b>133,730</b>

#### 7.1.6.2 Evaluate the woodfuel supply in supply basins based on forest inventory work and interpretation of satellite images

This inventory work will make it possible to assess the possibilities of forest areas to meet the demand for wood energy in the target cities. The evaluation of wood energy consumption and the evaluation of the possibilities of exploitation will make it possible to spatialize the exploitation so as to lead a sustainable exploitation of the resource while maintaining its role in rural and urban economies.

The objectives are as follows:

- estimate the resources available according to the different types of forest training by conducting forest inventories in partnership with the administration;
- extrapolate the data collected to the level of supply basins;
- draw up a map presenting the different forest formations and their production capacities in the two supply basins;

On the basis of the areas of the supply basins and a sampling rate of 2% to carry out inventories in the different forest formations, the forest inventory work can be carried out with a budget of 9,187,000 euros per basin of supply. This work should be done in collaboration with the MEF services. Two short term experts could be included in this work. An expert in forest inventory management who will be able to validate the resource assessment protocol and train field teams in inventory management and an expert in the analysis and processing of satellite images.



The heterogeneous forest environment, made up of the natural formations of Mayombe and more or less old fallows, covers an area of 1,075,575 ha (SOFRECO, 2012).

The heterogeneous forest environment is made up of gallery forests (405,764 ha) and degraded gallery forests (20,971 ha) (SOFRECO, 2012)

**Board 12: Details of costs for carrying out forest inventories in the supply basins of the cities of Brazzaville and Pointe Noire**

Forest inventory work to assess the woodfuel supply	Unit	Unit price (Euros / ha)	Forest area (ha)	Total (Euros)
Cost of setting up a forest inventory with a sampling rate of 2%	Brazzaville city wood energy supply basin	3	2 456 739	7,370,000
Cost of setting up a forest inventory with a sampling rate of 2%	Pointe Noire's wood-fuel supply basin	3	605 646	1,817,000
<b>Total</b>				<b>9,187,000</b>

#### 7.1.6.3 Create a multi-stakeholder and multi-sector platform to co-develop the Supply Master Plans

The consultation platforms will be multisectoral and multi-actor, making it possible to integrate the social diversity of the territories. The consultation platforms created or strengthened will make it possible to share information (e.g. popularization of regulatory texts, program objectives), to debate and define common positions (orientation of desired developments, planning), to draw up the SDAEBs. In order to have operational and representative consultation platforms, it is necessary to:

- ✓ Take stock of existing platforms by analyzing their actual functioning and their social representativeness;
- ✓ Support operational or created platforms;
- ✓ Identify the stakeholders in the consultation process;
- ✓ Define the statutes of the consultation platforms;

Once the platforms are operational, it will be necessary to:

- ✓ Lead the consultation platforms;
- ✓ Identify common development guidelines on the basis of consensus and a negotiation process;
- ✓ Prepare the SDAEBs on the basis of the information collected (forest inventories, surveys of sectors, surveys in customary territories and among actors in the sector);
- ✓ Validate the SDAEB;
- ✓ Support its implementation;

The animation of the platforms will be led by the project agents who will be neutral as a facilitator. These agents will be trained by experts in the field of regional planning to support the planning of the SDAEBs and in the field of territorial dialogue. Animation will be essential to the quality of the debates, the interest of the actors in participating and the collective consensus resulting from these consultations. Facilitating such a process requires a lot of skill. The facilitator must have communication skills, have a listening capacity, put himself at the same level as the interlocutors, be neutral, and mobilize participatory animation tools. The animators will benefit from training to strengthen their capacities of animation and conduct of a process of consultation and negotiation.

**Two levels of consultation will be set up, consultation at the interministerial level involving the various ministries concerned (Forest, Energy, Agriculture, Regional planning, etc.) and consultation**

at the level of each supply basin bringing together the various direct actors and indirect involved in the wood-energy sectors.

The platforms will be supported by the program to ensure their operation and by the provision of means of travel. These will meet at least once per quarter. We estimate that an allocation of 48,000 euros, per platform, will ensure their operation.

**Figure 5: Description of the costs of the interministerial consultation process and the consultation at the level of the supply basins of the cities of Brazzaville and Pointe Noire**

Support for governance (interministerial consultation platform)	Unit	Unit price	Number	Total
Initial diagnosis on existing platforms (national consultation contract)	by approximate basin	10,000	2	20,000
Operation of a multisectoral and multi-stakeholder consultation platform (4 meetings per quarter)	by approximate basin	48,000	1	48,000
Multisectoral and multi-stakeholder consultation platform for each appropriate basin	Unit	Unit price	Number	Total
Initial diagnosis on existing platforms (national consultation contract)	by approximate basin	10 00	2	20,000
Operation of a multisectoral and multi-stakeholder consultation platform (4 meetings per quarter)	by approximate basin	48,000	2	96,000
<b>Total</b>				<b>184,000</b>

## 7.2 Dedicate part of the Eucalyptus massif, from Pointe Noire, to the production of wood energy

### 7.2.1 Scenarios concerning the allocation of part of the Eucalyptus massif to the production of fuelwood

Pointe Noire is characterized by the presence of the Eucalyptus massif which contributes to providing a significant part of the current wood-fuel supply (around 50%). However, for several years, this massif at the gateway to the city has come under significant pressure for access to land which is becoming increasingly valuable. In the absence of industrial, currently, we can consider that the massif is even more in danger because of the absence of control and regulation of the exploitation. The overexploitation of the Eucalyptus massif has been confirmed following the various missions carried out as part of the pre-feasibility studies.

The supply basin of the city of Pointe Noire is characterized by:

- The presence of the Eucalyptus massif with an area of around 36,000 ha;
- Significant land saturation in the Kouilou department;
- Significant exploitation of the natural formations of the Mayombe and Chaillu massif for the development of agriculture and the production of wood energy;

On these bases, we propose three scenarios concerning the allocation of Eucalyptus massifs for the production of wood energy. Depending on the scenarios, the expected productions and the additional woodfuel needs for woodfuel consumption at the scale of the Kouilou department are presented.

In the first scenario, we propose that the Eucalyptus massif be dedicated exclusively to the production of fuelwood and be managed in coppice by the Economic Interest Groups (GIE) or other existing structures in partnership with a private partner. and under state control according to defined specifications.

In a second scenario, we propose that part of the massif, 5000 ha, be dedicated to the production of fuelwood. This zone will be managed in coppice by the EIGs or other existing structures in partnership with a private partner and under state control according to defined specifications.

In a third scenario, we hypothesize that the management of the massif will be reassigned to a private operator or that the State refuses the allocation of part of the massif to the production of wood energy. In this case, the production of wood energy from the massif will follow an organization similar to what was done in the past. That is to say that the wood energy will be produced from the logging residues.

Below, we present the potential for wood energy production according to the three scenarios identified and we indicate the additional needs for the supply of the Kouilou department on the basis of calculated consumption data.

#### Key figures retained:

- Consumption across the Kouilou department in 2018: 441,000 Tons Eq. Firewood / year;
- We estimate that 80% of the wood produced in the plantation under coppice management (scenarios 1 and 2) will be dedicated to the production of fuelwood, the rest will be valued in the form of poles;
- Productivity of the Eucalyptus plantation managed in coppice: 8 tons / ha / year;
- 2/3 of the wood comes from fallow land and 1/3 from gallery forests;
- Productivity of forest fallows: (4 Tons / ha / year)<sup>2</sup>;
- Productivity of gallery forests: (5 tons / ha / year);
- The average yields of Eucalyptus residues that can be used for the production of fuelwood are around 12 T / ha. Considering rotations of 5 years, the annual productivity is 2.4 tons / ha / year;

From these figures, we can estimate the supply of wood energy from the Eucalyptus massif and the additional wood energy needs to meet the demand for wood energy in the Kouilou department according to the three scenarios proposed.

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<sup>2</sup>According to the work of V. Gond et al. (2014) conducted in the gallery forests of Lufimi on the Batéké plateau in DR Congo, the above ground biomass (Above Ground Biomass) is estimated at 33 T / ha for old fallows > 6 years old and 6 T / ha for young fallow < 6 years. In gallery forests, the above-ground biomass was estimated at 75 T / ha.



### 7.2.1.1 Scenario 1: Eucalyptus massif dedicated to the production of wood energy in its entirety

**Board 13: Evaluation of woodfuel production in the case of scenario 1 and quantification of additional supply needs**

<u>Eucalyptus plantation (coppice)</u>		<u>Complementary supply (T Eq. Fuelwood / year)</u>
Wood energy demand (T Eq. Firewood / year) in the department of Kouilou in 2018		441,000
Average annual productivity (T / ha / year)	8	
Surface (ha)	36,000	
Annual potential production (T)	288,000	
Production dedicated to wood energy (80%)	230,400	Additional need estimated at 210 600 T Eq. Fuelwood / year to meet the demand for fuelwood in the Kouilou department
Areas operated per year (5-year rotation)	7200	
Proportion of wood energy from the Eucalyptus massif for the supply of the department of Kouilou	52%	

Under this first scenario, the allocation of the 36,000 ha of the Eucalyptus massif to the production of fuelwood would meet 52% of the demand of the Kouilou department (230,400 T). Additional needs are estimated at 210,600 T of Eq. firewood to meet the demand of the Kouilou department in 2018.

### 7.2.1.2 Scenario 2: Part of the Eucalyptus massif (5,000 ha) is dedicated to the production of fuelwood and the use of logging residues on the rest of the massif (31,000 ha)

**Board 14 : Evaluation of woodfuel production in the case of scenario 2 and quantification of additional supply needs**

<u>Eucalyptus plantation (coppice)</u>	<u>Eucalyptus plantation (logging residues)</u>	<u>Complementary supply (T Eq. Fuelwood / year)</u>

Wood energy demand (T Eq. Fuelwood / year) in 2018	441,000	
Average annual productivity (T / ha / year)	8	2
Surface (ha)	5,000	31,000
Annual potential production (T)	40,000	62,000
Production dedicated to fuelwood (80% for coppice and 100% for slash)	32,000	62,000
	Additional need estimated at 347,000 T Eq. Firewood / year	
Areas exploited per year (5-year rotation)	1000	6200
Proportion for supply	7.3%	14%

In the context of this second scenario, the allocation of 5,000 ha of the Eucalyptus massif to the production of fuelwood and the use of logging residues on the rest of the massif (31,000 ha) would make it possible to respond to 21.3% of the demand of the Kouilou department (94,000 T) which corresponds to the production from the 5,000 ha dedicated to the production of fuelwood and which covers 7.3% of the supply and the fuelwood from operating residuals, on the remaining 31,000 ha, covering 14% of the supply. Additional needs are estimated at 347,000 T of Eq. firewood to meet the demand of the Kouilou department in 2018.

#### 7.2.1.3 Scenario 3: Use of logging slash for the production of fuelwood

**Board 15 : Evaluation of woodfuel production in the case of scenario 3 and quantification of additional supply needs**

	Eucalyptus plantation (logging residues)	Additional supply (T Eq. Fuelwood / year)
Wood fuel demand (T Eq. Fuelwood / year)		441,000
Average annual productivity (T / ha / year)	2	Additional need estimated at 369,000 T Eq. Firewood / year

Surface (ha)	36,000
Annual potential production (T)	72,000
Areas exploited (5-year rotation)	7200
Proportion for the woodfuel supply of the city of Pointe Noire	16%

In the context of this third scenario, the production of fuelwood using the logging slash over the entire massif would meet 16% of the demand of the Kouilou department (72,000 T Eq. Fuelwood) . The additional needs are estimated at 369,000 T Eq. firewood to meet the demand of the Kouilou department in 2018.

### **We propose adopting scenario 2 to contribute to the woodfuel supply of the Kouilou department..**

It seems essential to dedicate part of the Eucalyptus massif to the production of fuelwood but it does not seem possible to dedicate the entire massif due to the State's commitments to other operators for the production of woodchips, electric poles, etc. This option will have to be validated by the Congolese Government but on the basis of the current situation, it seems to us the most relevant. We therefore propose that an area of 5000 ha of the Eucalyptus massif be dedicated to the production of charcoal and be managed in coppice. The management of this massif may be delegated to a private contractor on the basis of specifications which must be established by the Ministry in charge of the management of this massif.

#### **7.2.2 Proposed carbonization models**

We offer two technological models of carbonization to be installed in this massif:

1. Introduce the practice of decontaminated industrial carbonization with co-production of green electricity in the area of the Eucalyptus plantation dedicated to the production of charcoal under industrial management (CML industrial oven);
2. Introduce the practice of decontaminated artisanal carbonization(in brick or metal furnace) to supplement the production of charcoal. This production could be subcontracted to EIGs or to professional charcoal makers depending on the decision of the manufacturer who will be in charge of the management of this massif;

Let us recall here that improving carbonization practices is an important lever for better sustainability of the wood-energy sector. Depending on the techniques, technologies, the wood used as raw material, and the know-how of the charcoal maker; the production of one kg of charcoal requires between 3 and 10 kg fuelwood equivalent (Eq. Firewood). This shows how improving carbonization practices is an important lever for reducing the impact on the environment and improving the living conditions of the populations. Significant improvements in economic, environmental and social sustainability come from the more or less combined effects of the following five actions:

1. Improving the carbonization yield makes it possible to reduce withdrawals from the wood resource.



2. The reduction of GHG emissions released in carbonization fumes reduces the contribution to global warming.
3. Improving the income of charcoal makers improves their living conditions and those of their families.
4. Improving the working conditions and health of cookers using charcoal, thanks to the significant reduction in the fumes emitted during combustion in domestic stoves and thanks to the better "fire resistance" of charcoal compared to wood.
5. Improving the working conditions of charcoal burners who are less exposed to irritating and toxic carbonization fumes, and can carbonize a load in less time than with the earthen grindstone technique.

#### *7.2.2.1 Efficient industrial carbonization and depolluted with the possibility of recovering the energy of the fumes (50% of the energy) for the production of electricity*

There are several types of industrial technology for producing coal from biomass which are characterized from the following:

- the design of the oven;
- the heating mode (internal or external heating or with recirculation of the combustion gases from the pyrolytic vapors).
- the pressure maintained in the furnace (atmospheric pressure, high pressure, etc.);
- the raw material used (grain size, wood species, etc.);
- the intended application of manufactured coal (domestic use, metallurgical industry, manufacture of carbides, etc.).

The two major problems encountered in the industrial carbonization of wood and which impact the investment are the significant consumption of wood (raw material) on the one hand, and the emissions of polluting fumes that must be decontaminated before their release into the atmosphere. , on the other hand.

Among these technologies, the French CML carbonization technology stands out, which is a robust, simple and modular technology, and which has the largest number of industrial references since the company has sold and installed around ten units. Some are still in operation, others are at a standstill, and some terminate their service after 20 years of activity since the initial investment. The ten units sold were installed between 1993 and 2010, with the last installation carried out in 2010 in China.

##### *7.2.2.1.1 History of the CML process*

The increase in environmental constraints, in France and in Europe, has forced charcoal producers to change their production method to meet the new regulations put in place in the early 1990s.

The two main processes existing at the time are the "hot gas contact" process, which is automated industrial production equipment, requiring heavy investments and leading to high maintenance costs; and the process by partial combustion of the wood to be charred. More than 95% of the world's charcoal production is produced by the use of the partial combustion carbonization process. Consequently, the development of more efficient equipment, with a low impact on the environment and a reasonable investment rate has become an important issue to which the CML company has decided to respond.

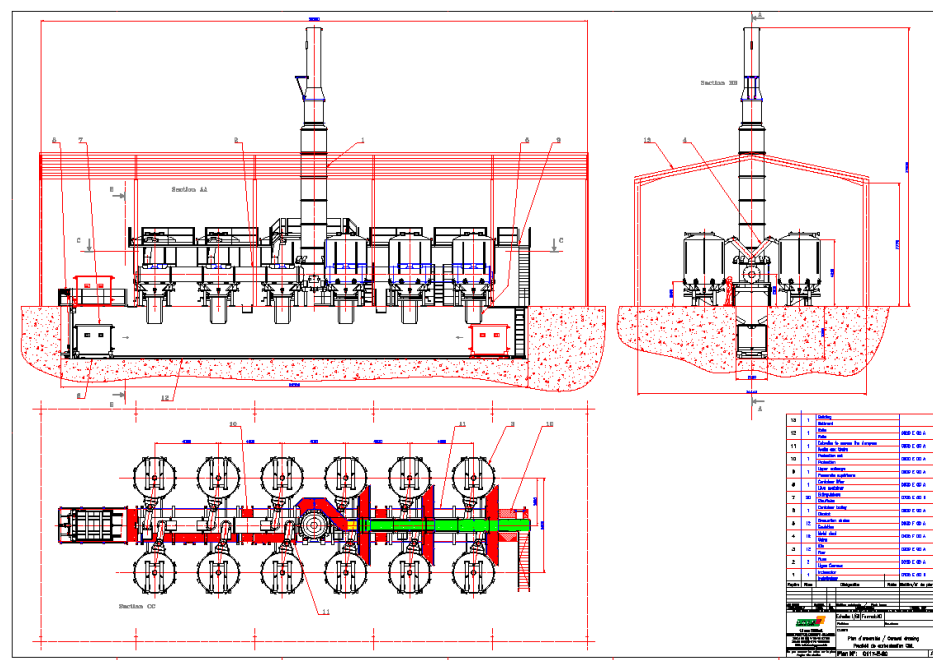
LRCB, in collaboration with a French industrial charcoal producer and CIRAD (International Cooperation Center for Agronomic Research for Development) has developed since 1993 a new clean technology for the production of charcoal by partial combustion called Technology CML.



The standard CML carbonization unit is a homogeneous unit comprising 12 production furnaces coupled to an incineration depollution system (see photo below).



#### 7.2.2.1.2 Block diagram of a CML Technology unit



**Figure 6: Diagram showing the principle of a CML technology unit**



### 7.2.2.1.3 Operational description of operation



The charcoal is made in cylindrical ovens equipped with a cover at the top and a drain trap at the bottom of the oven. The air intake is adjusted by manual valves located on the bottom and the lower periphery of the oven.

**Filling** is carried out from the top of the oven using a forklift truck fitted with a bucket. Emptying is done cold through the lower hatch.



**Discharge:** Under each oven, a chute allows the charcoal to be conveyed directly into the chokes. The dampers move to the bottom of a pit located between the 2 furnace lines using a rail trolley. They came out of the pit using a lifting container installed at the end of the pit.



**The depollution system** includes an incinerator and carnals. The fumes, captured in the upper part of the furnace body, are brought to the hearth of the incinerator via metal ducts (one per furnace) then flues.





Each CML carbonization unit is made up of the material according to the principle plan above and includes:

**Production equipment:** 12 ovens, and connection system (ducts)

The decontamination equipment for 12 ovens: 1 incinerator and 2 flue lines with 12 nozzles.

#### **Extraction equipment**

- 1 trolley (including the electric control cabinet for the trolley assembly and container lift)
- 1 container lift
- 12 drainage chutes
- 20 dampers
- 1 set of tracks at the bottom of the pit

**The accesses :** The installation is planned with a set of framework and walkway allowing access to all levels of the installation.

- 1 upper gangway with stairs
- 1 access gateway to 12 drawers
- 1 pit cover with trapdoor and crinoline ladder for access to the bottom of the pit
- 12 slatted walkways on chutes
- 1 pit exit protection

#### **7.2.2.1.4 Operating principle of depollution**

The pollutant emissions emitted during the carbonization of wood are very important and of different natures depending on the pyrolysis stage considered.

The composition and calorific value of polluting emissions vary greatly from incombustible to very combustible.

By capturing and mixing the fumes from several furnaces in operation, insofar as the firing of each furnace is appropriately offset, an effluent mixture is obtained which is approximately constant in composition and flow rate which burns without assistance. It is this situation which, properly exploited by the process, allows self-combustion of the fumes by means of an optimized fume collection and incineration system.

This operating principle makes it possible to obtain regulatory pollution control for all carbonization regimes.

#### 7.2.2.1.5 Performance

CML technology accepts the carbonization of all woods, hardwood and softwood. Its optimum operation, however, imposes a certain number of requirements. Carbonization performance (yield and productivity) is in fact directly linked to the quality and characteristics of the raw material (dimensions, humidity, cleanliness, etc.):

**The loads must be as homogeneous as possible** : one species, the same humidity, the same grain size per oven.

Sawdust and other small waste (bark, etc.) create pockets of incuit and to obtain good performance, it is preferable to eliminate them before carbonization.

The desirable dimensional characteristics are as follows:

- **length** lower than 30 cm (longer lengths reduce the filling coefficients and therefore the productivity of the installation).
- **section** less than one hundred square centimeters (too large sections increase the carbonization times and affect both the productivity of the installation and the homogeneity of the coal produced).

**Duration of an average carbonization cycle:** 22 to 24 hours decomposing as follows:

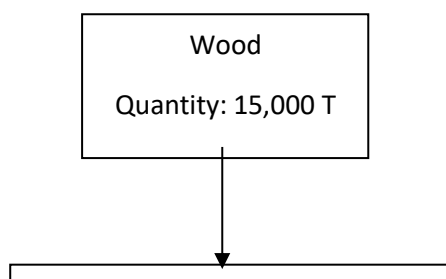
- carbonization time 6 to 8 hours,
- cooling time 14 to 15 hours,
- loading / unloading time 1 hour.

#### 7.2.2.1.6 Production capacity

This process accepts the carbonization of all woods, hardwood and softwood. The carbonization performance (yield and productivity) is directly linked to the quality and characteristics of the raw material (dimensions, humidity, cleanliness, etc.).

With wood whose moisture content does not exceed 20%, the complete production cycle, loading, carbonization, cooling, unloading is 24 hours per kiln.

As an indication, with oak or beech whose humidity is between 20 and 25%, and for a continuous annual production, a standard carbonization unit will produce more than 3000 tonnes of charcoal.



Raw material

Process

Production

**Figure 7: Simplified diagram showing the production potential of a CML carbonization unit**

#### 7.2.2.1.7 Valorization of energy from carbonization gases

Thanks to a recovery module located at the top of the incinerator, the energy contained in the carbonization gases can be recovered and transformed into heat or electricity. The temperature of the gases in the incinerator is 850 ° C. The recovery module allows dilution of the gases to reach the desired temperature depending on the intended application.

**Heat recovery** : For example, for an application of pre-drying of wood before carbonization, the gases are diluted to reach a temperature of 150 ° C before introduction into the dryer.

**Electricity recovery**: The energy available in the carbonization gases represents a power of approximately 3.6 MW thermal. These gases from the recovery module are transformed into electricity in a power plant consisting of a boiler and a steam engine. The unit power of a motor is 70 kW electric and depending on the needs it will be possible to install a battery of 4 motors, ie 280 kW electric.



**Example of a steam boiler**

Benefits



The use of the standard unit makes it possible to produce charcoal of constant quality, while respecting the environment.

Thanks to its pollution control system, the environmental constraint turns into an opportunity since the heat thus produced is used, either directly for drying, or by transforming it to produce electricity.

### **Coal quality**

Regular quality and compliant with the AFNOR NFB55101 standard.

### **Compliance with European environmental standards :**

- Compliance with the French ministerial decree of 2/02/1998, Art. 27.
- Efficient treatment of effluents by incineration of fumes, pyrolygnants and tars.
- Elimination of olfactory and visual nuisances.

### **Working conditions**

The working conditions of the operators are improved with mechanized handling operations, the monitoring and the settings for the conduct of the carbonization are simplified.

### **Modular installation**

In the case of very large production, it is possible to install several modules of 12 ovens.

### **Low cost of operationsmaintenance**

Thanks to the robustness of the equipment and great simplicity of operation, maintenance interventions are reduced to a minimum.

### **Energy recovery**

Valorization of the energy contained in carbonization gases, for example in the form of heat for a drying application or for the production of electricity.

### **The advantages of the depolluted industrial process**

This process makes it possible to obtain quality charcoal with a relatively low investment cost, by improving working conditions and respecting environmental standards. In addition, its carbonization waste depollution system generates a large quantity of hot gases. This heat is recovered either directly for drying or for the production of electricity.

#### **7.2.2.2 Practice of decontaminated artisanal carbonization (brick or metal) to complete the production of charcoal**

The charcoal production will be supplemented by 20 improved 3 m<sup>3</sup> kilns (rebuilt every year) producing between 150 and 200 tonnes of charcoal per year with a carbonization yield of between 25% and 30%.

The masonry or metal carbonization furnaces on an artisanal scale greatly facilitate the conduct of the carbonization and increase the regularity of the quality of the coal and the carbonization yield. The main models are known and many documents provide access to their descriptions and analyzes. As a reminder, we will mention the metal furnaces of the Magnien or Mark V type which can be mobile. Rabo-quente type hemispherical Brazilian brick kilns; or semi-buried Baranco type; or the Morado type surface oven, etc.

Y. Schenkel et al. (1997) also analyzed the advantages and disadvantages of carbonization techniques which they presented in the following table:

**Board 16 : Advantages and disadvantages of different artisanal carbonization techniques (Carré et al. In Schenkel et al. 1997)**

TECHNIQUES	BENEFITS	DISADVANTAGES
Masonry ovens	Local materials Good thermal insulation Easy driving Homogeneous and clean coal Long life expectancy Insensitive to climatic hazards	Construction requiring a competent mason Fixed installation - Skidding costs Determined capacity Slow cooling Significant pollution
Metal ovens	Mobility Short cycle - rapid cooling Homogeneous and clean coal Easy driving Not very sensitive to bad weather Skidding on small perimeter	Investment to be made in foreign currency Determined capacity Splitting of large timber to be carried out Average energy efficiency Significant pollution (smoke) Rather rapid wear if this practice of carbonization is poorly mastered.

Although making it possible to improve the carbonization yield and to simplify the conduct of wood firing; these furnaces do not make it possible to reduce greenhouse gas emissions by incinerating the fumes.

However, it should be noted a great improvement over the past ten years with the invention of the Four Adam also called ICPS - Improved Charcoal Production System (Adam. 2009). This type of improved furnace, of the retort type (heated from the outside) makes it possible both to improve the carbonization yield, to reduce emissions into the atmosphere of greenhouse gases and emissions harmful to human health. people.

Its design is characterized by:

- (i) The heating is done from an outdoor fireplace, which makes it possible to use fuels unsuitable for the production of charcoal.
- (ii) La collection and incineration of fumes in a specific combustion chamber when the drying phase of the wood to be charred is completed.
- (iii) Using the generated heat to self-feed the furnace heating system, which saves firewood.

The operating principle is as follows: A system of 2 hearths and chimneys makes it possible to heat either by passing the load of wood through the hot smoke of combustion in the hearth, or by directing these hot fumes under the hearth of the horn oven. The carbonization fumes (gas, tars and particles)

produced as the wood heats up are routed to a separate combustion chamber. When this chamber maintains combustion at a sufficiently high temperature, the carbonization fumes are burnt with combustion air, which allows them to be cleaned up. Another feature of the system is that it allows thermal energy to be recovered. The combustion fumes emitted by this chamber are used to heat the carbonization furnace.

The Adam furnace, built mainly in terracotta bricks and metal, has shown interesting performances with a carbonization yield which very regularly reaches 25% to 30%. Building on the early success of the Adam kiln, we have seen the emergence of carbonization kilns using the same principle but seeking to improve the lifetime of the kiln, which seems to be the weak point of the technology. Different types of kiln including the Green Mad Retort models in Madagascar or the “Mindourou kiln” which is used with waste from a timber processing plant in Cameroon have been developed. However, the literature does not yet specify whether the significant need for upkeep and maintenance has been reduced compared to the reference model.

The fact remains that for these improved artisanal ovens, a very important advantage is the drastic reduction in the cooking time: unlike traditional millstones which require a permanent presence throughout a generally long carbonization process ( sometimes several weeks), the necessary permanence of the charcoal burners near the kiln is reduced to only 1 or 2 days (depending on the quantity, the homogeneity of the grain size and the humidity of the treated wood) before the kiln is hermetically sealed and left at cool without intervention until discharge. As with any carbonization, the complete duration of a carbonization cycle depends on the wood resource (species, dimensions, humidity, etc.).

The quantity and quality of the charcoal produced can be regular unlike earthen grindstones which are much more difficult to drive. However, this is only possible with control of the supply and humidity of the wood used. Indeed, the water contained in the raw material must automatically be evaporated during the drying which takes place before pyrolysis. The yield can therefore be high, close to 30% on average if dry wood of uniform size is used. A good conduct of the carbonization with this type of furnace should make it possible to produce 1 kg of charcoal with only 3.5 kg of anhydrous wood.

Finally, a major advantage concerns the reduction of GHG emissions: this type of retort furnace not only allows obtaining a good material yield but also a strong reduction in emissions into the atmosphere of GHGs (greenhouse gases: methane, Co, etc.). GHG emissions, expressed per kg of coal produced, would be reduced by a factor of approximately 10 compared to emissions with traditional earthen millstones; this is thanks to the incineration of fumes containing in particular CO (carbon monoxide) and CH<sub>4</sub> (methane). It should be noted here the lack of precise data in the technical and scientific literature. Measurements by a scientific and technical body are recommended to consolidate this information.

### 7.2.3 Economic evaluation of the proposed models

According to the study - Cost-Benefit - conducted as part of the Technical and Economic Feasibility Study, the following elements emerge.

Once all the inventoried costs have been accounted for in the analysis, it turns out that the income compensates for the investment costs towards the 10th year, but only the 16th year if we take discounting into account. The median annual profit stabilizes from the 10th year and oscillates between 50 and 300 million CFA Francs.





On average, the scenario is profitable over 20 years with a net present value (NPV) of  $22.7 \pm 206.1$  M FCFA (mean  $\pm$  standard deviation) and an IRR of  $11.5 \pm 2.1\%$ . However, when the sources of variability are taken into account, profitability is not guaranteed. The low price of a sack of charcoal is the main cause of this risk.

In conclusion, it is indicated that given the current price of a bag of charcoal in Pointe Noire, it would not be certain that the coppicing of 5,000 ha of the Eucalyptus plantation, with 4,000 ha and 1,000 ha for production coal and perch respectively, which is profitable over 20 years. Thus, according to this scenario, it is not guaranteed to be able to recover sufficient funds to reimburse the initial investment in the cost of installing an industrial furnace. And a fortiori to build up sufficient capital to replace it after 20 years of operation. However, in the medium term when the eucalyptus massif near Pointe-Noire will be completely degraded (anarchic exploitation and extension of the city) or if an unregulated exploitation ban is applied,

On the other hand, the exploitation of perch being more profitable, if the demand for poles is present, by devoting more surface of the coppice to the production of poles, the profitability of the project is also guaranteed. Thus, the private manager could change the areas dedicated to the production of poles and charcoal according to the evolution of their selling prices to ensure the profitability of the coppice.

The program will finance the installation of the industrial furnace to guarantee the economic sustainability of the project (see section 9.1).

### 7.3 Development of plantations dedicated to woodfuel production

In order to meet the demand for wood energy in the two main agglomerations of the Republic of Congo and to limit the pressures on natural forest ecosystems, we are also proposing the development of plantations dedicated to the production of wood energy.

Two types of plantations are available:

- Agroforestry plantations with *Acacia auriculiformis* combining the production of wood and the production of food crops (cassava, maize, etc.)
- Mixed *Acacia* x *Eucalyptus* plantations helping to produce wood for charcoal production;

These plantations may be developed by local communities (small farmers), by private individuals or by industrialists interested in engaging in the development of plantations for the production of wood energy.

We believe that plantations cannot grow everywhere. The appropriation of the model and the development of the plantation cannot be done only in an environment where the wood resource is scarce for small producers. Indeed, the establishment of plantations, by small producers, requires a significant investment, not only financial but also in labor (preparation of the land, production of plants, planting, maintenance, protection against fires, etc.). As long as farmers have access to a free forest resource, they will not engage in plantation development. It is therefore necessary to target areas in which access to wood resources is problematic for the development of plantations by small producers.

In the context of a private investor, the current absence of private plantations in most of the countries of the sub-region indicates a lack of interest from investors in this area, in particular because of the return on investment in the long term. It is therefore advisable to subsidize plantation development to encourage private investors to engage in plantation development.



### 7.3.1 Plantation development in the fuelwood supply basin of the city of Pointe Noire

It is currently difficult to develop perennial plantations in the supply basin of the city of Pointe-Noire due to land saturation in the peri-urban belt of the city. We propose that the future program target the savannas of Niari in the departments of Niari and Bouenza for plantation development. These plantations will make it possible to meet the demand for wood energy in the towns of Nkayi and Dolisie, to limit pressure on natural formations and to encourage farmers to produce wood in savannah environments.

Indeed, agroforestry systems with *Acacia auriculiformis* could be developed on the grassy savannas of Niari in order to reduce the pressures on the eastern part of the Mayombe forest massif and to help develop savannas by producing fuelwood and food crops ( See Acacia-based agroforestry technical itinerary in the Technical and Economic Feasibility Study). These plantations, in the medium term, will be able to help supply the towns of Dolisie and Nkayie with wood energy and in the longer term, these same plantations will be able to supply the town of Pointe-Noire when the supply basin is enlarged due to the increase in the population of the city of Pointe-Noire. Moreover,

According to Proce et al. (2017), the stock of exploitable biomass for *Acacia auriculiformis* plantations on the Batéké plateau in DR Congo in the Mampu agroforestry massif for a 7-year-old stand (theoretical rotation of the agroforestry system) is 46.5 T / ha or a production of about 6 T / ha / year of exploitable biomass for the production of charcoal. Productivity could be improved by using provenances better suited to the pedoclimatic conditions of the targeted areas. A provenance trial for *Acacia auriculiformis* and *Acacia mangium* was set up in Pointe-Noire in 2012 as part of the EU Makala project. From this provenance test, it will be possible to identify the most productive provenances in order to use high-performance plant material (if this option is chosen,

In addition, the savannas of Niari are more fertile than the savannas of the Batéké plateau. Tests were carried out on identical provenances between the savannas near Pointe Noire and those of Loudima. At the time, it was observed a production 1.8 times higher in the savannas of Loudima because of more fertile soils.

We can then consider that the productivity of agroforestry plantations with *Acacia* would be higher than that observed on the Batéké plateau in the DRC where the soils are chemically poor, acidic and with low water retention (Dubiez et al., 2018). We hypothesize that the production of wood (exploitable biomass) on 7-year-old *Acacia auriculiformis* plantations, on the soils of the Niari savannas with suitable sources, would be estimated at 70 T / ha, i.e. a productivity of about 10 T / ha / year.

Based on the planned areas, 2,500 ha of plantation, the wood production potential would correspond to 25,000 T / year which would limit the exploitation of 5,000 ha of natural forest formation per year considering the productivity of natural formations at 5 m<sup>3</sup> / ha / year.





**Figure 8:**  
**after slash-**  
**cultivation of**  
**plantation in**  
**massif of**  
**Congo (R.**



**Cassava harvest**  
**and-burn**  
**an Acacia**  
**the agroforestry**  
**Mampu in DR**  
**Peltier, 2009)**

The production of 25,000 tonnes of wood per year would make it possible to produce 5,000 tonnes of charcoal per year if the development of these plantations is accompanied by a program to improve traditional charcoal practices making it possible to switch from a current yield from 12% to an improved efficiency of 20%.

**Board 17: Information concerning the plantations developed on the savannas of Niari**

Location	Technical itinerary	Surface (ha)	Products	Operators
Niari (Axis RN1)	Agroforestry with Acacia auriculiformis	2500	Wood But Cassava	Small producers Private

### 7.3.2 Plantation development in the supply basin of the city of Brazzaville

The wood-fuel supply basin of the city of Brazzaville is characterized by the presence of savannah to the north on the Batéké plateau and degraded space to the south. These spaces can be enhanced by developing energy crops.

The assumptions used for supply estimates are as follows:

- Consumption at the level of the Pool department: 979,000 Tonnes Eq. firewood / year in 2018;
- Agroforestry plantation productivity with Acacia auriculiformis: 6 tons / ha / year<sup>3</sup>;

<sup>3</sup>According to Proce et al. (2017), the productivity of Acacia auriculiformis plantations on the Batéké plateau in DR Congo in the Mampu agroforestry massif for an 8-year-old stand (theoretical rotation of the agroforestry system) is 72 T / ha.



- Plantation productivity in mixture (Eucalyptus x Acacia): 7 Tons / ha / year;
- Plantation area (community agroforestry system): 3,000 ha
- Plantation area (private agroforestry plantation): 1500 ha;
- Planting area (mixed Eucalyptus x Acacia plantation in peri-urban area): 5000 ha;
- 2/3 of the wood comes from fallow land and 1/3 from gallery forests;
- Productivity of forest fallows: (4 Tons / ha / year)<sup>4</sup>;
- Productivity of gallery forests: (5 tons / ha / year);

**Board 18: Assessment of the production of wood energy within the framework of the development of energy-oriented plantations on the Batéké plateau and quantification of additional supply needs**

	Plantation A. auriculiformis (7 year rotation)	Mixed plantation Eucalyptus x Acacia (rotation 7 years)	Additional supply (T Eq. Fuelwood / year)
Wood fuel demand (T Eq. Fuelwood / year)		979,000	
Average annual productivity (T / ha / year)	6	7	
Surface (ha)	4500	5000	Additional need estimated at 917,000 T Eq. Firewood / year
Annual potential production (T)	27,000	35,000	
Proportion for the woodfuel supply of the city of Brazzaville	2.8%	3.6	

We propose to develop agroforestry plantations with *Acacia auriculiformis* (4,500 ha) and mixed plantations (Eucalyptus x Acacia) (5,000 ha) on the Batéké plateau in areas located in the wood-fuel supply basin of the city of Brazzaville and in the south of the Pool department. The development of these plantations would make it possible to meet 6.4% of the demand for wood energy in the Department of Pool. Additional needs are estimated at 917,000 T Eq. Firewood per year.

Agroforestry systems with *Acacia auriculiformis* could be developed on the savannas and degraded areas of the Department of Pool in order to reduce the pressure on the natural forest areas in the

<sup>4</sup>According to the work of V. Gond et al. (2014) conducted in the gallery forests of Lufimi on the Batéké plateau in DR Congo, the above ground biomass (Above Ground Biomass) is estimated at 33 T / ha for old fallows > 6 years old and 6 T / ha for young fallow < 6 years. In gallery forests, the above-ground biomass was estimated at 75 T / ha.

supply basin of the city of Brazzaville and to help develop savannas and areas degraded by producing wood and food crops (See Agroforestry technical itinerary in Acacia of the Technical and Economic Feasibility Study).

As indicated above, the productivity of an *Acacia auriculiformis* plantation on the Batéké plateau can be estimated at 6 T / ha / year. This productivity could be improved by using provenances better suited to the pedoclimatic conditions of the targeted areas. A provenance trial of *Acacia auriculiformis* and *Acacia mangium* was set up in Kinzono in 2010 as part of the EU Makala project on the Batéké plateau in DR Congo. From this provenance test, it will be possible to identify the most productive provenances in order to use efficient plant material. Another provenance test was also installed at Regional Postgraduate School for Integrated Planning and Management of Tropical Forests and Territories (ERAIFT) in Kinshasa.

On the basis of the planned areas, 4,500 ha of plantation, the potential for wood production is estimated at 27,000 T / year. The production of 27,000 tonnes of wood per year would make it possible to produce 5,400 tonnes of charcoal per year if the development of these plantations is accompanied by a program to improve traditional charcoal practices making it possible to switch from a current yield from 12% to a yield improved to 20%.

In parallel, mixed *Acacia* x *Eucalyptus* plantations will be developed on the Batéké plateau on the areas affected by PRoNAR in the departments of Pool and Plateaux (See Technical itinerary for mixed acacias-eucalyptus of the Technical and Economic Feasibility Study).

On the basis of the planned areas, 5000 ha of plantation, the potential for wood production would correspond to 35,000 T / year. The production of 35,000 tonnes of wood per year would make it possible to produce 7,000 tonnes of charcoal per year if the development of these plantations is accompanied by a program to improve traditional charcoal practices making it possible to switch from a current yield from 12% to a yield improved to 20%.

**Board 19 : Information concerning the plantations developed in the supply basin of the city of Brazzaville**

Location	Technical routes	Surface (ha)	Products	Operators
District Ignié and Ngabé, PRoNAR bloc B	Mixed acacias / eucalyptus forest plantations	2500	Wood energy	Private
Ngoma Tié-Tié - Kinkala axis	Agroforestry with <i>Acacia auriculiformis</i>	4500	CornManiocWood energy	Small producers Private
PRoNAR blocks G, H, J, K, E	Mixed acacias / eucalyptus forest plantations	2500	Wood energy	Private PRONAR / SNR

### 7.3.3 Improved carbonization practices associated with plantations

Improving carbonization practices within the framework of plantations will depend on the areas available. Two options were retained, i) improve the traditional “grindstone” type kiln in small-area plantations, where the wood will be processed by charcoal burners working individually and ii) introduce the practice of decontaminated artisanal carbonization (in brick or metal oven) in plantations with larger areas.

As all carbonization techniques have advantages and disadvantages, rationality requires in these kinds of cases that all the negative points be put in the same balance so as to abandon those which are heavier and endorse the lighter ones.

Despite their good performance, easy handling and resistance to bad weather, the improved technologies have the greatest disadvantage of the high investment cost that some qualify as prohibitive for traditional charcoal burners. Apart from the investment cost which is incompatible with the standard of living of most charcoal makers working in Central Africa, there is another drawback linked to certain techniques such as masonry ovens, for example. It is their immobility. The traditional charcoal makers, who are the overwhelming majority, if not the only category in the study areas, are characterized by unquestionable operational mobility. This mobility is due to the fact that they must follow the species where they are of good quality and above all in abundance. Thereby,

Despite the fact that improved carbonization techniques are less wasteful of the wood resource and that they contribute to the reduction of greenhouse gas emissions, the traditional Congolese technique will still be used by Congolese charcoal burners in areas where the resource is dispersed. This choice is dictated by the reality, according to which the charcoal consumed in Congo, and more precisely in Pointe Noire and Brazzaville, is produced almost entirely by individuals.

This is how we espouse the conclusion of Schenkel et al. (1997) according to which “the carbonization wheel is a technique which turns out to be well suited to the socio-economic context of developing countries: it requires very little investment in equipment, is mobile, does not require skidding and is very flexible as to the volume of wood to be carbonized”. In addition, this practice implemented by experienced and conscientious charcoal makers can produce quality charcoal with good yields (around 20%). These good results depend of course on the technical mastery of the charcoal maker: construction of the grindstone, conduct of carbonization, etc.

Improving charcoal production will only be achieved by training charcoal makers as widely as possible. The improved techniques, by their behavior easier to master, must give less variable results, that is to say a carbonization yield and a more constant charcoal quality. Nevertheless, the main drawback of improved techniques - metal, brick, continuous furnaces - will remain for a long time to be their prohibitive investment cost for many charcoal makers in developing countries. Only small, well-structured companies will be able to make the technological leap towards carbonization systems requiring substantial investments. Therefore, technically, simple improvements to traditional methods,

TECHNIQUES	BENEFITS	DISADVANTAGES
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Grinding wheel	Mobility (all terrain) Local materials Zero investment Carbonizes large woods without the need for splitting. Adjustable capacity No skidding.	Requires operator know-how Requires a lot of manpower Charcoal of varying quality and soiled with the soil of the blanket - to be sorted. Sensitive to climatic hazards Low energy efficiency Significant pollution (smoke)
Pit	Very low investment Local materials Carbonizes large woods without splitting Adjustable capacity Easier handling than grinding wheels Relatively clean coal	Sensitive to climatic hazards Requires deep, consistent soil Lots of labor Requires good operator qualification. Low energy efficiency Significant pollution (smoke)

**Board 20 : Advantages and disadvantages of stone or pit carbonization practices (Square and *al.* in Schenkel *et al.*, 1997)**

The actions to be taken to improve the traditional carbonization technique will aim to improve and facilitate the working conditions of operators, increase their production yields and ensure the optimal use of the raw material.

**Wood drying:** let the woods dry at least one month before manufacturing the wheel to reduce the humidity level. Large logs can also be split to facilitate drying;

**The use of wood:** dense woods will provide better quality charcoal.

**The construction of the grinding wheel:** orient the grinding wheel in the direction of the wind. The woods constituting the bed must be flat, tight and tidy without empty space so as not to create a combustion zone. When stacking, the timber must be stacked in successive layers without leaving any empty space. Large diameter woods should be positioned in the center of the wheel. When dressing, the whole wheel must be covered with grass and then earth to avoid any air intake that could reduce the production of charcoal.

**Driving:** After lighting, the smoke should be even and white. The coalman must follow his grindstone at least twice a day to check that there is no air intake. Each hole must be filled with soil. Driving is done by opening or closing the vents.

**Management and marketing of charcoal:** The production of charcoal must be accompanied by management of the forest resource to maintain the contribution to household finances. Producers need to come together and sell their produce in urban centers to increase their share of income.

Drying the wood, careful construction of the grinding wheel and careful monitoring of the carbonization produces more charcoal with the same amount of wood.

The following table summarizes the advantages and disadvantages of the two technically recommended carbonization practices; economic, environmental and social.

**Board 21 : Summary of the advantages / disadvantages according to 5 criteria for the 2 recommended carbonization practices.**

	Improved earthen wheels	Retort artisanal oven
Wood consumption	---	+
Smoke emissions	---	+
Investment required	+++	+
Local constructability	+++	+
Need for wood transport	++	-
Drudgery	---	+

- = disadvantage and + = advantage

### 7.3.4 Cost of implementation

#### 7.3.4.1 Plantation installation cost

These costs are difficult to define because they relate more to the costs related to awareness, training, advice and monitoring of the work than the costs of the plantation itself. The costs of planting, in this type of project, are mostly borne by the farmers (or villagers) in the form of labor for the nursery, planting and maintenance of the seedlings.

As part of the EU-Makala project in DR Congo, the operating costs related to raising awareness and supporting farmers (plus the small equipment needed for village or individual nurseries) amounted to 185,000 CFA Francs (280 €) per hectare planted by unpaid farmers.

The farmers who will be involved in the development of these plantations have little financial means. In addition, the establishment of plantations is done at the time of agricultural work and therefore creates competition between these two activities.

To improve the success of small individual or collective plantations and encourage farmers to invest energy and time in plantation development, it is necessary to provide subsidies for the installation of plantations (plowing, supply of seedlings, construction firewall).

It is also essential to guarantee profitable outlets for the wood produced. For example, improving carbonization practices, as presented, would make it possible to produce a larger quantity of charcoal with an equivalent quantity of wood.

The estimated installation costs of 7 hectares of agroforestry plantation with *Acacia auriculiformis* are as follows.

**Board 22 : Installation and operating costs of 7 ha of the agroforestry system at *Acacia auriculiformis***

Years	Plant material	Stumping (ha)	Plowing (ha)	Acacia plantation (ha)	Cassava and Maize plantation (ha)	Firewall (ha)	Weeding (ha)	Thinning and relining of acacias	Corn harvest	Cassava harvest	Transport	Acacia exploitation	Other MO or cost	Total
1	619,500	50,000	100,000	52,500	40,000	50,000	225,000	10,500	20,000		70 625			<b>1 238 125</b>
2	619,500	50,000	100,000	52,500	40,000	100,000	375,000	10,500	20,000	130,000	218,500		12,325	<b>1,728,325</b>
3	562,500	50,000	100,000	52,500	40,000	150,000	375,000	10,500	20,000	130,000	218,500		12,325	<b>1,721,325</b>
4	562,500	50,000	100,000	52,500	40,000	200,000	375,000	10,500	20,000	130,000	218,500		12,325	<b>1,771,325</b>
5	562,500	50,000	100,000	52,500	40,000	250,000	375,000	10,500	20,000	130,000	218,500		12,325	<b>1,821,325</b>
6	562,500	50,000	100,000	52,500	40,000	300,000	375,000	10,500	20,000	130,000	218,500		12,325	<b>1 871 325</b>
7	562,500	50,000	100,000	52,500	40,000	300,000	375,000	10,500	20,000	130,000	380,219	445,000	219,747	<b>2,685,466</b>
Total	<b>4,051,500</b>	<b>350,000</b>	<b>700,000</b>	<b>367,500</b>	<b>280,000</b>	<b>1,350,000</b>	<b>2,475,000</b>	<b>73,500</b>	<b>140,000</b>	<b>780,000</b>	<b>1,543,344</b>	<b>445,000</b>	<b>281,372</b>	<b>12 837 216</b>

The cost of setting up one hectare of agroforestry plantation with *Acacia auriculiformis* is estimated at 1,834,000 CFA Francs (2,795 euros).



For the mixed Acacia X Eucalyptus plantation, the estimated installation costs of a seven hectare plantation are as follows

**Board 23 : Installation and operating costs of 7 ha of mixed Acacia x Eucalyptus plantation in CFA Francs**

Years	Plant material	Stumping (ha)	Plowing (ha)	Acacia and Eucalyptus plantation (ha)	Firewall (ha)	Weeding (ha)	Thinning and relining of trees	Thinning and relining of trees	Transport	Acacia and Eucalyptus exploitation	Other MO or cost	Total
1	500,000	50,000	100,000	50,000	50,000	225,000	10,500	10,500	20,000			1,005,500
2	500,000	50,000	100,000	50,000	100,000	375,000	10,500	10,500	20,000			1,205,500
3	500,000	50,000	100,000	50,000	150,000	375,000	10,500	10,500	20,000			1,255,500
4	500,000	50,000	100,000	50,000	200,000	375,000	10,500	10,500	20,000			1,305,500
5	500,000	50,000	100,000	50,000	250,000	375,000	10,500	10,500	250,000	400,000	176 140	1 985 500
6	500,000	50,000	100,000	50,000	300,000	375,000	10,500	10,500	20,000			1,405,500
7	500,000	50,000	100,000	50,000	300,000	375,000	10,500	10,500	20,000			1,581,640
Total	3,500,000	350,000	700,000	350,000	1,350,000	2,475,000	73,500	73,500	370,000	400,000	176 140	9 744 640

The cost of installing one ha of mixed Acacia x Eucalyptus plantation is estimated at 1,391,940 CFA Francs (2,122 euros).

#### 7.3.4.2 Cost of dissemination of improved carbonization practices

The cost of disseminating improved carbonization practices depends on the practices adopted.

As part of the improvement of traditional carbonization practices, there is no associated material cost but this requires taking charge of a practitioner familiar with these practices. It is possible to train trainers who will then disseminate the improved practices to the charcoal makers. The program will also be able to use the extension guide produced within the framework of the UE Makala project which presents the different stages of construction of an improved traditional millstone ([http://makala.cirad.fr/les\\_produits/guides\\_pratiques](http://makala.cirad.fr/les_produits/guides_pratiques)).

As regards the artisanal brick oven, the latter can make it possible to obtain a good carbonization yield (25% to 30%). However, the latter is fixed and therefore requires a means of transport to transport the wood to the carbonization site. Ovens should be replaced annually due to prolonged heat exposure. The ovens will have to be installed in another location in order to reduce the costs of transporting the wood.

The cost of installing a kiln, with a capacity of 3 m<sup>3</sup> of wood (production of 200 tonnes of charcoal per year), is 685,000 CFA Francs (1,044 euros). This investment is to be renewed every year.

#### 7.3.5 Profitability of agroforestry plantation with *Acacia auriculiformis*

According to the study - Cost-Benefit - carried out as part of the Technical and Economic Feasibility Study, the following elements emerge with regard to the profitability of agroforestry plantations with *Acacia auriculiformis*.

For the two locations, North Pool region and Niari region, the installation of agroforestry plantations combining acacia, cassava and maize is not profitable if we take into account all the production costs and the selling price of fuelwood less. raised in the Niari region.

However, in the context of family farming, where certain labor costs are internalized, the plantation becomes profitable in the long term, more quickly in the North Pool than in the Niari because of the price of the products (charcoal). wood, cassava, etc.). From the second rotation, the exploitation of the plantations is profitable with an average annual income of 1.1 M FCFA in the North Pool and 0.8 M FCFA in the Niari. Thus in the context of family farming, a subsidy covering start-up investments during the first rotation would make the plantation profitable almost from the first year and, according to forecasts, it should remain so in the long term without external financial support. .

**As part of the program, we are offering a subsidy of 48% of the total cost of setting up one ha of plantation. This grant will cover the following costs: plant material (plants), plowing and the creation of firewalls.**

The situation is overall more advantageous for the farmers of the North Pool because access to the markets of Brazzaville allows them to sell their production at a higher price, thus increasing their income compared to those of Niari although the latter have better yields in because of more fertile soil. It would therefore certainly be appropriate to provide for higher subsidies in Niari so that farmers would be interested in these plantations.

Current selling prices for maize, cassava and charcoal are lower than actual production costs. As long as prices do not increase, these sectors can only be supplied by family farming. These sectors are therefore structurally fragile and vulnerable to climatic hazards, the degradation of communication routes and competition from producers in neighboring countries. In addition, during periods of political

instability, the selling prices of producers collapse while the selling price in town increases, thus putting the sector at risk.

#### 7.4 Carry out research and development actions

As regards plantations, research centers and institutes (Forest Research Institute, Marien Ngouabi University, etc.) could collaborate in research and development programs related to the development of plantations. The courses of action, which are not exhaustive, can be as follows:

- **Genetics of acacias used in agroforestry systems** : the genetic basis of acacias used in agroforestry plantations is very poorly understood and probably very narrow. However, the needs in the country are important and the ecological conditions very varied. It will be necessary to obtain new provenances and test them in the main potential areas for planting. In the meantime, very quickly, it will be possible to enhance the existing Pointe-Noire test installed by the Center for Research on the Sustainability and Productivity of Industrial Plantations (VSRDPI) as part of the EU Makala project in 2012. For this, it will be necessary to collect seeds from the most beautiful trees (superior phenotypes) and put them in comparative planting (separate progenies). The parents whose descendants are the best performing will be identified and gradually grafted in order to set up a second generation seed orchard.
- **Monitoring and management of soil fertility in agroforestry systems and:** Studies carried out by CIRAD have shown that it is a productive system, appropriate in contexts where access to wood resources is critical and contributes to generating income in rural areas. They have also shown that they can indirectly reduce the ecological impact of slash-and-burn agriculture on natural forests. However, the productions resulting from these agroforestry systems must be accompanied by action in the marketing of products. In addition, they are often considered a panacea when it comes to managing soil fertility. However, recent studies by CIRAD show that on the soils of the Batéké plateau (chemically poor and with low water retention) that these systems despite all their advantages (increase in C, N, CEC, etc. ) pose problems of acidification, aluminum toxicity and deficiency in certain elements. These deficiencies require careful management of crop and carbonization residues as well as moderate inputs of inexpensive and available mineral fertilizers (Dubiez et al., 2018). It will be necessary to test techniques contributing to increase soil fertility, if we want to continue the promotion of these systems, to test i) the use of different fertilizers, in particular fertilizers of the calcium phosphate type, ii) the spreading of ash and charcoal fines produced by charring on the plots. An economic assessment of all these innovations should be carried out with potential users. These deficiencies require careful management of crop and carbonization residues as well as moderate inputs of inexpensive and available mineral fertilizers (Dubiez et al., 2018). It will be necessary to test techniques contributing to increasing soil fertility, if we want to continue promoting these systems, to test i) the use of different fertilizers, in particular calcium phosphate fertilizers, ii) the spreading of ash and charcoal fines produced by charring on the plots. An economic assessment of all these innovations should be carried out with potential users. These deficiencies require careful management of crop and carbonization residues as well as moderate inputs of inexpensive and available mineral fertilizers (Dubiez et al., 2018). It will be necessary to test techniques contributing to increase soil fertility, if we want to continue the promotion of these systems, to test i) the use of different fertilizers, in particular fertilizers of the calcium phosphate type, ii) the spreading of ash and charcoal fines produced by charring on the plots. An economic assessment of all these innovations should be carried out with potential users. if we want to continue promoting these systems, to test i) the use of different fertilizers, in particular calcium phosphate fertilizers, ii) the spreading of ash and coal fines produced by carbonization on the plots. An economic assessment of all these innovations should be carried out with potential users. if we want to continue promoting these systems, to test i) the use of different fertilizers, in particular calcium phosphate fertilizers, ii) the spreading of ash and coal fines produced by carbonization on the plots. An economic assessment of all these innovations should be carried out with potential users.





- **Development of industrial type SAF-Ac:** A request for the development of agroforestry systems intended for private investors is one of the objectives of this program. This would require adapting the methods developed, by testing mechanized techniques from seedling production to planting. These adaptations must be accompanied by research activities to meet the technical and economic challenges.

- **RNA:** Assisted Natural Regeneration (ANR) trials have been installed and measured by CIRAD on the Batéké plateau in the DRC. The results are very encouraging but deserve to be confirmed and enriched in the sites that will be identified in the Republic of Congo. In particular, it is necessary to monitor the growth of trees kept until the fallow cutting age, then to estimate the increase in wood and charcoal production allowed by the ANR. These economic data will be essential to consolidate the dynamics of peasant adoption over time. It will also be necessary to monitor the evolution of biodiversity, soil fertility and carbon fixation of this system as an alternative to traditional slash-and-burn agriculture.

## 7.5 Management of natural forest formations

It is essential to propose management methods for natural forest formations (fallow land, degraded forests, etc.) given that it is these formations that will be exploited to meet the additional demand for wood energy which will not be completely supplied by the management in coppice of part of the Eucalyptus massif in Pointe Noire and by the development of future plantations which will come into production at 5 years for mixed acacia x eucalyptus plantations and at 7 years for agroforestry plantations with acacia. The proposed management methods will be oriented around collective and individual management of the resource by proposing the development of a Simple Management Plan at the scale of the finages, the establishment of an Assisted Natural Regeneration activity to enrich forest fallows and activities to restore degraded forests. This work will be accompanied by a micro-zoning activity for village finages which will help to develop the wood-fuel supply basin.

The proposal is to intervene at the level of village finages and not at the village level (in the administrative sense of the term) because it is at the scale of finages that access and use of the resource forestry are socially controlled on a daily basis (Vermeulen et al., 2011). The finage corresponds to a territory socially appropriate by a community and is often made up of several terroirs (spaces intended for productive uses such as agriculture, hunting, etc.), embedded in one another. Individual and family rights at the land level are embedded in a collective appropriation at the finage level (Karsenty and Marie, 1998).

In the case of the Congo, it is land families who have traditional rights to certain lands. It is therefore essential to involve them in proposing management measures for the forest resource within these areas.

### 7.5.1 Simple Management Plan for the production of wood energy

The EU Makala project - "Sustainable management of wood energy resources in Central Africa" (2009-2013) - has developed in the DRC and the Republic of Congo simple management plans for wood energy production. ([http://makala.cirad.fr/index.php/projets/media/media\\_makala/les\\_produits/guides\\_pratiques/psg\\_canevas](http://makala.cirad.fr/index.php/projets/media/media_makala/les_produits/guides_pratiques/psg_canevas)).

The development of these PSGs was based on a participatory process to strengthen the viability and sustainability of actions involving beneficiaries in the choice, implementation and planning of activities developed in terms of environmental restoration. This process was based on its public, participatory, progressive and iterative character. It was implemented throughout the development stages of the PSGs to help improve the management of forest areas within customary territories and to help restore

degraded areas (Dubiez et al., 2013). Various didactic tools (films, interactive model, icon board, etc.) were used in this process to support the dynamic of participation of the populations (Dubiez et al., 2013, Larzillière et al.,

The PSGs were co-developed by following five stages - the formation of a working group, the mapping of the space under management, the division of the space into landscape units, the application of measures and management rules and finally the legitimization of agreements. Particular attention was given to the constitution of the working group so that all social classes (Men / Women, Young / Old, Notables / Non-natives,...) are represented in the working group.

In addition to the co-construction of the PSGs, the communities were trained in various technical itineraries (collective and individual) which were to help reintroduce the tree into the finages and improve the management of forest areas, such as agroforestry in *Acacia auriculiformis*, Assisted Natural Regeneration, the defense of certain forest areas, the restoration of forest areas with local species.

On the basis of the diagnosis of the sector, the program will identify possible and priority intervention areas for the establishment of PSGs. These should be located in the target departments of the program. When selecting sites, the program will pay attention to the following points:

- Security conditions;
- Accessibility;
- The availability of land;
- The levels of degradation of forest resources and the intensity of the woodfuel production activity;

#### 7.5.2 Assisted Natural Regeneration

Several technical itineraries could be developed within the framework of the co-development of PSGs (agroforestry plantations, plantations of local species, defenses, etc.). These choices will be made by the communities according to their wishes and the socio-environmental contexts of the target areas. Here, we will describe the Assisted Natural Regeneration (ANR) activity which has the advantage of being simple in its application and therefore more easily appropriable by local communities.

Much of the anthropogenic impact on natural tropical forests in Central Africa is linked to shifting slash-and-burn agriculture and the fuelwood extraction that is often associated with it. For several decades, many agronomists, foresters ... then agroforestry farmers have observed the value of fallow in restoring the fertility of tropical soils, while deploring the damage caused by burning and have tried various techniques to find a sustainable solution to replace the Slash-and-Burn (S&B). However, at the development level, the results have been disappointing (alley cropping, raméal wood, micro-char, etc.) and more than a billion farmers still depend on slash-and-burn agriculture for their daily survival.

ANR consists in conserving, during the period of agricultural cultivation, a few seedlings, suckers or suckers of pre-existing local forest species and promoting their growth through selective weeding, thinning and pruning practices. These are species and individuals which the farmers felt would not be too inconvenient for food crops, and then which could be useful to them during the following fallow period (improvement of soil fertility, charcoal production, caterpillars, etc.).

Then the cassava is harvested gradually over about two years. These periodic harvests are accompanied by new weeding. On this occasion, the farmer can again thin out the shoots and prune the low branches of the trees, which are a nuisance for the crops. After the final cassava harvest, the preserved and / or spontaneous woody plants will develop during the fallow period and the farmer will use this fallow for his pickings, beekeeping, small hunting, etc.



This activity makes it possible to increase the volume of wood available in future forest fallows and therefore ultimately to develop a larger volume of wood over an equivalent fallow period.

According to the work carried out in DR Congo on the Batéké plateau, the plots having benefited from the implementation of the RNA technique have a wood volume of 5.6 m<sup>3</sup> / ha after 43 months, while the plots without ANR have a volume of 3.2 m<sup>3</sup> / ha, ie a gain of 75% in wood volume.

### 7.5.3 Installation cost of PSGs

It is difficult to estimate the cost of implementing a Simple Management Plan because it depends on a participatory and support process which is difficult to quantify and which must adapt to each target group or community. . In addition, the size of the target groups, the size of the population, etc. are also parameters which will modify the support in the co-development of PSG and in the dissemination of the associated technical itineraries.

As part of the EU Makala project, the methodological development of the Simple Management Plan (design of the PSG framework, production of participation and awareness tools, training of local coordinators and project engineers, etc.), the co- development of PSGs with local communities, support in the dissemination of associated technical itineraries (construction of nurseries, plantation, RNA, etc.) for 18 PSGs were carried out with a budget of 518 million CFA Francs (790,000 euros) . However, the PSG framework exists and the facilitation and participation tools have already been tested and applied, which will make it possible to use existing tools.

As part of this program, we plan to go through local structures for the development of PSGs in 20 communities located in the Brazzaville wood-fuel supply basin, located in the South Pool, and 20 communities located in the basin. supply of wood energy from Pointe Noire, located in the forest of Mayombe.

We have planned an overall budget of 322.7 MFCFA (492,000 euros) for the co-development of 40 PSGs and their validation by the competent authorities. This overall cost includes the support of communities for the implementation of the practice of ANR. The local structures ensuring the implementation of these PSGs will be supported by the project staff as the technical expert specializing in participation, facilitation and animation and facilitators to support the structuring of the environment.

**Board 24: Implementation costs of forty Simple Management Plans in the woodfuel supply basins of the cities of Brazzaville and Pointe Noire**

Implementation of a Simple Management Plan for the production of wood energy	Unit	Unit price (Euros)	Number	Total
Consultancy contracts with local NGOs	by community	1000	40	40,000
Training of local NGOs	by approximate basin	10,000	2	20,000
Field surveys in target areas	by community	2,000	40	80,000
Meeting for the co-development of the PSGs	per meeting	100	960	96,000
Cleanup of PSG	by community	200	40	8,000
PSG registration	by community	100	40	4000
Means of transport of local FTAs	by NGO	60,000	2	120,000



Operation of local FTAs	per month and per NGO	1000	96	96,000
Production of didactic animation and participation tools	flat rate	20,000		20,000
Implementation of ANR	By community	200	40	8000
<b>Total</b>				<b>492,000</b>

## 7.6 Dissemination of improved stoves to urban households

In Pointe Noire, the dissemination of improved stoves (25% energy efficiency compared to a traditional stove with 15% energy efficiency) to urban households would help reduce the proportion of wood energy consumed by around 40%. Considering that 25% of the urban population of Pointe Noire can access an improved stove and that its use be sustainable, this would reduce the consumption of around 38,000 tonnes of fuelwood equivalent per year.

**Board 25: Presentation of the potential gain through the distribution of improved stoves (25% energy efficiency) to 25% of the population of the city of Pointe Noire**

Energy	Distribution in% of the main energies used in households in Pointe-Noire	Number of individuals	Number of individuals using traditional stoves	Urban individuals consumption (kg Eq wood / day)	Number of individuals benefiting from the dissemination of improved stoves	Urban individual consumption (kg Eq wood / day) with use of improved stoves (25% energy efficiency)	Firewood Eq market (Tons / year)	Fuelwood Eq gain (Tons / year) compared to the current scenario
Wood energy	48.50%	490,600	367,951	1.4	122 650	0.84	225,628	25,070
Gas	40.20%	406 650	304 982	0.7	101 661	0.42	93,508	10,390
Oil	8.50%	86,000	64,486	0.7	21,495	0.42	19,772	2 197
Other	2.80%	28,300	21,243	0.7	7 081	0.42	6,513	724
Total	100%	1011550	758 663	/	252 888	/	345,420	38 380

In Brazzaville, the dissemination of improved stoves (25% energy efficiency compared to a traditional stove with 15% energy efficiency) to urban households would help reduce the share of wood energy consumed by around 40%. Considering that 25% of the urban population of Brazzaville can have access to an improved stove and that its use be sustainable, this would reduce the consumption of around 83,000 tonnes of firewood equivalent per year.

**Board 26 : Presentation of the potential gain through the distribution of improved stoves (25% energy efficiency) to 25% of the population of the city of Brazzaville**

Energy	Main energy used in households in Brazzaville	Proportion of number of individuals	Proportion of the number of people using traditional stoves	Urban individuals consumption (kg Eq wood / day)	Proportion of individuals benefiting from the distribution of improved stoves	Urban individual consumption (kg Eq wood / day) with use of improved stoves (25% energy savings)	Firewood Eq market (Tons / year)	Fuelwood Eq gain (Tons / year) compared to the current scenario
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Wood energy	67.10%	1307000	980 331	1.4	326,777	0.84	601,139	66,793
Gas	21.30%	415,000	311,193	0.7	103,731	0.42	95 412	10,601
Oil	9.90%	193,000	144,639	0.7	48,213	0.42	44 346	4,927
Other	1.70%	33,000	24 837	0.7	8,279	0.42	7 615	846
Total	100%	1948000	1,461,000	/	487,000	/	748,512	<b>83,168</b>

Considering that a Congolese family consists of an average of 7 individuals, this would require targeting 36,127 families in Pointe Noire and 69,571 families in Brazzaville.

During the field missions, a potential partner was met in Brazzaville. This is the NGO Initiative Développement Congo. This NGO works in Brazzaville for the dissemination of improved stoves. Currently, they have distributed 4,500 homes to households and collective canteens. The NGO offers three types of models of different sizes (Annex 1).

The improved stoves were designed on the basis of existing models and were adapted to the initial material, the size of the pots used, etc. These stoves are made by artisans who have been trained by the NGO. Currently, there are 5 workshops in Brazzaville, 7 workshops in the department of Bouenza and 4 in Pointe-Noire. Performance tests were conducted by the NGO using the Kitchen Performance Test (KPT) methodology and compared to a simple brazier. According to the results communicated to us, the stoves save 50% of wood and 40% of charcoal by their use.

**Another association has also contributed to the distribution of improved stoves in the Republic of Congo since 2009. It is the Association Femmes Energies which distributed an improved stove or "Litouka ya peto" with the support of the United Nations Program. United for Development (UNDP). (<http://associationfemmeenergies.simplesite.com/428890141>)**

Cylindrical in shape, the improved fireplace consists of with a clay insert encased in a metal sheath, the improved fireplace offers multiple economic advantages by reducing the household fuel budget. This fireplace would save 40% of charcoal by their use. According to the association, the lifespan of their home is three years.

The Femmes Energies association, with the help of the UNDP, was formed in 2013 at the Research Center for Technological Initiatives (CRIT) of the University Marien Ngouabi, and produced the first models the same year. UNDP brought in an expert from Senegal who trained 16 ironworkers and ceramic manufacturers. However, to have a significant impact, it was recommended to disseminate 5,000 improved stoves per year to urban households.

In 2016, the association had three points of sale in the northern zone: the Moukondo, Mikalou, Massengo markets and within the walls of the National Energy Company.

**In order to strengthen the ownership of improved stoves by urban households, it is necessary to plan a communication and awareness program on the use of improved stoves which should be broadcast on radio and television in order to sensitize urban households to the use of improved stoves. interest in adopting this type of home. This step is essential for a change in the practices of urban households and for the appropriation of new homes.**

The selling price of a small improved stove is 10,000 CFA Francs (for the Initiative Développement association), we could not find the selling price of the Women Energies Association stove. The program will have to support other artisans in order to meet the demand. It would be necessary to have 105,700 improved stoves to distribute to urban households in Brazzaville and Pointe Noire.

It would therefore be necessary to maintain a network of small artisans (as developed by the current Associations) to support them in productivity efforts, and also to promote 2 to 3 medium-sized businesses, capable of responding to a number of demands. The current obstacle is access to raw materials.

We estimate that the overall cost of this part of the project is 807 MFCFA (1,230,000 euros).

**Board 27: Costs for the manufacture and distribution of improved stoves under the proposed program**

Diffusion of improved stoves	Unit	Unit price (Euros)	Total (Euros)
Consulting contracts with NGOs	flat rate	600,000	600,000
Training of craftspeople producing improved stoves and support for investments and entrepreneurship (SMEs)	flat rate	500,000	500,000
Performance test of improved stoves	flat rate	30,000	30,000
Communication and awareness program	flat rate	100,000	100,000
<b>subtotal</b>			<b>1,230,000</b>

## 7.7 Development of an offer to access alternative energies

In some countries, the subsidization of domestic gas has contributed to reducing wood energy consumption. One ton of domestic gas consumed is equivalent to 3.5 tons Eq. fuelwood as primary energy. The dissemination of this energy would help reduce the proportion of wood energy consumed by urban households. It will therefore be appropriate for the government to see the options for subsidizing domestic gas so that the purchase price is equivalent to that of wood energy and to encourage urban households to move towards this alternative energy. However, it is necessary to consider the initial investment, which is not insignificant, that households will have to make by purchasing gas stoves and lockers (gas cylinder).

As part of this program, a study on the potential for the development of domestic gas in the two target cities of the project and its impact could be carried out. The study will have to assess the opportunity costs of the development of domestic gas, production possibilities at the national level and its marketing to urban households. The budget for the conduct of this study is 131.2 MFCFA (200,000 euros).

**Board 28: Details of costs concerning the study on the development potential of domestic gas in the cities of Brazzaville and Pointe Noire**

Potential and impact of the deployment of LPG in the cities of Pointe Noire and Brazzaville	Unit	Unit Price (Euros)	Number	Total (Euros)
Consultancy (hydrocarbons specialist)	days	1500	120	180,000
Travel	tickets	1800	5	9,000
Transport	flat rate	8,000		8,000
Communication tools	flat rate	3000		3000
<b>Total</b>				<b>200,000</b>



The Congolese company of liquefied petroleum gas in the acronym GPL specializes in the storage, drumming, distribution and marketing of LPG. GPL SA is to date the only operator in the supply of butane gas in Congo. The company markets 12 kg and 20 kg bottles of butane.

This study will serve as a basis to see the opportunity or not to promote this type of energy in the cities of the Congo.

## 7.8 Gain in wood energy consumption according to the actions proposed

The Excel file, attached to this report, will make it possible to vary certain parameters (size of the population, energy efficiency of improved stoves, carbonization efficiency, etc.) in order to see the effects on wood energy consumption of the two. main cities of the Republic of Congo.

### 7.8.1 Pointe Noire case

**The supply of wood energy from sustainably managed space and the reduction of wood energy consumption can only be achieved by combining a series of interventions: i) allocation of a dedicated part of the Eucalyptus massif for the production of fuelwood, ii) dissemination of improved stoves, iii) improvement of carbonization practices, iv) use of sawmill waste.**

**Board 29: Summary table of the effect of the various actions on consumption demand in the city of Pointe Noire and the department of Kouilou**

	T eq. Firewood / year	Production dedicated to wood energy (T eq. Fuelwood / year)	Gain (T eq. Fuelwood / year)	Additional need (T eq. Fuelwood / year)
Consumption Department of Kouilou and city of Pointe Noire (2018)	441,000			
Production of wood energy on 5,000 ha of the Eucalyptus massif		32,000		409,000
Production of wood energy from slash on 31,000 ha of the Eucalyptus massif		62,000		347,000
Distribution of improved stoves to 25% of the urban population			38000	309,000
Improved carbonization practices on 10% of charcoal production			13,000	296,000
Use of wood waste from the processing units of forestry companies		In the absence of bibliographic data, it is not possible to estimate this production. This should be the subject of a specific survey among operators.		

- 1) The allocation of 5,000 ha of the Eucalyptus massif to the production of fuelwood and the use of logging residues on the rest of the massif would make it possible to meet 21.3% of the demand of the Kouilou department and the city of Pointe Noire (94,000 T eq. firewood / year);
- 2) The distribution of improved stoves (energy efficiency of 25% compared to a traditional stove with an energy efficiency of 15%) to 25% of the urban population would save 38,000 T eq. Firewood / year, ie 8.6% of the demand of the Kouilou department and the city of Pointe Noire;
- 3) Improving carbonization practices on 10% of charcoal production would save 13,000 T of eq. Firewood / year or 3% of the demand of the department of Kouilou and the city of Pointe Noire;

### 7.8.2 Case of Brazzaville

For Brazzaville, the production dedicated to wood energy and the gains generated by the dissemination of new techniques are as follows.

**Board 30 : Summary table of the effect of the different actions on the consumption demand of the city of Brazzaville and the department of Pool**

	T eq. Firewood / year	Production dedicated to wood energy (T eq. Fuelwood / year)	Gain (T eq. Fuelwood / year)	Additional need (T eq. Fuelwood / year)
Consumption Department of Pool and the city of Brazzaville (2018)	979,000			
Woodfuel production from plantations dedicated to woodfuel production		62,000		917,000
Distribution of improved stoves to 25% of the urban population			83,000	834,000
Improved carbonization practices on 10% of charcoal production			29,000	805,000
Use of wood waste from the processing units of forestry companies		In the absence of bibliographic data, it is not possible to estimate this production. This should be the subject of a specific survey among operators.		

- 1) The development of 9,500 hectares of plantation dedicated to the production of fuelwood would meet 6.4% of the demand of the Department of Pool and the city of Brazzaville (62,000 T eq. Of fuelwood / year);

- 2) The distribution of improved stoves (energy efficiency of 25%) to 25% of the urban population would save 83,000 T eq. Firewood / year or 8.4% of the demand of the Department of Pool and the city of Brazzaville;
- 3) Improving carbonization practices on 10% of charcoal production would save 29,000 T of eq. Firewood / year or 3% of the demand of the Department of Pool and the city of Brazzaville;

## 8. Set up a sustainable wood-energy sector to encourage stakeholders in the sector to better manage wood resources.

### 8.1 Regulatory review of woodfuel

Congolese forest law is being revised. Despite the political and legal commitments (forest policy, FLEGT and REDD in particular), and the reading of the proposed texts, confirmed during some discussions, wood energy is not really a priority of the current reform.

Ideally, the texts should essentially be reformulated following the classic legal method. However, this seems difficult in the Congolese context. In this context, it would seem rather judicious to apply concretely the practical answers corresponding to particular cases and then to evaluate them. This would make it possible to identify the practical additions to be made and then to combine them in a coherent and balanced way with what exists. It would be irrelevant whether or not these supplements were formally introduced into the forestry regime.

#### **Forest concessions for the establishment of plantations for the purpose of manufacturing woodfuel (in degraded areas of concessions): is this legally authorized and what prerequisites<sup>5</sup>**

Reading the proposed forest law suggests that plantations and concessions do not concern the same land at all. Moreover, the concessions seem to relate only to marketable timber. However, the provisions relating to afforestation and reforestation do not specify the nature of the land on which these two activities can be carried out. It could therefore very well be conceded land. In this context, the concessionaire must ask the water and forest administration for an authorization to plant. There is no limit especially regarding the area to be planted and the species used.

The special regime for carbon credits is also unclear. Nevertheless, one could consider that, within this framework, plantations in the concessions would be authorized. In this context, the concessionaire must be authorized by the water and forestry administration.

#### **Forest concessions and authorization to use forest waste to make charcoal and market this charcoal**

<sup>5</sup> Each of these five points corresponds to each of the following five concrete legal questions addressed by FAO to the legal consultant as part of this study:

- Are forest concessions legally allowed to establish plantations for the manufacture of woodfuel in degraded areas of their concessions? If so, what are the prerequisites? If not, what are the necessary legal reforms?
- Are logging concessions legally allowed to use forest scraps to make charcoal and market that charcoal? If so, what are the prerequisites? If not, what are the necessary legal reforms?
- Can private landowners establish and market woodfuel plantations on their own land? If so, what are the prerequisites? If not, what are the necessary legal reforms?
- Are the communities, either installed in the series of community development, or installed on private lands with customary tenure, legally authorized to make plantations for the manufacture of wood-fuel and to market this wood-fuel? If so, what are the prerequisites? If not, what are the necessary legal reforms?
- What are the laws / regulations governing the coal value chain and where are the gaps / shortcomings for a legal supply chain to be created / stimulated by the GCF project?



**Nothing prohibits the use of scraps to make wood energy.** Better still, the concessionaire has the obligation to recover the rejects; this can be done through the making of charcoal, as no restrictions have been set in this regard. No special conditions have been set for carrying out this activity, with the exception of the payment of a tax.

**Regarding marketing, there are no restrictions or prohibitions.** Depending on their profession, the owner may or may not need professional certification.

**The movement of all forest products requires the establishment of a roadmap** verified and approved by the water and forest services. There is no particular arrangement for wood energy.

#### **Private landowners and plantations for the manufacture / marketing of fuelwood on their own land**

Private landowners exercise over the forests located on these lands all the rights related to private property. Subject to compliance with the relevant rules, they can therefore freely manufacture charcoal and / or plant there for this purpose. It can also do so in the context of carbon credit projects.

**These owners should ask water and forest administration an authorization to make plantations.**

The exploitation of plantations including felling are subject to different conditions depending on the size of the forest held, the area cut and the ordinary or non-standard quality of the cut. In general, cutting must be authorized either directly or through the development of a management plan approved by the water and forestry services.

**There are no restrictions or prohibitions on the marketing.** Depending on their profession, the owner may or may not need professional certification.

**The movement of all forest products requires the establishment of a roadmap** verified and approved by the water and forest services. There is no particular arrangement for wood energy.

#### **Communities installed in community development series or on private land with customary tenure and plantations for the manufacture / marketing of woodfuel**

**There are no restrictions or prohibitions on the establishment of plantations by local communities on the land they manage..** Better still, they are encouraged to do so.

**These communities should ask water and forest administration an authorization to plant.** Authorization for any reforestation activity is set as a general rule without any exception in particular as to the nature of the land or the quality of the operator.

**There are no restrictions or prohibitions on the marketing.** Depending on the professional qualification assigned to them, the local community may or may not need professional accreditation. There are no exceptions to this general rule.

**The movement of all forest products requires the establishment of a roadmap** verified and approved by the water and forest services. There is no particular arrangement for fuelwood and for local communities.

#### **Laws / regulations governing the coal value chain and the gaps / shortcomings so that a legal supply chain is created / stimulated**

Despite the political and legal commitments (forest policy, FLEGT and REDD in particular), and the reading of the proposed texts, confirmed during some discussions, wood energy does not appear as a priority of the current reform.

As it stands, wood energy is subject to a legal regime, but this is not its own. As alternatively, "forest products", "other forest products", "accessory forest products" and "forest products of all kinds",

woodfuel is subject to general rules which nevertheless seem to meet the main expectations of observers. the wood-energy sector, for example forest plantations or control and verification of legality. It remains to be seen whether, ultimately, this general legal status is concretely satisfactory. In this regard, we can underline that the forest law review was carried out in a participatory manner, including with the main people and authorities, including the authorities responsible for FLEGT and REDD. Be that as it may, we can already note shortcomings and inaccuracies, such as the legal regime for residues, however essential to the wood-energy sector according to observers. This could prove detrimental to this sector. It is not, however, obvious that an overhaul, in the immediate or future, of the current proposed texts is absolutely necessary. First of all, it is possible to respond to an immediate need for clarification of the legal status of wood energy without modifying the architecture and the content of the proposed texts. Indeed, these provide in particular technical measures and individual decisions of which, subject to the applicable rules, one can freely set a content adapted to the specific needs of woodfuel, including in a given region of the Republic of the Congo. Then, in the absence of an immediate need, it would seem rather judicious to carry out an “experiment” of the provisions currently planned, the evaluation of which would make it possible to identify the necessary technical and legal institutions (form, content and combination). subject to the applicable rules, we can freely set a content adapted to the specific needs of woodfuel, including in a given region of the Republic of Congo. Then, in the absence of an immediate need, it would seem rather judicious to proceed to an “experiment” of the provisions currently planned, the evaluation of which would make it possible to identify the necessary technical and legal institutions (form, content and combination). subject to the applicable rules, we can freely set a content adapted to the specific needs of woodfuel, including in a given region of the Republic of Congo. Then, in the absence of an immediate need, it would seem rather judicious to proceed to an “experiment” of the currently planned provisions, the evaluation of which would make it possible to identify the necessary technical and legal institutions (form, content and combination).

In any case, any legal reform procedure should take into account the context of access to law in the Republic of Congo, both in terms of the content of the right to write and of the writing method to be followed. If a reform takes place, it should focus in particular on the relevant elements of related rights (land, tax and commercial law) and, concerning forest law:

- in the form of this: the complexity and diversity of the wood-energy sector would require the enactment of specific rules for this sector (special law and / or specific regulatory measures) preceded by the publication of a wood-energy policy in Republic of the Congo, which would set the objectives and fundamental principles (specifying those appearing in the forest policy, with a prior need to update the analysis on wood energy);
- its content: special attention should be paid:
  - the legal regime for residues
  - the authorization, control and sanction regime: as it stands, and by comparison in particular with similar situations in other countries, the applicable criminal regime seems too general to really encourage the establishment of a wood energy sector legal and sustainable

## 8.2 Sustainable sector of the wood energy sector

It would seem relevant to encourage woodfuel producers to use a forest resource resulting from sustainable management (energy plantations, sustainably exploited forest). There are different means of inducement. Tax incentive: lower taxation, or even zero, on sustainably produced wood. This requires means of controls and traceability which are difficult to set up in a country where governance remains weak and where wood-energy sectors are informal. ii) productive incentive. This is an



incentive (grant allowing individuals to engage in plantation development or forest management. These incentives can be collective or individual. They are provided for in the program.

All of these elements will lead to professionalization of the sector to improve the management of forest resources and the quality of products (charcoal, associated food crops, etc.).

#### 8.2.1 Payments for Environmental Services (source: A. Karsenty)

In the absence of land constraints, producers will not adapt new practices spontaneously, and incentive mechanisms supporting producers to modify their cultivation practices and to conserve forest areas are necessary. There are two types of payments for environmental services (PES). Investment PES to encourage small producers to adopt new practices within sectors and collective PES to remunerate communities to conserve or restore forest ecosystems in a territory. A sector-producer approach and a territory-community approach could be implemented as part of public-private partnership commitments.

The implementation of a PES system requires:

- Define the type of approach making it possible to support the change in practices of individual producers and communities as well as to meet the objectives of limiting deforestation;
- Identify collective and individual contracts to justify the continuity of payments;
- Propose a methodology making it possible to map the rights of communities and planters as well as to delimit the plots (georeferencing) on which technical activities will develop;
- Identify an institution which will ensure the updating of the plot (inheritance, division, rentals, sales, etc.) and which will monitor the implementation of contracts on the various plots
- Propose a governance model for the PES system;
- Propose coherent and incentive scales for payments;
- Identify a "sustainable" financing mechanism for PES over the long term. Support for small farmers and communities could be achieved through public funding. This fund could be partially supplied by the extractive industries as part of their CSR / biodiversity compensation and it would be relevant to study the possibility of supplying this fund through carbon finance (although currently the latter is not sufficiently remunerative. );



## 8.3 Potential partners on the implementation of the proposed actions

### 8.3.1 Coppicing management of the Eucalyptus massif

As we have seen previously, the management of 5,000 ha of the Eucalyptus massif in coppice for the production of charcoal, would allow to meet 7.3% of the demand of the city of Pointe Noire for the year 2018. in Eq. Firewood. This new allocation will require the approval of the public authorities in charge of the management of the Eucalyptus massif on the outskirts of Pointe Noire.

If this approach is validated, the public authorities will be able to launch a call for tenders to award the management of part of this massif to one or more companies wishing to sustainably enhance the plantation by producing wood energy.

Going through competitive calls for tenders for the allocation of part of the Eucalyptus massif would make it possible to establish a transparent allocation mechanism. It will be necessary that the social and environmental commitments of the private partners be one of the criteria of the technical evaluation of the offers.

The future program should help finance part or all of the investments (industrial ovens and improved ovens) in order to encourage the private sector to position themselves in the future development and sustainable management of this massif for the production of wood energy (See Cost-Benefit study produced within the framework of Technical and Economic Feasibility).

#### **Investments required to improve carbonization practices:**

CML industrial ovens with a heat recovery device for drying the wood before carbonization. The production capacity is 3500 to 4000 T / year of charcoal with a regular output of 30%. The investment cost for the installation of an industrial unit of this type is estimated at 1246 million CFA Francs (1.9 million euros) (budget including all costs: equipment, buildings, civil engineering) . The service life of the equipment is estimated at 20 years if the maintenance operations are respected.

This industrial carbonization process makes it possible to obtain quality charcoal with a satisfactory and regular carbonization yield, while improving working conditions and eliminating the emissions of GHG pollutants. The main drawback is the high investment cost mainly linked to the transport of the raw material to the carbonization site.

In the case of the Eucalyptus massif, the production resulting from the use of an industrial CML furnace will be supplemented by small carbonization units (improved brick furnaces). These ovens could be under the direct management of the company or the production of charcoal could be subcontracted to professional charcoal makers or to EIGs.

The cost of installing a kiln, with a capacity of 3 m3 of wood (production of 200 tonnes of charcoal per year), is 685,000 CFA Francs (1,044 euros). This investment is renewed every year. It is planned to install 20 furnaces of this type in addition to the industrial furnace, which is equivalent to an annual cost of 13.7 million CFA Francs (20,885 euros).

#### **Congo Carbo Industry Company:**

An economic operator, met during the missions, conducted a feasibility study to launch an industrial charcoal production project from the waste from logging, sawing of wood from natural and artificial forests.

The project provides for the establishment of a modern carbonization unit in the vicinity of Pointe Noire to exploit the Eucalyptus massif of Pointe Noire. In addition to this unit, the company plans to



deploy advanced manual ovens for the employment of the local population currently living from the profession of charcoal maker.

The complementary mission, led by Horus on the financing of the agricultural and forestry sector in the Republic of Congo, planned to meet this potential partner to analyze more precisely the economic feasibility of the model proposed by the private partner.

### 8.3.2 Development of plantation dedicated to charcoal production

Plantation development will target different actors (farmers, small private, large private). Depending on the type of actor, the procedures will be different. The call for projects files will be targeted for the private sector in order to assess their capacity to implement afforestation / reforestation programs in the target sites of the future project. The calls for projects are presented in the Operational and Financial Feasibility study.

#### **Société des Plantations Forestières Batéké Brazzaville:**

This company has a little less than 10,000 ha of secure land on the Batéké plateau. It plans to start planting in 2018 with a first attempt at planting 200 ha of *Acacia auriculiformis*. This plantation will be developed according to the *Acacia* agroforestry model developed in Mampu in DR Congo.

It has two objectives, to produce charcoal through the use of traditional grindstones and to produce wood to supply a future biomass power plant.

### 8.3.3 Diffusion of improved stoves

During the field missions, a potential partner was met in Brazzaville. This is the NGO Initiative Développement Congo. This NGO works in Brazzaville for the dissemination of improved stoves. Currently, they have distributed 4,500 homes to households and collective canteens.

A national NGO (Femme Energie) is also present in Brazzaville and has been supported by the UNDP.

### 8.3.4 Improving carbonization techniques

The establishment of a plan to build the capacity of charcoal makers will require calling on a short-term expert who can train charcoal makers in improved traditional carbonization techniques. The latter can then be made responsible for training other charcoal makers. Initially, it will be necessary to support them to ensure the proper implementation of the recommendations and the educational framework necessary for a good dissemination of knowledge.

It will be necessary to plan the number of charcoal burners targeted for the improvement of traditional carbonization techniques. In this document, the calculations have been made on the basis of 10% of the quantities of charcoal consumed in the two large urban areas of the country but depending on the budgets allocated to this activity, this percentage could be increased in order to have more consequent on wood savings in the carbonization process.

### 8.3.5 Development of a master plan for domestic energy supply

One-off actions have been initiated in the past or are being prepared to improve the management of the wood-energy resource either through the development of plantations, the dissemination of improved stoves, etc. However, no global strategy has been developed to supervise the supply in a reasoned and sustainable manner of the large agglomerations of the cities of the Republic of Congo.



It is with this in mind that we propose that the project contribute to the development of the Master Plan for the Supply of Domestic Energy for the two large agglomerations of the Republic of Congo, namely Brazzaville and Pointe Noire.

The program should contribute to improving the living conditions of the populations thanks to a sustainable supply and at competitive prices of domestic energy, to create income in rural areas and to maintain or increase forest carbon in the supply basins by placing in place of management measures adapted and adopted by the various actors.

Three actions flow from this purpose:

- i) organize the wood fuel supply for cities of Brazzaville and Pointe Noire through the development of the Domestic Energy Supply Master Plan (SDAED) and roll out these actions at the local level (department / district and customary territories);
- ii) maintain or increase forest carbon while preserving forest ecosystems, through the application of SDAED and through the development of various actions contributing to improving the management of the resource, restoring it and reducing its consumption;
- iii) improve governance of woodfuel supply to large urban centers by setting up consultation frameworks, monitoring mechanisms and capacity building at national and local level.

The monitoring and organization of the wood-energy sector requires intersectoral coordination which takes place at different levels: national, regional (supply basins of large urban centers) and local (local communities and / or customary territories). The future project should help establish a dialogue between the different structures involved and between the different actors involved in the wood-energy sectors. This work will require the establishment of a multi-sector and multi-stakeholder consultation platform to define a medium / long-term intervention strategy to improve the management of woodfuel resources in the targeted supply basins.

It will also be necessary to i) exchange views on technical issues with representatives of public administrations, operators, artisans, traders, transport, industrialists, local communities, civil society, etc., ii) strengthen technical capacities, organization and management of the various actors involved in the wood-energy sectors and iii) to help develop a regulatory framework to encourage the marketing of wood-energy from sustainable sources of supply (natural forests under management, dedicated wood-based plantations). energy, etc.)

## 9. Implementation of the wood energy project

### 9.1 Global Objective and Specific Objectives of the Wood-Energy component

The Global Objective of the Wood-Energy component of the future program will be to improve the management of the wood-energy resource while reducing deforestation and degradation of forest ecosystems and to help increase the income of the populations of the departments of Pool and Kouilou through sectoral and enabling investments.





This Global Objective (GO) can be broken down into three Specific Objectives (SO):

- **SO 1: The governance capacities of wood-energy resource management are improved:**
  - ❖ Revision of the regulatory framework and proposals for technical logging standards for the production of fuelwood;
  - ❖ Creation of a multisectoral and multi-actor consultation platform at different levels of governance (national, departmental, local);
  - ❖ Development of Master Plan for the Supply of Domestic Energy for the two main agglomerations of the Republic of Congo;
- **SO 2: Sectoral investments reduce the consumption of fuelwood and limit deforestation:**
  - ❖ Improvement of traditional carbonization practices and dissemination of improved ovens within the Eucalyptus massif and future plantations dedicated to the production of fuelwood;
  - ❖ Dissemination of improved stoves to urban households;
  - ❖ Development of energy-oriented plantations with private investors and local communities;
- **SO 3: Social investments contribute to more sustainable management of forest resources:**
  - ❖ Co-development with certain village communities of a Simple Management Plan dedicated to the production of wood energy;
  - ❖ Dissemination of forest restoration techniques (plantations, Assisted Natural Regeneration) to agriculture and village communities;

## 9.2 Associated technical assistance

The project will consist of a unit in charge of the Wood-Energy component and two technical branches in Brazzaville and Pointe Noire which will be responsible for carrying out activities in the supply basins of the two cities. If the option of developing plantations in the savannas of Niari is validated, it will also be necessary to have a sub-branch in Dolisie for the development of agroforestry areas. The project will also be provided with days of short-term expertise to support the conduct of the various activities.

The unit in charge of the wood-energy component will be responsible for i) organizing the AOs to recruit the service providers necessary for the implementation of the activities of the various components, ii) ensuring the technical coordination of the activities of these components, and iii) ensure the financial monitoring of the project and coordination with partners.

**The unit in charge of the Wood-Energy component:**



- an international technical assistant specializing in wood energy in charge of coordinating the component;
- a technical expert geographer, specialist in Geographic Information Systems;
- a technical expert specializing in participation, facilitation and animation who will be responsible for the participatory process conducted within customary territories and who will be in charge of conducting consultation within multisectoral and multi-actor platforms;
- a team of administrative assistants and a financial and accounting management manager;
- a driver ;

**The technical branches of Brazzaville and Pointe Noire will include:**

- Head of branch
- Forest engineer responsible for resource assessment
- Territorial agroforestry
- Support facilitator for the structuring of the environment
- Accounting ;
- Driver;
- Logistician ;

Dolisie's technical sub-antenna will include:

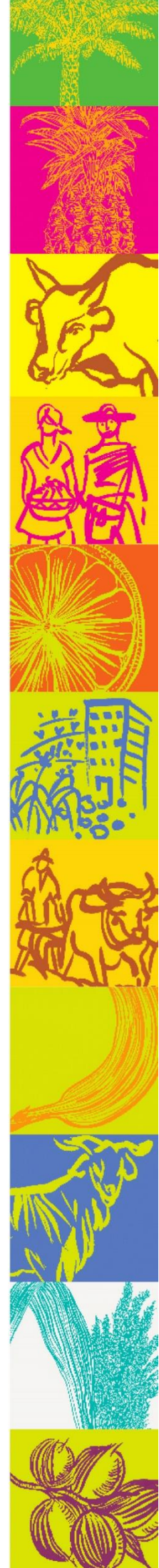
- Responsible for the sub-antenna;
- Territorial agroforestry;
- Driver;

**Experts Courts Termes will include:**

- Specialist in bioenergy sectors in Africa;
- Carbonization specialist to i) support the establishment of improved kilns, ii) help improve traditional carbonization techniques and iii) train trainers in improved traditional carbonization practices;
- Specialist in land use planning with skills in leading negotiation process;
- Specialist in territorial consultation;
- Agroforestry specialist;
- Forestry specialist for the establishment of inventories in order to estimate the wood resource in the supply basins;

### 9.3 Program budget

See the Excel file presenting the general budget of the program and the detailed budgets for the following technical itineraries: Acacia-Cassava agroforestry system, Acacia X Eucalyptus mixed plantation, Eucalyptus coppice and Cocoa agroforestry system.







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## APPENDIX 1: Improved cookstoves distributed by the NGO Initiative Développement in the Republic of Congo

# Congo-Mboté

Congo-Mboté, Lituka Nouvelle Génération

**MODERNE ET ECONOMIQUE**

**Modernisez vos cuisines et économisez l'Argent!**  
Son apparence **moderne** s'adapte parfaitement dans toutes les cuisines du Congo. Sa garantie qualité vous permet de cuisiner avec **Congo-Mboté** plus de 2 ans.

**SANTÉ ET ENVIRONNEMENT**

**Préservez votre santé et lutttez contre la déforestation**  
Congo-Mboté réduit les fumées toxiques lors de la cuisson.  
« Confort et santé assurés ».  
Avec Congo-Mboté vous réduisez efficacement la consommation de bois et de charbon.  
« 50% moins de bois, 40% moins de charbon »

**100% CONGO**

**Congo-Mboté est un Lituka 100% Congolais**  
Il est conçu, fabriqué et vendu par les congolais. Il favorise durablement l'économie locale.

**- La Gamme Congo-Mboté -**



Brazza Mboté



Grand modèle



Petit modèle

# Congo-Mboté

Cuiseur Économe bois et charbon

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## APPENDIX 2: Selection of the relevant draft legal and regulatory provisions

Projected text	Relevant provisions
Draft law on the forestry regime, version of September 2017	<p><b>TITLE I: GENERAL PROVISIONS</b></p> <p><b>CHAPTER III: DEFINITIONS</b></p> <p><b>Article 3:</b> This law is based on the principles of the sovereignty of the State over its natural resources, transparency of procedures, traceability and legality of timber and products from forest exploitation as well as the principle of the participation of the parties stakeholders involved in sustainable forest management.</p> <p><b>Article 4:</b> This law recognizes the right of local communities and indigenous populations to provide their free, prior and informed consent in the development, implementation and monitoring of actions and decisions concerning them in terms of the exploitation and sustainable management of forest resources, in accordance with the legislation in force.</p> <p><b>Article 6:</b> For the purposes of this law, the following expressions are defined as follows:</p> <p><b>Afforestation or afforestation:</b> Operation consisting in planting forest species or fruit species on non-wooded land;</p> <p><b>Other forest products:</b> Energy and service wood, as well as non-wood forest products with the exception of wildlife forest products;</p> <p><b>User rights:</b> Rights which result from local custom or traditions by which the local community or indigenous populations may, in a forest which does not belong to them, either take certain products or engage in certain productive activities intended for sale or not in the country. limit the satisfaction of their basic or customary domestic needs;</p> <p><b>Exploitation and artisanal processing:</b> Exploitation and processing of wood forest products without mechanization;</p> <p><b>Semi-industrial exploitation and processing:</b> Exploitation of wood forest products with reduced mechanization;</p>





**Industrial exploitation:** Exploitation and processing of wood forest products with complete mechanization;

**Wood residues or wood residues:** wood left in the forest after logging or wood by-products from the wood processing industry, such as: stumps, abutments, branches, slabs, edgings, scraps, downgraded timber for export, bark, cores residuals, strips of peeled or sliced veneer, sawdust, shavings.

## **TITLE II: FOREST DOMAIN OF THE STATE**

### **CHAPTER I: THE PERMANENT FOREST DOMAIN**

#### **SECTION II: FORESTS OF LEGAL PERSONS UNDER PUBLIC LAW**

**Article 22:** Forest products of any kind, resulting from the exploitation of forests of legal persons of public law, belong exclusively to the legal person of public law concerned, subject to the use rights in force.

#### **SECTION IV: COMMUNITY FORESTS**

**Article 32:** Income from the sale of forest products of all kinds resulting from the exploitation of community forests returns to the local communities or indigenous populations concerned.

**Article 33:** For-profit timber exploitation, subject to the use rights in force in a community forest, remains subject, for members of the local community or indigenous populations, to obtaining a special permit or a license. permit to cut plantation timber in accordance with the requirements of the simple management plan.

This exploitation is carried out with the objective of guaranteeing the sustainability of forest and wildlife resources in the series of community development.

The local authority, the beneficiary of the forest concession or the hunting operator bring their contribution to the development of activities in the community development series within the framework of social responsibility.

**Article 34:** The exploitation of non-timber forest products in a community forest for domestic needs comes under the right of use of the local community or indigenous populations. For lucrative needs, the use of these products is done in accordance with the simple management plan.

#### **CHAPTER I: NON-PERMANENT FOREST DOMAIN**

**Article 37 :** The exploitation of timber and other forest products in forests in the non-permanent forest domain is carried out in accordance with the provisions of this law and its subsequent texts.

#### **CHAPTER III: CLASSIFICATION AND DECLASSIFICATION**

##### **SECTION I: CLASSIFICATION**

**Article 44:** The classification and declassification commission meets at the sub-prefecture where the forest to be classified is located. However, when the transport and reception conditions of its members so require, it may meet at the prefecture or in the municipality concerned.

It determines the limits of the forest to be classified, notes the absence or existence of the rights of use encumbering this forest, and examines the merits of the complaints made.

If such rights exist, the committee notes the possibility of maintaining them in full; otherwise, it fixes their consistency and can confine them to well-defined forest areas.

A decree taken by the Council of Ministers specifies the criteria for assessing the complaints made.

A report recording the operations carried out by the classification and downgrading commission, and duly signed by the stakeholders, is sent to the government. A copy of these minutes is given to all members of the committee.

A decree taken by the Council of Ministers declares the classification or downgrading.

#### **TITLE III: FOREST DOMAIN OF PRIVATE PERSONS**

	<p><b>Article 59:</b> Any natural person, of Congolese nationality or legal person under Congolese law, who plants forest trees on land falling within the non-permanent forest domain, acquires ownership of the planted trees therein, subject to:</p> <ul style="list-style-type: none"> <li>- rights of third parties, including customary and user rights of local communities and indigenous populations;</li> <li>- that the number of trees planted exceeds that of trees not resulting from planting;</li> <li>- that the boundaries of the planted land are clearly marked.</li> </ul> <p><b>Article 60:</b> The rights acquired in application of the provisions of article 59 above are transferable, in accordance with the law. They cease with the clearing of the land, the abandonment or the withering away of the stand.</p> <p>The holders of these rights have the plantation certified by the water and forest administration.</p> <p>The recognition procedures are developed in accordance with the legislation in force.</p> <p><b>Article 61:</b> Private persons exercise the rights attached to private property over forests, located on land belonging to them.</p> <p><b>Article 62:</b> The owners of private forests and the holders of planting rights freely dispose of the products from their forest stands, subject, where applicable, to compliance with the development plans or simple management plans that they have contractually committed to. enforce.</p> <p>A decree taken by the Council of Ministers specifies the conditions for the management of natural forests and forest plantations of private individuals.</p> <p><b>TITLE IV: USE OF THE STATE FOREST DOMAIN</b></p> <p><b>CHAPTER I: PRINCIPLES OF THE MANAGEMENT, CONSERVATION AND DEVELOPMENT OF THE STATE FOREST DOMAIN</b></p> <p><b>Article 63:</b> The water and forest administration ensures at the national and departmental levels that the activities authorized in the national forest domain are</p>
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	<p>carried out in such a way as to avoid its destruction and to ensure its sustainability, its extension and its sustainable exploitation.</p> <p><b>Article 64:</b> These activities must be carried out with the objective of rational management of forest resources, on the basis of sustainable management of forest ecosystems guaranteeing sustained forest production, while ensuring the conservation of the environment, and in particular of biological diversity.</p> <p><b>Article 67:</b> In protected forests, the water and forest administration intervenes in consultation with local communities, local communities and indigenous populations, the services of agriculture and livestock, the environment and / or other services. public concerned, projects, civil society organizations, to promote the maintenance of useful wood and non-wood production, land productivity, as well as the conservation of ecosystems, soil and water and the preservation of the environment.</p> <p>The issuance of special permits in this forest area obeys the provisions set out in article 125 below.</p> <p><b>Article 68:</b> The water and forest administration takes appropriate measures to ensure participatory forest management, involving local communities and indigenous populations.</p> <p><b>Article 71:</b> In all outbuildings in the forest estate, it is forbidden to light a fire except in the cases of the use rights provided for in article 73 below as well as for campfires which are regulated in recreational forests and in tourism facilities. It is also forbidden to abandon a fire that is not extinguished.</p> <p><b>Article 72:</b> Anyone who notices a forest fire or a fire that could spread to a forest should make every effort to extinguish it or to urgently notify the nearest local authority. The latter is required to take all necessary measures. The agents of the local administrative authority and, failing that, the local officials of the water and forestry administration may request the assistance of the inhabitants of neighboring villages and any person in the vicinity, to fight against the fire.</p> <p>The minister in charge of water and forests provides by decree for prevention and support measures for forest fires and has response plans prepared.</p> <p><b>CHAPTER II: USAGE RIGHTS</b></p>
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**Article 73:** In protected forests, local communities and indigenous populations, subject to the regulations provided for in this article, enjoy rights of use enabling them in particular to:

- harvest the wood and non-wood products necessary for the construction and maintenance of their homes as well as for cultural, food or medicinal use;
- hunt and fish for local consumption within the limits provided by law;
- establish crops with traditional means or beehives and graze their livestock or harvest fodder;
- use the forest for the exercise of worship and rites, in particular sacred forests, sanctuaries or ritual sites;
- have access to watercourses and water sources for the satisfaction of their vital or customary needs.

A decree from the minister in charge of water and forests regulates these rights. It also specifies the criteria that can be used by the Minister in charge of Water and Forests in order to limit the consistency or the exercise of user rights by decree, in specific cases.

**Article 74:** In forests in the private domain of the State, forests of local communities, forests of public legal entities and community forests, classification decrees, development plans and simple management plans recognize user rights. of which they indicate the consistency and the conditions of exercise within the limits of article 73 above.

**Article 75:** The rights of use are reserved for the satisfaction of the personal needs of their beneficiaries. Their exercise is free. However, the products resulting from the right of use can be the object of a retail sale at the local level, framed by an order of the minister in charge of water and forests.

Forest fires and vegetation fires recognized within the framework of these rights of use are regulated by order of the Minister in charge of water and forests.

### **CHAPTER III: CONTROL OF FOREST LEGALITY AND THE TRACEABILITY OF FOREST PRODUCTS**

**Article 76 :**The water and forest administration is developing and implementing a system for verifying the legality of loggers and forest products for all timber produced or in transit through the national territory. It aims to ensure the legal character and status of timber and forest products, which makes it possible in particular to guarantee:

	<ul style="list-style-type: none"> <li>- respect for forest legality;</li> <li>- supply chain control to track timber and forest products from the forest to the point of export;</li> <li>- verification of the compliance of operations with all elements of the definition of legality and control of the supply chain;</li> <li>- procedures for issuing and issuing export authorizations and other authorizations;</li> <li>- independent audit, in order to guarantee the effective functioning of the system.</li> </ul> <p><b>Article 77:</b> The national legality verification system is based on the information provided by the legality compliance verification and supply chain control.</p> <p>Legality verification is carried out on the basis of national legality verification procedures.</p> <p>An order of the Minister in charge of Water and Forests defines the procedures for verifying legality.</p> <p><b>Article 78:</b> The forest legality control is carried out by the water and forest administration. Legality checks can be carried out by private independent auditors, on the basis of private standards officially recognized by the water and forest administration.</p> <p><b>Article 79 :</b> The Water and Forests Administration is setting up a national traceability system aimed at monitoring the wood from its origin of cutting on the exploitation site to its packaging and its stuffing for export or sale at the national level.</p> <p><b>Article 80:</b> It is created within the forest administration a specific structure responsible for monitoring the national legality verification system.</p> <p>A decree from the minister in charge of water and forests specifies the organization, operation, financing, roles and responsibilities of this structure.</p> <p><b>Article 81:</b> The circulation on national territory of forest products imported or in transit must be controlled using the national traceability system in force.</p> <p>Any forest product present in the national territory must be recorded at each stage of its traceability in the system, whether it is:</p>
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- from a natural forest or plantation;
- resulting from exploitation in one of the securities described in Articles 117 to 127 below;
- intended for export, processing or local sale;
- imported or in transit.

Forest products not registered and circulating or having circulated on the national territory in violation of the provisions of the above paragraph are declared illegal.

**Article 82:** The border control procedures for forest products in transit or imported, their brand and control responsibilities, as well as their inclusion in the national traceability system are set by regulation.

**Article 83 :** An independent observer, a body drawn from national civil society organizations and recognized by the government, carries out independent field missions or jointly with officials from the water and forestry administration, and regularly produces reports and recommendations on compliance. of forest legislation.

The independent observer's reports and recommendations are made public after validation by a reading committee.

A decree from the minister in charge of water and forests specifies the composition, organizational and operating methods of this reading committee.

## **TITLE V: INVENTORIES OF FOREST AND WILDLIFE RESOURCES AND DEVELOPMENT OF FOREST CONCESSIONS**

### **CHAPTER I: INVENTORIES OF FOREST AND WILDLIFE RESOURCES**

**Article 89 :** Under this law, six main types of forest and wildlife resource inventories are recognized:

- the national forest inventory;
- the planning or pre-investment inventory;
- the multi-resource development inventory;
- timber harvesting inventory;
- inventory of environmental services

- the inventory of wild fauna;
- inventory of other forest products.

## CHAPTER II: DEVELOPMENT OF FOREST CONCESSIONS

### SECTION I: FOREST RESOURCE MANAGEMENT

**Article 91:** The management of a forest management unit is subject to the development of a management plan in accordance with national directives and standards issued by order of the Minister in charge of water and forests.

The management of a domestic operating unit is subject to the development of a simple management plan in accordance with national directives and standards issued by order of the Minister responsible for water and forests.

**Article 92 :**In forests in the private domain of the State, the preparation of management plans is the responsibility of the forest administration. However, when a forest management unit or a planted forest is granted to a forest operator, the latter must prepare a management plan, within a period not exceeding three years, under the supervision of the administration of waters and forests.

Before the forest management unit is granted, a pre-investment inventory must be carried out.

During the development of the development plan, operation will be limited to a maximum annual forecast volume, determined by the pre-investment inventory.

A decree taken in the Council of Ministers determines the modalities of application of the provisions of this article.

**Article 93 :**The development of the management plan obeys the principles of sustainable development and participatory forest management. It is developed in accordance with national planning standards and guidelines.

Medium-sized forest management units will be subject to a simplified management plan.

An order of the Minister in charge of water and forests defines the conditions for the development of the management plan as well as the size of the medium-sized forest



	<p>management units, including the modalities of participation of stakeholders and in particular of local communities and indigenous populations living in or around the perimeter of the forest concession.</p> <p>The development plan is approved by decree taken in the Council of Ministers.</p> <p><b>Article 94 :</b> In the permanent forest domain, the management plan of a forest concession provides for a series of production, a series of conservation, a series of protection, a series of community development and a series of research, which constitute the basic units, for the performance of planning, management, conservation and production tasks.</p> <p><b>Article 95 :</b> In the production series, timber exploitation is carried out on the basis of forest production units, the area and number of which are defined by the management plan.</p> <p>The delimitation of community development series is done in consultation with civil society organizations, local communities, local communities and indigenous populations concerned.</p> <p>The conservation series are delimited according to the results of inventories of flora and fauna.</p> <p>The modalities of management of these series are defined by an order of the Minister in charge of water and forests.</p> <p><b>Article 96:</b> The development plan provides for the establishment of a consultation and conflict management mechanism at the forest concession level, called the consultation committee. This committee is responsible in particular for:</p> <ul style="list-style-type: none"> <li>- adopt and implement the management plan for the community development series of the forest management unit;</li> <li>- examine and approve the local development fund budget and project eligibility criteria;</li> <li>- review and approve the micro-projects and activities to be developed in the community development series;</li> <li>- facilitate the settlement of disputes between stakeholders within the forest management unit;</li> <li>- ensure the follow-up of the particular specifications.</li> </ul> <p>This committee is made up of representatives of local authorities, civil society organizations, the forestry company, local communities and indigenous populations.</p>
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	<p>An order of the Minister in charge of water and forests determines the composition, functioning, attributions and method of referral to this committee.</p> <p><b>Article 97 :</b> When a planted forest belonging to a local community is the subject of a domestic exploitation permit, the manager of this forest appoints a person in charge of the execution of the simple management plan and the administration of water and forests. appoints a controlling agent.</p> <p>The simple management plan for a planted forest belonging to a local or territorial community is proposed by the latter for approval by the water and forestry administration, under the conditions provided for by order of the minister in charge of water and forests. . The revision of the simple management plan is approved by the water and forestry administration.</p> <p>If intervention by the forestry fund, instituted in article 199 below, is necessary for the implementation of the simple management plans referred to in this article, it is subject to the favorable opinion of the fund management committee.</p> <p><b>Article 98:</b> The development and implementation of management tools for a forest belonging to a local community is the responsibility of the latter with the assistance of the water and forest administration.</p> <p><b>Article 99 :</b> The process of developing and implementing management plans follows national standards and guidelines for the management of forest concessions.</p> <p>The stages for the development of a development plan are specified by a decree taken by the Council of Ministers.</p> <p><b>Article 100 :</b> Forest resources inventory studies and additional studies are examined and validated by an interministerial commission.</p> <p>The composition and functioning of this commission are specified by a decree taken in the Council of Ministers.</p> <p><b>Article 101:</b> The development plan is adopted by a commission bringing together the different stakeholders, including civil society organizations, local communities and the indigenous populations concerned.</p>
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	<p>This commission meets in the department concerned.</p> <p>The composition and functioning of this commission are specified by a decree taken in the Council of Ministers.</p> <p><b>Article 102 :</b> The evaluation of the management plan is made by an evaluation committee, bringing together all the stakeholders, including representatives of local communities and indigenous populations, on the basis of the assessment of the implementation of the management plan. development series.</p> <p>In the event of force majeure, in particular the occurrence of unforeseeable events such as fire, tree dieback or changes in the market, the revision of the development plan is anticipated, at the initiative of the Minister in charge of water. and forests or the operator. The modalities of revision will be defined between the water and forest administration and the operator.</p> <p><b>Article 103 :</b> After the adoption of the development plan, the body responsible for its implementation produces a management plan for each series of development, under the conditions set by order of the Minister in charge of water and forests.</p> <p>The management plan for each series is subject to validation by the water and forest administration.</p> <p>A management report for each series is submitted for examination by the evaluation committee provided for in article 102 above.</p> <p><b>Article 104 :</b>The management of community forests is done on the basis of a simple management plan. This plan is drawn up by the competent services of the water and forestry administration. However, local communities and indigenous populations can call on the private organizations of their choice to assist them in drawing up a simple management plan.</p> <p>This plan must contain a descriptive part of the rights and obligations and a cartography and it must respect the requirements of sustainability of the resource and environmental protection. It is developed at the behest of local communities and indigenous populations.</p> <p>The process of developing and implementing simple management plans follows national standards and guidelines for the simplified management of community forests.</p>
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	<p>A decree of the Minister in charge of water and forests specifies the methods of development and approval of the simple management plan referred to in articles of this law.</p> <p><b>CHAPTER IV: ECONOMIC EXPLOITATION OF STATE FOREST DOMAIN AND TIMBER PROCESSING</b></p> <p><b>Article 110:</b> The exploitation for commercial purposes of all the forest products of the State forest domain, is carried out, either by management or by holders of exploitation titles issued by the water and forest administration.</p> <p><b>Article 111:</b> Logging complies with reduced impact logging standards defined by order of the Minister in charge of water and forests and including specific provisions for sensitive forests or difficult to access forests, such as mangroves, swamp forests, flooded or floodplains and mountain forests.</p> <p><b>Article 112:</b> The products of natural forests or planted forests must be processed on the national territory, so that exports relate, not to raw materials, but to semi-finished or finished products.</p> <p>However, the export of logs may be authorized up to a maximum of 15% of the total production of the concessionaire who requests it. In this case, exported logs are subject to specific taxation, the rates of which are specified in a regulatory text.</p> <p>An order of the Minister in charge of water and forests determines the nature of the semi-finished or finished products referred to in paragraph 1.</p> <p><b>Article 115:</b> The water and forest administration takes incentive measures, with a view to further national development of forest resources extracted from natural or planted forests, through declining taxation of exports, depending on the degree of processing.</p> <p>These taxes will be based solely on economic criteria so as to match the value of the products, without interrupting or even slowing down the expansion and sustainability of the forest economy.</p> <p><b>SECTION I: OPERATING TITLES IN THE PRIVATE DOMAIN OF THE STATE</b></p> <p><b>Article 117:</b> Operating titles include:</p>
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	<ul style="list-style-type: none"> <li>- the development and transformation agreement;</li> <li>- the agreement for the valuation of plantation timber;</li> <li>- the domestic operating permit;</li> <li>- the permit to cut plantation timber and</li> <li>- the special permit.</li> </ul> <p><i>Ultimately, the aforementioned agreements will be converted into a partnership contract as soon as the conditions for switching from the concession regime to the production sharing regime have been met.</i></p> <p><i>A specific law will determine the modalities for the conversion of these agreements and the sharing of production.</i></p> <p><b>Article 118:</b> The holders of logging titles, from the date of signature of the agreement, permit or delivery of the decision to award the special permit, are responsible for offenses committed in the logging area for which the titles have been issued, if they do not indicate it by making known the authors in a report which must be submitted to the departmental directorate of water and forests.</p> <p>To this end, licensees must develop collaboration with stakeholders for the investigation of the offense.</p> <p><b>Article 120:</b> The plantation timber valuation agreement, the title of which is issued by the Minister in charge of water and forests, guarantees its holder the right to take from a plantation in the State forest domain, a defined volume of timber according to the detailed conditions in the development plan as provided for in article 90 above.</p> <p>The duration of this agreement is based on the rotation cycles of species planted up to a maximum of 3 cycles, for fast-growing species, as defined in national standards.</p> <p>For species with medium or long growth, the duration of the agreement will be fixed according to the operating cycle of the plantation area and the volume to be exploited. However, it cannot exceed 20 years.</p> <p>Under the terms of the plantation timber valuation agreement, its holder is also subject to the obligation to regenerate the plantation.</p>
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	<p><b>Article 121 :</b>The management of a planted forest must comply with the prescriptions of a management plan drawn up by its holder and validated by the water and forest administration. The planted forests of the State forest domain subject to an agreement for the valuation of plantation timber must be managed according to a development plan adopted by a validation commission as defined in article 101 above. .</p> <p>A decree from the minister in charge of water and forests specifies the terms and conditions for the development of these plantations.</p> <p><b>Article 122:</b> The domestic exploitation permit, issued by the minister in charge of water and forests and according to a simple management plan approved by the water and forestry administration, gives its beneficiary the exclusive right to exploit the woody resource for which it is issued.</p> <p>The maximum area of a domestic forestry unit will be determined by an order of the Minister in charge of water and forests.</p> <p>It is valid for a period not exceeding three (3) years. The exact volume of wood harvested annually, as well as the authorized species, are specified in the logging permit.</p> <p>The operating conditions under this type of permit are set out in Articles 141, 142 and 146 below.</p> <p><b>Article 123:</b> The permit to cut plantation timber is issued by the minister in charge of water and forests, for the exploitation of a limited quantity of trees in forest plantations forming part of the State forest domain. The duration of this permit, which depends on the quantity of plants to be removed, cannot exceed six months.</p> <p><b>Article 124 :</b> Standing sales of timber from forest plantations in the State forest domain are made through public auctions.</p> <p>However, when the public auction could not take place twice in succession for lack of a minimum of two participants or did not produce results due to the fact that no participant purchased at a higher withdrawal price , the sale is done by mutual agreement.</p> <p>The plantation timber cutting permit is issued after public tender by the director general in charge of forests.</p>
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	<p>A decree of the Minister in charge of water and forests determines the zones in which the permits for cutting plantation timber are allocated, and the modalities of organization of the public tendering procedure referred to in the preceding paragraphs.</p> <p><b>Article 125:</b> The special permit confers on its holder the right to exploit, in the natural forest, forest products other than timber in the quantities and places it specifies and to market them.</p> <p>In landlocked areas of the State forest domain, the special permit can be extended to the exploitation and artisanal processing of timber species in limited quantities, and their marketing at the departmental level and in nearby localities. operating zones which will be defined in the operating permit.</p> <p><b>Article 126:</b> The agreements and permits listed in article 117 above are strictly personal. They cannot be transferred, nor be the subject of subcontracting, except authorization of the administration of water and forests, in particular for the operations of prospecting, felling and transport, sale of the debits that only the companies belonging to the Congolese are authorized in priority to work as a subcontractor.</p> <p>Persons called upon to inherit property found on an active site are authorized to continue operating under the same conditions as their deceased, until the expiry of the agreement or permit, unless that they do not have the skills necessary to effectively continue the activities of the site.</p> <p>If a company, in a state of insolvency, is put into receivership, the court, which will have noted this state, appoints a forestry specialist from among the members of the trustee, in the event of continued forestry activities.</p> <p>The operating permit held by this company cannot be transferred to any creditor, in compensation for the debts of the company.</p> <p><b>Article 127 :</b>Any holder of one of the agreements, listed in article 117 above, must have a triangular forest hammer, the imprint of which is deposited at the registry of the district court in which the holder is domiciled. The copy of the judgment of the registry is sent by the holder to the administration of water and forests.</p> <p>A joint order of the minister in charge of water and forests and of the minister in charge of justice defines the inscriptions appearing on this hammer.</p>
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## SECTION II: FOREST EXPLOITATION FOR INDUSTRIAL PURPOSES

**Article 128 :** The development and transformation agreement covers areas and durations sufficiently extended to allow its holder to carry out the agreed development programs. The duration of this agreement cannot exceed thirty years. It is renewable, except for fault of the beneficiary, observation of the decline of the stands or reason of public interest. In the latter case, the holder is entitled to be compensated for the damage he suffers.

**Article 129:** The forestry companies are taking appropriate measures to optimize wood processing and enhance the value of wood residues from logging and processing industries. Residues are categorized, quantified and their volumes communicated to the forestry administration, in accordance with regulatory provisions.

**Article 130:** The additional conditions for monitoring compliance with the legal and contractual obligations to which the holder is subject, the penalties for non-performance or poor performance as well as the protective measures likely to be taken in the interest of forest stands are defined by order of the minister in charge of waters and forests.

**Article 131 :** Conventional logging allows the export of wood products. It takes place in industrial form and only in forest management units and forest plantations.

**Article 132:** The exploitation for industrial purposes of natural forests by holders of development and transformation agreements is subject to the prior obtaining of the legality certificate and the obtaining of an annual cutting authorization. This authorization must take into account the annual possibility of the forest and the processing capacity of the processing unit installed for this purpose. However, the processing capacity of the industrial unit cannot be greater than the annual possibility.

**Article 133:** The financing methods for the development of natural forest areas and for the enhancement of forest plantations are defined in the agreements.

**Article 134:** The agreements referred to in article 117 have two parts:

- the general specifications, which have a synallagmatic character and determine the rights and obligations of the parties;
- the particular specifications, which specify the responsibilities of the successful tenderer and complete the general specifications, in particular with regard to the development plan, industrial facilities, log production and

	<p>wood processing programs, training professional, as well as the contribution to the creation and / or operation of training centers for woodworking and</p> <p>social or operating infrastructure, including the living base development master plan, contributions to the local development fund and the equipment of the water and forest administration.</p> <p>The goal of the local development fund is to finance development micro-projects and other alternative activities to the exploitation of forest and wildlife resources by local communities and indigenous populations. Other contributions can be made by logging companies to the development of the economic activities of local communities and indigenous populations and to the improvement of their living conditions, within the framework of social responsibility.</p> <p>The water and forest administration takes appropriate measures to involve local communities, local communities and indigenous populations in the development of specific specifications.</p> <p><b>Article 135:</b> The general specifications relate to agreements and permits; it relates to the control of the execution of the development plans, the transformation, the circulation and the marketing of the products.</p> <p>A decree taken by the Council of Ministers sets out these general specifications and specifies the conditions for granting agreements and permits, the conditions for carrying out forestry activities, concluding agreements and issuing permits.</p> <p><b>SECTION IV: FOREST EXPLOITATION FOR ARTISANAL PURPOSES</b></p> <p><b>Article 145 :</b> Logging for artisanal purposes is carried out on the basis of a special permit, reserved exclusively for natural persons of Congolese nationality, non-governmental organizations and associations governed by Congolese law.</p> <p>An order of the Minister in charge of water and forests determines the list of other forest products, the quantity of authorized timber feet, the areas in which the special permit is allocated, the duration, as well as the terms of its attribution.</p> <p><b>Article 146 :</b>The special permit is issued by the departmental director of water and forests at the request of the person concerned, after payment of the forestry tax on other forest products or timber species, for which he authorizes the exploitation. A copy is sent to the local authority.</p>
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## SECTION V: MARKETING OF FOREST PRODUCTS

**Article 148:** A public service has been created within the Water and Forests Administration which ensures the control of forest products for export and market monitoring. This service regularly publishes a report on the situation of the sector, in particular the selling prices of forest products for export, to serve as a basis for setting the tax base.

A decree taken in the Council of Ministers fixes the modalities of organization and functioning of this service.

**Article 149:** Forest products intended for export must meet recognized international standards.

**Article 150:** A decree taken in the Council of Ministers fixes the modalities of circulation of forest products.

## CHAPTER VI: DEFORESTATION OR DEFORESTATION

**Article 158 :**Deforestation of all or part of a classified forest is subject to its downgrading, under the conditions provided for in Articles 47 to 53 above, as well as to the conduct of a social and environmental impact study, according to the legislation. in force. However, these provisions do not apply to deforestation necessary for the construction of tracks and other infrastructures, provided for in the development plan of the forest concerned.

**Article 159 :** All companies other than forestry companies which, during their activities carry out a deforestation operation, are required to obtain a deforestation authorization from the Minister in charge of water and forests.

The conditions for deforestation of a part of the forest concerned are regulated and subject to authorization by decree taken in the Council of Ministers.

**Article 160 :** The issue of the deforestation authorization provided for in article 159 above is subject to the payment of a deforestation tax.

**Article 161 :** The exploitation of wood and non-wood forest products in the context of deforestation must comply with the regulations in force, in particular with regard to the traceability of wood products as provided for in article 76.



	<p><b>Article 162 :</b> Within a forest allocated by agreement or by permit, the products resulting from deforestation always and exclusively belong to the holder of the title.</p> <p>When deforestation takes place in a planted forest, the proceeds return to its owner.</p> <p><b>Article 163 :</b> When the products of deforestation belong to a company that is not a forestry company, their sale on the national or international market, the conditions for removing the wood and the payment of the various taxes are carried out in accordance with the provisions of this law.</p> <p><b>Article 164 :</b> Except in cases of force majeure, in the event of abandonment of the timber for a period of six months after their felling and after recognition and seizure of the timber by the water and forestry administration, the departmental director of water and forests, after consulting the director general in charge of forests, authorizes on a case-by-case basis, with regard to the quantity and distance of wood, donations for the benefit of the local communities and indigenous populations concerned, civil society, the local community or public administrations . These donations will be documented in accordance with national timber traceability requirements.</p> <p>A decree from the minister in charge of water and forests specifies the conditions for the transfer of this wood.</p> <p><b>Article 165 :</b> Apart from traditional agricultural activities, all the provisions concerning deforestation are applicable for the non-permanent forest domain. When deforestation takes place in a protected forest, the products return to the State which decides by ministerial decree on their destination.</p> <p>Traditional agricultural activities are not subject to the provisions of Articles 158 and 159 above.</p> <p><b>Article 166 :</b> Companies other than those authorized to manage forest plantations belonging to the State, in particular mining or oil companies, which carry out deforestation in the reforestation areas, for the establishment of production or transport infrastructure, are required to " obtain an occupancy permit from the minister in charge of water and forests.</p> <p>The issue of the occupancy permit provided for in the above paragraph is subject to the payment of an occupancy tax.</p>
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	<p>The conditions for issuing the occupation permit are set by decree taken in the Council of Ministers.</p> <p><b>TITLE VI: AFFORESTATION AND REFORESTATION</b></p> <p><b>Article 167:</b> Afforestation and reforestation activities are works of public interest, which help maintain ecological balance.</p> <p><b>Article 168:</b> The administration of water and forests guarantees the creation and reconstitution of forests, through the development and implementation of afforestation, reforestation and monitoring programs for the natural regeneration of forests.</p> <p><b>Article 169:</b> A public body responsible for implementing the national policy on afforestation and reforestation, the production of seedlings, the popularization of silvicultural techniques and the protection of basins is created within the water and forest administration. slopes.</p> <p>A decree taken in the Council of Ministers fixes the modalities of organization and functioning of this service.</p> <p><b>Article 170:</b> The government encourages the involvement of citizens, local communities and indigenous populations, decentralized administrative entities, civil society organizations and private individuals or legal entities in afforestation, reforestation and enrichment works. and monitoring the natural regeneration of forests.</p> <p>The State facilitates the financing of afforestation and reforestation operations. Other sources of funding accompany and support the public budget.</p> <p>The acquisition of wooded land, land to be afforested and the carrying out of forestry work benefit from specific tax incentives.</p> <p>The exercise of afforestation or reforestation activities benefits from an incentive tax system.</p> <p>A decree taken by the Council of Ministers determines the modalities of application of these measures.</p>
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	<p><b>Article 171:</b> Afforestation, reforestation, enrichment works and monitoring of natural forest regeneration are carried out under the authority of the water and forest administration, by natural or legal persons, public or private.</p> <p>A decree taken in the Council of Ministers sets these standards according to their field of application and defines the conditions for establishing plantations.</p> <p><b>Article 172 :</b> The realization of afforestation and reforestation activities is subject to an authorization from the Water and Forests Administration under the conditions and within the limits set by order of the Minister in charge of Water and Forests.</p> <p><b>Article 173:</b> The people and communities who carry out afforestation or reforestation activities benefit from all or part of the resulting forest products, under the conditions set by regulation.</p> <p>Local communities, indigenous populations and individuals have the obligation to declare their forest plantation annually to the departmental directorate in charge of forests within six months of the end of the plantation.</p> <p>The exploitation of the products resulting from these forest plantations must be carried out in compliance with the provisions of this law and its implementing texts, in particular with regard to the exploitation titles specific to forest plantations, as well as those relating to environmental protection.</p> <p><b>TITLE VII: THE FIGHT AGAINST CLIMATE CHANGE AND PAYMENT FOR ENVIRONMENTAL SERVICES</b></p> <p><b>Article 174:</b> The development of policies, strategies, national action plans, research programs, management plans and regulations for the sustainable management of forest ecosystems, as well as the implementation of forestry work, take into account the fight against climate change.</p> <p>To this end, the ministry in charge of water and forests, together with all the other actors concerned, carries out or encourages programs linked to research on the current and future impacts of climate change on these ecosystems.</p> <p><b>Article 175:</b> The government is taking the necessary measures to promote the adaptation of forest ecosystems and their biodiversity as well as their management to climate change, in order to reduce their vulnerability and increase their resilience.</p>
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**Article 176 :** The government is developing a national strategy for reducing greenhouse gas emissions from deforestation and forest degradation, including sustainable forest management, biodiversity conservation and increasing forest carbon stocks . The development of this strategy is done in a participatory approach involving representatives of the administrations concerned, the private sector, local communities, indigenous populations and civil society organizations.

The methods for developing and validating the strategy referred to in the previous paragraph are defined by decree taken by the Council of Ministers.

**Article 177:** Local strategies for reducing greenhouse gas emissions are gradually developed at departmental or interdepartmental level.

The development of local strategies is done in a participatory manner through the involvement of all the local stakeholders concerned by the use and management of forest ecosystems in accordance with the national strategy and the texts in force.

**Article 178:** The procedures for developing and validating local strategies are specified by decree issued by the Council of Ministers.

**Article 179 :** The government is setting up, as needed, new structures responsible for the implementation of the national strategy for the reduction of greenhouse gas emissions due to deforestation and

forest degradation, including sustainable forest management, biodiversity conservation and enhancement of forest carbon stocks.

**Article 180 :** Activities which contribute to reducing greenhouse gas emissions, conserving or increasing carbon stocks within the framework of projects, are authorized on forests, forest lands or forest lands belonging to public or private persons.

These activities take into account the environmental and social safeguard measures in force.

**Article 183:** The right to generate carbon credits and to market them is recognized for natural or legal persons.

Carbon credits can be generated from forests in the permanent domain and in the non-permanent forest domain of the State, either by management or by the promoters of projects to reduce emissions linked to deforestation and forest degradation, including management. sustainable forests, the conservation of biodiversity and the increase in forest carbon stocks, on the basis of an authorization

	<p>issued by the Minister in charge of water and forests, under the conditions provided for by regulation.</p> <p><b>Article 184:</b> In forests belonging to the State, to local communities or to other legal persons governed by public law, the carbon credits generated belong respectively to the State, to the local authority or to another legal person governed by public law concerned.</p> <p>In the event that the carbon credits are generated by a project to reduce emissions linked to deforestation and forest degradation including sustainable management of forests, conservation of biodiversity and increase in forest carbon stocks, led by a natural or legal person of private law, this one is also co-owner.</p> <p>However, the holders of customary rights and user rights are beneficiaries of carbon credits.</p> <p>In community forests, the carbon credits generated belong only or jointly to the local community and / or to the indigenous populations concerned, depending on whether the project is implemented by them or by a third party.</p> <p><b>Article 185:</b> Unless otherwise stipulated, the concession of a natural forest or a forest plantation belonging to the State does not confer carbon rights on the beneficiary.</p> <p><b>Article 186:</b> The carbon credits generated in a private forest plantation under the State forest domain are the property of the natural or legal person having planted the said forest. When the owner is not the operator of the carbon credits, the ownership of these is defined in a contract signed between the parties.</p> <p><b>Article 187:</b> Carbon credits generated in a natural private forest belonging to a natural or legal person or a forest planted by the latter belong to him. When the natural or legal person is not the operator of the carbon credits, the sharing of carbon credits is defined in a contract signed between the parties.</p> <p><b>Article 188:</b> The terms for the marketing of carbon credits are set by regulation.</p> <p><b>Article 189:</b> The sale of carbon credits belonging to natural or legal persons is subject to a tax on the sale of forest carbon credits.</p> <p><b>TITLE X: TAXES AND SALE PRICES FOR PLANTING TIMBER</b></p>
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	<p><b>Article 203:</b> With the exception of the user rights provided for in Articles 73 to 75 above, the exercise of which is free, the exploitation of forest products and the deforestation of forest plots are subject to the payment of forest taxes.</p> <p>Wood residues from logging and industrial processing of non-valued wood are subject to payment of the residue tax.</p> <p>Export and import of forest products are subject to payment, respectively, of export tax and import tax.</p> <p>All taxes provided for by this law are not subject to any exemption.</p> <p><b>Article 204:</b> The State has a resale right and / or mortgage on exported products, whatever their degree of processing.</p> <p>All producers of wood intended for local processing or forest products intended for export must first pay the taxes provided for by this law.</p> <p><b>CHAPTER I: FOREST TAXES</b></p> <p><b>Article 205:</b> The planned forestry taxes are:</p> <ul style="list-style-type: none"> <li>- the area tax;</li> <li>- the slaughter tax;</li> <li>- the tax on other forest products;</li> <li>- the deforestation tax;</li> <li>- occupancy tax;</li> <li>- the tax on the sale of forest carbon credits;</li> <li>- the residue tax;</li> <li>- import tax;</li> <li>- export tax.</li> </ul> <p><b>Article 217:</b> The residue tax is indexed to the category and quantity of residue produced by the forestry company.</p>
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	<p>The rate of the residue tax is set by joint order of the Minister in charge of Water and Forests and the Minister in charge of Finance. It is collected by the water and forest administration and transferred to the Public Treasury.</p> <p><b>Article 218:</b> The tax on forest products other than timber is set by tariff, depending on the product. It is collected by the water and forest administration and transferred to the Public Treasury.</p> <p><b>Article 221:</b> The export of other forest products, raw or processed from natural forests or plantations, is subject to a tax based on the quantities exported.</p> <p>The fixing and revision of rates are established so as to promote the export of processed products, as well as their diversification. The revision is made according to the evolution of the markets, as well as the degree of transformation in the country.</p> <p>The rates of this tax are set by joint order of the Minister in charge of Water and Forests and the Minister in charge of Finance, for each category of products, between 0% and 10% of the FOT value.</p> <p>A decree taken by the Council of Ministers fixes the methods for setting and revising these rates.</p> <p><b>Article 225:</b> Other forest products, raw or processed, exported or imported are subject to the payment of an export or import tax, subject to the stipulations of sub-regional, regional and international agreements.</p> <p>The collection of this tax is ensured by the customs service from exporters and importers.</p> <p>Its proceeds are donated to the public treasury.</p> <p>The rate of the export tax indexed to the FOT value is set between 5% and 10% by joint order of the Minister in charge of Water and Forests and the Minister in charge of Finance.</p> <p><b>Article 261:</b> Whoever, in the protected forest or in the permanent forest estate, cuts, sets on fire, mutilates, barks, uproots trees, or exploits other forest products, without having been duly authorized, will be punished with a fine equivalent to the value FOB per foot. If there has been exploitation of a commercial nature, the offender will be punished with a fine equivalent to double the FOB value per plant.</p>
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	<p><b>TITLE XI: OFFENSES AND PENALTIES</b></p> <p><b>CHAPTER I: OFFENSES</b></p> <p><b>SECTION II: CONFISCATION AND SEIZURE</b></p> <p><b>Article 238:</b> Any seizure must be the subject of a seizure report.</p> <p>When the perpetrator of the offense is unknown, the enforcement officer through his hierarchy, sends the report of seizure within thirty days to the registry of the competent court, so that it can be communicated to those who would claim the seized items.</p> <p><b>Article 239:</b> The enforcement officer seizes timber, non-timber forest products and wildlife products when they have been felled or illegally harvested.</p> <p>The material used in the commission of the offense is also seized and sent to the judicial authority which will decide on its treatment.</p> <p><b>Article 240 :</b> Timber, non-timber forest products and wildlife products duly seized by the water and forest administration, considered illegal, are treated on a case-by-case basis, as far as their destination is concerned.</p> <p>An Order of the Minister in charge of Water and Forests will specify for each case, the modalities of the treatment retained.</p> <p><b>TITLE XII: TRANSITIONAL AND FINAL PROVISIONS</b></p> <p><b>Article 308:</b> The contrary provisions of the laws, n ° 16-2000 of 20 November 2000 on the forestry code and 14-2009 of 30 December 2009 amending the above-mentioned law 16-2000 are repealed.</p>
Decree no... of... 2017 Setting the conditions for forest management	<p><b>TITLE II: ADMINISTRATIVE MANAGEMENT OF THE NATIONAL FOREST DOMAIN</b></p> <p><b>CHAPTER II: Delimitation and classification of forests</b></p> <p><b>SECTION 3: Community forests</b></p>



#### Article 63

The simple management plan is drawn up by the competent services of the water and forestry administration.

However, local communities and indigenous populations can call on the private organizations of their choice to assist them in drawing up a simple management plan.

The development of the management plan is subject to the prior realization of a socio-economic study, including in particular the various activities carried out, the socio-cultural and development needs, as well as a multi-resource inventory in accordance with the national directives of 'simplified management of community forests. The communities can be assisted by a private organization to carry out these inventories.

The simple management plan includes:

- The division of the community forest into specific zones and the allocation of these to activities to be undertaken there, according to their primary vocation. It is illustrated by a map identifying the different zones.
- Programming based on a socio-economic study and a simplified multi-resource inventory in time and space of all the activities concerned according to the objectives of meeting the various needs of the local community and its members, including those of development ;
- The definition and description of management measures, in particular those relating to the customs and traditions of the community;
- The modalities of the individual exercise of user rights by members of the community;
- Indication of specific rules relating to nature conservation and environmental protection as provided for by the legislation in force and / or the habits and customs of the community.

#### Article 64

The simple management plan is approved by prefectural decree after consulting the departmental director waters and forests of the department concerned

The approval gives the simple management plan an official character, making its execution binding on the local community and its members and enforceable against third parties. The execution of the simple management plan is subject to control by the community forest monitoring and evaluation body.

### CHAPTER III: DEVELOPMENT PLANS

#### SECTION 1: FOREST MANAGEMENT UNITS

#### Article 66

The forest management unit, according to the results of the basic studies carried out, is divided into different series of management. These include the production, protection, conservation, community development and research series.

The management plan, in addition to the stated objectives for the management of the forest management unit, includes:





	<ul style="list-style-type: none"> <li>▪ a cartography of plant formations, geology, pedology, hydrology and population, at 1/200 000;</li> <li>▪ a mapping of the populations and distribution of the inventoried species, at 1/200 000. for large FMUs (&gt; 500,000 ha), the scale can be adapted after approval by the Minister in charge of Water and Forests .;</li> <li>▪ a mapping of remarkable and threatened and inventoried water resources, at 1: 50,000;</li> <li>▪ a plot of networks of plots for monitoring forest dynamics and species growth, at 1: 50,000;</li> <li>▪ a plot determining the location of existing infrastructures or to be created, at 1: 50,000;</li> <li>▪ a map of the different development series at 1: 50,000;</li> <li>▪ the overall exploitable volume, the annual cut possibility and the production run rotation duration;</li> <li>▪ the development diameter of the different species;</li> <li>▪ the plots of young stands, the nature and schedule of silvicultural treatments, the specimens to be preserved and mapped, at 1: 50,000;</li> <li>▪ the protection or reconstitution measures established and mapped for degraded and / or degradable plots, at 1 / 50,000;</li> <li>▪ the potentialities and regulatory measures for the exploitation of accessory forest products such as plants of pharmaceutical or food interest;</li> <li>▪ regulation of the use rights and duties of local communities and indigenous populations and of their participation in development actions;</li> <li>▪ the deadline for revising the development plan.</li> </ul> <p>A simplified management plan based on the elements noted above must be drawn up by the holders of Development and Transformation Agreements covering Forest Management Units with an area of less than 100,000 ha. This simplified management plan responds to the same principles of sustainable management as the development plans of Forest Management Units of more than 100,000 ha.</p> <p>Specific guidelines are developed.</p> <p><b>SECTION 2: DOMESTIC EXPLOITATION</b></p> <p><b>Article 89</b></p> <p>Domestic exploitation permits are subject to a Simple Management Plan in accordance with article 140 of the law on the forestry regime.</p>
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	<p>This simple management plan must cover the entire domestic operating permit and detail over the 3 years of its allocation:</p> <ul style="list-style-type: none"> <li>- The limits of the annual cutting bases which will be the subject of an annual operating inventory</li> <li>- a map of the stands at 1/200 000;</li> <li>- a mapping of remarkable and threatened and inventoried water resources, at 1: 50,000;</li> <li>- regulation of the use rights and duties of local communities and indigenous populations and of their participation in development actions;</li> <li>- low impact operating rules as defined in the standards.</li> </ul> <p><b>CHAPTER IV: DEFORESTATION</b></p> <p><b>Article 114</b></p> <p>Apart from deforestation carried out in forest concessions, all wood from deforestation for agro-industrial, mining and public interest purposes belongs to the State.</p> <p>For the establishment of agricultural plantations in the non-permanent forest domain exceeding 2000 hectares, the departmental directorate of water and forests carries out an inventory of the woody potential, the results of which are submitted to the director general of waters and forests who launches an appeal for offer for the exploitation of all commercial species before the allocation of the area.</p> <p><b>TITLE III: USE OF THE FOREST DOMAIN</b></p> <p><b>CHAPTER I: FOREST AND TIMBER PROFESSIONS</b></p> <p><b>Article 119</b></p> <p>Professional accreditation is instituted for all natural persons and legal persons represented having professional activities in the forest economy, working mainly in the provision of services for the benefit of third parties, without having an operating title, whose main activity is no. It is not the trade in forest products.</p> <p><b>Article 120</b></p> <p>Any natural or legal person wishing to exercise a forest and timber profession is required to obtain approval from the ministry in charge of water and forests.</p> <p>Any natural person, legal representative of a legal person exercising a forestry and timber profession for the benefit of third parties, is required to obtain approval from the Ministry in charge of water and forests.</p> <p><b>Article 121</b></p> <p>The forestry and wood professions concerned by professional accreditation, which act as service providers for third parties, are defined as follows:</p>
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- a) Manager: any natural or legal person whose activity relates to the preparation of forest area management plans.
- b) Forest auditor: any natural or legal person who exercises the audit profession within the framework of forest certification
- c) Prospector: any natural or legal person who carries out a forest demarcation and counting activity on behalf of a third party.
- d) Topographer: natural or legal person, who carries out topography work in the forest on behalf of a third party.
- e) Cartographer: natural or legal person who draws up forest maps on behalf of a third party.
- f) Feller: any natural or legal person who does not hold a cutting permit and whose activities relate to felling and heading.
- g) Cutter: any natural or legal person whose activity involves the felling or harvesting of ancillary forest products subject to the issuance of a special permit as defined in Article 143 of the law on the forestry regime, or species of wood for third parties as well as their shaping.
- h) Forest operator: any natural or legal person, holder of an exploitation permit and whose activities include felling, skidding, preparation of logs and transport to a depot.
- i) Nurseryman: any natural or legal person who carries out, for the personal account or of a third party, an activity of production of seedlings of forest, fruit or ornamental species for the needs of research, conservation or development.
- j) Silviculturist: any natural or legal person who engages in afforestation or reforestation.
- k) Sawyer: any natural or legal person, not holding a cutting right, who carries out a sawing activity.
- l) Craftsman: any natural or legal person who carries out a non-industrial activity of processing forest products
- m) Industrial: any natural or legal person, holder or not of a cutting authorization using machines intended for the mechanical or chemical transformation of wood.
- n) Tool sharpener: any natural or legal person who carries out an activity of preparing and sharpening cutting tools
- o) Classifier: any natural or legal person who carries out a timber classification activity.
- p) Trader: any natural or legal person not holding a cutting right who engages in trade in timber or other forest products.
- q) Transporter: any natural or legal person who does not hold a cutting right who is engaged in the transport of forest products from the storage yard or the places of harvest to a specific point of delivery or marketing of forest products.
- r) Forwarder: Any natural or legal person, who carries out forest products transit operations
- s) Stevedore: Any natural or legal person who carries out stevedoring operations.

#### **Article 122**

The approval of a person to exercise a forestry and timber profession is subject to the presentation of the following documents:

- an application for professional accreditation for one or more professions;
- a certified copy of the identity document;
- an extract from the criminal record;
- two identity photographs;



- a copy of the unique identification number;
- a list of the main equipment and facilities required for the planned activity;
- a sheet on professional experience;
- the certificate of fiscal character.

For legal persons:

- an application for professional accreditation for one or more professions;
- a certified copy of the identity document of the manager of the company;
- an extract from the criminal record of the manager of the company;
- two identity photographs;
- a copy of the company's articles of association;
- a copy of the unique identification number;
- a list of the main equipment and facilities of the company necessary for the planned activity;
- a sheet on the company's experience in the forestry profession;
- the certificate of fiscal character.

### **Article 123**

Any request for professional accreditation and the issuance of a professional identity card is submitted to the departmental directorate of water and forests where the activity will be carried out. The departmental directors of water and forests forward the requests to the general directorate of water and forests with a reasoned opinion. Professional accreditation valid for one year, renewable, is issued to any accredited person.

The fees for issuing or renewing professional accreditation and the identity card are set by joint order of the Minister in charge of water and forests and of the Minister in charge of Finance.

The approval certificate is given to the applicant on presentation of a document justifying the payment of the delivery costs set by joint order of the ministers in charge of finance and water and forests.

### **Article 124**

Any natural or legal person who exercises the professions defined in article 121 above is subject to information obligations, in particular statistical data, according to the requirements of the regulation of the professions exercised.

### **Article 125**

Persons engaged in forestry activities defined above may not carry out activities relating to forest products other than those which have been approved.

People engaged in forestry activities defined above may form professional groups.

## **CHAPTER II: FOREST PLANTATIONS**

### **Article 126**

	<p>Any natural or legal person who plans to carry out a forest plantation informs the departmental directorate of water and forests before it starts. This information relates to:</p> <ul style="list-style-type: none"> <li>- the area to be planted,</li> <li>- essences;</li> <li>- sources of funding;</li> <li>- the plantation objectives: fuelwood, timber, industrial wood, service wood;</li> <li>- the georeferenced map of the plantation area at 1 / 50,000.</li> <li>- the title justifying the occupation or ownership of the project area</li> </ul> <p><b>Article 127</b></p> <p>Any natural or legal person promoting a forest planting project of at least 10 ha informs the departmental water and forestry directorate of the district where the project is located each year of the areas planted or to be planted.</p> <p>Forecasts of forest plantations must reach the departmental water and forest directorate no later than December 1 of the year preceding that of the forest plantation.</p> <p>The data on the implementation of forest plantations must reach the departmental water and forest directorate one month at the latest from the date of the end of the forest plantation program.</p> <p><b>Article 128</b></p> <p>Any natural or legal person who owns one or more forest plantations provides the departmental water and forest management of the local administrative district with a monthly statement of the products exploited, drawn up in accordance with the form attached to this decree. This must reach the said directorate no later than the 30th of the following month.</p> <p><b>Article 129</b></p> <p>The provisions of Articles 126, 127 and 128 above concern forest plantations with an area equal to or greater than one hectare.</p> <p><b>Article 130</b></p> <p>The departmental water and forestry directorate opens a register of forest plantations, updated annually, on which are indicated:</p> <ul style="list-style-type: none"> <li>- the name of the natural or legal person;</li> <li>- the areas planted;</li> <li>- the nature of the species planted;</li> <li>- the location of the plantations;</li> <li>- the phytosanitary state of the plots;</li> <li>- the destination of the products.</li> </ul> <p><b>Article 131</b></p>
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	<p>The departmental directorate of water and forests is required to monitor activities relating to the establishment and operation of forest plantations installed in its constituency.</p> <p><b>Article 132</b></p> <p>Standing sales of trees from State forest plantations are made by public tendering by descending auction, in accordance with article 300 of the law on the forestry regime.</p> <p>These public tenders are decided at the behest of the Minister in charge of water and forests, when plots of exploitable forest plantations are available.</p> <p><b>Article 133</b></p> <p>The public service in charge of reforestation, on the basis of the forest plantation management plan, informs the minister in charge of water and forests of the plots that have reached maturity.</p> <p>The ministry, after field verification of the plots concerned by the competent technical services of the general directorate of water and forests, initiates the public tendering procedure.</p> <p><b>Article 134</b></p> <p>The minister in charge of water and forests informs the public, by any means of communication, of the plots of forest plantations whose trees are to be the subject of a standing sale.</p> <p>The publicity notice indicates in particular the following elements</p> <ul style="list-style-type: none"> <li>- the location of the plots to be exploited;</li> <li>- the quantity of trees and the associated volume;</li> <li>- the nature of the tree species to be exploited;</li> <li>- the conditions required to be successful tenderers;</li> <li>- the duration of exploitation of the trees;</li> <li>- the operating rules to be observed.</li> </ul> <p>Any other information that is necessary and useful for the public can be included in the advertisement.</p> <p><b>Article 135</b></p> <p>Applicants to the auctions, provided for in article 133 above, must meet the following conditions:</p> <ul style="list-style-type: none"> <li>- have a good knowledge of the law;</li> <li>- have experience in the exploitation and processing of forest products;</li> <li>- have the necessary equipment specific to the exploitation and processing of timber from the plantations concerned;</li> <li>- have significant capital and specify the sources of funding;</li> <li>- provide a copy of the civil status document.</li> </ul>
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	<ul style="list-style-type: none"> <li>- specify the goods, movable and immovable, available in Congo, the existing and planned investments, the personnel to be recruited and the commercial outlets.</li> </ul> <p><b>Article 136</b></p> <p>The auction is supervised by the Director General of Water and Forests, assisted by officials from the public service responsible for reforestation and the estate and stamp service.</p> <p>At the end of the auction, a report is drawn up. This mentions the purchasers of the forest plantation plots awarded and the corresponding sales amounts.</p> <p>The selling price of plantation timber must be higher than the cost of setting up the plot.</p> <p><b>Article 137</b></p> <p>Two weeks after the date of the public tender, the General Directorate of Water and Forests and the purchaser have a maximum of fifteen days to initiate negotiations with a view to signing the permit to cut timber for forest plantation.</p> <p><b>Article 138</b></p> <p>During the period of exploitation of the plantation plots by the holder of the cutting permit, the public service in charge of reforestation monitors the cuts.</p> <p>This service ensures compliance with operating rules, in particular that felling is carried out at the required height and that operating residues are sheathed.</p> <p>The departmental directorate of water and forests concerned checks the use of the plots concerned.</p> <p><b>Article 139</b></p> <p>The holder of the permit to cut plantation timber records, daily, the number of trees felled in a site register opened for this purpose.</p> <p>Before the start of cutting activities, this register is brought by the permit holder to the departmental water and forestry directorate for opening.</p> <p>At the end of each working day, the register is updated and endorsed by the representative of the public service responsible for reforestation.</p> <p><b>Article 140</b></p> <p>On expiry of the permit to cut plantation timber, the public service in charge of reforestation is required to address the minister in charge of water and forests, the general directorate of water and forests and the general water inspectorate and forests, a detailed report of the activities carried out, as well as a plan for</p>
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	<p>reforestation of the areas exploited no later than 30 days after the exploitation of the permit.</p> <p><b>Article 141</b></p> <p>At the expiration of the permit to cut plantation timber, the unused trees return to the permanent forest domain of the State.</p> <p><b>CHAPTER V. USE AND ENHANCEMENT OF ACCESSORY FOREST PRODUCTS</b></p> <p><b>Article 213</b></p> <p>The holders of special permits are authorized, in accordance with article 123 of the law on the forestry regime, to exploit accessory forest products. These include:</p> <ul style="list-style-type: none"> <li>- energy and service wood</li> <li>- non-timber forest products such as: microfauna, fungi, rattans, food plants, medicinal plants, resins, saps, honey, gnetum leaves, maranthaceae leaves, latex and others for various uses.</li> </ul> <p><b>Article 214</b></p> <p>The water and forest administration implements programs to promote the use of accessory forest products. They aim :</p> <ul style="list-style-type: none"> <li>- the inventory of products, in order to improve their knowledge and assess their potential;</li> <li>- the identification of current and potential uses of the products;</li> <li>- the study of methods of sustainable exploitation, processing and packaging of products;</li> <li>- promoting the consumption of products;</li> <li>- the formulation of conservation measures for products threatened with extinction.</li> </ul> <p>These measures may relate to one or more products at a time and relate in particular to:</p> <ul style="list-style-type: none"> <li>- limitation of levies;</li> <li>- the ban on exploitation in certain harvesting methods;</li> <li>- the prohibition of certain harvesting areas;</li> <li>- domestication and creation of living collections.</li> </ul> <p>These measures are taken in consultation with the populations concerned.</p> <p><b>Article 215</b></p> <p>The minister in charge of water and forests periodically determines the list of accessory forest products to be subject to the payment of a tax according to their promotion on the market.</p> <p><b>Article 216</b></p>
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	<p>The departmental directorate of water and forests regularly monitors the exploitation of accessory forest products.</p> <p>It collects statistics on the exploitation and marketing of these products from harvesters, transporters, traders, artisans and traditional therapists.</p> <p>For this purpose, registers are kept by administrative district, indicating for each product:</p> <ul style="list-style-type: none"> <li>- local and scientific names</li> <li>- the quantities harvested, transported, manufactured or marketed;</li> <li>- preservation processes or methods</li> <li>- origin and destination.</li> </ul> <p><b>CHAPTER VI: MODALITIES OF EXPLOITATION OF NATURAL FORESTS AND PRIVATE FOREST PLANTATIONS</b></p> <p><b>Article 217</b> The owner of private natural forests cannot change the destination of the land without authorization.</p> <p>The private owner can join forces with other private owners to manage their forest.</p> <p><b>Article 218</b> The private owner of a forest property of less than 10 hectares in one piece has the right to exploit the products found there on the basis of an authorization to cut trees issued by the Departmental Directorate of Water and forests</p> <p>The private owner of a protected natural space must respect its regulations.</p> <p>The private owner of a single-piece forest property greater than 10 hectares must have a simple management plan drawn up and approved by the authorized services.</p> <p><b>Article 219</b> The simple management plan includes: 1 ° A brief analysis of the economic, environmental and social issues of the forest and, in the event of renewal, of the application of the previous plan; 2 ° A logging program; 3 ° A program of reconstruction work after cutting. When it includes a program of improvement works, it mentions those which are compulsory. It also specifies the strategy for the management of game populations covered by a hunting plan fixed throughout the national territory, proposed by the owner in accordance with his choices of silvicultural management.</p> <p><b>Article 220</b> One-piece cuts greater than 1 ha, removing more than half of the volume of high forest trees, are subject to administrative authorization if it is a forest property that does not have a guarantee of sustainable management.</p> <p><b>Article 221</b> The owner carries out, without any particular formality, the cuts provided for in the operating program of the approved simple management plan. It performs the work</p>
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	<p>mentioned as compulsory in the simple management plan. It also carries out reconstruction work after logging within five years of operation.</p> <p><b>Article 222</b> Any cut provided for in the simple management plan can be brought forward or delayed by up to four years.</p> <p>Extraordinary cuts, below and above this limit, or not included in the program may be authorized.</p> <p>The owner can proceed, outside the operating program, to logging for his rural and domestic consumption, provided that this felling remains an accessory to his forest production and does not compromise the execution of the simple management plan. .</p> <p>In the event of fortuitous events, accidents, illnesses or disasters, which require emergency measures, the owner can make the necessary cuts. He must first notify the Departmental Directorate of Water and Forests and observe a time limit set by decree during which the center can oppose this cut. In the event of a large-scale disaster noted by order of the Minister in charge of forests, he is exempt from this prior formality.</p> <p><b>Article 225</b> Any forest property subject to the obligation of a simple management plan and which does not have one is placed under an administrative authorization regime.</p> <p>No cutting can be made there without the prior authorization of the administrative authority. This authorization may be accompanied by the obligation, for the beneficiary, to carry out certain work related to the cuts or which are an essential complement.</p> <p>After a period of three years from either the expiry date of a simple approved management plan, or from the notification of the invitation made to the owner, by the administration, to present a first draft of a simple management plan management, the authorization may be refused by the administrative authority, after consultation with the departmental water and forestry directorate:</p> <p>1 ° Either because of the repeated nature of the requests;</p> <p>2 ° Either because of the size of the cut or its nature;</p> <p>3 ° Or in the case where the evolution of the stands present on the property requires no longer to defer the presentation of a simple management plan.</p> <p>The provisions of this article apply, whatever the changes in ownership, as long as a simple management plan has not been approved.</p> <p>This administrative authorization regime does not apply to timber cuts intended for rural and domestic consumption, excluding timber, by the owner.</p> <p>In the event of fortuitous events, accidents, illnesses or disasters, which require emergency measures, the owner can make the necessary cuts.</p>
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	<p><b>Article 226</b> A cut carried out in violation of the provisions of the preceding articles is an illegal and / or abusive cut.</p> <p>This illegal cutting is considered abusive when it has damaging effects on the sustainable management of woods and forests.</p> <p><b>Article 227</b> An owner who has been convicted of illegal cutting must, at the request of the competent administrative authority of the State, present an amendment to the simple management plan or a draft simple management plan, applicable to woods and forests, as the case may be. affected by the cut.</p> <p>In the absence of an amendment presented within the time limit, the simple management plan is deemed to have lapsed.</p> <p>In addition, the administrative authority may require the owner of the land to carry out, within a period fixed by it, forest reconstitution work on the land covered by the cut.</p> <p><b>Article 228</b> Simple management plans for private natural forests include:</p> <ul style="list-style-type: none"> <li>- the management objectives of these forests;</li> <li>- analysis of ecological, economic and sociological data;</li> <li>- the location of existing infrastructure or to be created;</li> <li>- the list of species likely to be exploited;</li> <li>- the silvicultural treatments to be carried out and the schedule of operations;</li> <li>- stand protection measures.</li> </ul> <p>These simple management plans are submitted to the ministry in charge of water and forests for approval. The time limit for examination of the file by the water and forestry administration must not exceed three months from the date of receipt of the file.</p> <p><b>Article 229</b> Logging in industrial quantities of wood from private natural forests, when it is not carried out by the owners themselves, is carried out by contract concluded between the owner and the operator.</p> <p>This contract specifies the obligations of the two parties relating to the development of the forest, as well as those of each party with regard to the administration of water and forests.</p> <p>Two copies of the contract, accompanied by the operating plan for the plots concerned by the contract, are sent to the departmental water and forest management of the district.</p> <p><b>Article 230</b> The exploitation of private natural forests is carried out on the basis of an exploitation plan drawn up by their owners or the persons authorized to exploit them.</p>
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	<p>This operating plan is sent to the departmental water and forestry directorate before the start of operations.</p> <p><b>Article 231</b> The owners of natural forests or the persons authorized to exploit such forests freely dispose of the products resulting from these stands on payment of the related taxes and fees.</p> <p><b>Article 232</b> People logging private natural forests have the same obligations as holders of management and transformation agreements, with regard to</p> <ul style="list-style-type: none"> <li>- timber production and marketing;</li> <li>- compliance with operating and processing standards;</li> <li>- circulation of products;</li> <li>- personnel management</li> <li>- Presentation of production statistics.</li> </ul> <p><b>Article 233</b> The departmental water and forestry directorates carry out periodic checks on activities in private natural forests. These controls give rise to reports which are sent to the local authority, the Director General of Water and Forests and the Inspector General of Water and Forests.</p> <p>Infringements noted during controls are punished in accordance with the legal provisions in force.</p> <p><b>CHAPTER VIII: CIRCULATION OF FOREST PRODUCTS</b></p> <p><b>Article 244</b> Anyone who circulates forest products establishes a roadmap in quadruplicate, numbered in order of commissioning from the beginning of the year. The roadmap mentions:</p> <ul style="list-style-type: none"> <li>- the references of the operating permit;</li> <li>- the origin and destination of the products;</li> <li>- the date of shipment;</li> <li>- the first and last names of the driver of the means of transport;</li> <li>- the references of the means of transport;</li> <li>- the nature, numbers, species, unit volumes and qualities of the products.</li> </ul> <p>The waybill is established without erasure or overloading, stopped and signed by the sender of the products. It is checked and stamped on departure and arrival by the water and forestry services.</p> <p>A copy of the roadmap remains in the notebook. Three copies are given to the driver of the means of transport who has them stamped by the recipient: the factory worker, the buyer, and the transporter. The operator keeps one copy and gives the other two to the transporter who keeps one and gives the other to the site manager, who is required to send it to the water and forestry administration.</p>
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	<p><b>Article 245</b> Any processing unit, any forest product and by-product trade company, and any transport company is required to justify at any time, during any transport and any storage, the origin of said products by presenting the certificate. one or other of the following documents:</p> <ul style="list-style-type: none"> <li>- a purchase invoice;</li> <li>- a dimensioned specifications sheet initialed by the Water and Forestry Department of the administrative district concerned;</li> <li>- a towing sheet or a transport slip;</li> <li>- a road map;</li> <li>- a supply contract drafted in French.</li> </ul> <p><b>Article 246</b> For any transport by rail or river, shipments are accepted at stations or ports only against delivery to the station or port master of three copies of the waybill.</p> <p>Night transport of logs and sawnwood by road is prohibited. However, in built-up areas where daytime traffic is a problem, it may be allowed to travel at night. Anyone who violates these provisions is liable to the penalties provided for in the provisions of the law on the forestry regime.</p> <p><b>Article 247</b> The forest operator simultaneously transmits, each month, to the departmental direction of water and forests the waybills which were used for the evacuation of timber outside the states of production as provided for in article 233 above.</p> <p>A copy of each waybill is sent monthly to the Departmental Directorate of Water and Forests by the sender himself if the transport by logging truck or raft brings the wood or derived products directly to the port or the boarding station. .</p> <p><b>Article 248</b> The circulation of forest products from plantation timber cutting permits and domestic logging permits obeys the provisions of the above articles.</p> <p><b>Article 249</b> For the special permit, the allocation decision takes the place of the roadmap. Each trip is subject, before departure, to an entry on the back of the decision, mentioning the nature and quantity of the products transported, the dimensions and volume of the parts transported, the registration of the transport vehicle, the date and the destination.</p> <p>The departmental director of water and forests may require more precise information if he deems it necessary.</p> <p>When the permit expires, the decision is withdrawn by the departmental water and forestry directorate.</p> <p><b>Article 250</b></p>
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All carriers ensure, beforehand, that their customer is the holder of a valid operating permit in the loading area, under penalty of being declared jointly and severally liable in the event of fraudulent cutting.

## CHAPTER IX: MARKETING OF FOREST PRODUCTS

### Article 251

To carry out trading activities, wholesale or retail, on the national market for timber and products derived from timber and other forest products, any natural or legal person must be registered in the trade and movable property credit register.

To exercise as an exporter and / or importer of wood and products derived from wood and other forest products, any interested natural or legal person must be registered in the trade, credit and furniture register, with the exception of forestry companies.

### Article 252

All semi-finished and finished products from the nomenclature of **Error! Reference source not found.** of this decree, imported into the Republic of Congo, which are made up of at least 10% by volume or weight of panels derived from wood (process panels) or species from outside the natural forests of the CEMAC zone, are subject to to an import tax of 50% of the CIF value.

For products whose wooden parts are made up of at least 90% of species from natural forests in the CEMAC zone benefit from a reduced rate of the import tax of 3% of the CIF value.

Like wooden profiles, the import of profiles in all materials intended for the manufacture of finished products under headings 44.18 (joinery), 44.20 (furnishings) and 94.03 (wooden furniture) of the customs nomenclature are taxed at 30 %.

### Article 253

All natural or legal persons wishing to carry out the activities of timber trading, importer and / or exporter must provide the Ministry in charge of Water and Forests with a file comprising the following documents

- an application on plain paper, specifying the surname, first names, date and place of birth, address and residence of the applicant;
- a certified copy of the identity document;
- the nature of the forest products to be marketed;
- an extract from the criminal record;
- a certificate of nationality;
- a list of movable and immovable property in the Congo;
- the registration number in the trade and movable property credit register.

In the case of a legal person, the file is completed by the articles of association of the company and the certificate of fiscal character. Remove company name and registered office

### Article 254

	<p>Exports relate mainly to semi-finished and finished products in accordance with the provisions of article 149 of the law on the forestry regime.</p> <p>However, genetic material and certain ancillary forest products may be exported in their raw form, with the authorization of the Minister responsible for water and forests.</p> <p>The possession, circulation and marketing of commercial woody species listed in the CITES appendices are conditioned by the issuance of a CITES certificate of origin, issued by the head of the management authority.</p> <p>The list of these products will be the subject of an order of the Minister in charge of water and forests.</p> <p><b>Article 255</b> The public service responsible for the control of forest products for export provides monthly, in triplicate, to the office of the minister in charge of water and forests, to the general directorate of water and forests and to the general inspectorate of water and forests at no later than the 15th of the following month and annually before January 30 of the following year:</p> <ul style="list-style-type: none"> <li>- a statement indicating, on the one hand, the volumes or quantities and qualities of the exported timber or only the quantities of timber re-exported for timber in transit, by species, and by destination country, and on the other hand, the FOB price average by quality of various species and by product quality;</li> <li>- a list of suppliers of wood and wood products sold by grade.</li> </ul> <p>This information is also provided for other forest products.</p> <p><b>Article 256</b> The public service responsible for controlling forest products for export draws up a quarterly report on export activities which it sends to the minister in charge of water and forests, the general directorate of water and forests and the inspectorate. general of waters and forests.</p> <p>The Minister in charge of Water and Forests may provide, by decree, for any other obligation that he deems useful for the knowledge of the market for timber and other forest products.</p> <p><b>Article 257</b> The public service responsible for controlling forest products for export regularly publishes, in addition to the information provided for in the <b>Error! Reference source not found.</b> above, a review of the international timber market.</p> <p>The public service works in collaboration with the customs services.</p> <p><b>Article 258</b> Any exporter of forest and wildlife products and genetic material provides information relating to his activity to the public service responsible for controlling forest and wildlife products for export on each export.</p>
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	<p><b>Article 259</b> Any buyer must ensure with the departmental water and forestry directorate that his supplier holds a valid logging permit, under penalty of being declared jointly and severally liable in the event of fraudulent cutting.</p> <p><b>Article 260</b> The public service responsible for controlling forest products for export signs the specification sheets established by the exporters. The export verification certificate and the FLEGT authorization, upon discharge from the general water and forest inspectorate, are established by the Forest Products Export Control Service. These two documents bear the product references, the name of the holder of the agreement, or of the permit and its tax category indicated by its triangular hammer.</p> <p>A levy of 1% of the FOB value of exported products is made by this public service for its operation.</p> <p>A monthly summary statement indicates, by tax category, the volumes or quantities and qualities of the timber exported or the quantities of timber re-exported for timber in transit, the species, the value declared in customs and the corresponding taxes calculated on the basis of the basis of the texts in force.</p> <p>A copy of the report of the public service responsible for controlling forest products for export is sent to the departmental directorate of water and forests in the district where the products are exported.</p> <p><b>Article 261</b> The Director General of Water and Forests regularly monitors the FOB prices and FOT prices of the various species and other forest and wildlife products on the national territory and in neighboring countries.</p> <p>It convenes buyers and exporters of forest and wildlife products to examine or resolve any anomalies noted in price fluctuations.</p> <p>These prices are the subject of a chapter of the annual report of the water and forestry administration.</p> <p><b>TITLE VI: MISCELLANEOUS AND FINAL PROVISIONS</b></p> <p><b>Article 353</b> This decree which repeals all previous or contrary provisions will be registered, published in the official journal and communicated wherever necessary.</p>
<b>Decree determining the modalities of negotiation and modification of</b>	<p><b>Article 1</b> This decree determines the modalities of development and the content of the social clause of the particular specifications, as provided for in article 138 of the Law on the forestry regime in the Republic of Congo.</p>



**the contribution to local development and development of the particular specifications, and determining a content model of the particular specifications, February 2018 release**

## **Article 2**

The social clause of the specifications is supplemented by the local development fund, which is an integral part of the specific specifications. The terms and conditions concerning contributions to the local development fund, including the organization and operation of the local development fund and the consultation committee, are specified by regulatory texts.

## **Article 3**

The content of the social clause of the specific specifications is negotiated between the administration in charge of water and forests, the concessionaire, representatives of local communities and indigenous populations freely chosen and representatives of local civil society organizations or working directly with communities during the preparation period of the convention.

The effective and efficient implementation of the particular specifications is done through:

- a negotiation guide which defines the framework in which the negotiation must take place: object of the negotiation, duration of the negotiation, the parties to the negotiation, the representation and assistance of local communities and indigenous populations, the management methods and of the operation of the particular specifications, the procedures for monitoring the negotiated agreement, etc. ;
- a standard model agreement to which the concessionaire must comply in the direct negotiations that it is called upon to enter into with the local communities and indigenous populations concerned.

## **Article 4**

A consultation process with local communities and indigenous populations of all the villages of the concession is implemented by the departmental administration in charge of water and forests, with the technical support of civil society organizations having a legal existence, working with the communities concerned in the fields of nature protection, the promotion and defense of human rights or local development, in order to identify the needs of the villages.

The list of needs is drawn up by local communities and indigenous populations and validated with them during a meeting. The minutes of the meeting are proof of the validation.

The report or report is sent to the concessionaire and to the Departmental Directorate of Water and Forests and forms the basis for negotiations.

## **Article 5**

Negotiations on the social clause of the particular specifications are initiated by the departmental water and forestry administration, with a representative of the



prefecture, the representative (s) of the concessionaire and representatives of local communities and indigenous populations residing in the within the concession, with the support of civil society organizations having a legal existence, working with the communities concerned in the fields of nature protection, the promotion and defense of human rights or local development.

The modalities of negotiation and representation of stakeholders are specified in a ministerial decree in charge of water and forests. The process of negotiating the social clause of the particular specifications must meet the requirements of the free, prior and informed consent of local communities and indigenous populations.

At each stage of the negotiation, a report is drawn up signed by all the stakeholders present.

#### **Article 6**

The agreement constituting the social clause of the particular specifications of the forest concession conforms to the model given in the appendix to this decree.

#### **Article 7**

The social clause of the particular specifications is signed at the prefecture or sub-prefecture of the area in which the forest concessionaire operates. A report will be drawn up of the signing meeting for this social clause with the signature of each party present and a copy will be given to each of the parties.

#### **Article 8**

The social clause of the particular specifications is made available to the public in each locality concerned by posting at the prefecture or sub-prefecture. At least one copy will be sent to stakeholder representatives within 30 days of signing the particular specifications.

#### **Article 9**

This decree repeals any previous agreement that may have been concluded between the forest concessionaire and the local communities and indigenous populations. However, the work in progress under the regime of these previous agreements will be continued until completion.

#### **Article 10**

This decree, which repeals all previous contrary provisions, will be registered, published in the official journal and communicated wherever necessary.

#### **APPENDIX TO THE DECREE: MODEL SOCIAL CLAUSE OF THE SPECIFIC SPECIFICATIONS**



	<p>Social clause of the particular specifications relating to the [Planning and transformation agreement / Convention for the enhancement of plantation timber] concluded between the Congolese government, local communities and indigenous populations, local civil society and society, for the operation of the FMU</p> <p>Definition of parties</p> <p>This social clause of the particular specifications is signed between:</p> <ol style="list-style-type: none"> <li>1) The forestry company (name, acronym, legal form) called "the forest concessionaire"</li> <li>2) The community (s) and / or indigenous populations living within the forest concession and / or bordering on it, more precisely the communities of (name of the village or group) represented by (names and first names, titles and functions ) referred to as "Local communities and indigenous populations"</li> <li>3) Members of local civil society or those working directly with the communities represented by (surnames and first names, titles and functions) called "local civil society"</li> <li>4) The water and forest administration and the local collectivities of the department represented by (names and first names, titles and functions) called "State"</li> </ol> <p>It being understood beforehand that:</p> <p>The Forest Concessionaire is the holder of the Management and Processing Conventions and / or the Plantation Timber Valuation Conventions n ° ..... assigned by (decree / Order) of ..... n ° ....., covering an area of ..... Hectares, located in the area ..... ..of the forest sector ..... .. and over a period of .....</p> <p>This forest located at ..... is part of the area where local communities and indigenous populations enjoy their customary and economic use rights.</p> <p>To this end, the Forest Concessionaire, the local communities and indigenous populations, the local civil society and the State jointly agree on the following:</p> <p><b>TITLE I: PURPOSE AND DURATION OF THE AGREEMENT</b></p> <p><b>Article 1 :</b> This agreement aims to directly benefit the communities concerned from the benefits of logging.</p> <p>It details the social commitments of the forest concessionaire completing the management plan, in particular the construction of socio-economic infrastructure for the benefit of local communities and indigenous populations and the commitments for the benefit of the administration.</p>
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**Article 2 :** In accordance with the provisions of article 134 of the Law on the forestry regime, the social clause of the particular specifications specifies and supplements the general specifications with regard to:

- the costs of the successful tenderer: the development plan, industrial facilities, log production and wood processing programs, vocational training, as well as the contribution to the creation and / or operation of training centers for wood trades, construction of social or operating infrastructure, including the master plan for the development of the living base, equipping the forestry administration, contributions to the local development fund

**Article 3 :** The social clause of the particular specifications relates to basic social infrastructures while the contributions to the local development fund aim to finance development micro-projects and other activities that are alternatives to the exploitation of forest resources.

**Article 4:** The present social clause of the particular specifications is concluded for a period of 5 years. It can be revised every 5 years from the date of signature.

An annual assessment of the fulfillment of the obligations of the social clause of the specific specifications is carried out by the stakeholders.

## **TITLE II: OBLIGATIONS OF THE PARTIES**

### **CHAPTER 1: THE OBLIGATIONS OF THE FOREST CONCESSIONAIRE**

#### **Section 1: Obligations supplementing the development plan, industrial facilities, log production and wood processing programs**

**Article 5 :** The forest concessionaire undertakes to develop the Forest Management Unit (UFA) or the planted forest in accordance with the provisions of these particular specifications, with the forestry legislation and regulations in force.

**Article 6 :** The forest concessionaire must carry out its activities with the objective of rational management of forest resources, on the basis of a sustainable management plan for forest ecosystems, guaranteeing sustained forest production, while ensuring the conservation of the forest environment, including biological diversity, and meeting the needs of local communities and indigenous peoples.

The development plan must therefore reconcile the optimal use of resources, the preservation of ecosystems and socio-economic development.

**Article 7 :** The concessionaire undertakes to set up industrial infrastructure in accordance with the provisions of the Development and Transformation Agreement / Plantation Wood Valuation Agreement which will be signed between the State and the concessionaire.

**Article 8 :** The concessionaire undertakes to make the following information available to the administration in charge of water and forests, which then disseminates it to the public:

- the general organization chart of the company;
- presentation of the total amount of the company's investments;
- presentation of the maximum annual volume of the company in the FMU;
- presentation of the technical schedule for the production and processing of logs;
- the presentation of the species taken into account for the calculation of the forest tax;
- presentation of minimum slaughter diameters.

**Article 9 :** When the head office of the forest concessionaire is not located in the department in which it operates, it undertakes to set up a liaison office to ensure communication with local communities and indigenous populations as well as the local administration in this department.

## **Section 2: Obligations concerning employment, professional training of workers and contribution to training centers**

**Article 10 :** Employment of local labor: With equal skills, the forest concessionaire undertakes to recruit local labor in his company, particularly local communities and indigenous populations of the area concerned. In particular, the concessionaire encourages the employment of women and indigenous populations, avoiding any form of discrimination.

However, when it is observed that it is not possible within the required timeframe to train the local workforce, the forest concessionaire may resort to other skills.

Recruitment is made on the basis of a public call for tenders, in accordance with the legislation in force.

**Article 11 :** Training of local labor: The forest concessionaire undertakes to recruit national executives, to provide and finance their training, in accordance with the provisions of the Congolese labor code and the texts in force on labor law.

**Article 12:** Commitments to workers: The forestry company provides additional training for workers, including local communities and indigenous populations



working or about to join the company, in order to supplement their technical knowledge and capacities. These courses must take into account the requirements of the national economy, the most advanced knowledge and the highest level of science and technology. The workers who will be trained should receive all possible assistance during their studies.

These training courses will be carried out on the basis of professional and complementary company training plans, subject to the approval of the Ministry of Labor and the General Directorate of Water and Forests. They will be provided either within the forestry company, or through vocational training centers, or even abroad.

**Article 13:** Support for the operation of training centers for woodworking trades: The forestry company will support the government in setting up projects for training centers for woodworking trades. These training centers will enable internships to be carried out in production forests and in protected areas.

The artisanal operators will also be able, under their own financing with the necessary reductions, to benefit from training in these centers, allowing to improve the quality of their productions.

### **Section 3: Social and operating infrastructure**

**Article 14 :** Master plan for the development of the life base: Under the social clause of the particular specifications, the forest concessionaire undertakes to finance the construction and maintenance of the base life in sustainable materials, for its staff, including minimum: an infirmary, a commissary, a school, a library, a drinking water supply system and a transit hut for water and forestry officers.

**Article 15 :** At the end of operation, when the need arises and with the authorization of the water and forest administration, on the basis of an environmental impact study carried out jointly with the local authorities, the base vie could benefit workers, local communities and indigenous populations.

**Article 16 :** Equipment of the departmental forestry administration: The forest concessionaire undertakes to carry out specific works for the benefit of the Water and Forestry Administration, and the local communities of the department to which the concession falls, in particular:

- equipment such as purchase-delivery of office, IT, transport and generator equipment;
- construction, maintenance and rehabilitation of infrastructure, such as the construction, repair or endowment of buildings and offices of the Departmental Directorates of Forest Economy as well as the Prefecture and Sub-Prefecture.

The provision of this equipment will be made according to a schedule established in advance between the concessionaire and the administration, identifying the infrastructure and equipment to be provided and the completion deadlines.

#### **Section 4: Commitments for the benefit of Local Communities and Indigenous Populations**

**Article 17 :** Construction of socio-economic infrastructures: Under the social clause of the particular specifications, the forest concessionaire undertakes to finance the construction of the following socio-economic infrastructures for the benefit of local communities and indigenous populations:

- road construction and development
- construction, repair and equipment of hospital and school infrastructures, meeting rooms and dining rooms, etc.
- the creation of spaces for cultural activities: play areas, places to promote art and traditional know-how,
- facilities for transporting people and goods
- the distribution of wood waste to local communities and indigenous populations
- support for local communities and indigenous populations in the development of income-generating activities within the framework of the toolbox.

**Article 18 :** The following information detailing these commitments of the forest concessionaire and concerning: 1) the plans and specifications of the socio-economic infrastructures, 2) their location and the designation of beneficiaries, 3) the provisional timetable, is appended to these specifications. construction of infrastructure and provision of services as well as 4) the related estimated costs.

The forest concessionaire undertakes to respect its obligations as specified in the documents annexed to the social clause of the particular specifications, in particular compliance with the provisional timetable for the construction of infrastructures and the provision of services.

**Article 19 :** Maintenance and operation of infrastructures: Throughout the duration of the social clause of the particular specifications, the maintenance and operation of the infrastructures is the responsibility of the forest concessionaire. Are covered by this social clause, in particular: the purchase of medicines, the purchase of school supplies, the purchase and installation of school and health equipment, and other social equipment.

**Article 20:** Some of the operating costs of hospital and school facilities, in particular the salaries of teachers and health personnel, are the responsibility of the State. However, in certain urgent circumstances, the local communities and indigenous

populations concerned may refer the matter to the Consultative Committee so that it determines whether the concessionaire will take charge of this personnel.

**Article 21 :** The forest concessionaire must take all the necessary measures to avoid polluting the environment in the performance of its obligations.

In the event of proven pollution causing direct or indirect damage to local communities and indigenous populations, the latter have the right to compensation according to the legislation in force. In this case, decontamination work is undertaken and paid for by the forest concessionaire in order to restore the polluted area to its original state.

#### **Section 5: Contributions to the Local Development Fund**

**Article 22 :** When these contributions are not taken into account by the Local Development Fund, this social clause provides in an annexed document that local communities and indigenous populations have the possibility of negotiating with the concessionaire to benefit from one-off financial support for special ceremonies (mourning, national holiday, all saints, etc.) and the provision of fuel when local communities and indigenous populations have community equipment that requires fuel for its use.

#### **CHAPTER 2: THE OBLIGATIONS OF LOCAL COMMUNITIES AND INDIGENOUS POPULATIONS**

**Article 23 :** Sustainable management of the concession: The local communities and indigenous populations concerned undertake to contribute to the sustainable management of the forest concession and to contribute to the full enjoyment by the forest concessionaire of his rights in accordance with the particular specifications.

**Article 24 :** Respect of the agreement: The local communities and indigenous populations concerned undertake not to call into question the clauses of the contract concluded with the forest concessionaire and to make their members aware of them.

**Article 25 :** Other obligations: The local communities and indigenous populations concerned undertake to:

- contribute to the fight against poaching and illegal logging in the forest concession -
- collaborate with the forest concessionaire to control any fire occurring inside the concession forest -
- refrain from promoting access for illegal purposes to the aforementioned roads to their members or to local communities and indigenous populations not bordering on the forest concession -





	<ul style="list-style-type: none"> <li>- take all appropriate measures so that its members contribute to the protection of the personnel and the operating assets of the forest concessionaire -</li> <li>- respect the community development series management plan</li> </ul> <p><b>Article 26 :</b> Any damage suffered as a result of acts of violence or assault on the staff of the forest concessionaire or acts of vandalism on its operating heritage perpetrated by one or more members of the local communities and indigenous populations concerned , entails compensation, in proportion to the responsibilities released, according to the legislation in force.</p> <p><b>CHAPTER 3: COMMITMENTS OF THE ADMINISTRATION IN CHARGE OF WATER AND FORESTS</b></p> <p><b>Article 27 :</b> The Water and Forests Administration ensures compliance with all the commitments of the social clause of the particular specifications made with the forest concessionaire, local communities and indigenous populations as well as civil society, in particular the proper execution of the social clause of the particular specifications.</p> <p><b>Article 28 :</b> The Water and Forests Administration undertakes not to unilaterally call into question the provisions of this social clause of the particular specifications on the occasion of agreements of any kind that it may enter into with third parties.</p> <p><b>TITLE III: IMPLEMENTATION OF THE AGREEMENT</b></p> <p><b>Article 29 :</b> The Minister in charge of water and forests, the forest concessionaire, local communities and indigenous populations, civil society organizations and the consultation council of the forestry unit are responsible, each as far as it is concerned, with the execution of this social clause of the specifications. particular charges.</p> <p><b>TITLE IV: MODIFICATION, REVISION OF THE SPECIFIC SPECIFICATIONS AND CASES OF FORCE MAJEURE</b></p> <p><b>Article 30 :</b> Modification and revision: The provisions of this social clause of the particular specifications can be modified and revised in particular circumstances, according to the interests of the parties so require, or when its execution becomes impossible for a reason of force major.</p> <p>Any request for modification or revision of the social clause must be made in writing, by the party who wishes to modify or revise, to the other parties to the agreement.</p>
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	<p>This modification or revision will only come into force if it is validated and signed by the representatives of all parties to the social clause.</p> <p><b>Article 31:</b> Case of force majeure: When a case of force majeure occurs as an event beyond the control of the Forest Company likely to adversely affect the conditions under which the social clause of the particular specifications must be fulfilled, the Forest Company must submit the situation, within two weeks, to the other parties for their consideration. The stakeholders therefore undertake to agree on an appropriate consensual solution.</p> <p><b>Article 32 :</b> Sanctions: In the event of non-observance of the prescriptions applicable under this social clause, the Minister in charge of water and forests gives notice to the forestry company to meet its obligations within a period not exceeding 3 months.</p> <p>At the expiration of the allotted time, the forestry company will be punished according to the provisions set out in article 279 and 280 of the law on the forestry regime in the Republic of Congo. The amount of the administrative fines takes into account the seriousness of the breaches observed.</p> <p><b>TITLE V: FINAL PROVISIONS</b></p> <p><b>Article 33:</b> The departmental water and forest directorate is responsible for monitoring the implementation of the social clause, in collaboration with the other ministries concerned, civil society organizations, the private sector and representatives of local communities and indigenous people.</p> <p><b>Article 34 :</b> Violations of the provisions of this decree are punished in accordance with the legislation in force in the Republic of Congo.</p> <p><b>Article 35</b></p> <p>This social clause of the particular specifications, which repeals all previous contrary provisions, will be registered, published in the official journal and communicated wherever necessary.</p>
Order determining the nature of the finished or semi-finished products, version of February 2018	<p><b>Article 1</b></p> <p>Semi-finished products must undergo processing before their final use. They understand:</p> <ul style="list-style-type: none"> <li>• Piles, stakes, logs including eucalyptus</li> <li>• Logs, logs except cants</li> <li>• Firewood, wood chips, sawdust, briquettes.</li> <li>• Charcoal of which agglomerated</li> </ul>



	<ul style="list-style-type: none"> <li>• Squared and square edged with thicknesses greater than 200 mm except hydraulic timber</li> <li>• Wooden sleepers for railways or the like</li> <li>• Unplaned lumber * including hydraulic timber</li> <li>• Sliced, peeled or sawn veneers less than 6 mm thick</li> <li>• Planed sawn timber with a thickness greater than 6 mm</li> <li>• Solid wood, profiled or glued by end assembly, including solid parquet and decking boards</li> <li>• Particle boards</li> <li>• Fiber boards</li> <li>• Plywood panels, veneered wood, slatted</li> </ul> <p><b>Article 2</b></p> <p>The finished products are ready for their final use. They understand :</p> <ul style="list-style-type: none"> <li>• Framing</li> <li>• Wooden pallets, wooden packaging</li> <li>• Articles or parts thereof for cooperage</li> <li>• Tool handles</li> <li>• Wooden items for the table or kitchen</li> <li>• Boissellerie, statuettes, furnishing articles</li> <li>• Notched parts for frames, trusses</li> <li>• Prefabricated wooden constructions</li> <li>• Joinery works except structural parts for construction, interior and exterior doors, windows, closures, gates and gates.</li> <li>• Wooden seats</li> <li>• Wooden furniture: offices, kitchens, bedrooms, etc.</li> </ul>
<p><b>Decree setting the conditions for the identification and exercise of use rights of local communities and indigenous populations in protected forests and specifying the criteria that can be used to limit the consistency or exercise of user rights by decreed, in</b></p>	<p><b>Article 1</b></p> <p>The exercise of use rights is authorized in protected forests. Forests assigned to use rights must have a sufficient area to meet the needs of the populations for whom they are intended. Their definition takes into account in particular and as much as possible the importance of the populations concerned and areas of traditional influence.</p> <p><b>Article 2</b></p> <p>In the event of decommissioning, the administration in charge of water and forests, in collaboration with representatives of the neighboring villages, recognizes the perimeter to be decommissioned and customary or other use rights exercised within the concerned perimeter. .</p> <p><b>Article 3</b></p> <p>User rights may be authorized for each forest by the forest management plan applicable to it.</p> <p><b>Article 4</b></p> <p>User rights cannot relate to protected species.</p>





<p><b>specific cases, version of February 2018</b></p>	<p><b>Article 5</b> The exercise of the rights of use is subordinated to the state and to the possibility of the forests. When the state of the forest so requires, restrictions on the exercise of use rights, its suspension or its removal may be temporarily or definitively enacted without compensation, in consultation with the populations concerned, by order of the Minister in charge of waters and forests. The latter may in particular decide to protect a forest plot or prohibit grazing, felling, or limbing there.</p> <p><b>Article 6</b> The water and forest administration may exceptionally authorize the circulation of products acquired by virtue of the right of use outside the land of the owner thereof. It sets the conditions for its exercise in its decision.</p> <p>The above-mentioned circulation of products acquired by virtue of the right of use does not give rise to the payment of taxes specific to the forestry sector.</p> <p>The products acquired by virtue of the right of use can only be marketed at retail and within the limits of the land of the holder of the right of use and the satisfaction of his personal needs.</p> <p>The water and forestry service may exceptionally authorize the wholesale marketing, outside the limit of the land of residence of the holder of the right of use or outside the satisfaction of the personal needs of the latter of products acquired by virtue of the right of use. 'use. It sets the conditions for its exercise in its decision.</p> <p>The above-mentioned marketing of products acquired by virtue of the right of use does not give rise to the payment of taxes specific to the forestry sector.</p> <p><b>Article 7</b> The exercise of usage rights in matters of hunting and wildlife is authorized, subject to:</p> <ul style="list-style-type: none"> <li>- to use only non-prohibited weapons and devices;</li> <li>- to respect the regulations on slaughter latitudes.</li> </ul> <p><b>Article 8</b> The exercise of rights of use in fishing is prohibited when it is practiced by means of prohibited products and techniques, in particular drugs, poison or toxic products and explosive devices. However, the decommissioning texts must determine the watercourses and bodies of water likely to accommodate the exercise of fishing user rights by the riparian populations.</p>
<p><b>Regulatory text setting the conditions for issuing authorizations to generate carbon credits to promoters of projects to reduce emissions linked to</b></p>	<p><b>Article 1</b> This decree sets out the terms and conditions for issuing approval for the implementation of projects relating to the mechanism for the reduction of emissions linked to deforestation and forest degradation, the conservation and increase of carbon stocks, with a view to 'sustainable development in the Republic of Congo.</p> <p><b>Article 2</b></p>



<p><b>deforestation and forest degradation, including sustainable forest management, biodiversity conservation and stock increase forest carbon</b></p>	<p>The types of projects whose promoters can apply for approval relate in particular to: forestry, agroforestry, energy, social improvement and payments for environmental services.</p> <p><b>Article 3</b></p> <p>Any natural or legal person wishing to undertake the realization of the projects referred to in art. 2 of this Order, must comply with national legislation on trade and submit a request for approval to the Minister responsible for REDD +.</p> <p><b>Article 4</b></p> <p>The request is addressed to the minister in charge of water and forests accompanied by a file comprising the following documents:</p> <ul style="list-style-type: none"> <li>- The National Identity Card and the promoter's address;</li> <li>- the project description specifying: <ul style="list-style-type: none"> <li>1. The project area or the REDD + program area;</li> <li>2. Relevant REDD + activities planned;</li> <li>3. Relevant stakeholders, including a detailed description of customary rights holders;</li> <li>4. A financing plan and financial sources;</li> <li>5. The REDD + carbon standard, the methodological approach envisaged, the applicable reference level and MRV system;</li> <li>6. The reasoned opinion describing the extent to which the program or project: <ul style="list-style-type: none"> <li>a) Complies with and serves the objective of the national REDD + strategy;</li> <li>b) Respects national REDD + social and environmental standards, a copy of which is annexed to this decree;</li> <li>c) Applies the REDD + safeguard instruments, a copy of which is annexed to this decree;</li> <li>d) Use the complaints management mechanism, a copy of which is annexed to this decree;</li> </ul> </li> <li>7. a detailed benefit-sharing plan and proof of the free, prior and informed consent of local communities and / or affected indigenous populations.</li> <li>8. a performance monitoring plan describing the data and parameters to be reported, including data sources and frequency of monitoring</li> <li>9. in the case of article 6 below, the note of transfer of rights to Carbon Emissions Reduction Units</li> </ul> </li> <li>- the promoter's registration document at the Commercial Court Registry</li> </ul> <p>If one of these documents is not provided, the request is deemed inadmissible.</p> <p><b>Article 5</b></p> <p>In the case of recognized national associations and NGOs, the application file includes: (a) the approvals of the Ministries in charge of Territorial Administration,</p>
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	<p>Planning and supervision of the project area; (b) the technical and economic descriptive document of the project to be carried out.</p> <p><b>Article 6</b></p> <p>If the project includes forests belonging to third parties and / or private forest plantations of a third party falling within the State forest domain, the request of the project or program promoter must be accompanied by a note of assignment of rights to the Units. reduction in carbon emissions for the people concerned.</p> <p><b>Article 7</b></p> <p>The competent services of the Ministry responsible for REDD + examine the admissibility of the application file by an internal Committee.</p> <p><b>Article 8</b></p> <p>The examination is carried out within Seven (07) days from the date of receipt of the file. After this period, the request is considered admissible. The costs of examining the file are the responsibility of the promoter. These fees are set by a Decision of the Minister responsible for REDD +. These costs cover the examination of the admissibility of the file, the public hearings and the validation meeting of the Interministerial Committee.</p> <p><b>Article 9</b></p> <p>When the file is admissible, public hearing sessions are organized by the Ministry responsible for REDD + to collect the concerns and aspirations of the local communities concerned. It is obligatory to publish the holding of public hearings on radio, television and in a local newspaper in the vernacular and French languages.</p> <p><b>Article 10</b></p> <p>During the public hearings, the issues of profit sharing and guarantees of good governance of income from project activities are openly discussed.</p> <p><b>Article 11</b></p> <p>In the event of disagreement, a negotiation is opened between the promoter and the communities, in the presence of the administrative and local authorities to find a consensual alternative solution.</p> <p><b>Article 12</b></p> <p>The reports of the public hearings are drawn up by mutual agreement between the representatives of the Ministry responsible for REDD +, the local communities and the promoter. In the absence of a capable representative for the local communities,</p>
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	<p>a member of the Territorial Collectivity of the jurisdiction is appointed for this purpose.</p> <p><b>Article 13</b></p> <p>After transmission of the reports of the public hearings to the Minister responsible for REDD +, the latter convenes a validation workshop by an Interministerial Committee to rule on the approval request files.</p> <p><b>Article 14</b></p> <p>The minister responsible for REDD + proposes the composition of the interministerial committee</p> <p><b>Article 15</b></p> <p>The decision of the Interministerial Committee must take into account the socio-environmental concerns and aspirations of the local communities concerned contained in the report of the public hearings.</p> <p><b>Article 16</b></p> <p>After a favorable opinion from the Interministerial Committee, a report from the Minister responsible for REDD + is sent to the National REDD + Committee for approval.</p> <p><b>Article 17</b></p> <p>The National REDD + Committee, convened in ordinary session, gives its opinion on the report of the Minister responsible for REDD +.</p> <p><b>Article 18</b></p> <p>After a favorable opinion from the National REDD + Committee, approval is issued by a Decree taken by the Council of Ministers. The approval is brought to the attention of the promoter by an official notification from the Minister responsible for REDD +.</p> <p><b>Article 19</b></p> <p>The procedure for issuing approval is carried out within a maximum of ninety (90) days.</p> <p><b>Article 20</b></p>
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	<p>The notification of approval is published in the public and private media of the locality and possibly in the peripheral regions of the allocated zone.</p> <p><b>Article 21</b></p> <p>The approval granted is recorded in the REED + project register of the Ministry in charge of water and forestry. Copies of all documentation on REDD + projects are deposited with local and communal administrations for follow-up.</p> <p><b>Article 22</b></p> <p>Obtaining approval means recognition of the promoter's exclusive right to carry out the project in question and to claim the RCUs on the basis of a title deed.</p> <p><b>Article 23</b></p> <p>Obtaining approval on an allocated area does not give the promoter the right of ownership over the land and the resources therein.</p> <p><b>Article 24</b></p> <p>Approval on an allocated area is granted for a renewable period of 15 to 20 years.</p> <p><b>Article 25</b></p> <p>The activities of the projects mentioned in Article 2 of this Decree are carried out exclusively on the perimeters designated by the Award Decree, in collaboration with the Territorial Collectivities and Local Communities.</p> <p><b>Article 26</b></p> <p>The implementation of each project is subject to the signing of a specific contract with the local authorities, taking into account the specific requirements of the sectors and those likely to induce measures to improve, mitigate and eliminate negative socio-environmental impacts.</p> <p>Each locality concerned by the allocated perimeter is involved in the activities of implementation of a project to be carried out in its area of jurisdiction.</p> <p><b>Article 27</b></p> <p>The recruitment of local labor is privileged.</p> <p><b>Article 28</b></p>
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	<p>The redistribution of income generated by project activities must be carried out in accordance with the texts governing Economic Interest Groups.</p> <p><b>Article 29</b></p> <p>The investment tax rate is set by the finance law.</p> <p><b>Article 30</b></p> <p>The promoter monitors the implementation of the project in accordance with the execution monitoring plan and submits each monitoring report within two weeks of completion.</p> <p>The promoter must carry out an external verification of the project on the basis of monitoring reports and in accordance with the rules of the selected carbon standard.</p> <p>The verification report must be submitted to the registry within two weeks of its adoption.</p> <p><b>Article 31</b></p> <p>The Ministry responsible for REDD + monitors the implementation of all projects and can audit operations at any time.</p> <p>The promoter of a project is responsible for damages resulting from a deviation from the description of the project.</p>
<p><b>Order fixing the rules for the exploitation of forests in areas of difficult accessibility, version of February 2018</b></p>	<p>For the purposes of this decree, forests are understood to be difficult to access areas, swamp forests and mountain forests. This list can be supplemented if necessary, by order of the Minister.</p> <p><b>TITLE I: SWAMP AND MANGROVED FORESTS, FLOOD AND FLOOD FORESTS</b></p> <p><b>Article 1</b></p> <p>Within the meaning of this decree, swamp forests are classified forests.</p> <p><b>Article 2</b></p> <p>The protection and management of swamp forests and mangroves obey the same rules as those described in the law on the forestry regime for protected forests classified under the reservations below.</p> <p><b>Item 3</b></p> <p>Swamp and mangrove forests can be declassified in accordance with the provisions of the law on forest regimes.</p>





	<p><b>Article 4</b> Swamp and mangrove forests are managed as classified protected forests in which the only human activity allowed is the exercise of the use rights of local communities and indigenous populations established according to specifications guaranteeing a minimization of the negative impacts of management or exploitation on the environment. The specifications must allow the populations who traditionally derive their means of subsistence from these forests to keep their way of life present ”.</p> <p><b>Article 5</b> Any construction in swamp forests and mangroves is prohibited.</p> <p><b>Article 6</b> The cutting, sale and use of tree species forming the swamp forest and mangroves are prohibited, except for phytosanitary reasons or exceptions in the specifications provided for in article 4 above.</p> <p><b>Article 7</b> The Minister in charge of Water and Forests may prohibit certain activities in and around swamp forests and mangroves as well as any change of use or mode of occupation which could compromise the conservation or protection of afforestation, unless it is essential equipment for the protection of forests against fires.</p> <p><b>Article 8</b> Research and exploitation work on water resources intended for human consumption, when they are carried out by local authorities or their delegates, when they have been the subject of a declaration of public utility and that they do not fundamentally change the forest destination of the land, can be done in swamp and mangrove forests.</p> <p><b>Article 9</b> Offenses relating to the protection of fauna and flora found in swamp and mangrove forests are punished in accordance with the provisions in force in this area.</p> <p><b>Article 10</b> Offenses against swamp and mangrove forests are recorded and prosecuted in the forms prescribed by this law on the forestry regime.</p> <p><b>Item 11</b> The fines and penalties incurred for other forestry offenses are tripled when these offenses are committed in a swamp or mangrove forest.</p> <p><b>Article 12</b> In order to fight against their degradation, mangrove forests are the subject of a restoration and reforestation program by the National Service in charge of this activity.</p> <p><b>Article 13</b> Permanently flooded forests follow the same principle of classification, management and exploitation as swamp forests.</p>
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Flood-prone forests follow the same management and exploitation principle as swamp forests during the flood phase. They obey the same rules as those described in the law on the forest regime for protected forests outside periods of flooding.

## **TITLE II: REGIME OF MOUNTAIN FORESTS**

### **SECTION 1: CLASSIFICATION OF MASSIVES**

#### **Article 14**

Woods and forests whose conservation is recognized as necessary to maintain land on mountains and slopes, to defend against erosion and flooding of water and sand can be classified as protection forests, for reasons of public utility. , after public inquiry.

#### **Article 15**

Classification as a protection forest prohibits any change in use or any land use method likely to compromise the conservation or protection of afforestation.

#### **Article 16**

As soon as the owner has been notified of the intention to classify a forest as a protection forest, no modification can be made to the inventory, no cutting can be carried out nor any right of use created for fifteen months from the date of notification, unless authorized by the competent administrative authority of the State.

### **SECTION 2: SPECIAL REGIME FOR PROTECTIVE FORESTS**

#### **Article 17**

Protective forests are subject to a special regime, particularly with regard to management and exploitation rules, the exercise of user rights, excavations and extraction of materials as well as the search for and exploitation of the water resource by public authorities or their delegates.

#### **Article 18**

Research and exploitation of water resources intended for human consumption, when they are carried out by public authorities or their delegates, when they have been the subject of a declaration of public utility and that they do not fundamentally modify the forest destination of the land, can be carried out under the conditions determined by the special protection forest regime.

#### **Article 19**

A regulatory text determines the conditions under which the projects of works and structures necessary for the collection of water in protection forests are subject, depending on their importance, to public inquiry or to prior availability to the public.

### **SECTION 3: INDEMNITIES AND ACQUISITIONS BY THE STATE**

#### **Article 20**

Compensation that could be claimed by owners and holders of a right of use, in the event that the classification of their woods and forests as protection forests would lead to a reduction in income, are paid, taking into account the capital gains. any resulting from the work carried out and measures taken by the State, either by direct agreement with the administration, or, failing that, by decision of the administrative court.

The State can also proceed to the acquisition of wood and forests thus classified. The owner may require this acquisition if he can justify that classification as a protective forest deprives him of half of the normal income he receives from his forest. The acquisition takes place either by mutual agreement or by expropriation.

### **CHAPTER II: CONSERVATION AND RESTORATION OF FORESTS IN MOUNTAINS**

#### **SECTION 1: DEFENSES**

#### **Article 21**

The competent administrative authority of the State decides to protect mountain land, to whatever owner they belong to, whenever the state of degradation of the soil does not require restoration work.

When an opposition is formulated during the preliminary investigation, the decision is taken in the form of a decree.

This decree determines the nature and the limits of the land to be prohibited. It also fixes the duration of the defense, which cannot exceed ten years, as well as the period during which the interested parties can proceed to the amicable settlement of the compensation to be granted to the owners for deprivation of use.

In the absence of an amicable agreement, this compensation is fixed by the administrative court.

In the event that the State wishes, at the end of the ten-year period, to maintain the defenses, it will be required, if so requested by the owners, to acquire the land amicably or by way of expropriation.



#### **Article 22**

During the period of the defense, the State can carry out on the defended land the work deemed necessary for the rapid consolidation of the soil provided that this work does not change its nature, and without any compensation whatsoever. be required of the owner, because of the improvements that this work would have brought to his property.

### **SECTION 2: RESTORATION OF MOUNTAIN LANDS**

#### **Article 23**

The public utility of the restoration and reforestation work necessary for the maintenance and protection of mountain land and for the regularization of the water regime is declared by decree at the request of the minister in charge of forests, a local authority or 'a group of local authorities.

This decree, which fixes the perimeter of the land on which the works must be carried out, is issued after:

- 1 ° An investigation opened in each of the municipalities concerned;
- 2 ° A deliberation by the municipal councils of these municipalities;
- 3 ° The opinion of the departmental council;
- 4 ° The opinion of a special commission, the composition of which, fixed by decree, comprises equally representatives of the State and representatives of the local communities concerned. The departmental councilor representing the department where the land included in the scope of the work is located, as well as the owners of this land, cannot sit on this commission.

#### **Article 24**

Restoration and reforestation work is carried out and maintenance is provided at its expense by the beneficiary of the declaration of public utility.

The owners can carry out the work themselves and ensure their maintenance under the conditions fixed by an agreement to be made between them and the local authority at the request of which the declaration of public utility has been pronounced.

### **SECTION 3: EXPLOITATION OF MOUNTAIN FORESTS**

#### **Article 25**

For mountain forests, the logging authorization may be refused when the conservation of woods and forests or the massifs they supplement, or the

	<p>maintenance of the forest use of the soils, is recognized as necessary for one or more of the following functions :</p> <p>1 ° To the maintenance of land on the mountains or on the slopes;</p> <p>2 ° To the defense of the soil against erosion and invasion of rivers, streams or torrents;</p> <p>3 ° The existence of springs, watercourses and wetlands, and more generally the quality of water;</p> <p>5 ° To national defense;</p> <p>6 ° To public health;</p> <p>7 ° The enhancement of public investments made for the improvement in quantity or quality of the forest resource, when the timber has benefited from public aid for the constitution or improvement of forest stands;</p> <p>8 ° The biological balance of a territory of remarkable interest and motivated from the point of view of the preservation of animal or plant species and the ecosystem or the well-being of the population;</p> <p>9 ° To the protection of people and property and of the forest complex within whose jurisdiction they are located against natural risks, in particular fires.</p> <p><b>Article 26</b></p> <p>The exploitation of mountain forests is carried out in compliance with the technical standards in force</p>
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