

## A. Cost Benefit Studies

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# Studies Costs Benefits Case study 1: village agroforestry plantation Acacia-Cassava-Maize

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## 1. Description of the scenarios considered

- **Culture cycles:**
  - Annual plots: 1 ha
  - 7-year rotation
  - Total area: 7 ha
  - Plantations: acacia, cassava, corn
  - Harvests:
    - Corn: 4 months
    - Cassava: 18 months
    - Acacia: 7 years

The farmer has 7 ha, with the assumption that the land acquisition problem has been resolved (eg made available by the Pronar or by the land owner involved in the project). The farmer plants one hectare per year with acacia, cassava and maize in combination. After 7 years, he exploits the acacia of the first hectare planted and replanted identically. Thus the farmer harvests maize every year, cassava every 18 months and acacia every year from the seventh year.

From the 2nd rotation, the farmer breaks the dormancy of the acacia seeds by a controlled firing and replants the cassava and corn

- **Locations :** two situations
  - Production in the north of the Pool (geological substrate like the Batéké plateau) and sale in Brazzaville
  - Production in Niari and sale in Dolisie
- **Hypotheses :**
  - Acacias are planted every three meters, or 1111 feet per hectare.
  - All Acacia production is sold in the form of charcoal.
  - Charcoal is produced by traditional millstones (carbonization yield between 10% and 15%)
  - Cassava cuttings (improved) are bought for the first 2 plots at each new rotation, for the other plots the farmer uses his own cuttings.
  - The yield of cassava and maize increases from the 2nd rotation thanks to the enrichment of the soil induced by the planting of acacia.
- **Workforce :**
  - Start-up :
    - Stumping
    - Plowing
    - Plantation: acacia, cassava, corn
  - Interview
    - Weeding (3, 6, 10, 14 and 24 months)
    - Firewall (12, 24, 36, 48, 60 and 72 months)
  - Harvests
    - But
    - Cassava
    - Acacia tree felling
  - Production
    - Coal sack
  - Subsequent rotations
    - Thinning and relining of acacia
    - Spreading amendment (crushed limestone)
    - Plantation: cassava, corn
- **Investments:**
  - Plant material
    - Acacia plants (starter)
    - Cassava cutting (for 2 years every 7 years)
    - Corn seeds
  - Other
    - Empty bags of capacity:

- 40kg of coal
  - 50 kg of cassava chips
  - 50 Kg Corn
- Ground limestone amendment (2 T / ha from 2nd rotation)
- **Other Costs:**
  - Transportation
    - Plant material (plants)
    - Amendment
    - Coal to the city
    - Cassava to the city
    - Corn to the city
  - Various
    - Charcoal bag taxes
    - Cassava bag taxes
    - Corn bag taxes
    - Charcoal bag storage cost (warehouse in town)
    - Bag storage cost of cassava chips (warehouse in town)
    - Corn bag storage cost (warehouse in town)

## 2. Reference parameters used for the cost-benefit analysis:

- **Plant material**

Equipment	Price (FCFA)
Acacia plants (not subsidized)	[450; 550]
Acacia plants (ha)	[486,000; 605,000]
Cassava cuttings (ha)	[54,000; 66,000]
Maize seeds (ha)	[10,000; 15,000]
Limestone amendment (T)	[28,000; 32,000]
Limestone amendment (ha)	[56,000; 64,000]

- **Labor costs**

Activity	Price (FCFA)
Stumping (ha)	[40,000; 60,000]
Plowing (ha)	[80,000; 120,000]
Spreading limestone amendment (ha)	
Acacia plantation (ha)	[50,000; 55,000]
Cassava and Maize plantation (ha)	[30,000; 50,000]
Firewall (ha)	[40,000; 60,000]
Weeding (ha)	[60,000; 90,000]
Cassava harvest (ha) (village transport included)	[80,000; 180,000]
Corn harvest	[10,000; 30,000]
Thinning and relining of acacias	[7,000; 14,000]
Acacia tree felling (ha)	[420,000; 470,000]
Charcoal production (40 kg bag)	[900; 1100]

- **Transport costs (average distance 50 km)**

Activity	Price (FCFA)
Transport purchase plant material (ha)	[10,000; 30,000]
Cassava sale transport (bag)	[2500; 4500]
Transport sale but (bag)	[2500; 4500]
Coal sales transport (bag)	[800; 1500]
Limestone amendment transport	[25,000; 35,000]

- **Yields of combined crops**

1st rotation	Batéké Plateau	Niari
Acacia (T / ha)	[40; 50]	[60; 75]
Cassava (T / ha)	[5; 10]	[7.5; 15]
Maize (T / ha)	[0.5; 1]	[0.75; 1.5]
2nd rotation and beyond		
Acacia (T / ha)	[40; 50]	[60; 75]
Cassava (T / ha)	[6; 12]	[9; 18]
Maize (T / ha)	[0.6; 1.2]	[1; 1.8]

- **Efficiency of transformations**
  - Acacia -> charcoal (%) [10; 15]
  - Cassava -> chips (%) [22; 26]

- **Selling price**

Products	Brazzaville (FCFA)	Dolisie (FCFA)
Coal (40kg bag)	[5500; 6500]	[3500; 4500]
Cassava chips (50 kg)	[18,000; 22,000]	[11,000; 12,500]
Corn (50 kg bag)	[18,000; 22,000]	[11,000; 14,000]

- **Other costs**

Description	Price (FCFA)
"Minoco for charcoal" bag	[250; 300]
Taxes per bag of corn	200

Taxes per bag of chips	200
Taxes per bag of charcoal	100
Charcoal bag storage cost (sale in town)	100
Storage cost of corn bag (sale in town)	100
Storage cost bag of cossettes (sale in town)	200

- **Discount rate:** 10%

### 3. Results

#### 3.1 Production in the north of the Pool with sale in Brazzaville

The forecasts of changes in the three productions (charcoal, cassava chips, maize) during two rotations of 7 years (i.e. 14 years) over 7 ha, with 1 ha planted each year for the North Pool region, according to the scenario envisaged, are represented on the Figure 1 and the associated revenue for a sale in Brazzaville on the Figure 2. It appears that the cultivation of cassava brings in the highest income.

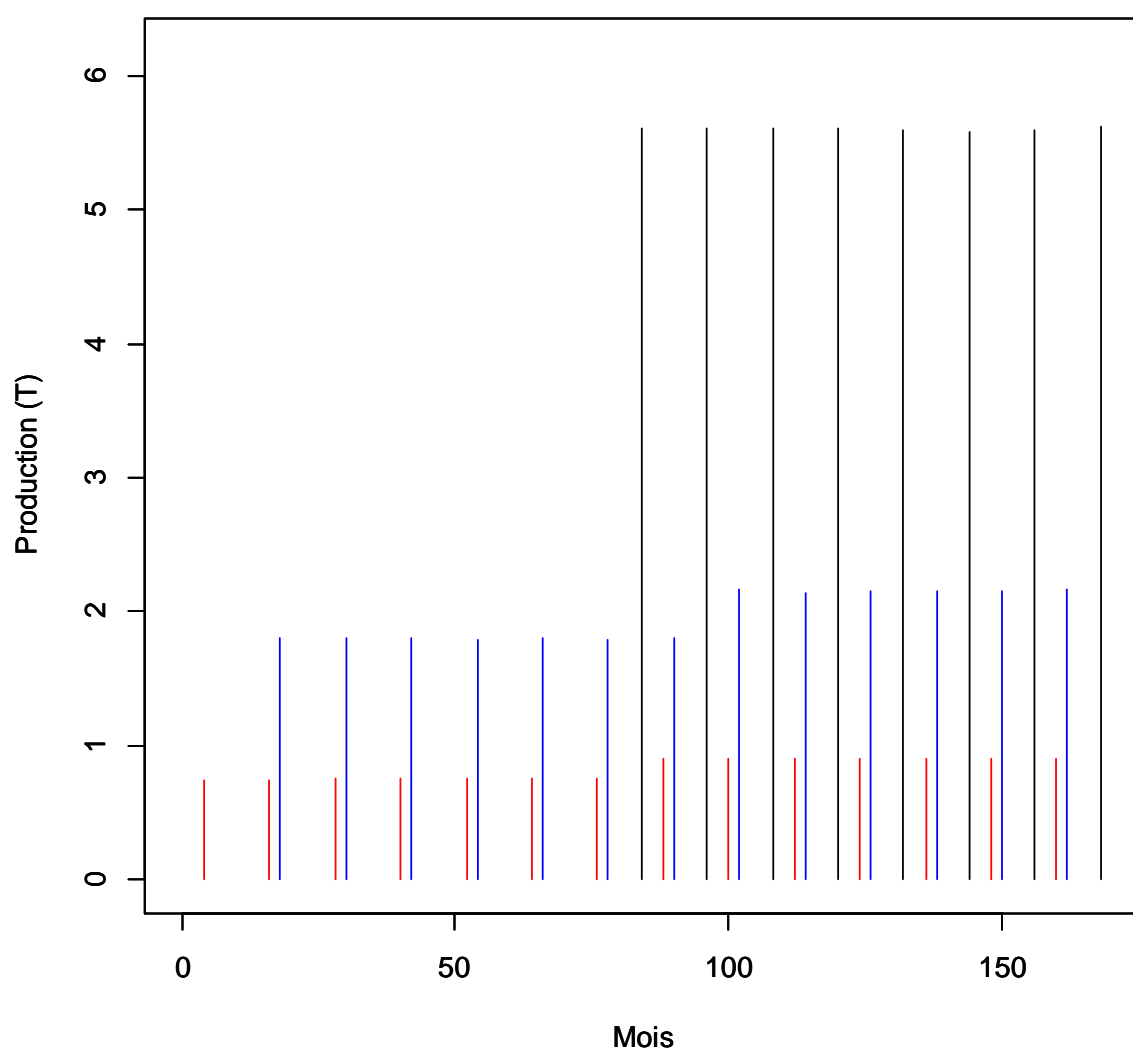
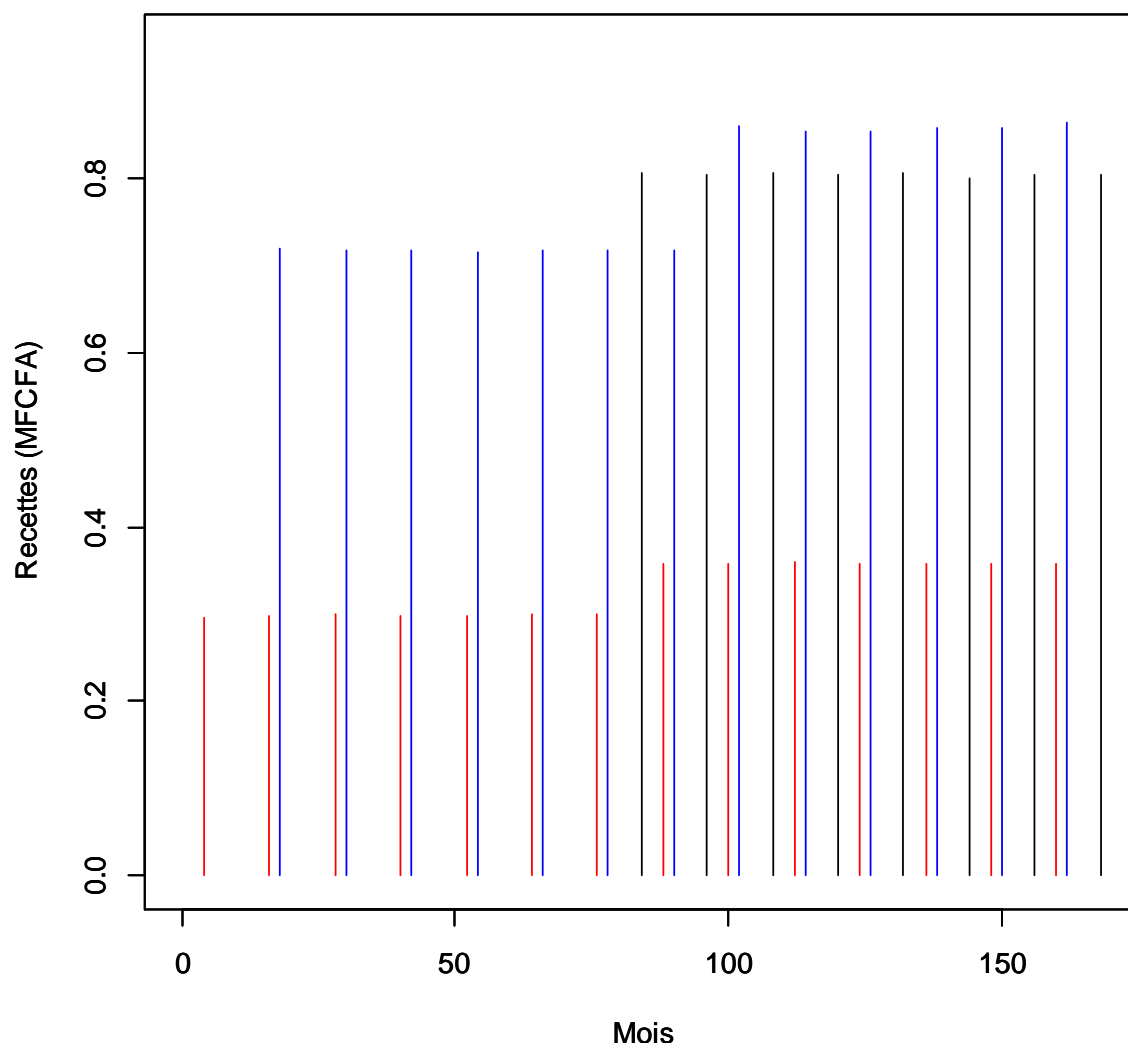


Figure 1. Forecast of the evolution of production according to the scenario cycle for the northern Pool region (red: corn, blue: cassava chips, black: charcoal).





**Figure 2. Forecast of changes in median revenue for the sale of produce in Brazzaville (red: corn, blue: cassava chips, black: charcoal)**

The cost-benefit analysis that follows considers three cases for cost accounting. First, all identified costs are accounted for. Then, as these planting activities are considered for family farming, we place ourselves in this perspective and assume that part of the labor costs are internalized by the farmers. Finally, from the perspective of support provided by external financing, we envisage that part of the investments necessary to start the plantation will be subsidized by the project.

### 3.1.1 Full cost analysis

In this section, all inventoried costs are accounted for in the analysis. The costs are spread more over time than the income and a significant initial investment of around 1 million FCFA is required (Figure 3).

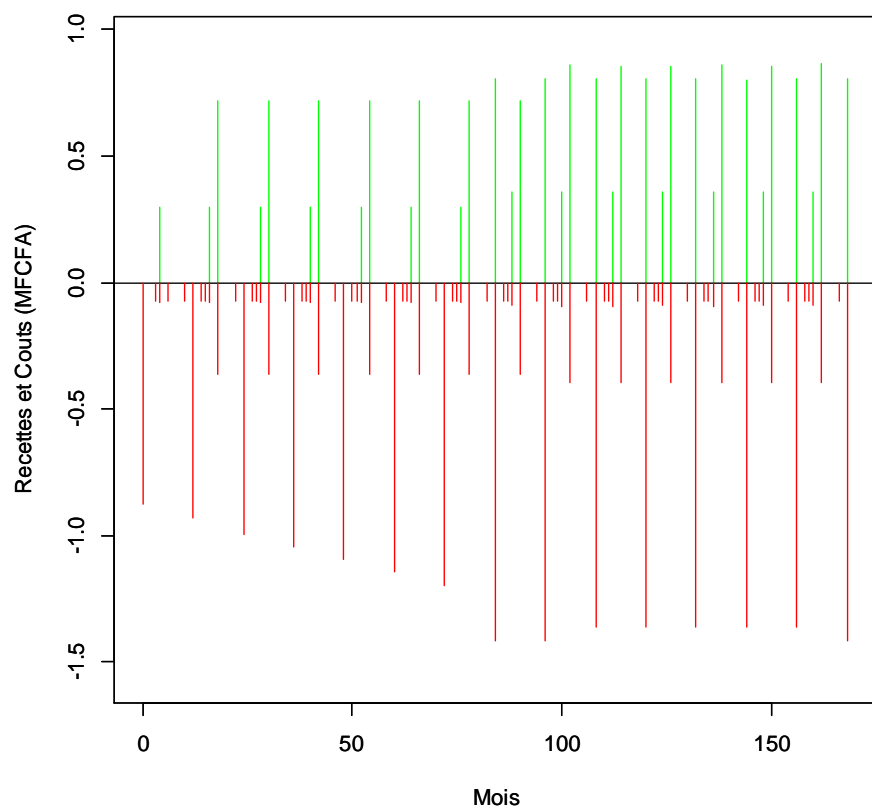


Figure 3. Forecast trends in revenue and costs for all crops combined, including all identified costs (green: revenue, red: costs)

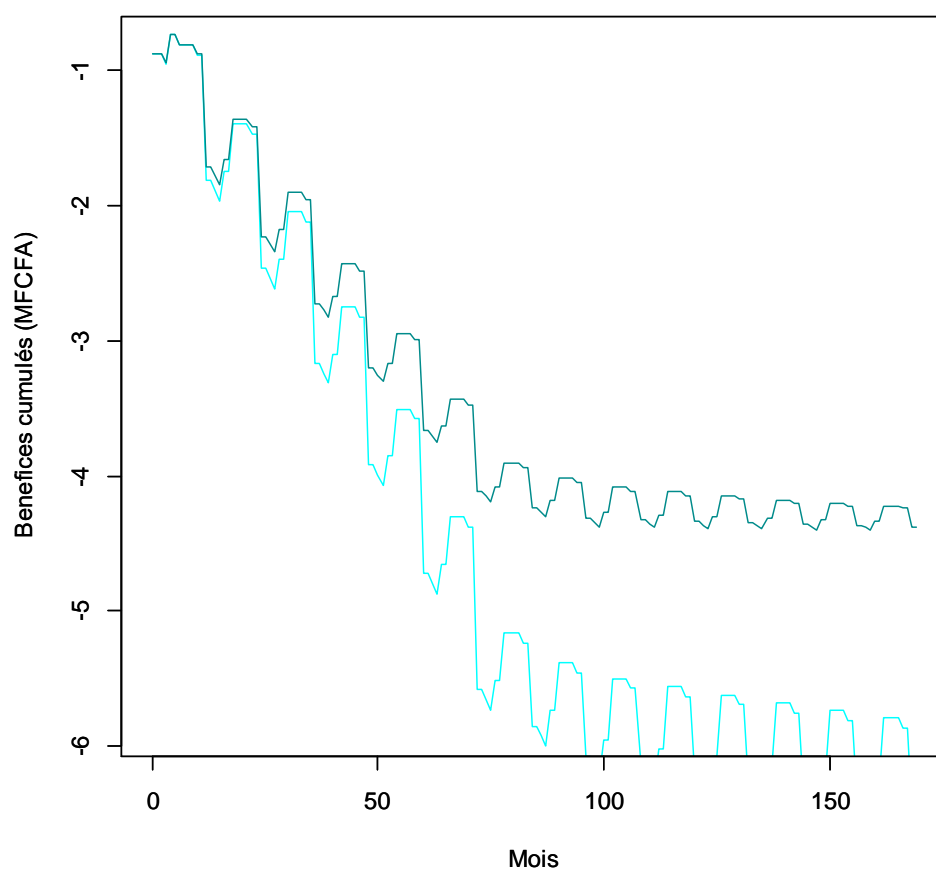


Figure 4. Cumulative profit development forecasts (light blue: gross, dark blue: discounted at an annual rate of 10%)

Years	1	2	3	4	5	6	7
<b>Costs</b>	1.18	1.6	1.66	1.71	1.76	1.81	1.87
<b>Discounted costs</b>	1.18	1.44	1.35	1.25	1.16	1.07	0.99
<b>Cumulative discounted costs</b>	1.18	2.62	3.97	5.22	6.37	7.45	8.44
<b>Recipes</b>	0.3	1.02	1.02	1.02	1.01	1.02	1.02
<b>Updated recipes</b>	0.3	0.92	0.82	0.74	0.67	0.6	0.54
<b>Cumulative updated revenue</b>	0.3	1.21	2.04	2.78	3.44	4.05	4.59
<b>Discounted benefits</b>	-0.89	-0.52	-0.52	-0.51	-0.49	-0.47	-0.45
<b>Cumulative discounted profits</b>	<b>-0.89</b>	<b>-1.41</b>	<b>-1.93</b>	<b>-2.44</b>	<b>-2.93</b>	<b>-3.4</b>	<b>-3.85</b>

Years	8	9	10	11	12	13	14
<b>Costs</b>	2.1	2.13	2.07	2.07	2.07	2.07	2.07
<b>Discounted costs</b>	1	0.92	0.8	0.72	0.65	0.59	0.53
<b>Cumulative discounted costs</b>	9.44	10.36	11.16	11.88	12.53	13.12	13.64
<b>Recipes</b>	1.88	2.02	2.02	2.02	2.02	2.02	2.03
<b>Updated recipes</b>	0.9	0.87	0.78	0.7	0.63	0.57	0.51
<b>Cumulative updated revenue</b>	5.49	6.36	7.14	7.84	8.48	9.05	9.56
<b>Discounted benefits</b>	-0.1	-0.04	-0.02	-0.02	-0.02	-0.02	-0.01
<b>Cumulative discounted profits</b>	-3.95	-4	-4.02	-4.04	-4.05	-4.07	-4.08

**Board 1. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a mixed production of acacias, cassava, maize over 7 ha with a rotation of 7 years in the north of the Pool with sale in Brazzaville. All production costs are accounted for.**

Revenue never compensates for losses but is close to balancing costs from the 9th year (Figure 4, Board 1). The scenario is globally unprofitable with a net present value (NPV<sup>1</sup>) of - 4,227,067 ± 295,062 FCFA (mean ± standard deviation).

### 3.1.2 Analysis with part of the workforce at the expense of the farmer

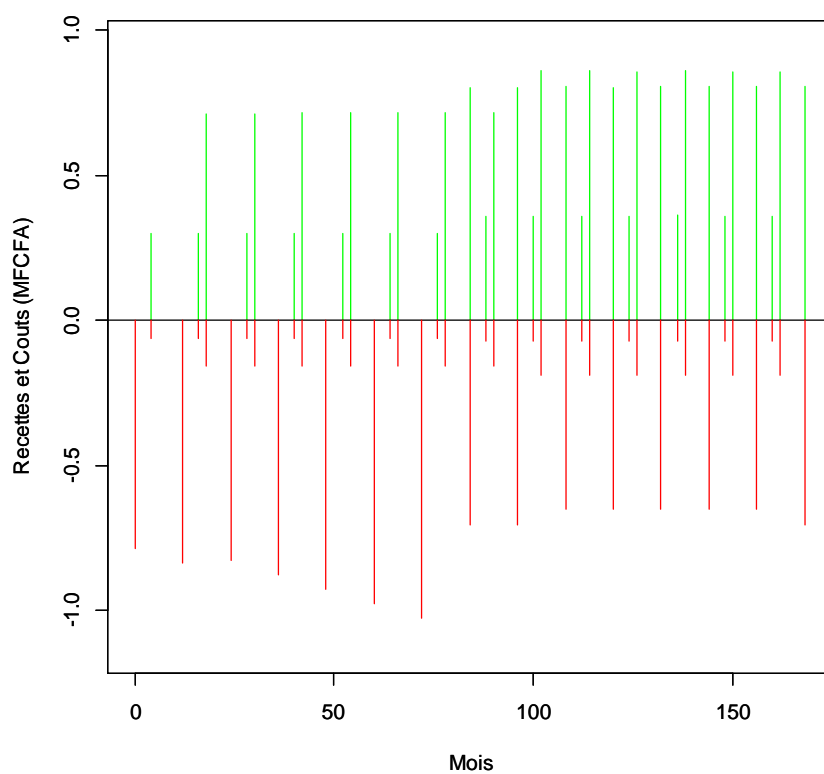
In the context of family farming, from the farmer's point of view, labor costs can be internalized and therefore assumed to be zero for the cost-benefit analysis:

Activity	Price (FCFA)
Stumping (ha)	[40,000; 60,000]
Plowing (ha)	[80,000; 1,200,000]
Spreading limestone amendment (ha)	0
Acacia plantation (ha)	0
Cassava and Maize plantation (ha)	0

<sup>1</sup> Valeur actuelle nette : mesure de la rentabilité d'un investissement égale à la somme des flux de trésorerie actualisés engendrés par l'opération. Une valeur actuelle nette positive signifie que le projet est rentable.

Firewall (ha)	[40,000; 60,000]
Weeding (ha)	0
Cassava harvest (ha) (village transport included)	0
Corn harvest	0
Thinning and relining of acacias	0
Acacia tree felling (ha)	0
Charcoal production (40 kg bag)	0
Production bag of chips (50 kg)	0
Maize bag production (50 kg)	0

The costs of stumping, firebreaking and plowing are maintained because they are mechanized. In this context, the productions and their recipes remain the same, only the costs change.



**Figure 5. Forecast trends in income and costs for all crops combined, assuming that labor costs are borne by the farmer and his family (green: income, red: costs)**

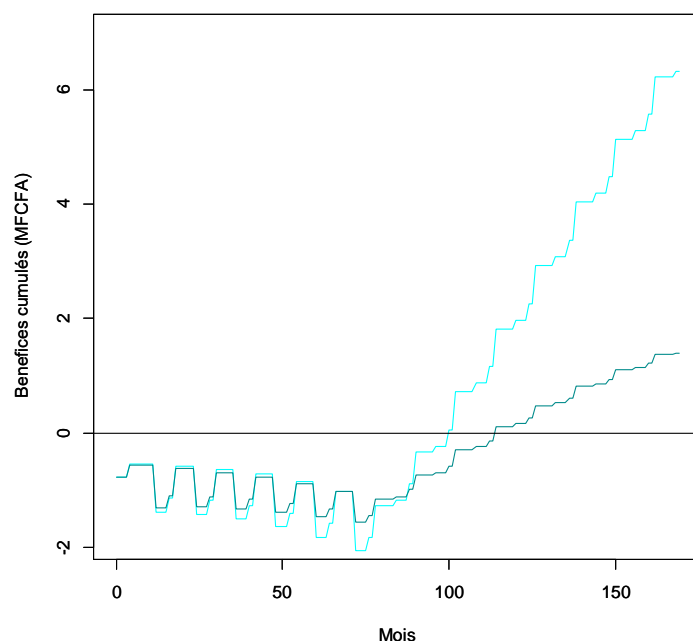


Figure 6. Forecast cumulative profit development assuming labor costs are borne by the farmer and his family (light blue: gross, dark blue: discounted at an annual rate of 10%)

The costs are almost halved (Figure 5) compared to the full cost situation. Profits are negative until the 8th year but approach equilibrium by the second year. The investment of the first year (around 500,000 FCFA) is not amortized until the 8th year (Figure 6, **Error! Not a valid bookmark self-reference.**).

Years	1	2	3	4	5	6	7
Costs	0.84	1.05	1.04	1.09	1.14	1.2	1.25
Discounted costs	0.84	0.95	0.84	0.8	0.75	0.71	0.66
Cumulative discounted costs	0.84	1.79	2.64	3.43	4.18	4.89	5.55
Recipes	0.3	1.01	1.01	1.02	1.02	1.02	1.02
Updated recipes	0.3	0.91	0.82	0.74	0.67	0.6	0.54
Cumulative updated revenue	0.3	1.21	2.03	2.77	3.44	4.04	4.58
Discounted benefits	-0.55	-0.04	-0.03	-0.06	-0.08	-0.11	-0.12
Cumulative discounted profits	-0.55	-0.58	-0.61	-0.66	-0.75	-0.85	-0.97

Years	8	9	10	11	12	13	14
Costs	0.93	0.97	0.91	0.91	0.91	0.91	0.91
Discounted costs	0.45	0.42	0.35	0.32	0.29	0.26	0.23
Cumulative discounted costs	6	6.42	6.77	7.08	7.37	7.63	7.86
Recipes	1.88	2.02	2.03	2.02	2.03	2.02	2.02
Updated recipes	0.9	0.87	0.79	0.7	0.64	0.57	0.51
Cumulative updated revenue	5.48	6.35	7.14	7.84	8.48	9.05	9.56
Discounted benefits	0.45	0.46	0.43	0.39	0.35	0.31	0.28
Cumulative discounted profits	-0.52	-0.06	0.37	0.76	1.11	1.42	1.71

Board 2. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a mixed production of acacias, cassava, maize over 7 ha with a rotation of 7 years in the northern region Pool with sale in Brazzaville. Most of the labor costs are borne by the farmer and his family.

The scenario in this context, where the farmer's family bears most of the labor costs is globally profitable over 14 years with a NPV of 1,553,023  $\pm$  291,591 FCFA (mean  $\pm$  standard deviation) and an annual rate internal profitability (IRR<sup>2</sup>) 22.1  $\pm$  2.5% (monthly rate 1.6  $\pm$  0.2%).

Although in this context the scenario is economically viable in the long term, it is not realistic to envisage that small farmers can wait 8 years to recover their investments. However in the second rotation, this system would ensure an average annual income of 1.1 MFCFA. For the scenario to be realistic, it is necessary to consider that an external aid covers the investments of the first rotation (plant material, stumping, plowing,...). This is the subject of the next section.

### 3.1.3 Analysis with part of the labor at the expense of the farmer and part of the initial subsidized investments

Still in the context of family farming, we assume that for the first rotation (i.e. for 7 years) the plant material and the amendment are 100% subsidized as well as the preparation of the field (plowing, firewall):

Equipment	Price (FCFA)	
	Rotation 1	Other rotations
Acacia plants (ha)	0	
Cassava cuttings (ha)	0	[54,000; 66,000]
Maize seeds (ha)	0	[10,000; 15,000]

Activity	Price (FCFA)	
	Rotation 1	Other rotations
Stumping (ha)	[40,000; 60,000]	0
Plowing (ha)	0	0
Spreading limestone amendment (ha)	0	0
Acacia plantation (ha)	0	0
Cassava and Maize plantation (ha)	0	0
Firewall (ha)	0	[40,000; 60,000]
Weeding (ha)	0	0
Cassava harvest (ha) (village transport included)	0	0
Corn harvest	0	0
Thinning and relining of acacias	0	0
Acacia tree felling (ha)	0	0
Charcoal production (40 kg bag)	0	0

<sup>2</sup> Taux de rentabilité interne : taux d'actualisation qui annule la valeur actuelle nette d'une série de flux financiers. Un projet d'investissement ne sera généralement retenu que si son TRI prévisible est suffisamment supérieur au taux d'intérêt bancaire.

Production bag of chips (50 kg)	0	0
Maize bag production (50 kg)	0	0

In this context, the productions and their recipes remain the same only the costs change. From the first rotation, costs are lower than income (Figure 7).

The benefits are positive, albeit small, in the first year. They are around 0.5 MFCFA per year for the other years of the first rotation, then stabilize around 1.1 MFCFA per year from the second rotation (Figure 8, Board 3).

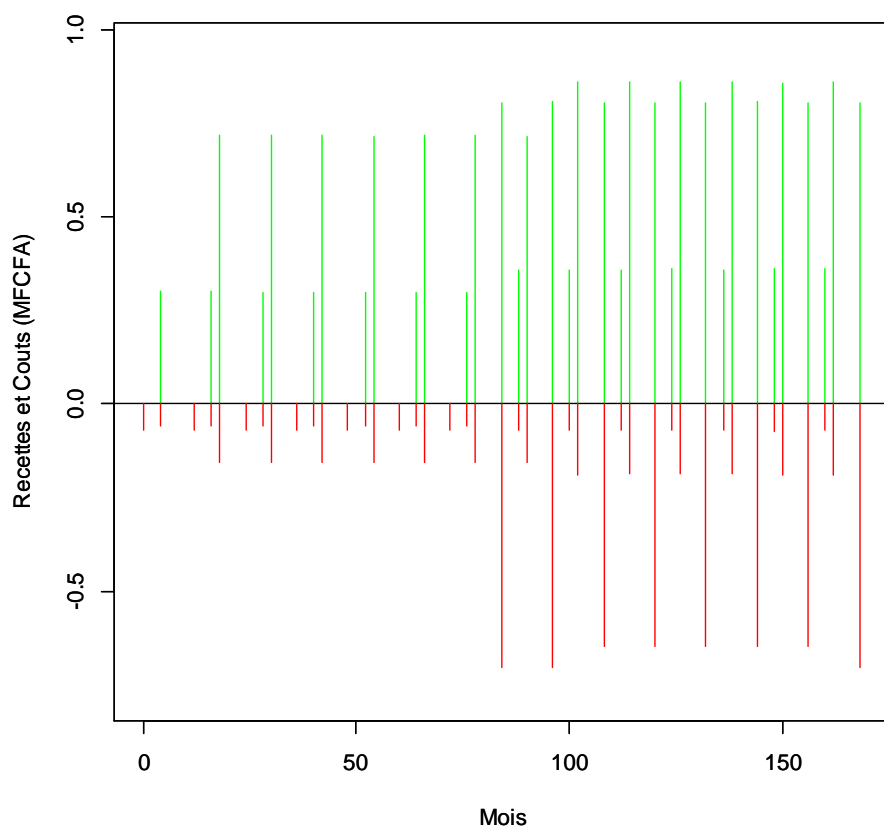


Figure 7. Forecast trends in income and median costs for all crops combined, assuming that labor costs are borne by the farmer and that agricultural equipment and amendment are 100% subsidized during the first rotation ( green: revenue, red: costs)

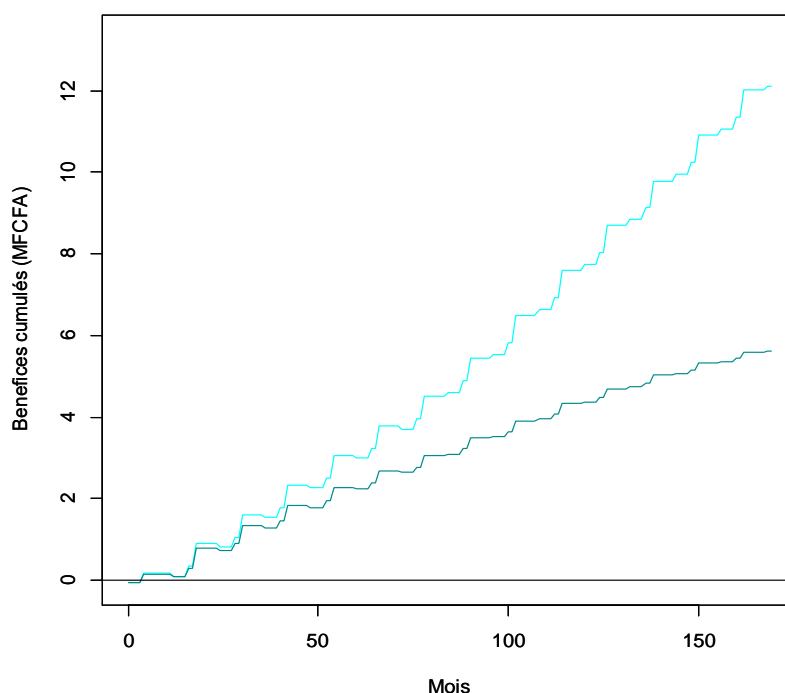


Figure 8. Forecast of the evolution of the median cumulative profits assuming that the labor costs are borne by the farmer and that the agricultural equipment and the amendment are 100% subsidized during the first rotation (light blue: raw, dark blue : discounted at the annual rate of 10%)

Years	1	2	3	4	5	6	7
Costs	0.13	0.29	0.29	0.29	0.29	0.29	0.29
Discounted costs	0.13	0.26	0.23	0.21	0.19	0.17	0.15
Cumulative discounted costs	0.13	0.39	0.62	0.83	1.02	1.19	1.34
Recipes	0.3	1.02	1.02	1.02	1.01	1.02	1.02
Updated recipes	0.3	0.92	0.82	0.74	0.66	0.6	0.54
Cumulative updated revenue	0.3	1.22	2.04	2.78	3.45	4.04	4.59
Discounted benefits	0.17	0.66	0.59	0.53	0.48	0.43	0.39
Cumulative discounted profits	0.17	0.83	1.42	1.95	2.43	2.86	3.25

Years	8	9	10	11	12	13	14
Costs	0.93	0.97	0.91	0.91	0.91	0.91	0.91
Discounted costs	0.45	0.42	0.35	0.32	0.28	0.26	0.23
Cumulative discounted costs	1.79	2.2	2.55	2.87	3.16	3.41	3.64
Recipes	1.87	2.03	2.02	2.03	2.02	2.02	2.02
Updated recipes	0.9	0.87	0.78	0.71	0.63	0.57	0.51
Cumulative updated revenue	5.48	6.35	7.14	7.84	8.48	9.05	9.56
Discounted benefits	0.45	0.46	0.43	0.39	0.35	0.31	0.28
Cumulative discounted profits	3.7	4.15	4.58	4.97	5.32	5.64	5.92

Board 3. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a mixed production of acacias, cassava, maize over 7 ha with a rotation of 7 years in the north of the Pool with sale in Brazzaville. Most of the labor costs are borne by the farmer and his family. The plant material and the amendment are 100% subsidized in the first rotation.



The scenario in this context, where the farmer's family receives a subsidy and bears most of the labor costs is globally profitable over 14 years with NPV of 5,767,945 ± 279,983 FCFA (mean ± deviation-type) and an IRR of 5177 ± 3598% (Monthly rate 37.3 ± 7.2%).

### 3.2 Production in the Niari area with sale in Dolisie

The forecasts of changes in the three productions (charcoal, cassava chips, maize) during two rotations of 7 years (i.e. 14 years) over 7 ha, with 1 ha planted each year for the Niari region, according to the scenario envisaged, is shown. on theFigure 9 and the associated revenues for a sale to Dolisie on the Figure 10. It emerges that the cultivation of acacia brings in the greatest revenue while in the north of Pool it is cassava.

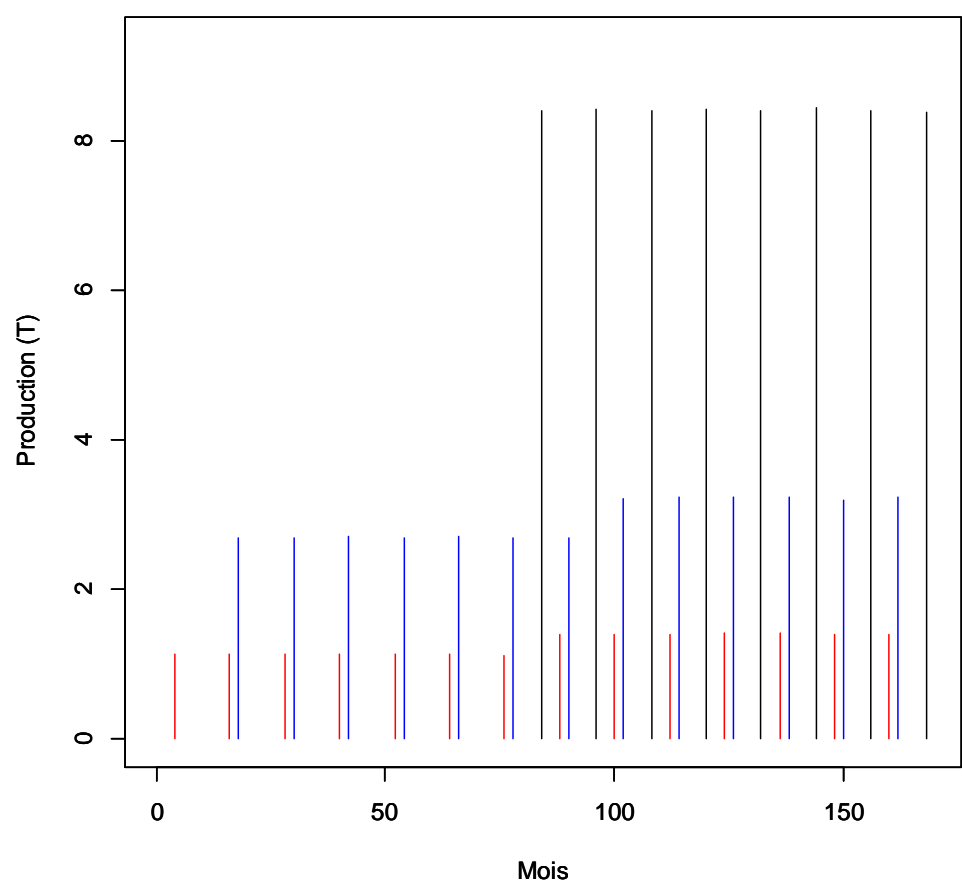
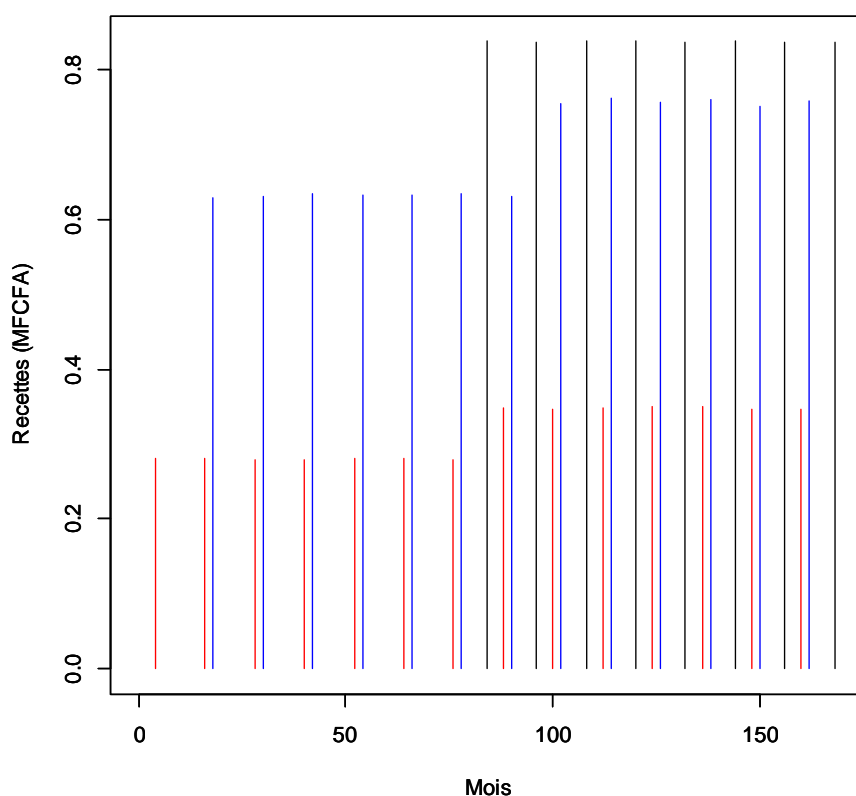


Figure 9. Forecast of the evolution of production according to the scenario cycle for the Niari region (red: corn, blue: cassava chips, black: charcoal).



**Figure 10. Forecast of changes in median revenue for the sale of produce in Brazzaville (red: corn, blue: cassava chips, black: charcoal)**

As before, the cost-benefit analysis that follows considers three cases for cost accounting. First, all identified costs are accounted for. Then, as these planting activities are considered for family farming, we place ourselves in this perspective and assume that part of the labor costs are internalized by the farmers. Finally, from the perspective of support provided by external financing, we envisage that part of the investments necessary to start the plantation will be subsidized by the project.

### 3.2.1 Full cost analysis

In this section, all inventoried costs are accounted for in the analysis. The costs are spread more over time than the income and a significant initial investment of around 1 MFCFA is required (Figure 11). The revenues never offset the costs, the deficit stabilizes at around 0.45 MFCFA from the 10th year (Figure 12, Board 4).

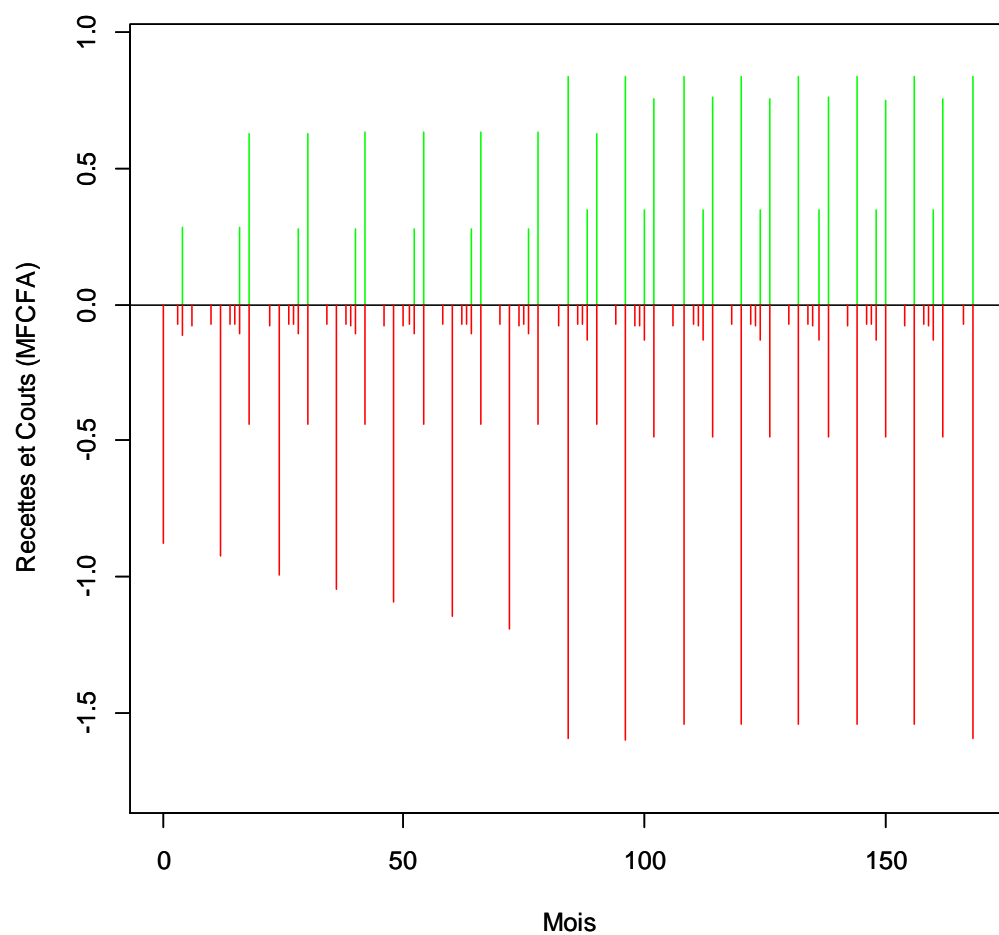


Figure 11. Forecast trends in revenue and costs for all crops combined, including all identified costs (green: revenue, red: costs)

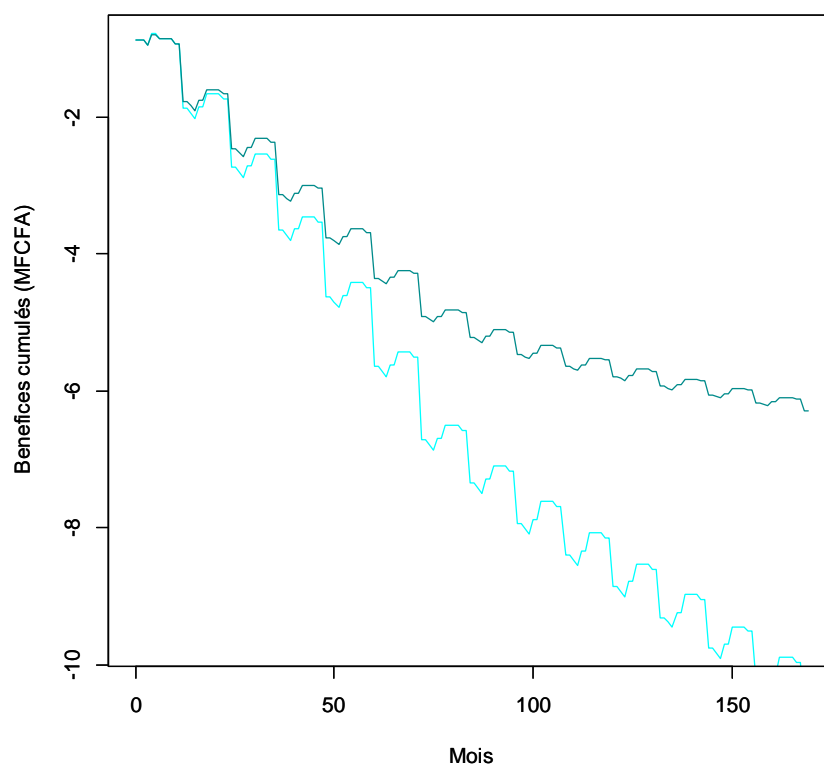


Figure 12. Cumulative profit development forecasts (light blue: gross, dark blue: discounted at an annual rate of 10%)

Years	1	2	3	4	5	6	7
Costs	1.21	1.7	1.77	1.82	1.87	1.92	1.97
Discounted costs	1.21	1.53	1.43	1.33	1.23	1.14	1.05
Cumulative discounted costs	1.21	2.75	4.18	5.51	6.74	7.87	8.92
Recipes	0.28	0.91	0.91	0.91	0.91	0.91	0.91
Updated recipes	0.28	0.82	0.74	0.67	0.6	0.54	0.48
Cumulative updated revenue	0.28	1.1	1.84	2.5	3.1	3.64	4.13
Discounted benefits	-0.93	-0.71	-0.7	-0.66	-0.63	-0.6	-0.56
Cumulative discounted profits	-0.93	-1.65	-2.34	-3.01	-3.63	-4.23	-4.79

Years	8	9	10	11	12	13	14
Costs	2.4	2.45	2.39	2.39	2.39	2.38	2.39
Discounted costs	1.15	1.05	0.93	0.83	0.75	0.67	0.61
Cumulative discounted costs	10.07	11.12	12.04	12.88	13.63	14.3	14.91
Recipes	1.82	1.94	1.95	1.95	1.95	1.94	1.94
Updated recipes	0.87	0.83	0.75	0.68	0.61	0.55	0.49
Cumulative updated revenue	5	5.83	6.59	7.26	7.87	8.42	8.92
Discounted benefits	-0.28	-0.22	-0.17	-0.15	-0.14	-0.13	-0.11
Cumulative discounted profits	-5.07	-5.29	-5.46	-5.61	-5.75	-5.88	-5.99

**Board 4. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a mixed production of acacias, cassava, maize over 7 ha with a rotation of 7 years in the Niari region and sale in Dolisie. All production costs are accounted for.**

The scenario is globally unprofitable over 14 years with a net present value (NPV) of - 6,217,954 ± 235,784 FCFA (mean ± standard deviation).

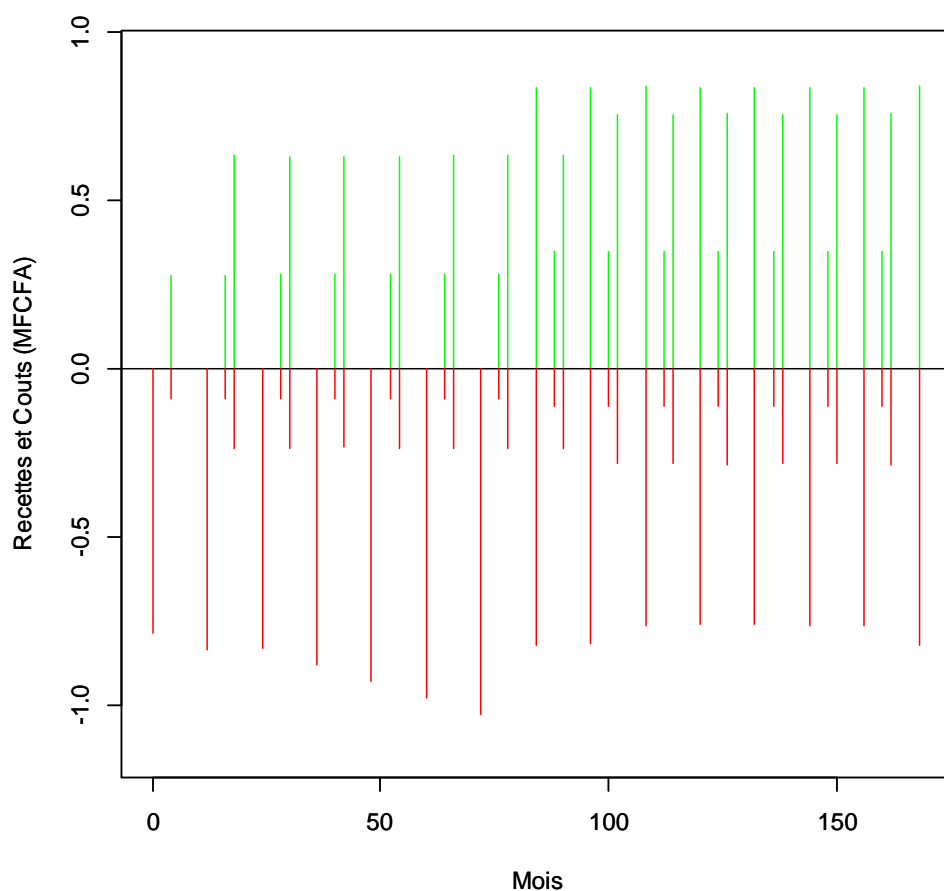
### 3.2.2 Analysis with part of the workforce at the expense of the farmer

In the context of family farming, from the farmer's point of view, labor costs can be internalized and therefore assumed to be zero for the cost-benefit analysis:

Activity	Price (FCFA)
Stumping (ha)	[40,000; 60,000]
Plowing (ha)	[80,000; 100,000]
Spreading limestone amendment (ha)	0
Acacia plantation (ha)	0
Cassava and Maize plantation (ha)	0
Firewall (ha)	[40,000; 60,000]
Weeding (ha)	0
Cassava harvest (ha) (village transport included)	0
Corn harvest	0
Thinning and relining of acacias	0

Acacia tree felling (ha)	0
Charcoal production (40 kg bag)	0
Production bag of chips (50 kg)	0
Maize bag production (50 kg)	0

The costs of stumping, firebreaking and plowing are maintained because they are mechanized. In this context, the productions and their recipes remain the same only the costs change. The costs are thus reduced and more stable over time compared to the reference situation where all the costs are accounted for (Figure 1).



**Figure 13. Forecast trends in income and costs for all crops combined, assuming that labor costs are borne by the farmer and his family (green: income, red: costs)**

The benefits are negative until the 8th year but relatively low (around -0.25 MFCFA) from the second year. The investment of the first year (around 500,000 FCFA) seems to be amortized from the 15th year (Figure 14, Board 5).

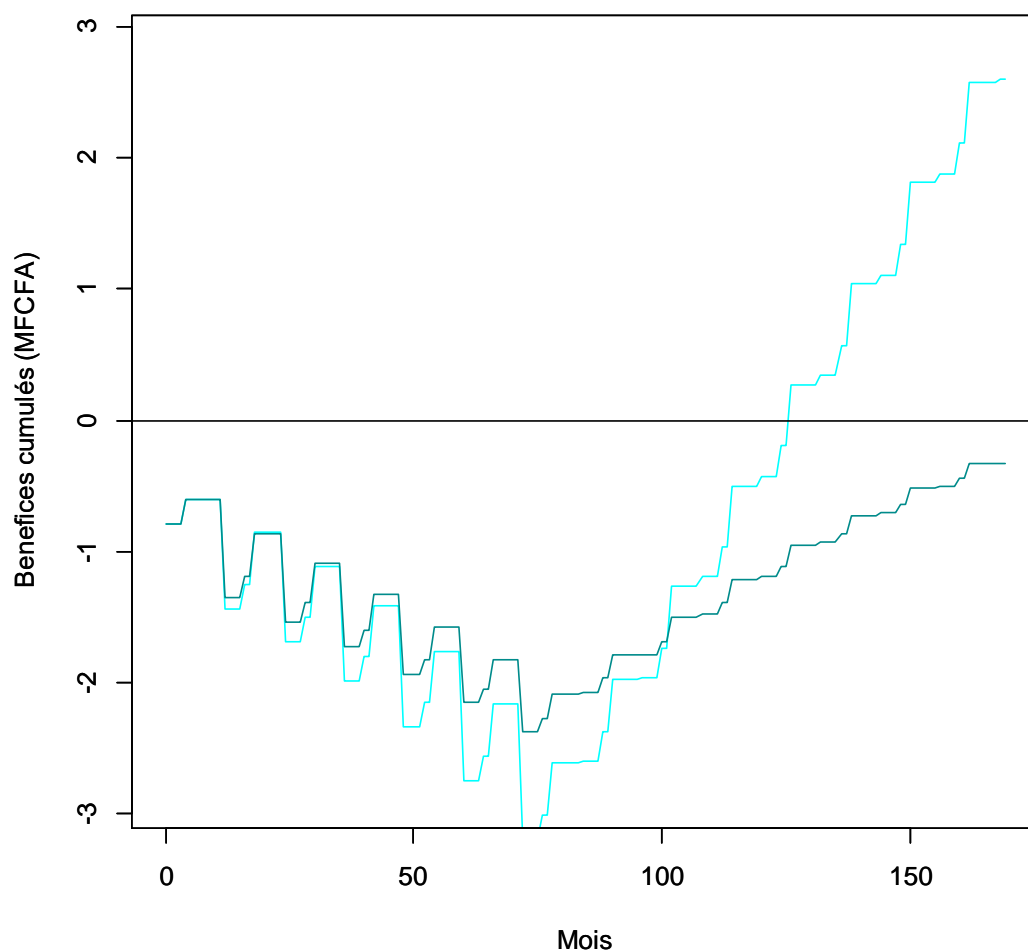


Figure 14. Forecast changes in median cumulative profits assuming that labor costs are borne by the farmer and his family (light blue: gross, dark blue: discounted at an annual rate of 10%)

The scenario in this context, where the farmer's family bears most of the labor costs is at the break-even point over 14 years with a net present value (NPV) of  $-247,841 \pm 234,290$  FCFA (average  $\pm$  standard deviation) and an annual internal rate of return of  $9.4 \pm 1.6\%$  (monthly rate  $0.7 \pm 0.13\%$ ).

It is unrealistic to imagine small farmers going into a plantation with uncertain long-term profitability. However, from the second rotation, this system could ensure an average annual income of 0.8 MFCFA. For the scenario to be realistic, it is necessary to consider that external aid will cover the investments of the first rotation. This is the subject of the next section.

Years	1	2	3	4	5	6	7
Costs	0.88	1.16	1.15	1.2	1.25	1.3	1.35

<b>Discounted costs</b>	0.88	1.04	0.93	0.88	0.82	0.77	0.72
<b>Cumulative discounted costs</b>	0.88	1.92	2.85	3.73	4.55	5.32	6.04
<b>Recipes</b>	0.28	0.91	0.91	0.91	0.91	0.91	0.92
<b>Updated recipes</b>	0.28	0.82	0.74	0.66	0.6	0.54	0.49
<b>Cumulative updated revenue</b>	0.28	1.1	1.84	2.5	3.1	3.64	4.12
<b>Discounted benefits</b>	-0.6	-0.22	-0.2	-0.21	-0.22	-0.23	-0.23
<b>Cumulative discounted profits</b>	-0.6	-0.82	-1.02	-1.23	-1.45	-1.68	-1.92

<b>Years</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>
<b>Costs</b>	1.17	1.21	1.15	1.15	1.15	1.15	1.16
<b>Discounted costs</b>	0.56	0.52	0.45	0.4	0.36	0.33	0.29
<b>Cumulative discounted costs</b>	6.6	7.12	7.57	7.97	8.33	8.66	8.95
<b>Recipes</b>	1.82	1.94	1.94	1.94	1.94	1.94	1.94
<b>Updated recipes</b>	0.87	0.83	0.75	0.68	0.61	0.55	0.49
<b>Cumulative updated revenue</b>	4.99	5.83	6.58	7.26	7.86	8.41	8.91
<b>Discounted benefits</b>	0.31	0.31	0.3	0.28	0.25	0.22	0.2
<b>Cumulative discounted profits</b>	-1.6	-1.29	-0.99	-0.71	-0.47	-0.24	-0.04

Board 5. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a mixed production of acacias, cassava, maize over 7 ha with a 7-year rotation in the Niari region with sale in Dolisie. Most of the labor costs are borne by the farmer and his family.

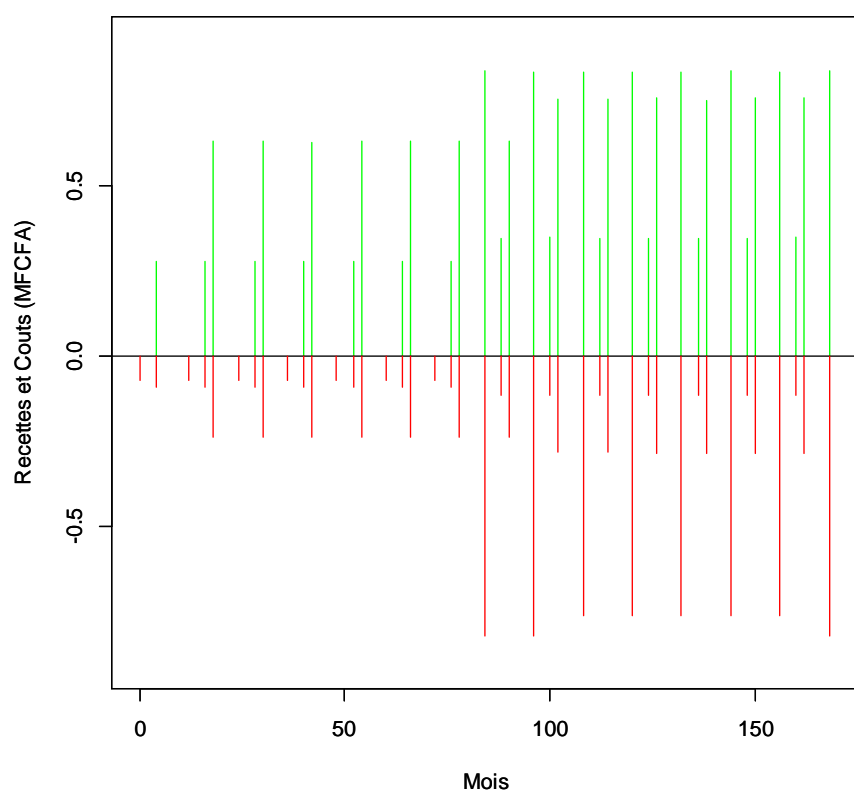
### 3.2.3 Analysis with part of the labor at the expense of the farmer and part of the initial subsidized investments

Still in the context of family farming, we assume that for the first rotation (i.e. for 7 years) the plant material and the amendment are 100% subsidized as well as the preparation of the field (plowing, firewall):

<b>Equipment</b>	<b>Price (FCFA)</b>	
	<b>Rotation 1</b>	<b>Other rotations</b>
Acacia plants (ha)	0	
Cassava cuttings (ha)	0	[54,000; 66,000]
Maize seeds (ha)	0	[10,000; 15,000]

<b>Activity</b>	<b>Price (FCFA)</b>	
	<b>Rotation 1</b>	<b>Other rotations</b>
Stumping (ha)	[40,000; 60,000]	
Plowing (ha)	0	
Spreading limestone amendment (ha)		0
Acacia plantation (ha)	0	0
Cassava and Maize plantation (ha)	0	0
Firewall (ha)	0	[40,000; 60,000]

Weeding (ha)	0	0
Cassava harvest (ha) (village transport included)	0	0
Corn harvest	0	0
Thinning and relining of acacias		0
Acacia tree felling (ha)	0	0
Charcoal production (40 kg bag)	0	0
Production bag of chips (50 kg)	0	0
Maize bag production (50 kg)	0	0



**Figure 15. Forecast trends in income and median costs for all crops combined, assuming that labor costs are borne by the farmer and that agricultural equipment and amendment are 100% subsidized during the first rotation ( green: revenue, red: costs)**



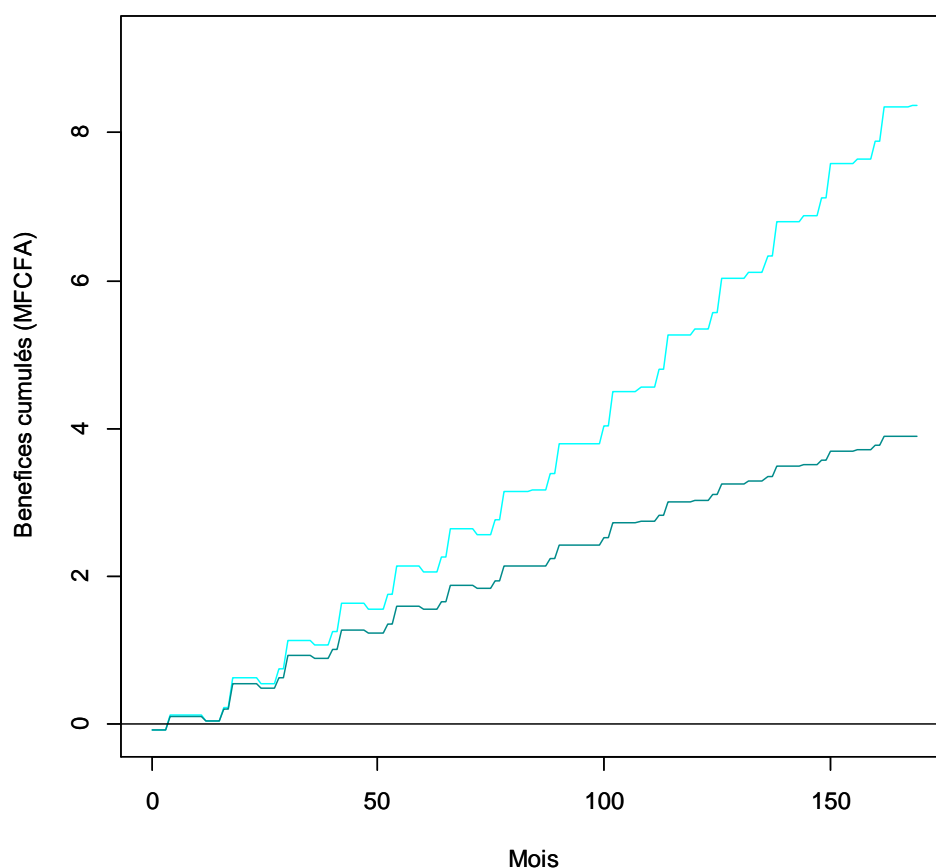


Figure 16. Forecast of the evolution of the median cumulative profits assuming that the labor costs are borne by the farmer and that the agricultural equipment and the amendment are 100% subsidized during the first rotation (light blue: raw, dark blue : discounted at the annual rate of 10%)

In this context, the productions and their recipes remain the same only the costs change. From the first rotation, the costs are of the same order of magnitude as the income (Figure 15). The benefits are positive, although small, from the second year. They are around 0.5 MFCFA per year in the first rotation, then stabilize around 0.8 MFCFA per year from the second rotation (Figure 16).

Years	1	2	3	4	5	6	7
Costs	0.16	0.4	0.4	0.4	0.39	0.39	0.39
Discounted costs	0.16	0.36	0.32	0.29	0.26	0.23	0.21
Cumulative discounted costs	0.16	0.52	0.84	1.12	1.38	1.62	1.83
Recipes	0.28	0.91	0.91	0.91	0.91	0.91	0.91
Updated recipes	0.28	0.82	0.74	0.66	0.6	0.54	0.48
Cumulative updated revenue	0.28	1.1	1.84	2.5	3.1	3.64	4.12
Discounted benefits	0.12	0.47	0.42	0.37	0.34	0.3	0.27
Cumulative discounted profits	0.12	0.58	1	1.38	1.71	2.02	2.29

Years	8	9	10	11	12	13	14
Costs	1.17	1.21	1.15	1.15	1.15	1.16	1.16
Discounted costs	0.56	0.52	0.45	0.4	0.36	0.33	0.29
Cumulative discounted costs	2.38	2.91	3.35	3.76	4.12	4.44	4.74
Recipes	1.82	1.94	1.94	1.94	1.94	1.94	1.94

<b>Updated recipes</b>	0.87	0.84	0.75	0.68	0.61	0.55	0.49
<b>Cumulative updated revenue</b>	4.99	5.82	6.58	7.25	7.86	8.41	8.91
<b>Discounted benefits</b>	0.31	0.31	0.31	0.28	0.25	0.22	0.2
<b>Cumulative discounted profits</b>	2.6	2.92	3.22	3.5	3.75	3.97	4.17

**Board 6. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a mixed production of acacias, cassava, maize over 7 ha with a rotation of 7 years in the Niari region with sale in Dolisie. Most of the labor costs are borne by the farmer and his family. The plant material and the amendment are 100% subsidized in the first rotation.**

The scenario in this context, where the farmer's family bears most of the labor costs is globally profitable over 14 years with a net present value (NPV) of 3,967,594 ± 223,350 FCFA (mean ± deviation- type) and an internal rate of return of 2743 ± 1939% (monthly rate 30.3 ± 6.5%).

## 4. Conclusion

For the two locations, North Pool region and Niari region, the installation of agroforestry plantations associating Acacia, Cassava and Maize is not profitable if all production costs are taken into account (Board 7). However, in the context of family farming, where certain labor costs are internalized, planting becomes profitable in the long term, more quickly in the North Pool than in Niari. From the second rotation, the exploitation of the plantations is profitable with an average annual income of 1.1 MFCFA in the North Pool and 0.8 MFCFA 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. .

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. 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.

		Batéké platter sale Brazzaville	Niari region for sale Dolisie
Full cost	VAN MFCFA (avg. $\pm$ and)	- 4.2 $\pm$ 0.3	- 6.2 $\pm$ 0.2
	SORTING % (avg. $\pm$ and)		
Labor cost borne by the farmer	VAN MFCFA (avg. $\pm$ and)	1.5 $\pm$ 0.3	-0.2 $\pm$ 0.2
	SORTING % (avg. $\pm$ and)	22.1 $\pm$ 2.5	9 $\pm$ 1.16
Labor cost borne by the farmer and start-up subsidy	VAN MFCFA (avg. $\pm$ and)	5.8 $\pm$ 0.3	4.0 $\pm$ 0.2
	SORTING % (avg. $\pm$ and)	5177 $\pm$ 3558	2745 $\pm$ 1939

**Board 7. Summary of the financial profitability analyzes of an agroforestry plantation associating Acacia, Cassava, Maize according to the different situations envisaged.**

## Studies Costs Benefits Case study 2: Conversion of an Eucalyptus Plantation into Coppice

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## 1. Description of the scenarios considered

A mature 5,000 ha eucalyptus plantation is converted to coppice. Each year, during the first 5 years, a plot of 1000 ha is harvested and all the production is converted into charcoal. Then a part of 200 ha of the plot will be dedicated to the production of perch on a rotation cycle of three years and finally the remaining part of 800 ha will be dedicated to the production of charcoal over a rotation cycle of 5 years.

- **Production cycles:**
  - Annual plots 1000 ha divided into two parts:
    - 800 ha: coal
    - 200 ha: poles
  - Energy wood rotation 5 years
  - Pole rotation 3 years
- **Location:** production from the eucalyptus plantation in Pointe-Noire, all production is sold in Pointe-Noire
- **Hypotheses :**
  - Management of 5,000 ha of Eucalyptus plantation in coppice
  - Productions
    - Charcoal :
      - An industrial furnace and 20 improved 3m<sup>3</sup> furnaces (rebuilt every year) producing 3500 to 4000 t and 150 to 200t of coal per year respectively with a respective carbonization yield of 30% and 25%.
      - The production of eucalyptus wood dedicated to charcoal is transformed half by the industrial kiln and the other half by improved brick kilns.
    - Eucalyptus perch
- **Steps :**
  - Year 0:
    - Purchase and installation of the industrial furnace
  - Year 1:
    - Construction of improved ovens
    - Harvest of the whole plot (1000 ha) to produce charcoal
  - Year 2:
    - Selection of stems, weeding and spreading fertilizer over the entire plot
  - Year 3:
    - Weeding of the whole plot
  - Year 4:
    - Harvest of the perch part (200 ha)
    - Maintenance of the coal parts (800 ha)
  - Year 5:
    - Selection + weeding + fertilizer on the pole part
    - Maintenance of the coal part

- Year 6:
    - Weeding of the pole part
    - Construction of improved ovens
    - Harvesting the coal part
  - Year 7:
    - Selection + weeding + fertilizer from the coal part
    - Harvesting perch (200 ha)
  - Year 8:
    - Selection + weeding + fertilizer on the pole part
    - Weeding of the coal part
  - ...
- Investments:
    - Equipment
      - Improved ovens
      - Industrial oven
    - Plant material
      - Urea fertilizer
    - Other
      - 40kg empty bags (for charcoal)
  - Other Costs:
    - Transport
      - Coal sales
      - Perch sale
    - Various
      - Charcoal bag tax
      - Charcoal bag storage cost in market depots

## 2. Reference parameters used for the cost-benefit analysis:

- Equipment**

Equipment	Price (FCFA)
Industrial oven	[1; 1.4] Billion
Improved oven 3m3 plus maintenance	[600,000; 770,000]

- Fertilizer:**

Equipment	Price (FCFA)
Fertilizer (ha)	[45,000; 55,000]

- Labor costs:**

Activity	Price (FCFA)
Selection + weeding + fertilizer spreading (year 1) (ha)	[100,000; 120,000]
Weeding (year 2) (ha)	[60,000; 90,000]
Plantation maintenance (year 3,4,5) (ha)	[35,000; 45,000]
Eucalyptus felling (ha)	[310,000; 340,000]
Perch felling (ha)	50
Charcoal production (40 kg bag)	[900; 1100]

- Transport costs :**

Activity	Price (FCFA)
Roadside pole transport	50
Roadside pole transport in town	300
Coal sales transport (bag)	[800; 1000]

- Crop yields:**

Production	
Eucalyptus (T / ha) in 5 years	[25; 35]
Perch (Nb / ha) in 3 years	[1600; 2400]

- **Carbonization yield:** Eucalyptus -> charcoal

Equipment	%
Improved ovens	[22; 27]
Industrial ovens	[28; 32]

- **Selling price :**

Products	Price (FCFA)
Coal (40kg bag)	[4500; 5500]
Perch (unit)	[900; 1100]

- **Other costs:**

Description	Price (FCFA)
Empty bag capacity 40 kg	[250; 300]
Tax per bag of charcoal	100
Charcoal bag storage cost (sale in town)	100

- **Discount rate :** 10%



### 3. Results

Forecasts of changes in the two productions (charcoal and poles) during 4 rotations of 5 years (i.e. 20 years corresponding to the lifespan of an industrial oven) on a 5,000 ha Eucalyptus plantation, with 1,000 ha harvested each year (during the first rotation) for the Pointe Noire region are represented on the Figure 17 and the associated revenues for a sale in Pointe Noire on the Figure 18.

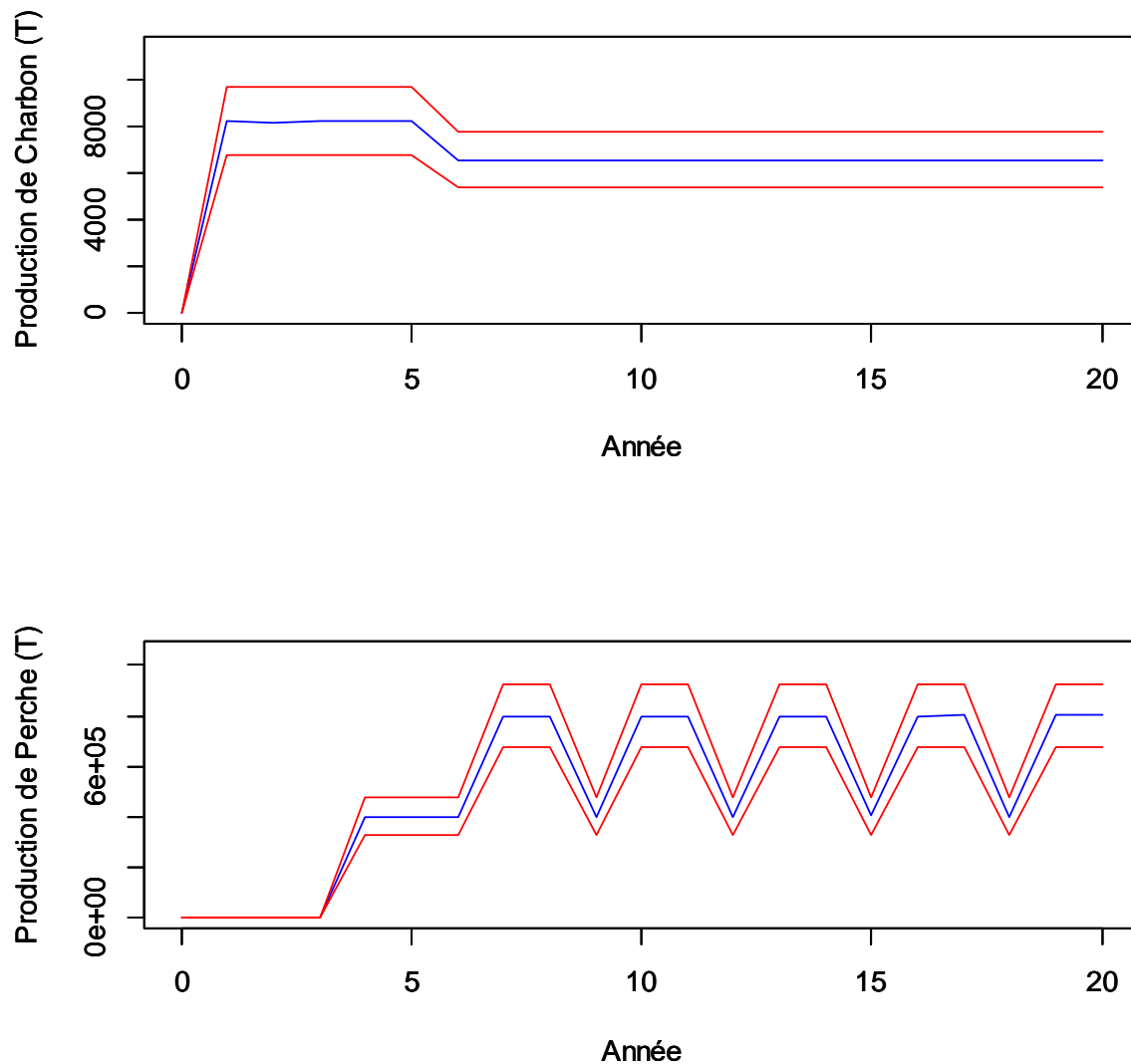
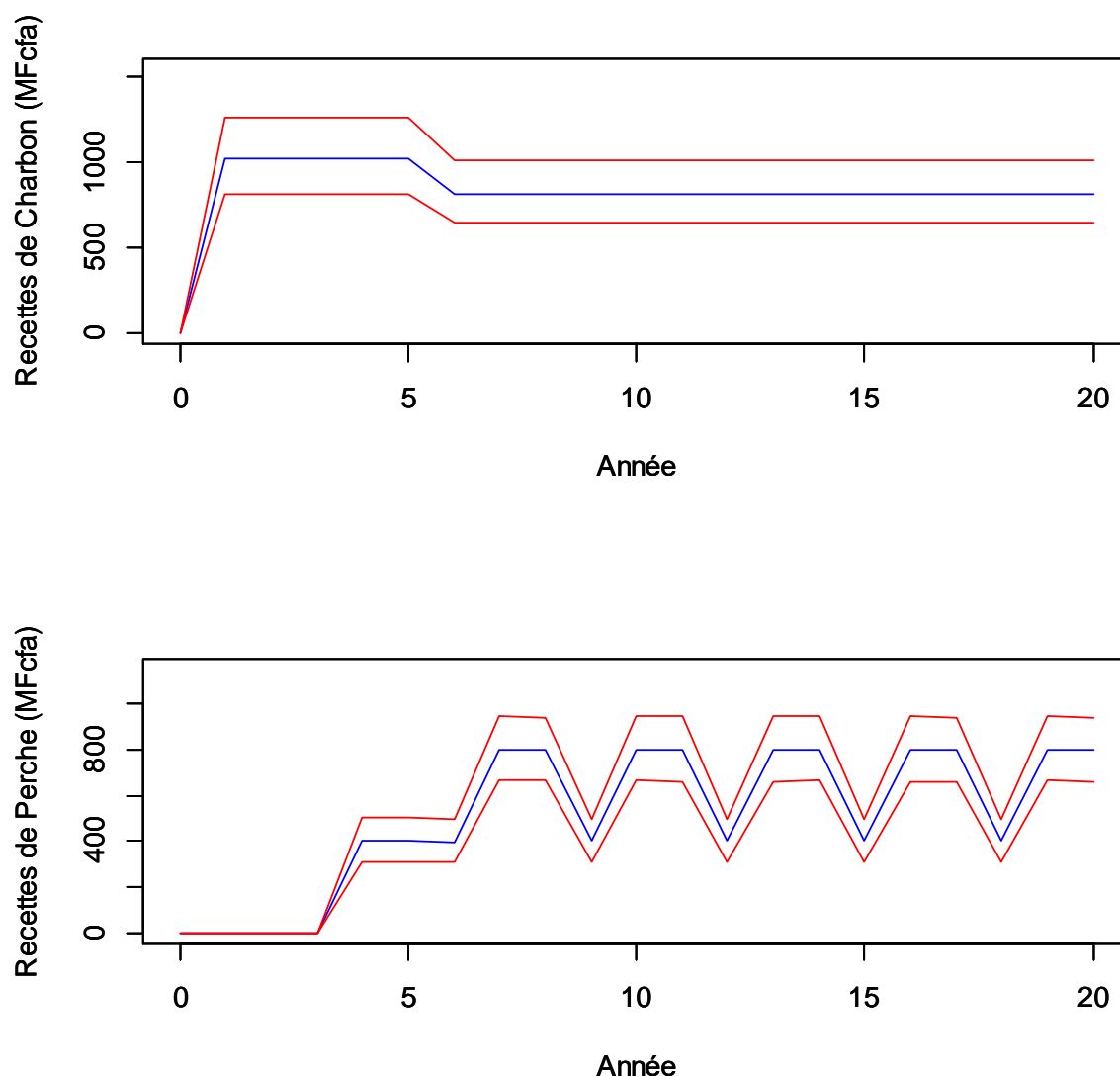


Figure 17. Forecast of changes in coal and perch production, for a 5,000 ha eucalyptus plantation converted to coppice in the Pointe-Noire region (blue: median, red: 95% confidence intervals)

It turns out that the production of charcoal provides the greatest revenue. However, the revenues provided by the poles are also important, especially since the poles are produced on an area four times smaller.



**Figure 18. Forecast of changes in revenue for the sale of productions in Pointe Noire (blue: medians, red: 95% confidence intervals)**

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 fluctuates between 50 and 300 MFCFA (Figure 19, Figure 20).

On average, the scenario is profitable over 20 years with a net present value (NPV) of  $22.7 \pm 206.1$  MFCFA (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 current low price of a sack of charcoal is the main cause of this risk.

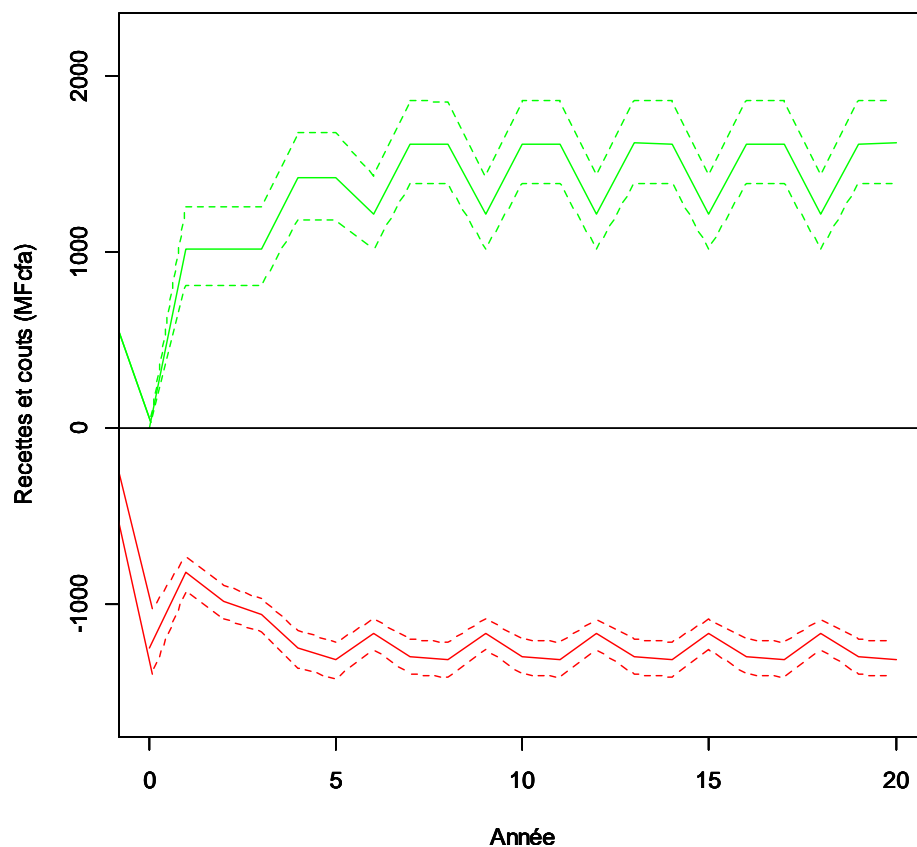


Figure 19. . Forecast trends in revenue and costs for all productions combined, including all identified costs (green: revenue, red: costs; -: median, - -: 95% confidence intervals)

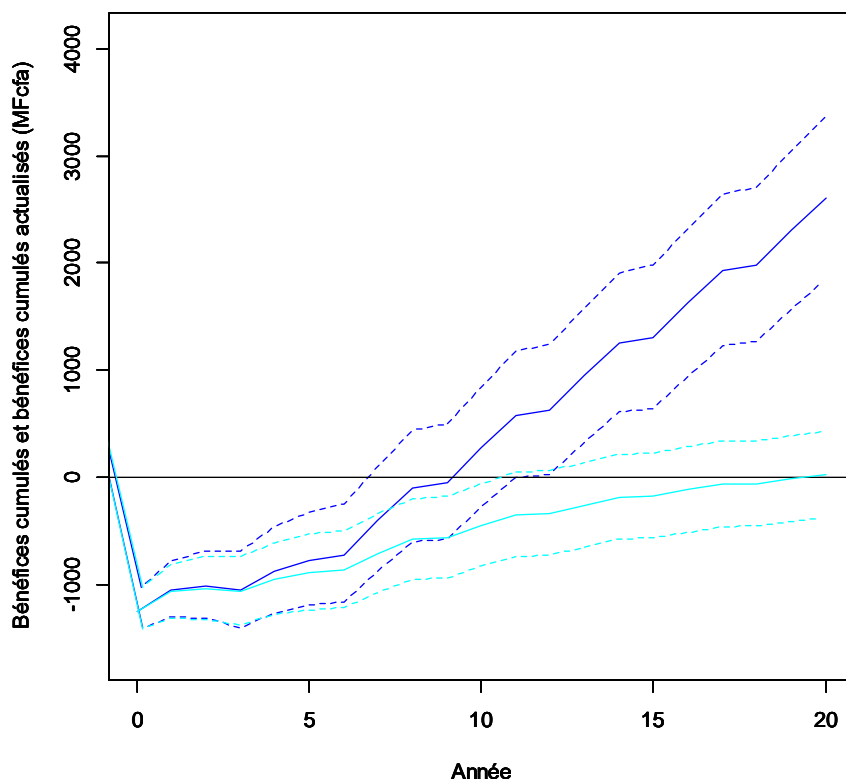


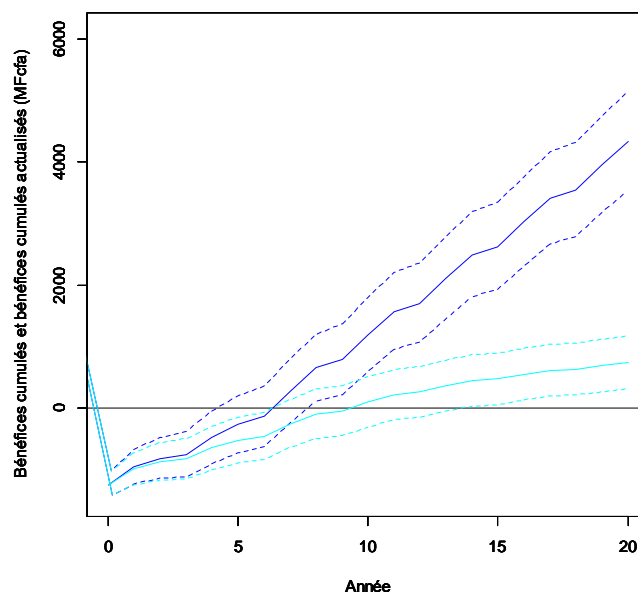
Figure 20. Cumulative profit development forecasts (light blue: gross, dark blue: updated at an annual rate of 10%; -: median, - -: 95% confidence intervals)

Years	0	1	2	3	4	5	6	7	8	9	10
Costs	1246	823	982	1058	1250	1314	1167	1295	1312	1167	1295
Discounted costs	1246	741	795	771	820	776	620	620	565	452	452
Cumulative discounted costs	1246	1987	2782	3554	4374	5150	5771	6390	6955	7407	7859
Recipes	0	1018	1016	1018	1418	1419	1214	1614	1614	1214	1615
Updated recipes	0	916	823	742	931	838	645	772	695	470	563
Cumulative updated revenue	0	916	1739	2481	3412	4249	4895	5667	6362	6832	7395
Discounted benefits	-1246	175	27	-29	110	62	25	153	130	18	111
Cumulative discounted profits	-1246	-1071	-1044	-1073	-963	-901	-876	-723	-593	-575	-463

Years	11	12	13	14	15	16	17	18	19	20
Costs	1312	1167	1295	1313	1167	1296	1312	1168	1295	1313
Discounted costs	412	330	329	300	240	240	219	175	175	160
Cumulative discounted costs	8270	8600	8929	9230	9470	9710	9929	10104	10279	10439
Recipes	1613	1214	1616	1614	1215	1615	1616	1215	1615	1616
Updated recipes	506	343	411	369	250	299	269	182	218	197
Cumulative updated revenue	7902	8244	8655	9025	9275	9574	9843	10026	10244	10441
Discounted benefits	95	13	81	69	10	59	51	7	43	37
Cumulative discounted profits	-369	-356	-274	-205	-195	-136	-86	-78	-35	2

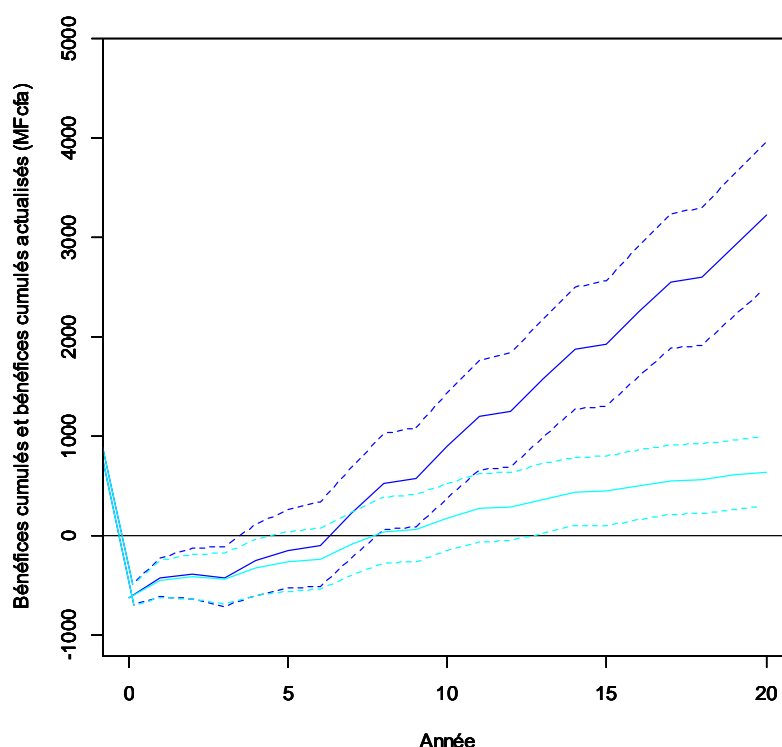
**Board 8. Median forecasts of changes in costs, revenues and benefits (Million FCFA), updated with an annual rate of 10%, for a production of coal and poles, for a eucalyptus plantation of 5000 ha under coppicing in the region of Black Point.**

Reasoning with prices close to those practiced in Brazzaville, that is to say between 5000 and 6000FCFA per 40kg bag, profitability would be guaranteed. Indeed, profitability with a discount rate of 10% would be guaranteed from the 10th year (Figure 21). In this case the project would have a net present value (NPV) of  $742 \pm 217$  MFCFA (mean  $\pm$  standard deviation) and an IRR of  $18.6 \pm 2.7\%$ .



**Figure 21. Cumulative profit development forecasts (light blue: raw, dark blue: discounted at the annual rate of 10%; -: median, - -: 95% confidence intervals) assuming a selling price of the 40kg bag of coal between 5,000 and 6,000 FCFA.**

Assuming that if the price of the 40kg bag of charcoal remains between 4,500 and 5,500 FCFA, and that if a subsidy of around 50% of the installation price of the industrial furnace is granted, profitability is also guaranteed from the 7th year (Figure 22). In this case the project would have a net present value (NPV) of  $645 \pm 182$  MFCFA (mean  $\pm$  standard deviation) and an IRR of  $22.2 \pm 4.2\%$ .



**Figure 22. Cumulative profit development forecasts (light blue: gross, dark blue: updated at the annual rate of 10%; -: median, - - : 95% confidence intervals) assuming a subsidy of 50% of the price of the industrial furnace**

Another choice of distribution of the production area between poles and charcoal can also improve profitability if the price of a 40kg bag of charcoal remains between 4500 and 5500 FCFA. Indeed, suppose that 600ha are dedicated to charcoal and 400ha to poles. This would imply that only 10 improved brick kilns are needed in addition to the industrial kiln to perform carbonization. Except for the first year when the entire plot will be dedicated to charcoal production, 20 improved brick kilns would then be needed in addition to the industrial kiln to carry out carbonization. In this case profitability with a discount rate of 10% would be guaranteed from the 6th year (Figure 23). The project would have a net present value (NPV) of  $1752 \pm 228$  MFCFA (mean  $\pm$  standard deviation) and an IRR of  $23.3 \pm 2.3\%$ .

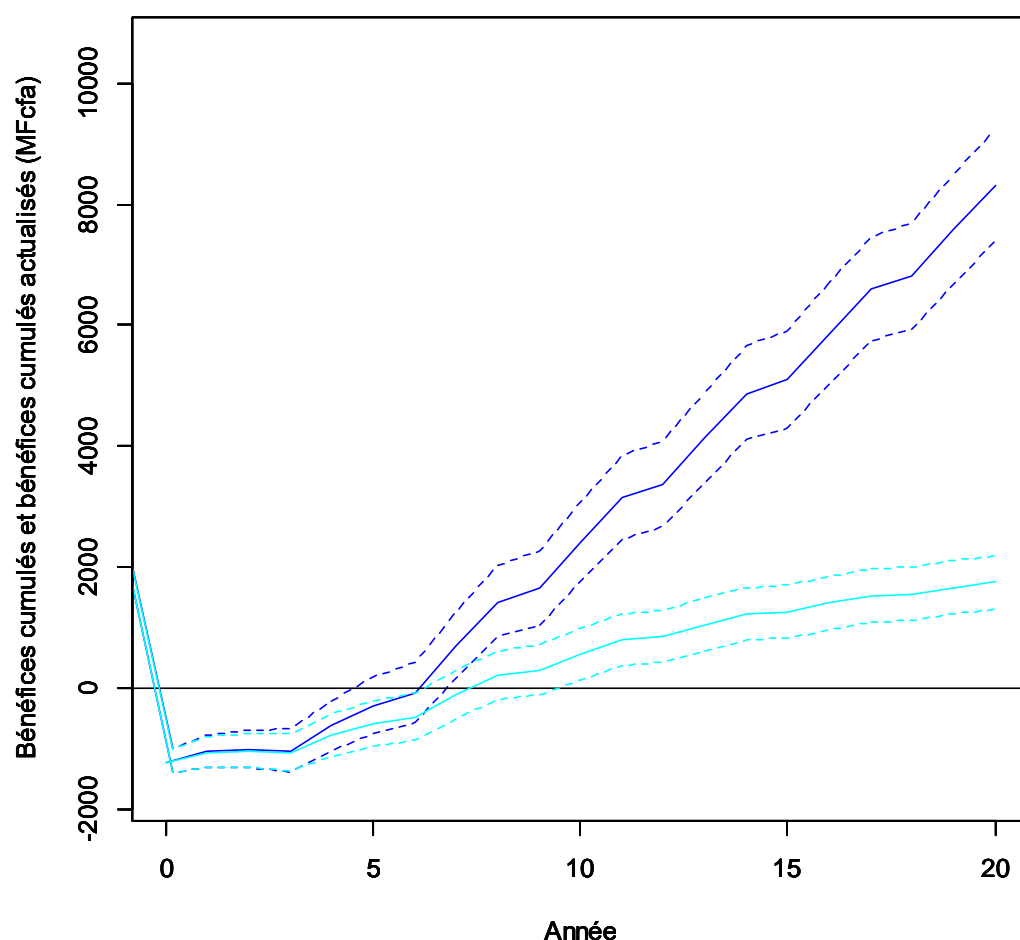


Figure 23. Cumulative profit development forecasts (light blue: raw, dark blue: discounted at the annual rate of 10%; -: median, - -: 95% confidence intervals) assuming a selling price of the 40kg bag of coal between 5000 and

## 4. Conclusion

Given the current price of a bag of charcoal in Pointe Noire, it would not be certain that the conversion into coppice of 5000ha of Eucalyptus plantation, with 4000ha and 1000ha for the production of charcoal and perch respectively, would be profitable over 20 years. . Thus, under this scenario, it is not guaranteed to be able to recover sufficient funds to reimburse the initial investment of the cost of installing the carbonization furnaces. However, in the medium term when the eucalyptus massif near Pointe-Noire (southern part of the massif) will be completely degraded (anarchic exploitation and extension of the city noted during the mission in 2018) or if an anarchic exploitation ban is imposed. applied which, according to our information, was implemented very recently, the price of a sack of charcoal could return to its usual level and thus guarantee the economic sustainability of this project. Following this recent ban on the exploitation of the massif near Pointe-Noire, the price of the bag has already increased significantly and should return to its base level, that is to say close to the price of Brazzaville.

In addition, a production unit like this could have the capacity to store part of the production to sell it at a high price during recurring periods of market stress, for example in the middle of the rainy season. Indeed, the export of production to Pointe-Noire does not depend on the condition of the tracks since most of the route is paved. The geographical location of this massif is therefore ideal for carrying out such a project.

On the other hand, the exploitation of poles being more profitable, if the demand for poles is sufficient, by devoting more surface to the production of poles, the profitability of the project is also guaranteed. Thus, the coppice 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 project.

A subsidy for the installation of the industrial furnace which allows the complete depollution of GHG emissions (greenhouse gas) and a much better valuation of wood (reduces the need for forest resources) could also guarantee the economic sustainability of the project.

The project would:

- Contribute to the protection of natural forests which will be less used to supply the city of Pointe-Noire with charcoal.
- Improve the carbonization performance with a good carbonization yield in improved furnaces (25%) and a very good carbonization yield in an industrial furnace (30%).
- Create jobs for the management of plantations and the harvest of poles and timber.
- Legalize the activity of charcoal burners who will work on the production of 8,000 tonnes of coal annually.
- Guarantee the collection by the services of Them and Forestry of the tax on coal transport.

## Studies Costs Benefits Case study 3: village agroforestry plantation Cacao-Plantain-Arachide

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## 1. Description of the scenarios considered

- **Crop cycle:**
  - Plots planted annually: 1 ha
  - Total area: 5 ha
  - Plantations: Cocoa, Plantain, Peanuts and other forest / fruit trees
  - Harvests:
    - Peanuts: 3 months
    - Plantain: every 3 months for 3 years (first harvest at 12 months)
    - Cocoa: every year from 3 years old

The farmer has 5 ha and plants one hectare per year with cocoa trees and fruit / forest trees, plantains and peanuts in combination. On the first hectare planted, after 3 months the farmer harvests the peanuts and replant the peanuts once to carry out a second harvest at 6 months. Then at 12 months he harvests the first production of plantains, then harvests them every 3 months for 3 years. From the age of 3 he begins to harvest cocoa.

- **Location :**
  - Production in the Cuvette and Cuvette Ouest departments (savannah forest transition zone) sale in the village to traders who transport to Pointe-Noire for cocoa and to Brazzaville for groundnuts and plantains
- **Assumptions (see technical itinerary):**
  - Cocoa trees are planted every three meters, or about 1,100 plants per hectare.
  - The other forest trees are planted at a density of 50 trees per hectare for those of the lower stratum (fruit trees) and at 35 trees per hectare for those of the upper stratum (forest trees).
  - Banana trees are planted at a density of 800 feet per ha
- **Workforce :**
  - Start-up :
    - Stumping
    - Plowing
    - Spreading amendment (crushed limestone 2t / ha) and NPK starter fertilization (55kg / ha)
    - Plantation: peanuts, cocoa trees, plantains, and other forest / fruit trees
  - Interview
    - Weeding (3, 6, 10, 14, 24, 30 and 36 months)
    - Firewall (12, 24, 36, 48, 60 and 72 months)
  - Harvests
    - Peanuts (3 and 6 months)
    - Plantain (12, 15, 18, 21,..., 48 months)
    - Fruits (from 4-5 years old)
    - Cocoa (every 6 months from 3 years old)

- **Investments:**
  - Plant material
    - Cocoa plants
    - Forest and fruit tree plants
    - Plantain cuttings
    - Peanut seeds
  - Other
    - Crushed limestone
    - NPK fertilizers
    - Empty bags of capacity:
      - 50kg of peanuts
- **Other Costs:**
  - Transportation
    - Plant material (plants)
    - Cocoa to the village
    - Fertilizer and crushed limestone

## 2. Reference parameters used for the cost-benefit analysis:

- **Plant material and fertilizers**

Equipment	Price (FCFA)
Cocoa plant	[900; 1100]
Low stratum forest trees plant (fruit trees)	[1000; 2000]
High stratum forest trees plant	[400; 600]
Plantain cutting	[250; 500]
Peanut seeds (ha)	[10,000; 15,000]
Limestone amendment (ha)	[56,000; 64,000]
NPK fertilizer (ha)	[35,000; 45,000]

- **Labor costs**

Activity	Price (FCFA)
Stumping (ha)	[40,000; 60,000]
Plowing (ha)	[80,000; 120,000]
Plantation of cocoa trees, plantains, peanuts, other trees (ha)	[115,000; 135,000]
Groundnut plantation (ha)	[15,000; 25,000]
Firewall (ha)	[40,000; 60,000]
Weeding (ha)	[60,000; 90,000]
Groundnut harvest (ha) (village transport included)	[10,000; 30,000]
Plantain harvest (ha) (village transport included)	[30,000; 50,000]
Pod harvest (ha) (for mature cocoa trees with village transport included)	[30,000; 50,000]

• Transport

costs (average distance 50 km)

Activity	Price (FCFA)
Transport of plant material (ha)	[10,000; 30,000]
Limestone amendment transport (ha)	[25,000; 35,000]
Fertilizer transport (ha)	[2000; 3000]

• Yields of

combined crops

Peanuts per harvest (T / ha)	[0.5; 0.6]
Plantain per harvest (T / ha)	[0.45; 0.55]
Commercial cocoa (T / ha) (3 to 6 years)	[0.1; 0.3]
Commercial cocoa (T / ha) (7 to 10 years)	[0.4; 0.6]
Commercial cocoa (T / ha) (11 to 12 years)	[0.6; 0.8]
Commercial cocoa (T / ha) (> 12 years)	[0.7; 1]

• Selling price

Products	
Peanuts (50kg bag)	[25,000; 40,000]
Plantain (15 kg diet)	[2500; 3500]

Cocoa beans (kg)	[700; 900]
------------------	------------

- **Other costs**

Description	Price (FCFA)
Bag	[250; 300]

- **Discount rate:** 10%

### 3. Results

The forecasts of changes in the three productions (cocoa, plantain and peanuts) over 20 years over 5 ha, with 1 ha planted each year for the first five years in the departments of the basin and the western basin (forest-savannah transition zone ) are represented on theFigure 24 the associated recipes are represented on the Figure 25. It emerges that initially groundnuts provide relatively low incomes which are supplemented from the first year by the incomes of plantains. Then from the fifth year, there is almost only the income from plantains supplemented by the first income from cocoa. From the 7th year, cocoa revenues start to be important and progress steadily until stabilizing around the 17th year.

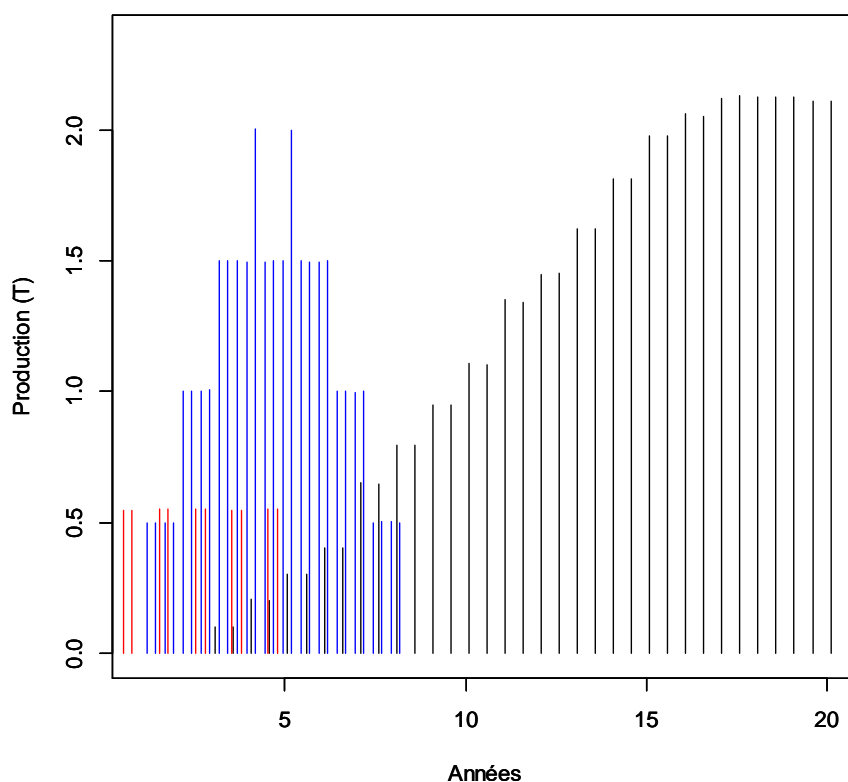
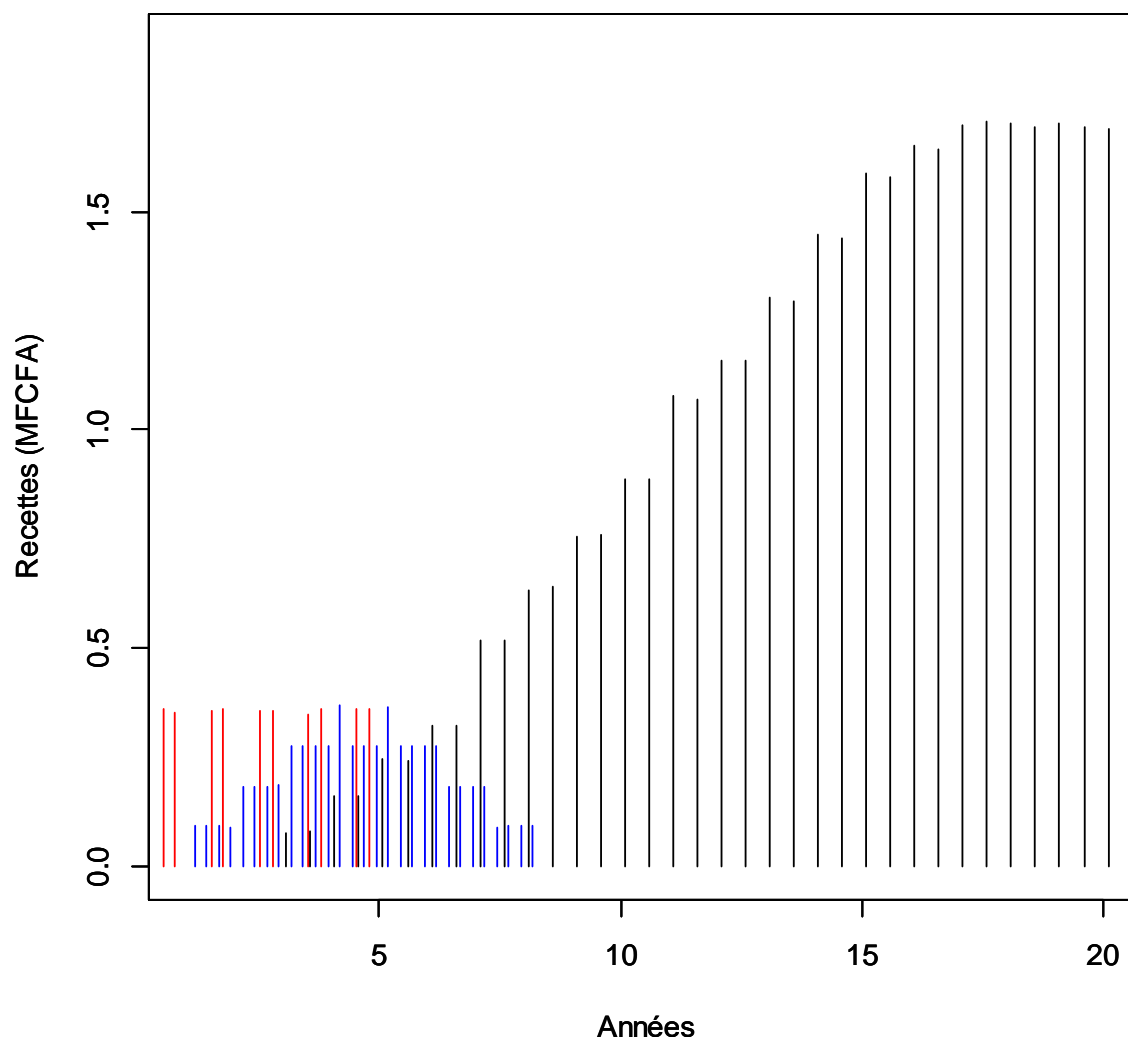


Figure 24. Forecast of the evolution of productions according to the scenario cycle for the regions of the basin and the western basin (red: peanuts, blue: plantain, black: cocoa).



**Figure 25. Forecast of changes in median revenue for the sale of products to traders in the village (red: peanuts, blue: plantain, black: cocoa)**

The cost-benefit analysis that follows considers three cases for cost accounting. First, all identified costs are accounted for. Then, as these planting activities are considered for family farming, we place ourselves in this perspective and assume that part of the labor costs are internalized by the farmers. Finally, from the perspective of support provided by external financing, we envisage that part of the investments necessary to start the plantation will be subsidized by the project.

### 3.1. Full cost analysis

In this section, all inventoried costs are accounted for in the analysis. The costs are significant the first five years to set up the plantations, they exceed 10 million FCFA. After five years, the costs decrease significantly and stabilize after ten years (Figure 26). Income increases steadily until the 5th year, then decreases until the 10th year and progresses again to stabilize from the 17th year.

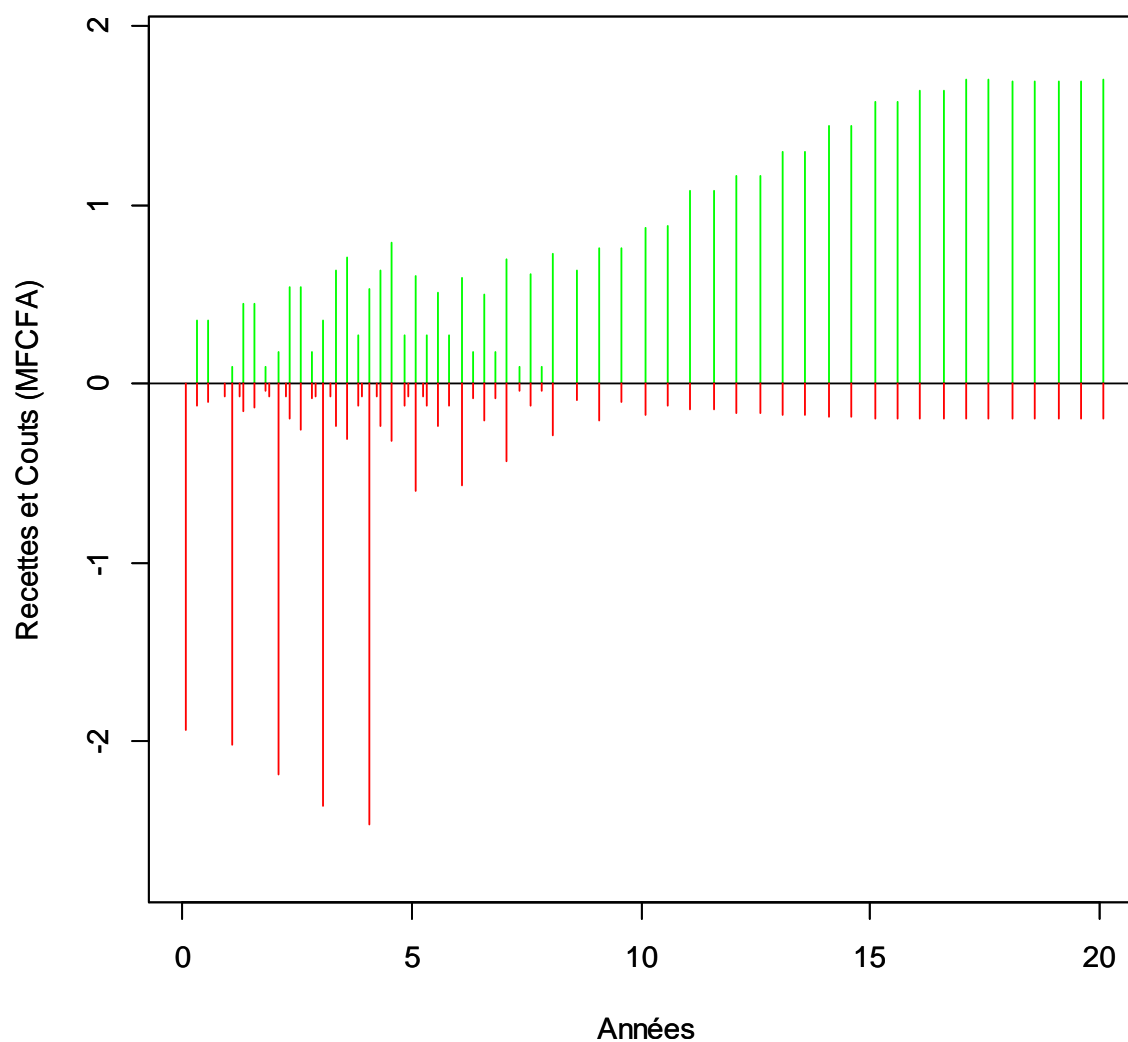


Figure 26. Forecast trends in revenue and median costs for all crops combined, including all identified costs (green: revenue, red: costs)

Revenue compensates for losses only from the 17th year and annual profits seem to stabilize from the tenth year (Figure 27, Board 9). The scenario is globally profitable with a net present value (NPV) of  $1.51 \pm 0.25$  MFCFA (mean  $\pm$  standard deviation) and an internal rate of return (IRR)<sup>3</sup> of  $13.5 \pm 0.4\%$  (monthly rate  $1.06 \pm 0.03\%$ ).

<sup>3</sup> Taux de rentabilité interne : taux d'actualisation qui annule la valeur actuelle nette d'une série de flux financiers. Un projet d'investissement ne sera généralement retenu que si son TRI prévisible est suffisamment supérieur au taux d'intérêt bancaire.

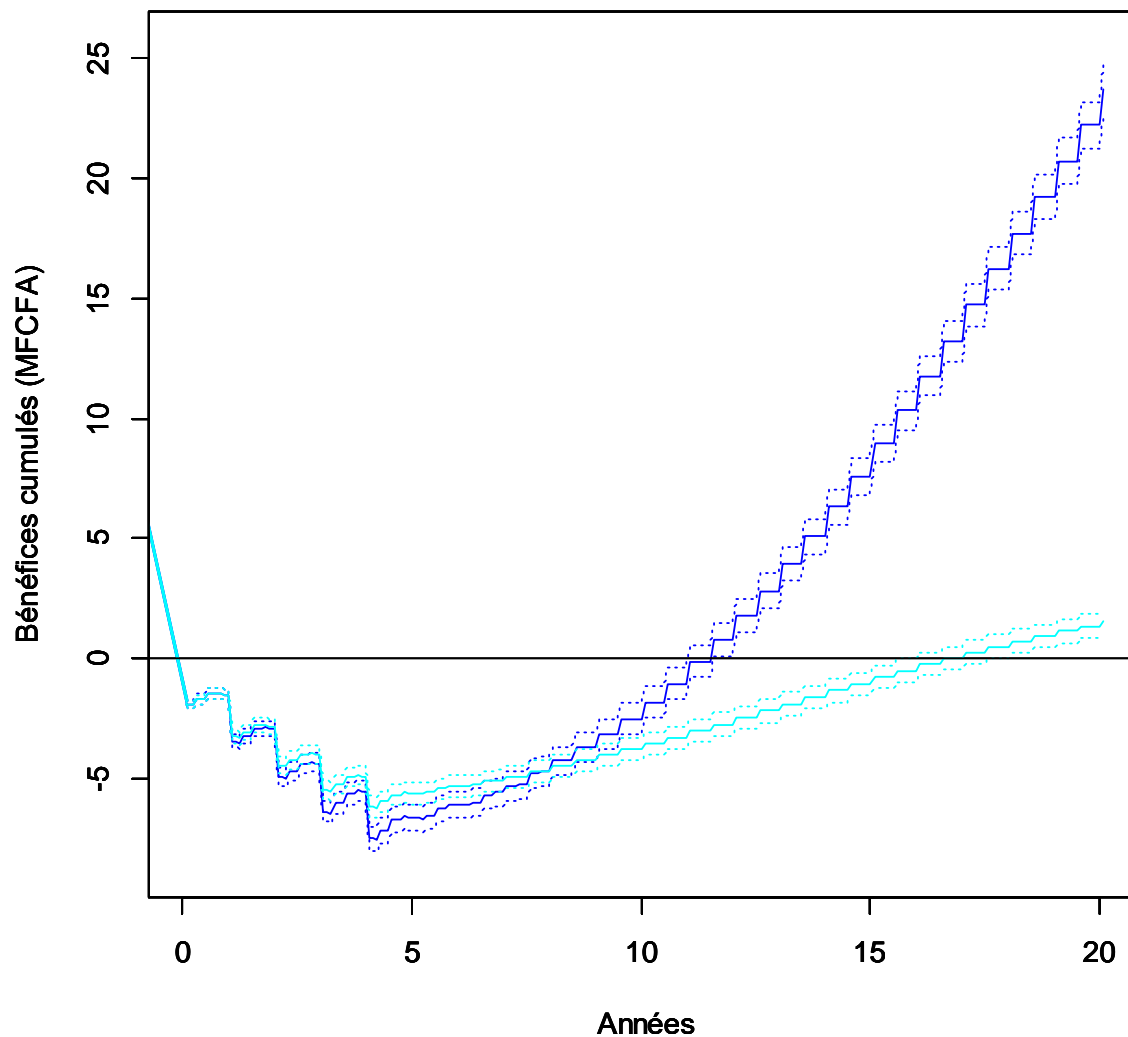


Figure 27. Cumulative profit development forecasts (light blue: gross, dark blue: updated at an annual rate of 10%; -: median,...: 95% confidence intervals)

Years	1	2	3	4	5	6	7	8	9	10
Costs	2.22	2.51	2.87	3.18	3.3	1.15	0.94	0.64	0.38	0.31
Discounted costs	2.22	2.26	2.32	2.32	2.16	0.68	0.5	0.3	0.16	0.12
Cumulative discounted costs	2.22	4.48	6.81	9.12	11.29	11.97	12.47	12.77	12.93	13.05
Recipes	0.71	1.08	1.45	1.97	2.22	1.67	1.46	1.5	1.37	1.52
Updated recipes	0.71	0.97	1.17	1.44	1.46	0.99	0.78	0.72	0.59	0.59
Cumulative updated revenue	0.71	1.68	2.85	4.29	5.75	6.74	7.52	8.23	8.82	9.41
Discounted benefits	-1.51	-1.29	-1.15	-0.88	-0.7	0.31	0.28	0.41	0.43	0.47
Cumulative discounted profits	-1.51	-2.8	-3.95	-4.83	-5.54	-5.23	-4.95	-4.54	-4.11	-3.64
Years	11	12	13	14	15	16	17	18	19	20
Costs	0.29	0.29	0.32	0.35	0.37	0.4	0.4	0.4	0.4	0.4
Discounted costs	0.1	0.09	0.09	0.09	0.09	0.08	0.07	0.07	0.06	0.05

<b>Cumulative discounted costs</b>	13.15	13.25	13.34	13.43	13.51	13.59	13.67	13.73	13.79	13.85
<b>Recipes</b>	1.76	2.16	2.32	2.6	2.88	3.16	3.28	3.4	3.39	3.39
<b>Updated recipes</b>	0.61	0.68	0.66	0.66	0.66	0.65	0.61	0.57	0.51	0.46
<b>Cumulative updated revenue</b>	10.02	10.7	11.36	12.02	12.67	13.32	13.93	14.5	15.01	15.47
<b>Discounted benefits</b>	0.51	0.59	0.56	0.57	0.57	0.57	0.53	0.5	0.45	0.4
<b>Cumulative discounted profits</b>	-3.13	-2.55	-1.98	-1.41	-0.84	-0.27	0.26	0.76	1.21	1.62

**Board 9. Median forecasts of changes in costs, revenues and benefits (Millions FCFA), updated with an annual rate of 10%, for a mixed production of cocoa, plantain, peanuts over 5 ha over 20 years in the departments of the basin and the West basin with sale to merchants in the village**

### 3.2. Analysis with part of the workforce at the expense of the farmer

In the context of family farming, from the farmer's point of view, labor costs can be internalized and therefore assumed to be zero for the cost-benefit analysis. The costs of stumping, firebreaks and plowing are maintained because they are mechanized:

<b>Activity</b>	<b>Price (FCFA)</b>
Stumping (ha)	[40,000; 60,000]
Plowing (ha)	[80,000; 120,000]
Plantation of cocoa trees, plantains, peanuts, other trees (ha)	0
Groundnut plantation (ha)	0
Firewall (ha)	[40,000; 60,000]
Weeding (ha)	0
Groundnut harvest (ha) (village transport included)	0
Plantain harvest (ha) (village transport included)	0
Pod harvest (ha) (for mature cocoa trees with village transport included)	0

In this context, the productions and their recipes remain the same, only the costs change. The costs are a little reduced at the start but almost disappear from the fifth year compared to the full cost situation (Figure 28). The profits are negative until the 4th year and the start-up investments of the plantation (around 10 MFCFA) are not amortized until the 8th year (Figure 29, Board 9).

The scenario in this context, where the farmer's family bears most of the labor costs is globally profitable over 20 years with a NPV of  $6.93 \pm 0.24$ MFCFA (mean  $\pm$  standard deviation) and a rate of internal profitability (IRR) of  $26.2 \pm 1.0\%$  (monthly rate  $1.96 \pm 0.07\%$ ).



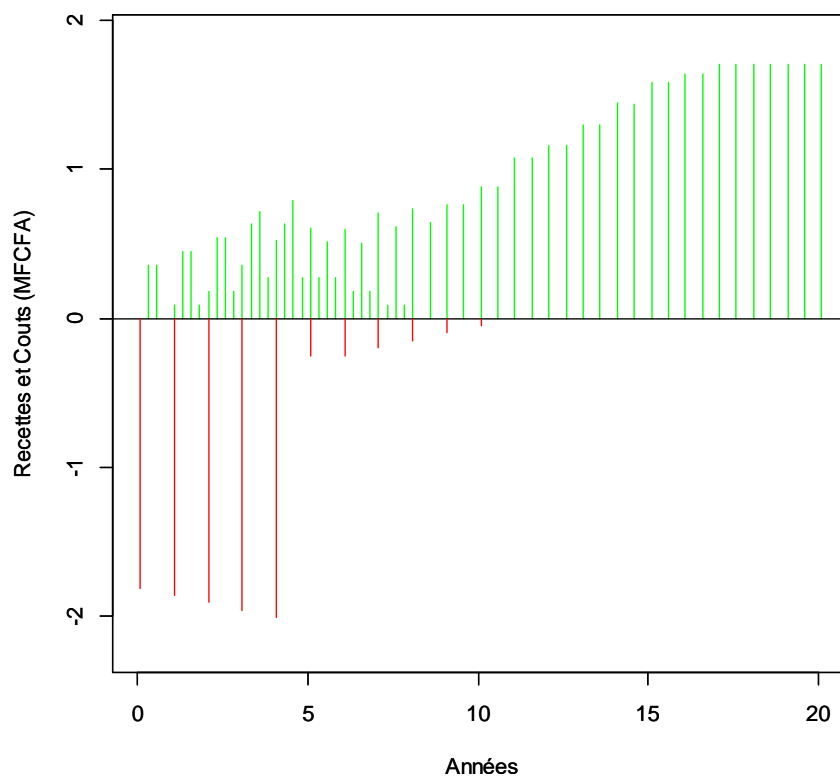


Figure 28. Forecast trends in income and costs for all crops combined, assuming that labor costs are borne by the farmer and his family (green: income, red: costs)

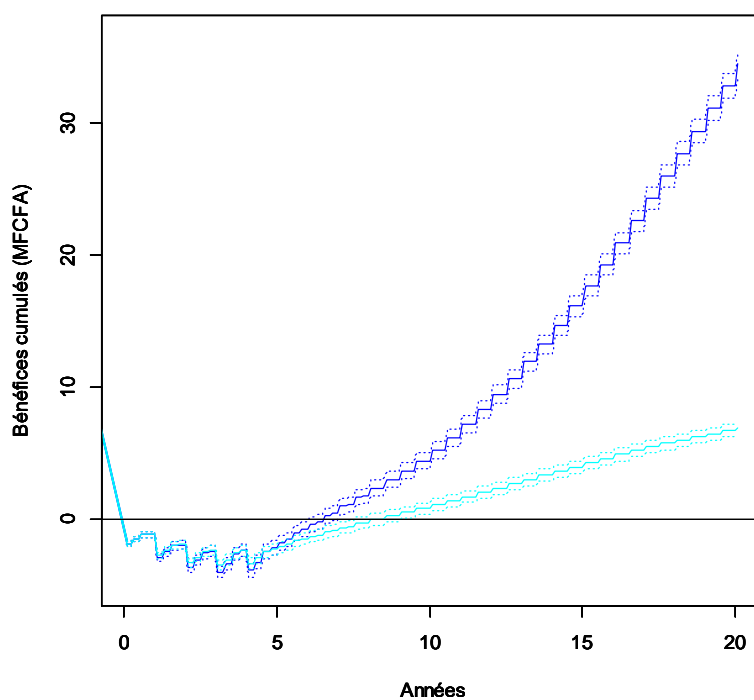


Figure 29. Cumulative profit development forecasts assuming that labor costs are borne by the farmer and his family (light blue: gross, dark blue: discounted at an annual rate of 10%; -: median, ...: intervals 95% confidence)

Years	1	2	3	4	5	6	7	8	9	10
Costs	1.82	1.86	1.91	1.96	2.01	0.25	0.25	0.2	0.15	0.1
Discounted costs	1.82	1.68	1.55	1.43	1.32	0.15	0.13	0.1	0.06	0.04
Cumulative discounted costs	1.82	3.49	5.04	6.47	7.79	7.94	8.07	8.17	8.24	8.27
Recipes	0.71	1.08	1.44	1.97	2.22	1.67	1.46	1.5	1.37	1.52
Updated recipes	0.71	0.97	1.17	1.44	1.46	0.99	0.78	0.72	0.59	0.59
Cumulative updated revenue	0.71	1.68	2.85	4.29	5.75	6.74	7.52	8.23	8.82	9.41
Discounted benefits	-1.1	-0.71	-0.38	0.01	0.14	0.84	0.65	0.62	0.53	0.55
Cumulative discounted profits	-1.1	-1.81	-2.19	-2.18	-2.04	-1.2	-0.56	0.06	0.59	1.14

Years	11	12	13	14	15	16	17	18	19	20
Costs	0.05	0	0	0	0	0	0	0	0	0
Discounted costs	0.02	0	0	0	0	0	0	0	0	0
Cumulative discounted costs	8.29	8.29	8.29	8.29	8.29	8.29	8.29	8.29	8.29	8.29
Recipes	1.76	2.16	2.32	2.6	2.88	3.16	3.28	3.4	3.4	3.4
Updated recipes	0.61	0.68	0.66	0.66	0.66	0.65	0.61	0.57	0.51	0.46
Cumulative updated revenue	10.02	10.7	11.35	12.02	12.67	13.32	13.93	14.5	15.01	15.47
Discounted benefits	0.6	0.68	0.66	0.66	0.66	0.65	0.61	0.57	0.51	0.46
Cumulative discounted profits	1.73	2.41	3.06	3.72	4.38	5.03	5.64	6.21	6.72	7.18

**Board 10. Median forecasts of changes in costs, revenues and benefits (Millions FCFA), updated with an annual rate of 10%, for a mixed production of cocoa, plantain, peanuts over 5 ha over 20 years in the departments of the basin and the West basin with sale to traders in the village. Most of the labor costs are borne by the farmer and his family.**

Although in this context the scenario is economically viable in the long term, it is not realistic to envisage that small farmers can wait 8 years to recover their investments. However, this plantation would ensure an average annual income of more than 3 MFCFA from about fifteen years. For the scenario to be realistic, it is necessary to consider that an external aid covers the investments of the first rotation (plant material, stumping, plowing,...). This is the subject of the next section.

### 3.3. Analysis with part of the labor at the expense of the farmer and part of the initial subsidized investments

Still in the context of family farming, we assume that for the start of plantations, during the first 5 years, the plant material and fertilizers are subsidized at 50% as well as the preparation of the field (stumping, plowing, firebreak ):

Equipment	Price (FCFA)
Cocoa plant	[450; 550]
Low stratum forest trees plant (fruit trees)	[500; 1000]
High stratum forest trees plant	[200; 300]
Plantain cuttings (ha)	[125; 250]
Peanut seeds (ha)	[5,000; 7,500]
Limestone amendment (ha)	[28,000; 32,000]
NPK fertilizer (ha)	[7,000; 9000]

Activity	Price (FCFA)
Stumping (ha)	[20,000; 30,000]
Plowing (ha)	[40,000; 60,000]
Plantation of cocoa trees, plantains, peanuts, other trees (ha)	0
Groundnut plantation (ha)	0
Firewall (ha)	[20,000; 30,000]
Weeding (ha)	0
Groundnut harvest (ha) (village transport included)	0
Plantain harvest (ha) (village transport included)	0
Pod harvest (ha) (for mature cocoa trees with village transport included)	0

In this context, the productions and their recipes remain the same only the costs change. The start-up costs are logically halved (Figure 30).

The benefits are positive, although small, from the second year and the initial investments are repaid from the third year. Profits then increase linearly over time and seem to stabilize from the 16th year at just over 3MFCFA per year (Figure 31, Board 11).

The scenario in this context, where the farmer's family receives a subsidy for the start-up of the plantation and bears most of the labor costs is globally profitable over 20 years with NPV of  $11.0 \pm 0$ , 19MFCFA (mean  $\pm$  standard deviation) and an IRR of  $80.9 \pm 7.3\%$  (monthly rate  $5.05 \pm 0.34\%$ ).

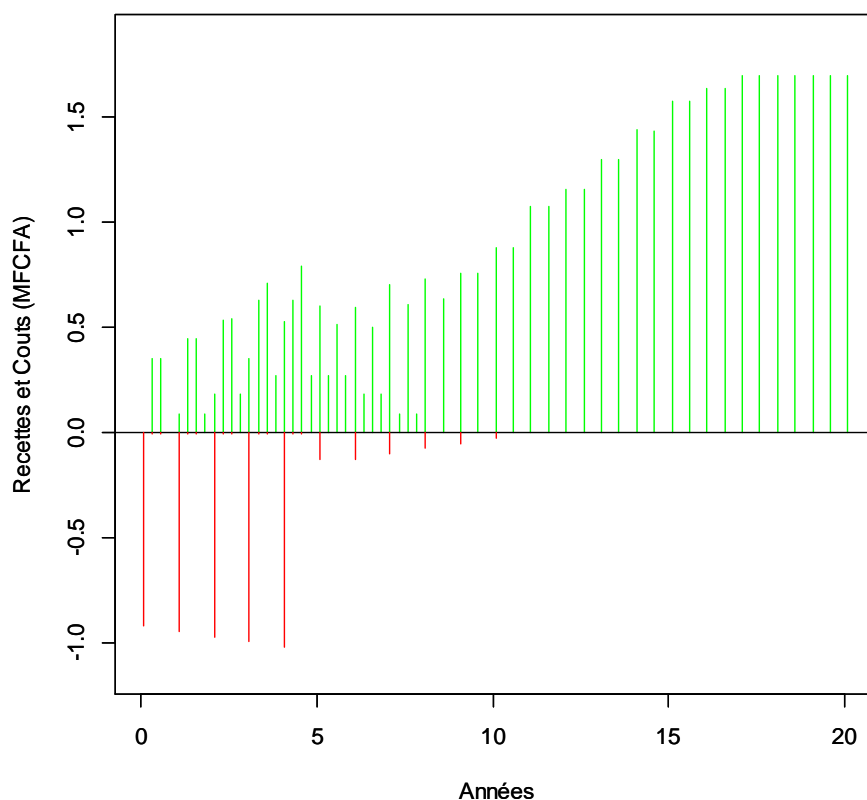


Figure 30. Forecast changes in income and median costs for all crops combined, assuming that labor costs are borne by the farmer and that agricultural equipment, amendment and field preparation are subsidized at 50%

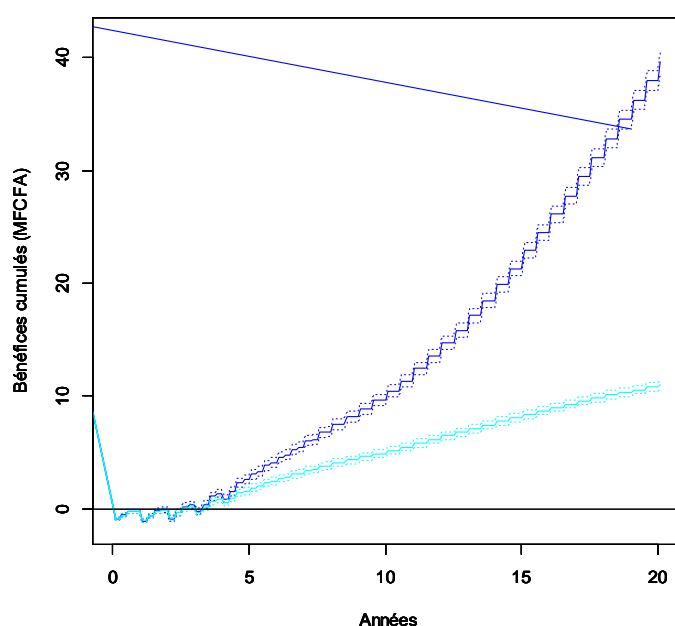


Figure 31. Forecast of the evolution of the cumulative benefits assuming that the labor costs are borne by the farmer and his family and that the agricultural equipment, the amendment and the preparation of the fields are subsidized at 50% (light blue: gross , dark blue: updated at an annual rate of 10%; -: median,...: 95% confidence intervals)

Years	1	2	3	4	5	6	7	8	9	10
Costs	0.92	0.95	0.97	1	1.02	0.13	0.13	0.1	0.08	0.05
Discounted costs	0.92	0.85	0.79	0.73	0.67	0.07	0.07	0.05	0.03	0.02

<b>Cumulative discounted costs</b>	0.92	1.78	2.57	3.29	3.97	4.04	4.11	4.15	4.19	4.21
<b>Recipes</b>	0.71	1.08	1.44	1.97	2.22	1.67	1.46	1.5	1.37	1.52
<b>Updated recipes</b>	0.71	0.97	1.17	1.44	1.46	0.99	0.78	0.72	0.59	0.59
<b>Cumulative updated revenue</b>	0.71	1.68	2.85	4.29	5.75	6.73	7.51	8.23	8.82	9.4
<b>Discounted benefits</b>	-0.21	0.12	0.38	0.71	0.79	0.91	0.71	0.67	0.56	0.57
<b>Cumulative discounted profits</b>	-0.21	-0.1	0.28	0.99	1.78	2.69	3.4	4.07	4.63	5.2

<b>Years</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
<b>Costs</b>	0.02	0	0	0	0	0	0	0	0	0
<b>Discounted costs</b>	0.01	0	0	0	0	0	0	0	0	0
<b>Cumulative discounted costs</b>	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21
<b>Recipes</b>	1.76	2.16	2.32	2.6	2.88	3.16	3.28	3.4	3.39	3.4
<b>Updated recipes</b>	0.61	0.68	0.65	0.66	0.66	0.65	0.61	0.57	0.51	0.46
<b>Cumulative updated revenue</b>	10.02	10.7	11.35	12.01	12.67	13.32	13.93	14.49	15	15.46
<b>Discounted benefits</b>	0.6	0.68	0.65	0.66	0.66	0.65	0.61	0.57	0.51	0.46
<b>Cumulative discounted profits</b>	5.8	6.48	7.13	7.8	8.45	9.1	9.71	10.28	10.79	11.25

**Board 11. Median forecasts of changes in costs, revenues and benefits (Millions FCFA), updated with an annual rate of 10%, for a mixed production of cocoa, plantain, peanuts over 5 ha over 20 years in the departments of the basin and the West basin with sale to traders in the village. Most of the labor costs are borne by the farmer and his family. Agricultural equipment, improvement and preparation of fields are subsidized at 50%.**

### 3.4. Analysis with labor at the expense of the farmer and part of the initial subsidized investments

Still in the context of family farming, we assume that for the start of plantations, during the first 5 years, the plant material and fertilizers are subsidized at 50% and the preparation of the field (stumping, plowing, firebreak) 100% :

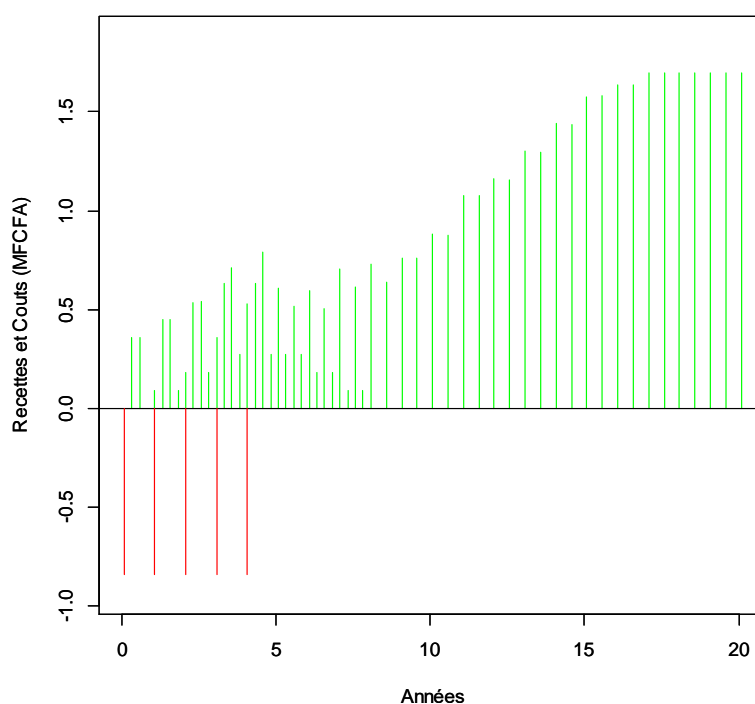
<b>Equipment</b>	<b>Price (FCFA)</b>
Cocoa plant	[450; 550]
Low stratum forest trees plant (fruit trees)	[500; 1000]
High stratum forest trees plant	[200; 300]
Plantain cuttings (ha)	[125; 250]
Peanut seeds (ha)	[5,000; 7,500]
Limestone amendment (ha)	[28,000; 32,000]
NPK fertilizer (ha)	[7,000; 9000]

Activity	Price (FCFA)
Stumping (ha)	0
Plowing (ha)	0
Plantation of cocoa trees, plantains, peanuts, other trees (ha)	0
Groundnut plantation (ha)	0
Firewall (ha)	0
Weeding (ha)	0
Groundnut harvest (ha) (village transport included)	0
Plantain harvest (ha) (village transport included)	0
Pod harvest (ha) (for mature cocoa trees with village transport included)	0

In this context, the productions and their recipes remain the same only the costs change. Start-up costs are further reduced and stabilized at 0.85MFCFA per year (Figure 32, Board 12).

The benefits are positive, although small, from the second year and the initial investments are repaid from the second year. Profits then increase linearly over time and seem to stabilize from the 16th year at just over 3MFCFA per year (Figure 33, Board 12).

The scenario in this context, where the farmer's family receives a subsidy for the start-up of the plantation and bears most of the labor costs is globally profitable over 20 years with NPV of  $11.74 \pm 0, 2\text{MFCFA}$  (mean  $\pm$  standard deviation) and an IRR of  $101.3 \pm 10.5\%$  (monthly rate  $5.99 \pm 0.45\%$ ).



**Figure 32.** Forecast changes in income and median costs for all crops combined, assuming that labor costs are borne by the farmer and that agricultural equipment and amendment are subsidized at 50% and that the preparation of champs is 100% subsidized.

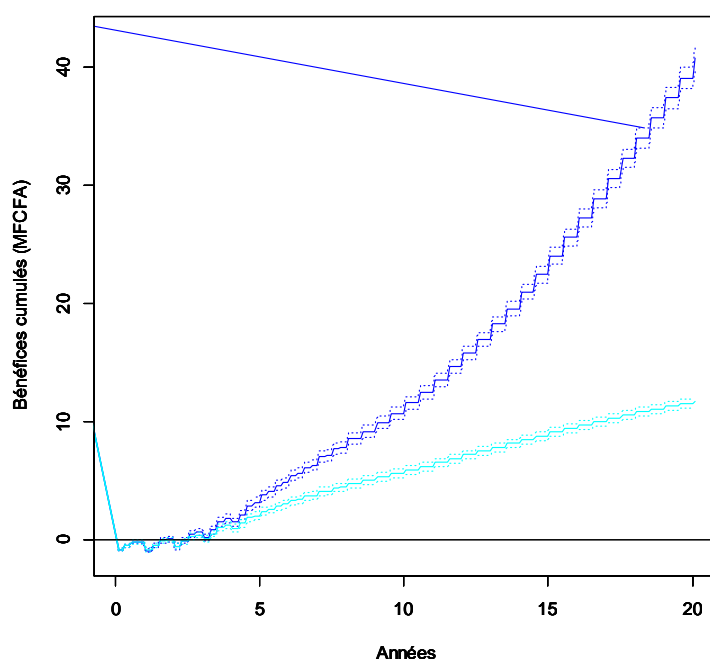


Figure 33. Forecast evolution of cumulative benefits assuming that labor costs are borne by the farmer and his family and that agricultural equipment, amendment are subsidized at 50% and that field preparation is subsidized at 100 %. (light blue: raw, dark blue: updated at the annual rate of 10%; -: median,...: confidence intervals at 95%)

Years	1	2	3	4	5	6	7	8	9	10
Costs	0.85	0.85	0.85	0.85	0.85	0	0	0	0	0
Discounted costs	0.85	0.76	0.69	0.62	0.56	0	0	0	0	0
Cumulative discounted costs	0.85	1.61	2.3	2.92	3.48	3.48	3.48	3.48	3.48	3.48
Recipes	0.71	1.08	1.44	1.97	2.22	1.67	1.46	1.5	1.37	1.52
Updated recipes	0.71	0.97	1.17	1.44	1.46	0.99	0.78	0.72	0.59	0.59
Cumulative updated revenue	0.71	1.68	2.85	4.29	5.75	6.73	7.51	8.23	8.82	9.41
Discounted benefits	-0.14	0.21	0.48	0.82	0.9	0.99	0.78	0.72	0.59	0.59
Cumulative discounted profits	-0.14	0.07	0.55	1.37	2.27	3.26	4.03	4.75	5.34	5.93

Years	11	12	13	14	15	16	17	18	19	20
Costs	0	0	0	0	0	0	0	0	0	0
Discounted costs	0	0	0	0	0	0	0	0	0	0
Cumulative discounted costs	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48
Recipes	1.76	2.16	2.32	2.6	2.88	3.16	3.28	3.4	3.4	3.39
Updated recipes	0.61	0.68	0.65	0.66	0.66	0.65	0.61	0.57	0.51	0.46
Cumulative updated revenue	10.02	10.7	11.35	12.01	12.67	13.32	13.93	14.49	15	15.46
Discounted benefits	0.61	0.68	0.65	0.66	0.66	0.65	0.61	0.57	0.51	0.46
Cumulative discounted profits	6.54	7.22	7.87	8.53	9.19	9.84	10.45	11.02	11.53	11.99

Board 12. Median forecasts of changes in costs, revenues and benefits (Millions FCFA), updated with an annual rate of 10%, for a mixed production of cocoa, plantain, peanuts over 5 ha over 20 years in the departments of the basin and the West basin with sale to traders in the village. Most of the labor costs are borne by the farmer and his family. The agricultural equipment, the amendment are subsidized at 50% and the preparation of the fields is subsidized at 100%.

## 4. Conclusion

The installation of agroforestry plantations associating cocoa, plantain and peanuts is generally profitable, according to all the scenarios considered (

Board 13). However, in contexts where all costs are accounted for and in the context of family farming, where certain labor costs are internalized, the initial investments for the start-up of plantations are not recovered until very late. These initial investments being substantial, it is unrealistic to envisage that small farmers can support them and live almost without income for ten years.

Also the context of family farming with a subsidy covering part of the start-up investments would make the plantation profitable almost from the second year. According to forecasts, it should remain so in the long term without external financial contribution and ultimately ensuring an annual rent of around 3.4MFCFA.

	VAN MFCFA (avg. $\pm$ and)	SORTING % (avg. $\pm$ and)
Full cost	1.51 $\pm$ 0.25	13.5 $\pm$ 0.4
Labor cost borne by the farmer	6.93 $\pm$ 0.24	26.2 $\pm$ 1.0
Labor cost borne by the farmer and subsidy of plant material and field preparation 50%	11.0 $\pm$ 0.19	80.9 $\pm$ 7.3
Labor cost borne by the farmer and plant material subsidy 50% and field preparation 100%	11.74 $\pm$ 0.2	101.3 $\pm$ 10.5

**Board 13. Summary of the financial profitability analyzes of an agroforestry plantation associating Cocoa, Plantain, Groundnut according to the different situations envisaged**



## B. Towards an Environmental and Social Management Framework

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## Acronyms:

" Under Project "	Via loans or donations granted to local businesses within the framework of the FVC Congo Project
"The project" or FVC Congo	Refers to the project "Implementation of the Contribution Déterminée Nationale (CDN) of Congo in the land use and forest sector"
AFD	French Development Agency
E&S	Environmental and social
EFIR	Reduced impact logging
IFC	International Finance Corporation (World Bank Group)
PAES	Environmental and social action plan:
NWFP	Non-timber forest products
DDES	Environmental and social due diligence
EFIR	Reduced impact logging
ESIA	Environmental and social impact study
CGES	Environmental and social management framework
SANDSTONE	Management of environmental and social risks
MEF	Ministry of Forest Economy
MTE	Ministry of Tourism and the Environment,
NIES	Environmental and Social Impact Notice
PFDE	Forest project and economic diversification
ESMP	Environmental and social management plan
PNAT	National Land Use Plan
SFL	Local financial sector
SNAT	National Land Use Planning Scheme
SANDSTONE	Management of environmental and social risks
FPIC	Prior Consent, given freely and with knowledge of the cause
FVC	The Green Climate Fund (GCF)
GHG	Greenhouse gas
IFC	International financial corporation
PPA	Plan for Indigenous Peoples
NDC	Nationally determined contributions
NP	Performance standard (s)

REDD	Reduced Emission from Deforestation and forest Degradation
PMU	Management unit of the FVC Congo project within the MEF or intermediate level of coordination
LULUCF	Land Use, Land Use Change and Forestry
RDT	Terms of reference

## The objectives of the development of the environmental and social management framework (ESIA)

The environmental and social management framework (CGES)<sup>4</sup> should make it possible to clearly identify the risks of the sub-projects, which will be financed according to their situation in the field. The identification of major environmental and social risks (possible reduction in the access of populations to indigenous lands, conflicts over modifications of agricultural and pastoral systems, effects on the supply of groundwater, risks of erosion, etc. .) was made on the basis of impacts observed during the establishment of similar projects in the sub-region and more generally in the countries of the South. Considering the time allocated to this work, it is a question here of laying the foundations of a CGES.

*In fine*, the environmental and social management framework accompanied by recommendations should make it possible to minimize, a priori, the negative impacts that may have been identified. The purpose of this report, given the time allocated to its preparation, is simply to initiate the definition of this environmental and social management framework.

## Context of the project submitted to the GCF by Congo and its sub-projects

The Congo Project "Implementation of the Congo's National Determined Contribution (CDN) in the land use and forestry sector", submitted to the Green Climate Fund by the Congo, aims at low-carbon development and climate resilient in the land sector (LULUCF)<sup>5</sup>. This project will help support the Republic of Congo in the implementation of its National Determined Contribution (CDN) in this land sector, including forestry and its National REDD + Strategy.

Among the current and future causes of deforestation have been identified in the REDD + process: (i) slash-and-burn agriculture, (ii) unsustainable production and consumption of fuelwood, (iii) unsustainable logging and / or illegal, (iv) the development of agro-industry; (v) mining development; (vi) development of road and urban infrastructure.

Congo is offering green investments in three priority intervention zones (Sangha-Likouala, Pool-Plateaux, Kouilou-Niari departments), in order to tackle the main causes of deforestation and forest degradation, and to replace wood energy unsustainable by a green source of supply, which will significantly reduce the pressure on forests.

The Project is organized around 5 components whose implementation should contribute to reducing CO2 emissions and benefit local communities and indigenous populations in low-income rural areas (especially women) and private entrepreneurs who manage small businesses. and medium-sized

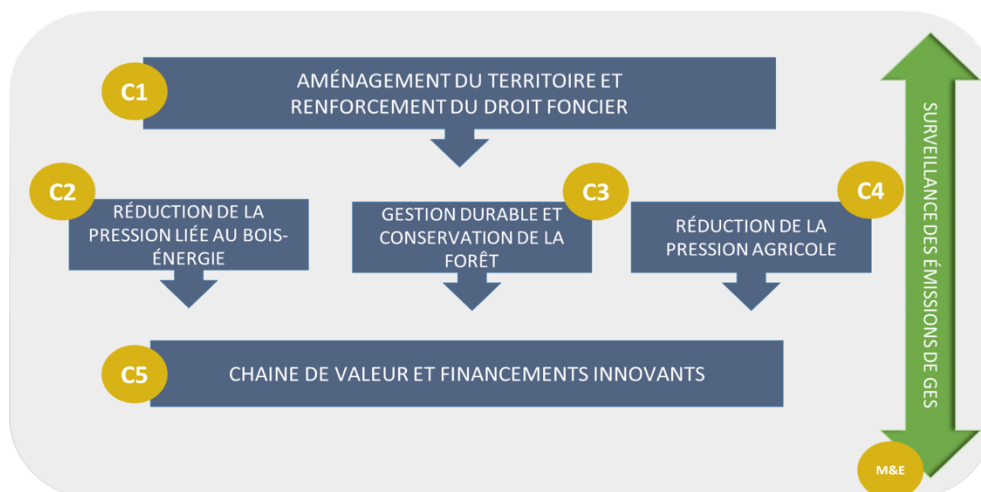
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<sup>4</sup> Cadre de gestion environnementale et sociale est un instrument d'évaluation des risques et des impacts lorsqu'un projet consiste en une série de sous-projets, et les risques et impacts ne peuvent être déterminés avant que les détails du programme ou du sous-projet aient été identifiés. Le CGES définit les principes, les règles, les lignes directrices et les procédures devant servir à l'évaluation des risques et des impacts environnementaux et sociaux. Il comporte des mesures et des plans visant à réduire, atténuer et / ou compenser les risques et impacts négatifs, des dispositions permettant d'estimer et de budgétiser les coûts de telles mesures ainsi que des informations sur l'agence ou les agences chargées de gérer les risques et les impacts du projet notamment sur les informations sur leur aptitude à gérer risques et impacts environnementaux et sociaux. Il comprend non seulement des informations adéquates sur la zone dans laquelle les sous-projets devraient être localisés, notamment toutes vulnérabilités environnementales et sociales éventuelles de la zone ; mais aussi les informations sur les impacts possibles susceptibles de survenir et les mesures d'atténuation que l'on prévoit d'utiliser.

<sup>5</sup> Secteur des terres ou UTCATF (utilisation des terres, du changement d'affectation des terres et de la foresterie)

forestry and agricultural enterprises (Anon, (2018). Concept note FVC Congo (pp. 1–32)). These 5 components are presented in the following table.

<b>Component 1</b>	Implementation of structural reforms concerning planning and land use - National Land Use Planning Scheme (SNAT) and National Land Use Plan (PNAT).
<b>Component 2</b>	20,000-30,000 hectares of agro-forestry and forestry systems diversified into savannah or degraded areas in order to reduce the production and unsustainable consumption of wood energy, the departments of Plateau and Pool are the main areas of intervention.
<b>Component 3</b>	Support for good governance and sustainable forest management through the implementation of the new Forest Code, a program to support certification and reduced impact forestry (EFIR) in small and medium-sized concessions, at capacity building of government institutions in charge of monitoring the application of development plans and zone control. This component will focus on the South region in the Departments of Kouilou and Niari.
<b>Component 4</b>	Development of climate-smart agricultural systems and economic alternatives (e.g. livestock farming, agroforestry, non-timber forest products (NTFPs)) in order to reduce deforestation in North and South Congo in the Departments of Sangha, Likouala, Kouilou and Niari. Activities will focus on the community development series (CDS) in the North and the depreciation areas of protected areas in the South at risk.
<b>Component 5</b>	Ensure the sustainability of the green investments that will be supported by the Project. It aims to strengthen value chains and offer innovative and adapted financial tools to support green investment projects, with particular emphasis on 4 sectors, namely: wood energy, agricultural products, non-wood forest products. (NTFP), timber extracted from forest concessions.



**Figure 34:: Links between the components of the project.**

Source: (Anon. (2018). Concept note FVC Congo (pp. 1–32)

The goal of Component 5 is to generate a flow of green investment projects that will focus on the 4 sectors: wood energy, agricultural products, non-wood forest products (NTFPs), timber extracted from concessions forest. The FVC Congo project will therefore be based largely on calls for sub-projects and therefore on the promoters of these green investment sub-projects. For this, component 5 will support the business environment related to land (capacity development, value chains, access to finance). For wood energy and agricultural products / NTFPs, this support will target small and medium-sized community and private enterprises and will be structured among other things around the organization of producers (eg associations, cooperatives, SMEs),

These investments include those undertaken within the framework of the World Bank's Emissions Reduction Program (FCPF Carbon Fund), the Forest Investment Program (PIF) implemented by the World Bank and the African Development Bank, the Fund of the “Central African Forest Initiative” (CAFI) and the “Paysages Forestiers Nord Congo” and the “Revival of the Agricultural Sector” projects implemented by the French Development Agency (AFD).

The requested E&S framework will accompany the calls for sub-projects of the FVC Congo and relates in particular here to components 2 and 4. In the following table we summarize the technical itineraries of these sub-projects as identified by the studies carried out by CIRAD. (see in particular reference 7 § following).

#### **Board 14: Brief description of the technical itineraries proposed by sites**

N o .	Type of sub-projects	Brief technical characteristics	Location of the sub-project,
1	Sub-Project 1: Management in coppice of eucalyptus plantations for charcoal & poles production	Conversion of old eucalyptus plantations (5,000 ha) into coppice to supply the city of Pointe-Noire with charcoal and poles for construction. Each year 1000 ha will be exploited to produce only charcoal (old stands) then converted into coppice with a rotation of 5 years for charcoal and 3 years for poles. Installation of an industrial kiln and 20 improved brick kilns. A specific study must be carried out to determine with precision the areas to be converted into coppice. It is probable that a certain area (to be defined by the study) will have to be replanted due to excessive degradation of the current plantations.	Project planned in the Kouilou department, north of the Kouilou river, about 50 km from Pointe-Noire. Access by paved road. Cf description of the zone (zone N ° 1), cost-benefit study and technical itinerary.
2	Sub-Project 2: Management in coppice of eucalyptus plantations for fuelwood production	Conversion of old eucalyptus plantations (2000 ha) into coppice to supply the region's clay brick manufacturers with firewood (Nkayi, Madingou, etc.). Each year an area to be determined will be exploited and then coppiced with a 5-year rotation. A specific study must be carried out to determine with precision the areas to be converted into coppice. It is probable that a certain area (to be defined by the study) will have to be replanted due to excessive degradation of the current plantations.	Forest plantation of Loudima department of Bouenza.
3	Sub-Project 3: Agro-forestry plantations based on acacias, cassava and maize	Installation of acacia-based agroforestry systems with cassava and maize crops intercropped at the start of the rotation (cf. acacia-cassava agroforestry technical itinerary and cost-benefit analyzes). One hectare will be cultivated annually with a rotation of 7 years for the acacias which will be transformed into charcoal. The exploitation of acacias will be accompanied by an improvement in carbonization yields (installation of improved ovens) and / or improvement of traditional carbonization practices. A cassava harvest is planned and a maize harvest at the start of the cycle. It is in the second rotation of acacia (in year 8) that food crops can benefit from soil enrichment.	Two zones considered: 1) in the Niari department near Dolisie, project of 2500ha in total 2) in the department of Pool near Brazzaville, between Ngoma-Tsétsé and Kinkala, project of 3000 ha of community plantations and 1500 ha of private plantations. (see description sheet for zones 2 and 3).

4	Sub-Project 4: Establishment of mixed plantations associating eucalyptus and acacias	Plantations on savannah of mixed eucalyptus and acacias (mangium and / or auriculiformis) at densities ranging from 800 to 1200 plants / ha on a basis of 50% of each of the 2 species, a proportion which may vary depending on the option chosen ( see technical itinerary). On the basis of data acquired in Congo, the timber production of the mixed stand is 30% higher than the pure stands of eucalyptus. The duration of the rotation is 7 years.	Project planned in the departments of Pool Nord and Plateaux (Cf description of zones, zones N ° 3 and 4) with 2500 ha afforested in each of the two zones. The products (coal) will be sent to Brazzaville.
5	Sub-Project 5: Agro-forestry plantations associating plantain, cocoa trees and fruit and forest trees	Installation in the savannah of agroforestry systems based on cocoa (1,100 plants / ha) and plantains (low stratum), fruit trees (middle stratum) and forest trees (high stratum). The role of the plantains is to provide initial shade and additional income. Food crops are also cultivated at the start of the cycle for additional income and herbaceous control (cf. technical itinerary in cocoa-based agroforestry). One hectare will be cultivated annually with for example 5 ha in total for a small farmer.	Areas considered: in the savanna / forest transition zones of the Cuvette departments on 1000 ha.

## Method used to define this pre-framework of the ESIA for the Congo GCF

The environmental and social impact study (ESIA) is an instrument which aims to identify and assess the environmental and social risks and impacts of a project, also to evaluate the alternatives and to consider measures. appropriate mitigation, risk management and control. This report, which is only a preliminary framework, is largely based on the following existing reports:

1. Anon. (2018). Concept note FVC Congo (green fund for the climate) (pp. 1–32).
2. Republic of Congo (2018). Strategic environmental and social assessment (SEA), of the environmental and social management framework (CGES) of the REDD + process in the Republic of Congo IV, 1–201.
3. Anon. (2018). Investment Plan of the National REDD + Strategy of the Republic of Congo 2018-2025 (1–150).
4. AFD. (2018). Environmental and Social Setting, 1–86.  
<https://www.afd.fr/sites/afd/files/2018-07-04-03-14/cadre-environnemental-social-climat.pdf>
5. World Bank, Republic of Congo (2016). Strategic environmental and social assessment of the REDD + process in the Republic of Congo.  
<https://www.forestcarbonpartnership.org/sites/fcp/files/2016/Aug/SESA.%20Models%20for%20impact%20analysis.pdf>
6. FAO. (2012). Environmental Impact Assessment, 1–52.
7. CIRAD. (2018). Technical itineraries & potential areas for setting up FvC Congo projects (pp. 1–48).
8. Marien, JN, Laclau, J.-P., Moka, C., & Forni, E. (2018). Report of the operational study within the framework of the implementation of the national determined contribution (CDN) of Congo in the sector of land use and forestry. CIRAD study (pp. 1–93).
9. FAO. (2015). Environmental and social management guidelines, 1–77.



10. Green Climate Fund. (2017). Environmental and social management system, 1–31.
11. DECREE N ° 2009-415 OF 20/11/09 on ESIA in Congo source: <http://extwprlegs1.fao.org/docs/pdf/con93661.pdf>
12. IFC. (2012). International Finance Corporation's Guidance Notes: 1–273.

From study 4 (AFD) we have reproduced by adapting in appendices 1 and 2 recommendations in favor of indigenous peoples. From study 2, in appendix 3, the model of environmental and social clauses for worksites which will concern in particular the construction of furnaces in sub-project 1. These various documents have enabled us to analyze the texts, which frame the ESIA in Congo for this FVC project; in particular the FVC refers for the ESIA to the standards of the IFC (Ref 12).

## ESIA: FAO GCF framework and Congo legislation

### ESIA: Congo's national legislation and FAO ESIA framework

This part is largely inspired by document 5 (World Bank, 2016) for the legal framework, it is not, again, a complete study on the legal framework because it should be carried out later; this part also uses FAO documents 6 and 9, indicated above, on ESIA's (FAO, 2012; FAO 2015).

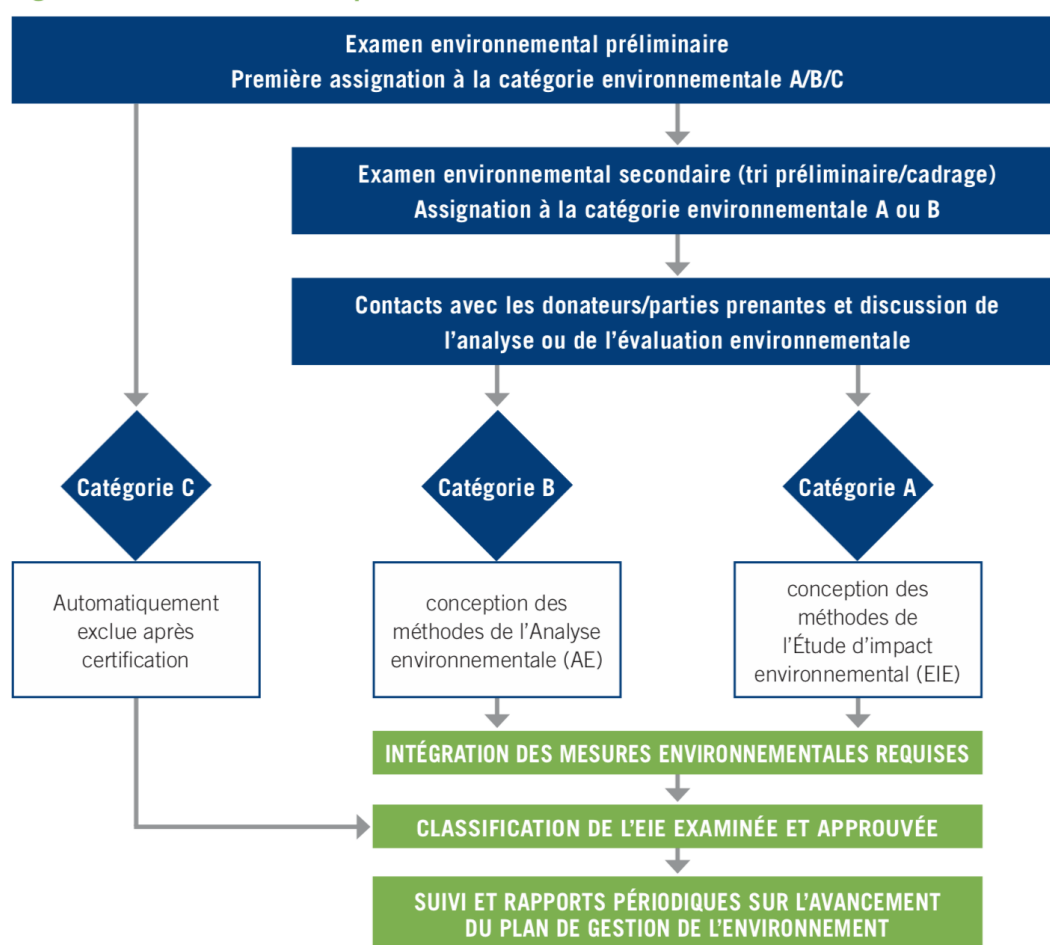
Decree No. 2009-415 of 20/11/09 endows the Republic of Congo with a regulatory text on ESIA. In Congo there are thus three levels of categorization A, B, C, as for the FAO:

- Level A applies when E&S risks are considered significant. It involves carrying out an environmental and social impact assessment (ESIA) including an environmental and social management plan (ESMP).
- Level B applies when the E&S risks are judged to be lower. It involves the preparation of an Environmental and Social Impact Notice (ESIN), which is a simplified version of ESIA.
- As for category C, it does not require any form of additional environmental and social impact assessment.

As a reminder: The purpose of the ESIA is to identify and assess the possible environmental and social impacts of a proposed project, to assess the alternatives and to design appropriate mitigation, management and control measures. The ESMP plan should detail (a) the measures to be taken during project implementation in order to eliminate or compensate for undesirable E&S effects, so as to reduce them to acceptable levels.

The contents of the ESIA and NIES are indicated in the decree. However, in the context of small and medium REDD + projects, a simplified version was adopted that should be followed in this GCF project so as to have a unique model for projects in the land restoration sector in Congo, while falling under the regulations of the Congo. This ESIA report template is reproduced in Annex 5, the ESMP template is likewise in Annex 6.

The categorization A, B, C is done in several stages. The idea is to adapt as quickly as possible the level of requirements and efforts for the ESIA to the levels of risk; the aim is to quickly eliminate from the circuit those activities that present little E&S risk, categories C. We reproduce the overall ESIA process as presented in the FAO document (2012):



**Figure 35: Overview of the ESIA process (FAO, 2012):**

Examples of categorization are given by type of project in Annex 8 (FAO, 2012).

**Board 15: Proposal for an ESIA process for GCF projects in the Republic of Congo**

Actor / structure	Responsibilities
Project leader (public or private)	Preparation of the environmental examination sheet
	Proposal for categorization of the project and identification of documents to be prepared
	Consultation of groups affected by the project
	Monitoring of the execution of environmental and social management plans (ESMP)
	Submission of periodic reports
	Completion of the end of work report

PMU (FVC Congo project management unit, coordination level within the MEF)	Support for the preparation of categorization and no objection about the category and the safeguard policies triggered,
	Preparation of RFPs for carrying out ESIA or ESMPs
	Support for the selection of consultants
	Comments on the studies carried out and transmission to the MEF, the Ministry of the Environment and the FAO
	No Objection on ESMPs and other documents pending for authorization from FAO or MEF
	Control of the execution of the ESMP
	Comments on completion reports
The Ministry in charge of the environment (MTE) if it is a category A or B	Checks that the conformity of the project and the ESIA carried out meet national standards in the case of projects subject to the full ESIA
The Ministry in charge of the environment if it is a category B Requiring only an ESMP or a NIES	Checks that the conformity of the ESMP and the NIES carried out meet national standards

## GCF ESIA Framework

The FVC refers for ESIA to the standards of the IFC (International Finance Corporation). The IFC has produced norms and standards (IFC, 2012 or doc 13 above), which are for the ESIA process similar to those of FAO. These standards are in the form of guidance notes (GN-Guidance Note).

The guidance notes in particular GN18, GN23, GN28, GN57 deal with categorization, in this regard GN23 says: *"For some projects, and in particular for new investments and projects (including, but not limited to, major expansion or transformation activities), the client must conduct a full scale ESIA. The key elements of the ESIA process generally consist of (i) an initial categorization of the project and definition of the assessment process; (ii) examination of alternatives; (iii) identification of stakeholders (with emphasis on those directly affected) and collection of environmental and social baseline data; (iv) identification, forecasting and analysis of the impact; (v) production of mitigation or management measures and actions; (vi) significance of impacts and assessment of residual impacts; and vii) documentation of the assessment process (ie ESIA report). The breadth, depth and type of analysis should be commensurate with the nature of the impact of the proposed project as identified during the evaluation process. The ESIA must comply with the requirements of the country's environmental laws and regulations, including the provision of information and the provision of information."* It can be seen that the general FAO ESIA process is in phase with the IFC process and in all cases we must obviously rely on national legislation; however, the governmental and social management framework of FVC Congo should refer as much as possible to IFC standards.

## Conclusions on the ESIA regulatory framework for the GCF project in Congo

AFD refers to the standards of the World Bank Group, and therefore to those of the IFC in terms of ESIA. We can therefore see that the approaches to assess the environmental and social impacts,

whether they come from the government of Congo, the FAO, the World Bank, AFD or the Green Climate Fund, converge.

These approaches are based on guiding principles (international standards and policies) which are common. These guiding principles relate to a) protected areas, natural habitats of critical ecosystems, b) land tenure, c) management of biological diversity for food and agriculture, d) plant genetic resources, e) resources genetics in animal production systems, f) management of agricultural chemicals and pesticides, g) management and use of fishery and aquaculture resources, h) forest and tree management, i) resource management natural, j) land degradation management, k) climate change impact management, l) forced resettlement, m) cultural heritage,

## ESIA framework proposal for GCF Congo sub-projects

We will retain a common approach for Environmental and Social Impact Studies in three stages:

- 1) A process of reconstruction / translation of GCF sub-projects with local populations (see the recommendation chapter below entitled "For a process of reconstruction of sub-projects with local actors in order to mitigate E&S risks")
- 2) A preliminary environmental review (PEA), which will take place as soon as possible, can be used to include E&S requirements in the sub-project calls for tenders, a preliminary review that the project promoters must provide. The purpose of this preliminary review is to identify Category C, which is exempt from EIA. However, the preliminary environmental review should be sufficiently detailed to be able to identify environmental and social issues, negative impacts and key stakeholders; this PEA will be all the more detailed as the translation / reconstruction process with the local populations has been carried out upstream.
- 3) A secondary environmental and social review which aims to document in more detail the potential environmental and socio-economic effects of the sub-project in order to determine whether it is in category A or B and then in category B , to specify in which sub-category it is. Considering the sub-projects indicated in this GCF project, the sub-projects will certainly be in category B. This examination will determine the level of detail of the environmental and social analysis to be done. There are lists of "basic requirements for field projects" that facilitate this categorization work, see Annex 3 in (FAO, 2012). The sub-projects classified in category B can be of two types:
  - a. Either the negative effects are well identified and can be avoided or mitigated by known practices in accordance with the legislation and regulations in force, then it is possible to put in place prevention, mitigation and monitoring measures,
  - b. Either the potential negative effects or the mitigation measures are not well known, it is therefore necessary to submit the project to a more in-depth study before making a decision; then an environmental scan will be prepared. If the potential negative effects are more important according to one of the criteria of either the Government of Congo, the FAO or the Green Climate Fund, then the sub-project should be reclassified in category A, and a study prepared. environmental and social impact (ESIA). This eventuality is unlikely.
- 4) The environmental and social framework is the last step. It helps identify what can be improved in the project design and the types of analyzes needed. This environmental and social management framework for the FVC Congo project will identify the most important issues and problems as well as possible solutions that will need to be examined in further analysis, which this framework may recommend. This framework must include at least the following points:
  - a. Identification of relevant environmental and social laws, regulations,
  - b. Initial assessment of the capacities to prevent and mitigate unwanted environmental or social impacts, these capacities can be located at the level of individuals or organizations.

## Pre-identification of E&S risks of the FVC Congo project

The project may be the subject of an environmental and social impact study (ESIA) in relation to FAO's environmental and social protection measures. However, we have made a pre-analysis below which will have to be confirmed or rejected by this ESIA.

We estimate that there will be no significant negative environmental and social impacts for components 1, 3 and 5 of the project, which will probably be classified in category C.

The potential impacts identified are mainly localized impacts associated with activities including the involvement of communities; they are located in components 2 and 4; if the associated activities are reviewed to ensure the interactive participation of the populations concerned so that they are based on the principles of their voluntary request, these impacts can be effectively mitigated and treated with the help of a plan of environmental and social management built with these local populations (ESMP).

Board 16: Probable categorization by component

<b>Component 1</b> <i>Probable category C</i>	Implementation of structural reforms concerning planning and land use - National Land Use Planning Scheme (SNAT) and National Land Use Plan (PNAT).
<b>Component 2</b> <i>Probable category B</i>	20,000-30,000 hectares of agro-forestry and forestry systems diversified into savannah or degraded areas in order to reduce the production and unsustainable consumption of wood energy, the departments of Plateau and Pool are the main areas of intervention.
<b>Component 3</b> <i>Probable category C</i>	Support for good governance and sustainable forest management through the implementation of the new Forest Code, a program to support certification and reduced impact forestry (EFIR) in small and medium-sized concessions, at capacity building of government institutions in charge of monitoring the application of development plans and zone control. This component will focus on the South region in the Departments of Kouilou and Niari.
<b>Component 4</b> <i>Probable category B</i>	Development of climate-smart agricultural systems and economic alternatives (e.g. livestock farming, agroforestry, non-timber forest products (NTFPs)) in order to reduce deforestation in North and South Congo in the Departments of Sangha, Likouala, Kouilou and Niari. Activities will focus on the community development series (CDS) in the North and the depreciation areas of protected areas in the South at risk.
<b>Component 5</b> <i>Probable category C</i>	Aim to ensure the sustainability of green investments that will be supported by the Project. It aims to strengthen value chains and offer innovative and adapted financial tools to support green investment projects, with particular emphasis on 4 sectors, namely: wood energy, agricultural products, non-wood forest products. (NTFP), timber extracted from forest concessions.

### Board 17: Risk analysis at the sub-project level.

Sub-Project 1: Management in coppice of eucalyptus plantations for charcoal & poles production (Kouilou department north of the Kouilou river)

Identification of stakeholders in carrying out agricultural activities	Brief technical characteristics	Expected results of the sub-project	Other associated positive social and environmental impacts	The negative impacts and social and environmental risks identified,	Mitigation options for negative impacts and risks	Other identified risks
Private partner, land agreement with Ministries and landowners.	Conversion of old eucalyptus plantations (5,000 ha) into coppice to supply the city of Pointe-Noire with charcoal and poles for construction. Each year 1000 ha will be exploited to produce only charcoal (old stands) then convert to coppice with a rotation of 5 years for charcoal and 3 years for poles. Installation of an industrial kiln and 20 improved brick kilns. A specific study must be carried out to determine with precision the areas to be converted into coppice. It is probable that a certain area (to be defined by the study) will have to be replanted due to excessive degradation of the current plantations.	1) Production of 6000 to 8000 tons of annual coal and 400 to 800 thousand poles annually. Profitable scenario for a stabilized coal price between 5,000 and 6,000 FCFA per bag or in the event of a GCF subsidy (see cost-benefit study).	1) Decrease in pressure on the forest area of Mayombe, which is in the process of degradation, for the production of charcoal and service wood supplying Pointe-Noire. 2) Wood production on a perennial area identified with a fast growing species 3) Few inputs used 4) No invasive nature of eucalyptus in Congo 5) Recycling of fumes produced by ovens 6) jobs for the populations local 7) sustainability of threatened local know-how in the management of eucalyptus plantations 8) few new environmental impacts because the plantations already exist 8) maintenance of carbon stocks in the biomass by restoring the massif (eg illegal logging , fire control etc.)	1) Possibility of competing with artisanal charcoal makers in the area 2) Excessive demands from landowners	1) employ local charcoal makers and train them in new carbonization techniques and forestry management techniques specific to the project 2) formalized "solid" agreement with landowners.	a) land risks; b) E&S risk prevention measures to be planned at the level of furnace construction sites; c) potential conflicts between private partners and local populations

Sub-Project 2: Management in coppice of eucalyptus plantations for the production of energy wood (Forest plantation of Loudima department of Bouenza.)

Identification of stakeholders in carrying out agricultural activities	Brief technical characteristics	Expected results of the sub-project	Other associated positive social and environmental impacts	The negative impacts and social and environmental risks identified,	Mitigation options for negative impacts and risks	Other identified risks
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Private partner, land agreement with Ministries and landowners.	Conversion of old eucalyptus plantations (2000 ha) into coppice to supply the region's clay brick manufacturers with firewood (Nkayi, Madingou, etc.). Each year an area to be determined will be exploited and then coppiced with a 5-year rotation. A specific study must be carried out to determine with precision the areas to be converted into coppice. It is probable that a certain area (to be defined by the study) will have to be replanted due to excessive degradation of the current plantations.	Eventually production of 25 to 30 tonnes of wood per hectare for a 5-year rotation over 2000 ha.	1) Decrease in degradation pressure on forest areas in the department and on fruit trees, especially mango trees 2) Wood production on a perennial area identified with a fast growing species 3) Few inputs used 4) No invasive nature of eucalyptus in Congo 5) jobs for local populations 6) few new environmental impacts because the plantations already exist 7) maintenance of carbon stocks in the biomass by restoration of the massif (eg illegal logging, fire control etc.)	1) Possibility of competing with lumberjacks and timber sellers in the zone 2) Excessive demands by landowners	1) employ local labor and train them in silvicultural management techniques 2) "solid" formalized agreement with landowners.	a) land risks, b) on land use; c) potential conflicts between private partners and local populations
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Sub-Project 3: Agroforestry plantations based on acacias, cassava and maize (Niari department near Dolisie, 2) in the Pool department near Brazzaville, between Ngoma-Tsétsé and Kinkala)

Identification of stakeholders in carrying out agricultural activities	Brief technical characteristics	Expected results of the sub-project	Other associated positive social and environmental impacts	The negative impacts and social and environmental risks identified,	Mitigation options for negative impacts and risks	Other identified risks
Small farmers, private partner, land agreement with Ministries and landowners.	Installation of acacia-based agroforestry systems with cassava and maize crops intercropped at the start of the rotation (cf. acacia-cassava agroforestry technical itinerary and cost-benefit analyzes). One hectare will be cultivated annually with a rotation of 7 years for the acacias which will be transformed into charcoal. The exploitation of acacias will be accompanied by an improvement in carbonization yields (installation of improved ovens) and / or improvement of traditional carbonization practices. A cassava harvest is planned and a maize harvest at the start of the cycle. It is in the second rotation of acacia (in year 8) that food crops can benefit from soil enrichment.	Production of charcoal, corn and cassava sold in the form of cosettes, improvement of farmers' income and production model, maintenance and improvement of soil fertility, carbon storage in soils and biomass.	1) Decrease in degradation pressure on the forest areas of the department which are exploited by burning for cultivation 2) increased carbon storage in the soils 3) improvement of soil fertility, sustainability of the production system 4) better yields and income for peasants and their families, 5) production of wood and food crops on a perennial area identified without shifting cultivation 6) Few inputs used (limestone amendment) 7) jobs created for local populations (eg processing of cassava sales on site and / or export to urban centers).	1) Possibility of competing with farmers who are not beneficiaries of the project risk of "jealousy" 2) Excessive demands from landowners 3) possibility of spreading acacias due to the invasive nature of this species (acacias mangium and / or auriculiformis), 4) risk of pollution from phytosanitary products	1) "solid" formalized agreement with landowners, 2) involving women, groups not directly benefiting from primary cassava production, in cassava processing	a) land risks, b) on land use; c) potential conflicts between private partners and local populations d) the possible emergence of large agro-industrial groups producing maize could compete with these maize agroforestry systems (problem in the value chain)

Sub-Project 4: Establishment of mixed plantations associating eucalyptus and acacias (departments of North Pool and Plateaux)

Identification of stakeholders in carrying out agricultural activities	Brief technical characteristics	Expected results of the sub-project	Other associated positive social and environmental impacts	The negative impacts and social and environmental risks identified,	Mitigation options for negative impacts and risks	Other identified risks
Private partner, land agreement with Ministries and landowners.	Plantations on savannah of eucalyptus and acacias in mixtures (mangium and / or auriculiformis) at densities ranging from 800 to 1200 plants / ha on a basis of 50% of each of the 2 species, a proportion which may vary depending on the option chosen ( see technical itinerary). On the basis of data acquired in Congo, the timber production of the mixed stand is 30% higher than the pure stands of eucalyptus. The duration of the rotation is 7 years.	1) Production of 30-40 tonnes of wood per ha and per rotation. In the end, the average mass of charcoal produced annually for the 2 combined zones (6,000 ha) is 7,000 tonnes with the use of improved ovens.	1) Decrease in pressure on the forest areas of the departments concerned 2) Wood production on a perennial area identified with a fast growing species 3) No inputs used (fertilizers) thanks to the fixation of atmospheric nitrogen of the acacias 4) No invasiveness of eucalyptus in Congo 5) Recycling of fumes produced by improved ovens 6) jobs for local populations 7) sustainability of local know-how in the management of eucalyptus plantations 8) constitution of " a stock of carbon in the biomass and in the soil (see technical itinerary) 9) possibility of developing a beekeeping activity thanks to the flowering of acacias.	1) Possibility of competing with artisanal charcoal makers in the area 2) excessive demands from landowners and conflicts 3) use of herbicide 4) invasiveness of acacia, 5) risk of erosion, 6) risk of pollution from phytosanitary products	1) employ local charcoal makers and train them in new carbonization techniques and silvicultural management techniques specific to the project. 2) use the herbicide at the recommended doses and train the personnel in individual and environmental protection measures 3) plant the lines of trees according to the contour lines and in flat or gently sloping areas to prevent the risk of erosion. Sow a cover crop if the ground is sloping (eg pueraria), 4) "solid" formalized agreement with the landowners.	a) land risks, b) on land use; c) potential conflicts between private partners and local populations

Sub-Project 5: Agroforestry plantations associating plantain, cocoa trees and fruit and forest trees (savanna / forest transition zones in the Cuvette departments).

Identification of stakeholders in carrying out agricultural activities	Brief technical characteristics	Expected results of the sub-project	Other associated positive social and environmental impacts	The negative impacts and social and environmental risks identified,	Mitigation options for negative impacts and risks	Other identified risks
Small farmers, private partner, land agreement with Ministries and landowners.	Installation in the savannah of agroforestry systems based on cocoa (1,100 plants / ha) and plantains (low stratum), fruit trees (middle stratum) and forest trees (high stratum). The role of the plantains is to provide initial shade and additional income. Food crops are also cultivated at the start of the cycle for additional income and herbaceous control (cf. technical itinerary in cocoa-based agroforestry). One hectare will be cultivated annually with for example 5 ha in total for a small farmer.	This project in connection with other cocoa projects (AFD, BM, Eco + ...) will participate in the revival desired by the government of this sector in Congo. Cocoa production from year 3 with yields reaching 0.6 to 1 ton kg per ha after 11 years. Maintenance and improvement of soil fertility, carbon storage in soils and biomass. Harvest of plantains between 1 and 4 years before the cover is closed. The project is profitable with an initial subsidy (see cost-benefit study).	1) Relaunch of a business sector with positive impacts on carbon sequestration (storage in biomass and soil), improvement of the fertility of savannah soils. 2) better yields and income for farmers and their families with income security through diversification of production at the start of the project 3) little or no fertilizer used	1) Possibility of competing with farmers who are not beneficiaries of the project, risk of "jealousy" 2) Excessive demands from landowners 3) possibility of using herbicides according to the production model selected (see technical itinerary), 4) risk of pollution from phytosanitary products	1) use the herbicide at the recommended doses and train staff in individual and environmental protection measures 2) formalized "solid" agreement with the landowners.	a) Risk of conflicts between migrant farming populations and indigenous peoples, this sub-project may involve agricultural activities which are subject to the establishment of legally recognized rights to lands, resources or territories that indigenous peoples have traditionally owned, occupied or used , a more in-depth study in particular on land rights and those of indigenous peoples could make it possible to identify the means to mitigate this risk, b) Economic risk, the development of this sector is currently very little developed in Congo, would require efforts with long-term support from the government and unsecured donors, the risk is to commit the peasants to a path without a future; the presence of fruit trees,

## For a process of co-construction of sub-projects with local actors in order to mitigate E&S risks

We have seen that the main risks lie in components 2 and 4, which concern restoration activities on the land. In these components, a certain number of risks, such as the use of the necessary phytosanitary products, seem to us to be moderate and can easily be identified and treated via an ESMP.

On the other hand, changes in land use, even in cases where owners are identified, are sources of numerous conflicts, whether for reasons of conflicts of interest between beneficiaries (inheritances), between lineages (rights of historical uses), of perceptions (fear of being dispossessed in one way or another), of power, of jealousy of actors outside the scope of the project etc ... these risks of conflicts can completely defeat the project through resistance from certain sections of the local population.

Paradoxically, the involvement of local populations in the ESIA processes is recommended in all documents and guides on ESIA, but after the fact, because nothing is really said about the involvement of these local populations in the decision-making processes that define the project from its objectives to its technical itineraries. So often, the social is seen as a constraint whereas if we really took the time to involve the local populations from the design of the project, original and often more effective solutions could emerge.

The involvement of local populations in the ESIA process is reduced, at best, to a few workshops to validate objectives and ideas, which have been designed elsewhere. It is nominal or passive participation (see annex 7). However, we know that a change in land use is extremely complex social and ecological and that to understand this complexity it is necessary to call on the expertise of local actors.

Also, we recommend a translation of the project objectives with all the components of the local level, as quickly as possible, it would be a co-construction and also a reconstruction of the project with the local actors:

1. Either, this reconstruction makes it possible to amend the project by really reducing E&S risks thanks to a better knowledge of local realities,
2. Either the project can be profoundly modified to take into account these local realities while remaining within the objectives of the FVC Congo project,
3. Either finally we realize that the objectives of the FVC project are not suitable and would not be viable in the local context and, locally, the project would be abandoned. In the latter case, we would then save time and save public money because we would avoid an almost certain failure which would then be identified only after several years.

In any case, this translation effort will be a measure without regret, even if the project is abandoned locally, it would remain a social investment that would have enabled local populations to have

defined their own objectives and the actions they wish to implement in their territory and this could serve as a basis for new projects for other donors or a future phase of GCF. Thus, it could show that the site is more conducive to other potential investments (FCPF Carbon Fund, of the Forest Investment Program PIF, CAFI, "Paysages Forestiers Nord Congo" or "Relance du Secteur Agricole") than those of the components 2 or 4.

It would therefore be an investment that would make it possible to identify and prevent risks, first of all social, but also environmental, because local populations often have detailed knowledge of their environment.

Ways to facilitate these decision-making processes have already been tested elsewhere and could easily be adapted in the context of the Congo, for example:

- Model forests in Central Africa and around the world: <http://www.rifm.net>
- The work of CIRAD and CIFOR:
- Adaptive co-management (CIFOR)
- Multi Landscape Assessment (CIFOR)
- Leveling the playing field: [www.cifor.org/lpf/ ref/index.htm](http://www.cifor.org/lpf/ref/index.htm)

However, these processes take time, around 2 years, and come at a cost. It is an investment to be made if we want to prevent the involvement of local populations from remaining a wishful thinking; thus EIA & S would be done at the appropriate level, to significantly reduce the risk of failure of GCF projects.

Component 5, with the aim of ensuring the sustainability of the green investments that will be made by the project, this facilitation activity for the integration of local populations in the decision-making process of sub-projects should be included. This activity, which would help reduce conflicts at the local level, would at the same time improve the business environment linked to land.

This activity should be launched as quickly as possible on each site, to ensure that the FVC Congo project is not built on the basis of a nominal participation of local actors but on a truly active participation, or even interactive (see the typology FAO participation in Annex 7). It should therefore be done well before the launch of calls for tenders for sub-projects, so as to better define the environmental and social management framework for these sub-projects. For this activity, it would be necessary to call on specialists in these participatory approaches to ensure their quality.

The co-construction of a land management or land rehabilitation project with the local populations (Landscape approach) has the disadvantage of taking time. A team should gradually do this work to create a portfolio of feasible and co-constructed projects with local actors and therefore well before the launch of calls for tenders for sub-projects of this Green Fund or similar future projects. . Component 5 could be mobilized for this purpose. Alternatively, we could use the knowledge acquired from existing projects, which have already done this work of co-construction with local actors, to begin with.

## APPENDICES

## Annex 1 Planning framework for indigenous peoples

This framework concerns, at least, sub-projects 5, that is to say:

- Sub-Project 5: Agroforestry plantations associating plantain, cocoa trees and fruit and forest trees

the text of this appendix below has been adapted from: AFD. (2018). Environmental and Social Setting, 1–86.

### 1. Objectives and principles

This indigenous peoples planning framework will be applied when indigenous peoples are present in the area of influence of a subproject, as identified during the social and environmental screening process or subsequently during the ESIA.<sup>6</sup> The sub-project developers and the SFL (SFL: local financial sector) are responsible for implementing the actions necessary to meet the requirements defined by this framework.

There is no universally accepted definition of Indigenous peoples. Indigenous peoples can be referred to in different countries by terms such as indigenous ethnic minorities, aborigines, hill tribes, minority nationalities, listed tribes, First Nations or tribal groups. This Framework refers to the Indigenous Peoples Policy of the GCF recognizing the different definitions and takes into account commonly accepted and applied criteria for identifying indigenous peoples, respecting self-identification as indigenous or tribal as a fundamental criterion in determining its application.

### 2. General Requirements of the Framework

The subproject promoters and the SFLs will identify, through the social and environmental screening and the ESIA, the communities of indigenous peoples that may be present in the area of influence of the subproject, as well as the nature and degree of expected social impacts, impacts on physical cultural resources, environmental impacts as well as potential benefits for indigenous peoples. Sub-project promoters must take all necessary measures to avoid negative impacts on indigenous populations. Where avoidance is not possible, sub-projects will minimize, mitigate or compensate for these impacts in a culturally appropriate manner. The proposed actions will be developed with the informed participation of affected indigenous peoples and included in an Indigenous Peoples Plan with a timetable, or a broader community development plan, depending on the nature and extent of the impacts. When the subproject is considered to have high impact due to other potential

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<sup>6</sup> EIES : Étude d'Impact Environnemental et Social est un instrument permettant d'identifier et d'évaluer les impacts environnementaux et sociaux éventuels d'un projet proposé, d'évaluer les alternatives et de concevoir des mesures d'atténuation, de gestion et de contrôle appropriées



risks such as natural resource conflicts, the subproject should include measures to obtain free, prior and informed consent and an agreed process for the sub-project.

Sub-projects should establish an ongoing relationship with affected indigenous populations and communities as early as possible in the planning of the sub-project and throughout the life of the sub-project. Through the technical assistance (TA) of the program, specialists can be engaged to help subproject designers and LFS to design and implement an appropriate consultation approach. The consultation process will ensure their free, prior and informed consent and facilitate informed participation of communities on issues that concern them, such as impact mitigation measures, opportunities and implementation issues. The process of Community engagement will need to be culturally appropriate and correspond to the potential risks and impacts for indigenous peoples. In particular, the process will include the following steps:

a) Involve representatives or representative bodies of indigenous peoples such as councils, elders, etc .; (b) ensuring that the consultation includes both women and men and various age groups in a culturally appropriate manner; (c) allow sufficient time for the collective decision-making process; (d) facilitate the expression of views, concerns and proposals in the language of one's choice, without external manipulation, interference or coercion, and without intimidation; (e) ensure that the grievance mechanism established for the project is culturally appropriate and accessible to Indigenous communities; and (f) ensure that project plans and documents are made available to affected indigenous populations and communities in an appropriate form, manner and language.

The aim is to obtain and maintain free, prior and informed consent for sub-projects. This determination is generally based on the collective and manifest expression of favorable views concerning the objectives, plans and modalities of implementation of the sub-projects. This decision does not require unanimity, as support may exist even in cases of internal disagreement within the community or in cases of limited opposition to the objectives of the subproject or the proposed arrangements. The sub-project level will describe the basis for the determination as well as the consultation process undertaken.

Free, prior and informed consent requirements are outlined in the FAO / AFD and GCF Safeguard Standard on Indigenous Peoples and aligned with the requirements of the GCF Indigenous Peoples Policy.

### 3. Development benefits

Through this process and the informed participation of affected communities, sub-projects should identify opportunities for culturally appropriate development benefits.

These opportunities should be commensurate with the degree of impact of the project, aimed at improving their living conditions and livelihoods in a culturally appropriate manner, and fostering the long-term sustainability of the natural resources on which they depend. Benefits and the agreed process for benefit sharing will be documented and provided to indigenous peoples and communities in a timely and equitable manner to aid in deliberation and decision making.

#### 4. Indigenous peoples development plan

When indigenous peoples and communities are identified in the project area through the selection process, an Indigenous Peoples Plan (IPP) will be prepared by the developers of the subproject. The Plan will be informed through social and economic assessment, and consultation processes. The Plan will establish the measures by which the sub-borrowers will ensure that: a) the indigenous populations affected by the sub-projects receive culturally appropriate social and economic benefits; and (b) if potential negative effects on indigenous peoples are identified, these negative effects will be avoided, minimized, mitigated or compensated. The Plan will make important contributions to the design and structure of the sub-projects. The indicative content of

#### 5. Social assessment

The social assessment will include the following, as applicable:

- (a) description of sub-projects and potential problems or impacts for communities, including indigenous peoples, indicating if there are any sub-groups such as indigenous peoples that may be affected differently; (b) identification affected communities and other key stakeholders to be consulted;
- (c) basic information on the demographic, social, cultural and economic characteristics of the communities concerned; (d) assessment of potential negative impacts and benefits likely to be associated with the project, including opinions thereon arising from consultations; and
- (e) a summary of the preferences and concerns of the communities relating to the objectives of the project, the access and cultural relevance of the benefits of the project, the mitigation of any negative impacts and the arrangements for implementing the project.

#### 6. Special requirements

Given that indigenous peoples may be particularly vulnerable to the circumstances of the sub-project, appropriate requirements will be required, particularly with regard to effects on traditional and customary lands, resettlement of indigenous peoples and cultural resources. When any of these special cases apply, the program will use qualified external experts as part of its technical assistance to help conduct the social assessment and ensure their proper inclusion in the Plan.

##### a) Impacts on traditions or customs

Indigenous peoples are associated with their customary lands and the natural and cultural resources of the land. The use of land, including seasonal or cyclical uses, by indigenous peoples and communities for their livelihoods or cultural, ceremonial or spiritual purposes defining their identity and community, may be justified and should be duly documented. . If the location of the sub-project is decided on traditional or customary lands and negative impacts are expected on livelihoods or cultural, ceremonial or spiritual uses that define the identity and community of indigenous peoples, the promoters of sub-projects must prove that the acquisition is respectful of the land.

- (i) sub-project developers should document efforts to avoid or at least minimize the proposed sub-project footprint; ii) experts will be engaged to document land uses in collaboration with affected indigenous communities without harming their land claims;
  - (iii) affected indigenous communities are informed of their rights to their lands under national laws, especially those which recognize customary rights or uses;
  - (iv) sub-projects can provide the indigenous communities concerned with fair compensation and due process such as benefit-sharing mechanisms; and / or land and / or in-kind compensation instead of monetary compensation if possible; and
  - (v) the sub-project promoters enter into good faith negotiations with the indigenous communities concerned and document their informed participation and the results of the consultations.
- (b) Relocation of indigenous peoples

Subproject promoters and LFS should consider alternative subproject designs to avoid relocation of indigenous peoples from their traditional or customary lands. If such resettlement is unavoidable, the sub-projects will not be continued, unless they have negotiated in good faith with the indigenous communities concerned, and document the free, prior and informed consent (FPIC) as a result of the negotiation and validated by the SFL and FAO / AFD. Any resettlement of indigenous populations will have to comply with FAO / AFD and GCF standards for land acquisition and involuntary resettlement. The possibility for relocated indigenous peoples to return to their traditional or customary lands,

#### (c) Cultural resources

Where a subproject proposes to use the cultural resources, knowledge or practices of indigenous peoples for commercial purposes, the subprojects should document and inform indigenous peoples and communities of: i) their rights under the laws national; (ii) the scope and nature of the proposed business development; and (iii) the potential consequences of such a development. Sub-projects should not engage in such commercialization unless they: (i) engage in good faith negotiations with the indigenous communities concerned; (ii) to prove the free, prior and informed consent as a result of the negotiation and that this consent must be validated by the SFL and FAO / AFD; and (iii) provides for fair and equitable benefit sharing.

## Annex 2- Presentation of the Indigenous Peoples Plan (PPA) for information only

Source: AFD. (2018). Environmental and Social Setting, 1–86.

The main titles of this Indigenous Peoples Plan (PPA):

1. PPA summary
2. Project description
3. Description of indigenous peoples
4. Summary of substantive rights and legal framework
5. Summary of social and environmental assessment and mitigation measures
6. FPIC participation, consultation and process<sup>7</sup>
7. Appropriate benefits
8. Capacity support
9. Recourse to complaints
10. Monitoring, reporting, evaluation
11. Institutional arrangements
12. Budget and funding

1. Summary of the Indigenous Peoples Plan: concisely describes critical facts, significant findings and recommended actions
2. Project description: general description of the project, the project area and the components / activities likely to have repercussions on indigenous peoples
3. Description of indigenous peoples : a description of the affected indigenous populations and their location, including:
  - i. description of the community or communities constituting the affected peoples (eg names, ethnicities, dialects, estimated numbers, etc.);
  - ii. description of the resources, lands and territories to be affected and the links / relationships between affected peoples and these resources, lands and territories; and
  - iii. identification of all vulnerable groups within affected populations (eg isolated and voluntary peoples, women and girls, disabled and elderly, others).

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<sup>7</sup> CPLCC : Consentement Préalable, donné Librement et en Connaissance de Cause

4. Summary of substantive rights and legal framework : a description of the fundamental rights of indigenous peoples and the applicable legal framework, in particular<sup>8</sup> :
  - i. An analysis of applicable national and international laws affirming and protecting the rights of indigenous peoples (including a general assessment of government implementation of these same rights).
  - ii. Analysis of whether the project involves activities that are contingent on the establishment of legally recognized rights to lands, resources or territories that indigenous peoples have traditionally owned, occupied or used or otherwise acquired. When this possibility exists include:
    1. identification of the steps and associated timetable for obtaining legal recognition of this property, occupation or use with the support of the competent authority, including how the demarcation, demarcation and titling should respect customs, traditions, norms, values, land tenure and the effective and meaningful participation of affected peoples, with legal recognition granted to titles with full Prior Consent, given Freely and with Knowledge of the Cause of the peoples concerned; and
    2. list of prohibited activities until delineation, demarcation and titling are completed.
  - iii. Analysis of whether the project involves activities which depend on the recognition of the legal personality of the affected indigenous peoples. When this possibility exists:
    1. identification of the steps and associated timetables for achieving this recognition with the support of the competent authority, with the effective and effective participation and consent of the indigenous peoples concerned; and
    2. list of prohibited activities until recognition.
5. Summary of social and environmental assessment and mitigation measures :
  - i. A summary of the conclusions and recommendations of the required prior social and environmental impact studies (limited assessment, ESIA, EHSA, if applicable) - in particular those concerning indigenous peoples, their rights, lands, resources and territories. This should include how affected indigenous peoples participated in this study and their views on the mechanisms for participation, findings and recommendations.
  - ii. When potential risks and negative impacts on indigenous peoples, their lands, resources and territories are identified, the details and time frames associated with the measures planned to avoid, minimize, mitigate or compensate for these negative effects. Identification of special measures to promote and protect the rights and interests of indigenous peoples, including respect for the internal norms and customs of the affected peoples.
  - iii. If the project results in the resettlement of indigenous peoples from their lands and territories, a description of the FPIC consultation and process leading to the subsequent agreement on resettlement and fair and equitable compensation, including the possibility of return.

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<sup>8</sup> Une étude sur le foncier et les droits juridiques au Congo était prévue et devra préciser ce cadre et faciliter la rédaction de cette partie.

- iv. A description of the measures for the protection of traditional knowledge and cultural heritage in the event that the project results in the documentation and / or use and appropriation of this knowledge and heritage of indigenous peoples and the measures to be taken to ensure FPIC.
6. FPIC participation, consultation and process:
    - i. A summary of the results of the culturally appropriate consultation and, where applicable, FPIC processes undertaken with affected populations, which led to indigenous peoples' support to the project.
    - ii. A description of the mechanisms for conducting iterative consultation and consent processes throughout the implementation of the project. Identify specific project activities and circumstances that require consultation and FPIC.
  7. Appropriate benefits : an identification of steps to be taken to ensure that indigenous peoples receive equitable and culturally appropriate social and economic benefits, including a description of the consultation and consent processes that lead to specific benefit-sharing arrangements.
  8. Capacity support:
    - i. Description of project activities aimed at building capacity within government and / or affected indigenous peoples, and facilitating exchanges, awareness and cooperation between the two.
    - ii. Description of measures to support the social, legal and technical capacities of indigenous peoples' organizations in the project area to enable them to better represent affected indigenous peoples in a more effective manner.
    - iii. If applicable and requested, description of measures to support the technical and legal capacities of relevant government institutions to strengthen compliance with the country's duties and obligations under international law with respect to the rights of indigenous peoples.
  9. Recourse to complaints : a description of the procedures available to deal with complaints raised by indigenous peoples affected by the implementation of the project, including available remedies, consideration of customary laws and indigenous peoples' dispute resolution mechanisms, as well as the effective capacity of indigenous peoples, under national laws, to denounce violations and ensure reparations for them in national courts and administrative procedures.
  10. Monitoring, reporting, evaluation:
    - i. Mechanisms and benchmarks appropriate to the Project for transparent and participatory joint monitoring, evaluation and communication, including a description of how relevant indigenous peoples are involved.
    - ii. Define the mechanisms put in place to allow the periodic review and revision of the PPA in the event that new Project circumstances warrant modifications developed through consultation and consent processes with affected indigenous peoples.
  11. Institutional arrangements: describe the responsibilities in terms of institutional arrangement and the mechanisms for implementing the measures contained in the PPA, including the participatory mechanisms of the affected indigenous populations. Describe the role of independent

and impartial entities in auditing, performing social and environmental assessments as needed and / or monitoring the project.

12. Budget and funding : a properly costed plan, with a detailed budget sufficient to satisfactorily undertake the activities described.

### Annex 3: Model of environmental and social clauses

Source of this annex: Republic of Congo. (2018). Strategic environmental and social assessment (SEA), of the environmental and social management framework (CGES) of the REDD + process in the Republic of Congo IV, 1–201.

The construction of the furnaces of sub-project 1 will involve the establishment of worksites. These clauses are intended to help those in charge of drafting bidding documents and works execution contracts (technical specifications), so that they can integrate into these documents requirements allowing " optimize the protection of the environment and the socio-economic environment. These clauses must be adapted, they are specific to all site activities that may be sources of environmental and social nuisance. They must be annexed to the bidding documents or works execution contracts of which they constitute an integral part.

The main titles of the model environmental clauses, detailed in the following paragraphs, are:

1. Prior arrangements for the execution of the work
2. Environmental and social management program
3. Site installations and preparation
4. Employment of local labor
5. Measures against traffic obstructions
6. Site retreat and redevelopment
7. Notification
8. Sanction
9. Works receipt
10. Specific Environmental and Social Clauses

Prior arrangements for the execution of the work:

#### **Compliance with national laws and regulations:**

The Contractor and his subcontractors must: know, respect and apply the laws and regulations in force in the country and relating to the environment, the disposal of solid and liquid waste, discharge and noise standards, working hours, etc. ; take all appropriate measures to minimize damage to the environment; take responsibility for any claim related to non-respect for the environment.

#### **Permits and authorizations before work**

Any work must be subject to a prior information and administrative authorization procedure. Before starting the work, the Contractor must obtain all the necessary permits for carrying out the work provided for in the road project contract: authorizations issued by local communities, forestry services (in the event of deforestation, pruning, etc. .), mining services (incase of quarry exploitation and borrow pits), hydraulic services (if public water points are used), labor inspectorates, networks, etc. Before starting work, the Contractor must consult with local residents with whom he can make arrangements to facilitate the progress of the works.

### **Kick-off meeting**

Before the start of works, the Contractor and the Project Manager, under the supervision of the Client, must organize meetings with the authorities, representatives of the populations located in the project area and the competent technical services, to inform them of the consistency of the work to be carried out and their duration, of the routes concerned and the locations likely to be affected. This meeting will also allow the Client to collect the observations of the populations, to sensitize them on the environmental and social issues and on their relations with the workers.

### **Site preparation and release**

The Contractor must inform the populations concerned before any activity of destruction of fields, orchards, market gardeners required under the project. The release of the right-of-way must be done according to a schedule defined in agreement with the affected populations and the Client. Before installation and the start of works, the Contractor must ensure that the indemnities / compensations are actually paid to the beneficiaries by the Client.

### **Identification of dealer networks**

Before starting work, the Contractor must instruct a procedure for locating the concessionaires' networks (drinking water, electricity, telephone, sewer, etc.) on a plan which will be formalized in a Minutes signed by all parties (Contractor, Project manager, dealers).

### **Liberation of public and private domains**

The Contractor must know that the perimeter of public utility linked to the operation is the perimeter likely to be affected by the work. Work can only begin in the areas affected by private rights-of-way when these have been released following an acquisition procedure.

Environmental and social management program:

The Contractor must establish and submit, for the approval of the Project Manager, a detailed environmental and social management program for the site which includes:

- a land use plan indicating the location of the camp and the different areas of the site according to the components of the project, the planned locations and a description of the facilities;
- a site waste management plan indicating the types of waste, the type of collection envisaged, the place of storage, the method and the place of disposal;



- the information and awareness program for the population specifying the targets, the themes and the method of consultation adopted;
- an accident management and health preservation plan specifying the risks of major accidents that could endanger the safety or health of staff and / or the public and the safety and / or health preservation measures to be applied as part of an emergency plan.

The Contractor must also establish and submit, for the approval of the Project Manager, an environmental protection plan for the site which includes all of the site protection measures: protection of the fuel storage tanks, lubricants and bitumen to contain leaks; hydrocarbon separators in the drainage networks associated with washing, maintenance and fueling installations for vehicles and machinery, and with wastewater disposal installations in kitchens); description of the methods of avoiding and reducing pollution, fires and road accidents; health infrastructure and population access in the event of an emergency; site regulations concerning environmental protection and safety;

The environmental and social management program will also include: the organization chart of the personnel assigned to environmental management with an indication of the person in charge of the project's Health / Safety / Environment; description of methods of reducing negative impacts; the management and rehabilitation plan for borrow pits and quarries; the water and sanitation supply and management plan; a list of agreements made with the owners and current users of private sites.

Site installations and preparation :

### **Localization standards**

The Contractor must build his temporary site installations in such a way as to disturb the environment as little as possible, preferably in places already deforested or disturbed when such sites exist, or on sites that will be reused in a later phase for other purposes. The Contractor must strictly prohibit the establishment of a base camp inside a protected area.

### **Display of internal regulations and staff awareness**

The Contractor must display internal regulations in a visible manner in the various facilities of the base camp specifically prescribing: respect for local customs and traditions; protection against STIs / HIV / AIDS; hygiene rules and safety measures. The Contractor must make his staff aware of the respect for the habits and customs of the populations of the region where the work is carried out and of the risks of STIs and HIV / AIDS.

Employment of local labor:

The Contractor is required to hire (apart from his technical managerial staff) as much labor as possible in the area where the work is carried out. If qualified personnel cannot be found on site, it is authorized to hire labor outside the work area.

### **Respect of working hours**

The Contractor must ensure that the working hours comply with the national laws and regulations in force. Any exemption is subject to the approval of the Project Manager. As far as possible (except in the case of an exception granted by the Project Manager), the Contractor must avoid performing the work during rest hours, Sundays and public holidays.

### **Protection of site personnel**

The Contractor must provide site personnel with correct regulatory work clothes in good condition, as well as all protective and safety accessories specific to their activities (helmets, boots, belts, masks, gloves, glasses, etc. .). The Contractor must ensure the scrupulous wearing of protective equipment on the site. A permanent control must be carried out for this purpose and, in the event of non-compliance, coercive measures (warning, dismissal, dismissal) must be applied to the personnel concerned.

### **Health, Safety and Environment Manager**

The Contractor must designate a Health / Safety / Environment manager who will ensure that the rules of hygiene, safety and environmental protection are strictly followed by all and at all levels of execution, both for workers only for the population and other people in contact with the site. He must set up a current and emergency medical service at the camp, adapted to the number of his staff. The Contractor must prohibit access to the site to the public, protect it with beacons and signage, indicate the various accesses and take all order and safety measures to prevent accidents.

### **Designation of on-call staff**

The Contractor must ensure the security, surveillance and maintenance of his site, including outside hours of presence on the site. Throughout the duration of the work, the Contractor is required to have on-call staff, outside working hours, every day without exception (Saturday, Sunday, public holidays), day and night, to compensate for everything incident and / or accident likely to occur in connection with the work.

Measures against traffic obstructions :

The Contractor must avoid obstructing public access. It must permanently maintain traffic and access for residents during the work. The Contractor shall ensure that no excavation or trenches remain open at night, without adequate signage accepted by the Project Manager. The Contractor must ensure that the temporary detours allow safe traffic.

Site retreat and redevelopment :

### **General rules**

Whenever a site is vacated, the Contractor leaves the premises clean for their immediate assignment. He cannot be released from his commitments and his responsibility for their use without having formally noted this good condition.

The Contractor will carry out all the arrangements necessary for the restoration of the premises. He is required to fold up all his equipment and materials and cannot leave them on the site or the surrounding area. Once the work is completed, the Contractor must:

- remove temporary buildings, equipment, solid and liquid wastes, excess materials, fences etc.;
- rectify drainage defects and level all excavated areas;
- reforest the areas initially deforested with appropriate species, in conjunction with local forest services;
- protect structures which remain dangerous (wells, open trenches, unevenness, projections, etc.);
- make the roadways, sidewalks, gutters, ramps and other works provided to the public service functional;
- decontaminate soiled soil (contaminated parts must be disburied and backfilled with sand);
- clean and destroy emptying pits.

If it is in the interest of the Client or the local authorities to recover the fixed installations for future use, the Contractor must transfer them without compensation during the withdrawal. Permanent installations that have been damaged must be repaired by the Contractor and returned to an equivalent condition to what they were before the start of the work. The access roads must be restored to their initial state. Wherever the soil has been compacted (work areas, traffic lanes, etc.), the Contractor must scarify the soil at least 15 cm deep to facilitate the regeneration of vegetation. Concrete coverings, pavers and slabs should be removed and sites covered with earth and sent to authorized disposal sites.

In the event of the Contractor's failure to carry out the repair work, these are carried out by a company of the Client's choice, in connection with the services concerned and at the expense of the defective. After the withdrawal of all the equipment, a report noting the restoration of the site must be drawn up and attached to the report of acceptance of the works. Failure to restore the premises must result in the refusal of acceptance of the work. In this case, the percentage that has not yet been released from the amount of the "site installation" item will be retained to be used to ensure site withdrawal.

### **Protection of unstable areas**

When dismantling structures in unstable environments, the Contractor must take the following precautions to avoid accentuating the instability of the ground: (i) avoid any heavy traffic and any overload in the instability zone; (ii) conserve the vegetation cover as much as possible or reconstitute it using appropriate local species in the event of erosion risk.

### **Development of quarries and temporary borrow sites**

The Contractor must redevelop the quarries and borrow sites according to the options to be defined in relation with the Project Manager and the local populations: (i) leveling of the land and restoration of plant cover (trees, shrubs, lawns or crops); (ii) filling (earth, or stones) and restoration of the plant cover; (iii) development of water bodies (basins, ponds) for local communities or animals; (iv) recreation area; ecotourism, among others.

## **Management of petroleum products and other contaminants**

The Contractor must clean the work or storage area where there has been the handling and / or use of petroleum products and other contaminants.

## **Control of the execution of environmental and social clauses**

The control of the respect and the effectiveness of the implementation of the environmental and social clauses by the Contractor is carried out by the Project Manager, whose team must include an environmentalist expert who is an integral part of the control mission. Works.

### **Notification**

The Project Manager notifies the Contractor in writing of all cases of default or non-execution of environmental and social measures. The Contractor must rectify any breach of the requirements duly notified to him by the Project Manager. Resumption of work or additional work resulting from non-compliance with the clauses are the responsibility of the Contractor.

### **Sanction:**

In application of the contractual provisions, non-compliance with environmental and social clauses, duly noted by the Project Manager, may be a reason for termination of the contract. The Contractor having been the subject of a termination for non-application of the environmental and social clauses is exposed to sanctions up to the suspension of the right to tender for a period determined by the Contracting Authority, with a reduction in the price and a blocking of the holdback.

## **Works receipt:**

Failure to comply with these clauses exposes the Contractor to the refusal of provisional or final acceptance of the works by the acceptance committee. The execution of each environmental and social measure may be the subject of a partial acceptance involving the relevant competent services.

## **Guarantee obligations**

The Contractor's obligations run until final acceptance of the works, which will only be acquired after complete execution of the environmental improvement works provided for in the contract.

### **Specific Environmental and Social Clauses:**

## **Roadwork signage**

The Contractor must place, prior to the opening of the worksites and whenever necessary, a pre-signaling and a signaling of the long-distance worksites (exit of quarries or base-camps, circuit used by the machines, etc. ) which complies with the laws and regulations in force.

## **Measures for earthworks**

The Contractor must limit stripping, clearing, backfilling and leveling of work areas to a strict minimum in order to respect the natural topography and prevent erosion. After stripping the topsoil layer, the Contractor must conserve the topsoil and use it for the redevelopment of embankments and other disturbed surfaces. The Contractor must deposit the unused excavation in storage areas if it is planned to use it later; otherwise he must transport them to previously authorized backfill areas.

## **Material transport and storage measures**

During the execution of the work, the Contractor must (i) limit the speed of vehicles on the site by installing signage and flag bearers; (ii) regularly water the traffic lanes in inhabited areas (in the case of dirt roads); (iii) provide for deviations from existing tracks and roads to the extent possible. In residential areas, the Contractor must establish the schedule and route of heavy vehicles that must travel outside the sites in order to reduce nuisances (noise, dust and traffic congestion) and carry it for approval by the Project Manager.

To ensure order in traffic and safety on roads, sand, cement and other fine materials must be hermetically contained during transport to prevent dust build-up and spillage during transport. Materials containing fine particles should be covered with a securely attached tarpaulin.

The Contractor must take special protection (nets, tarpaulins) against the risk of projections, fumes and falling objects.

The Contractor may set up secondary zones for the parking of vehicles which are not authorized to park on the public highway outside working hours and outside the right of way of the sites. These areas may also include a space for welding, assembly, minor machining, and minor maintenance work. These areas will not be able to store hydrocarbons.

Any storage of any kind whatsoever is strictly prohibited in the immediate environment, outside of worksite rights-of-way and predefined areas.

## **Measures for the movement of construction machinery**

Only strictly essential materials are tolerated on the site. Outside the accesses, designated passageways and work areas, it is forbidden to use construction machinery. The Contractor must ensure the speed limit for all his vehicles traveling on public roads, with a maximum of 60 km / h in the open countryside and 40 km / h in urban areas and crossing villages. Drivers exceeding these limits should be subject to disciplinary action up to and including termination. The installation of speed bumps at the entrances to built-up areas will be recommended.

The Contractor's vehicles must in all circumstances comply with the prescriptions of the highway code in force, in particular with regard to the weight of the laden vehicles. The Contractor shall, in dry periods and depending on the availability of water, regularly water the tracks used by his transport vehicles to avoid dust, more particularly in inhabited areas.

## **Measures for transport and storage of petroleum products and contaminants**

The Contractor must transport petroleum products, lubricants and other hazardous materials in a safe manner, in airtight containers on which the name of the product is clearly identified. Delivery must be carried out by tanker trucks that comply with current regulations and drivers must be made aware of the damage in the event of an accident. Transshipment operations to storage tanks must be carried out by trained personnel. Storage tanks must be watertight and placed on protected surfaces having a system of protection against inadvertent spillage of product. The Contractor must install its fuel stores, lubricants and petroleum products at a distance of at least 200 m from bodies of water and waterways. Storage areas must be located outside any flood zone and residential area. Storage areas must be clearly identified to avoid collisions between construction vehicles and petroleum product tanks. The Contractor must protect the petroleum product tanks and filling equipment with a basin for the retention of the content in the event of an accidental spill. All tanks should be closed when not in use.

## **Measures in the event of an accidental spill of petroleum products**

The Contractor must prepare an emergency plan in the event of an accidental spill of contaminants and submit it to the Project Manager before the start of work. The measures to fight and control contaminant spills on the work site must be clearly identified and workers must be aware of them and be able to implement them in the event of an accident. The Contractor must put in place on the site: (i) equipment to fight against spills (absorbents such as peat, shovels, pumps, machinery, containers, gloves, insulation, etc.); (ii) communication equipment (radio transmitter, telephone, etc.); (iii) safety equipment (signage, etc.).

### **Protection of agricultural areas and structures**

The work schedule must be established in order to limit disruption to agricultural activities. The main periods of agricultural activity (seeds, harvests, drying, etc.) must in particular be known in order to adapt the schedule to these periods. The Contractor must identify the places where passages for animals, livestock and people are necessary. Here again, the involvement of the population is essential.

## **Protection of wetlands, fauna and flora**

The Contractor is prohibited from making temporary arrangements (storage and parking areas, bypass or work roads, etc.) in wetlands. In the case of plantations, the Contractor must adapt to the local vegetation and take care not to introduce new species without the advice of the forestry services. For all deforested areas located outside the right-of-way and required by the Contractor for the purposes of his work, the extracted topsoil must be placed in reserve.

## **Protection of sacred sites and archaeological sites**

The Contractor must take all the necessary measures to respect worship and cultural sites (cemeteries, sacred sites, etc.) in the vicinity of the works and not harm them. To do this, it must first ensure their typology and their location before starting work. If, during the work, vestiges of cultural, historical or archaeological interest are discovered, the Contractor must follow the following procedure: (i) stop the work in the area concerned; (ii) immediately notify the Project Manager who must take measures to protect the site to avoid destruction; a protection

perimeter must be identified and materialized on the site and no activity should take place there; (iii) refrain from removing and moving objects and remains. Work must be suspended within the protection perimeter until the national body responsible for historical and archaeological sites has given permission to continue them.

### **Tree felling and deforestation measures**

In case of deforestation, felled trees must be cut and stored in places approved by the Project Manager. The riparian populations must be informed of the possibility they have of being able to dispose of this wood at their convenience. Felled trees must not be left in place, burnt or run away under earthworks.

### **Prevention of bush fires**

The Contractor is responsible for preventing bush fires over the scope of his work, including borrow pits and accesses. He must strictly observe the instructions, laws and regulations issued by the competent authorities.

### **Site water supply**

The research and operation of water points are the responsibility of the Contractor. The Contractor must ensure that the site's water needs do not adversely affect the water sources used by local communities. It is recommended that the Contractor use the public drinking water services as much as possible, if available. In the event of water supply from groundwater and surface water, the Contractor must submit an authorization request to the responsible Ministry and comply with the regulations in force. Surface water intended for human consumption (site personnel) must be disinfected by chlorination or other process approved by the environmental and health services concerned. If the water does not fully comply with the quality criteria for drinking water, the Contractor must take alternative measures such as the supply of bottled water or the installation of water tanks in quantity and quality. sufficient. This water must comply with the drinking water regulations. It is possible to use non-potable water for toilets, showers and sinks. In these cases, the Contractor must notify the employees and place posters in plain view with the words "NON-DRINKING WATER". It is possible to use non-potable water for toilets, showers and sinks. In these cases, the Contractor must notify the employees and place posters clearly marked "NON-DRINKING WATER". It is possible to use non-potable water for toilets, showers and sinks. In these cases, the Contractor must notify the employees and place posters in plain view with the words "NON-DRINKING WATER".

### **Liquid waste management**

Offices and accommodation must be provided with sufficient sanitation facilities (latrines, septic tanks, sinks and showers). The Contractor must respect the health regulations in force. The sanitary facilities are established in agreement with the Project Manager. The Contractor is prohibited from discharging liquid effluents that may cause stagnation and inconvenience for the neighborhood, or pollution of surface or underground water. The Contractor must put in place an appropriate autonomous sanitation system (waterproof or septic tank, etc.). The

Contractor shall avoid any discharge or discharge of wastewater, emptying water from pits, sludge, hydrocarbons, and pollutants of all kinds, in surface or underground water, in sewers,

### **Solid waste management**

The Contractor must place household waste in airtight bins that must be emptied periodically. In case of evacuation by trucks from the site, the skips must be watertight so as not to let any waste escape. For hygienic reasons, and not to attract vectors, daily collection is recommended, especially during hot periods. The Contractor must eliminate or recycle waste in an environmentally sound manner. The Contractor must route the waste, if possible, to the existing disposal sites.

### **Protection against noise pollution**

The Contractor is required to limit construction noise likely to seriously annoy local residents, either by an excessively long duration, or by extending them outside of normal working hours.

### **Prevention against STIs / HIV / AIDS and work-related illnesses**

The Contractor must inform and sensitize his staff on the risks associated with STIs / HIV / AIDS. It must provide staff with condoms against STIs / HIV / AIDS. The Contractor must inform and educate his staff on occupational safety and health. He must take care to preserve the health of workers and neighboring populations, by taking appropriate measures against other diseases related to the work and the environment in which they take place: respiratory diseases due in particular to the large volume of dust and gas issued during the work; malaria, gastroenteritis and other diarrheal diseases due to the high proliferation of mosquitoes, changes in climate and the quality of the water and food consumed;

The Contractor must provide for the following preventive measures against the risks of illness: (i) introduce the wearing of masks, uniforms and other suitable footwear; (ii) systematically install infirmaries and provide site personnel with the basic drugs needed for emergency care free of charge.

### **Prevention of gender-based violence**

In the event that Project Management Unit staff, the contractor, workers or community members suspect or witness acts of gender-based violence in the workplace or areas of impact of the project. project, or suspect or report gender-based violence perpetrated either against a member of the community, or an employee, they should express their concern to the appropriate body according to the complaints mechanism. The contractor or its field unit must not retaliate, fire or discipline any employee for reporting good faith concerns regarding incidents of gender-based violence, including if the alleged perpetrator is an employee or someone who has a management role.

### **Risks of social conflicts**



The entrepreneur must carefully monitor the risks of social conflicts, especially those generated by the influx of workers, considering that even a modest flow of labor can already have negative repercussions on the host community. The risks of social conflicts, in particular those identified in the safeguard instruments, must be dealt with using relevant approaches that take into account the rights of persons belonging to vulnerable groups. The entrepreneur must take into account that problematic social behavior, often pre-existing, can be culturally tolerated or even accepted, at the national or local level. The complaints settlement mechanism must be available to deal with this type of social conflict.

### **Bypass and temporary access roads**

The use of local roads must be subject to prior agreement with the local authorities. To avoid their premature degradation, the Contractor must maintain the local roads in good condition during construction and restore them to their original condition at the end of the work.

### **Pedestrian bridges and river access**

The Contractor must constantly ensure access to riparian properties and ensure the enjoyment of driveways and pedestrian entrances, exhibition windows, by temporary bridges or walkways fitted with guardrails, placed above trenches or other obstacles created by the works.

### **Public services and rescue**

The Contractor must maintain access to public and emergency services in all places. When a street is blocked, the Contractor must study with the Project Manager the arrangements for maintaining access for fire vehicles and ambulances.

### **Site log**

The Contractor must keep an up-to-date site log, in which will be recorded any complaints, shortcomings or incidents having a significant impact on the environment or an incident involving the population. The job log is unique to the job site and the notes should be written in ink. The Contractor must inform the general public, and neighboring populations in particular, of the existence of this newspaper, with an indication of the place where it can be consulted.

### **Maintenance of construction machinery and equipment**

The Contractor must respect the maintenance standards of construction machinery and vehicles and refuel with fuel and lubricant in a place designated for this purpose. On the site, a supply of absorbent materials and insulation (cushions, sheets, socks and peat fiber, etc.) as well as well-identified waterproof containers, intended to receive oil residues and waste, must be present. The Contractor must carry out, under constant supervision, all handling of fuel, oil or other contaminating products, including transfer, in order to avoid the spill. The Contractor must

collect, treat or recycle all petroleum residues, used oils and wastes produced during the activities of maintenance or repair of machinery. It is forbidden to release them into the environment or on the work site. The Contractor must perform the oil changes in airtight drums and keep the used oils to hand them over to the supplier (recycling) or to the local populations for other uses. Used spare parts should be sent to the landfill.

Equipment washing and maintenance areas must be concreted and provided with an oil and grease recovery structure, with a slope oriented so as to prevent the flow of pollutants towards unpaved floors. Concrete mixers and equipment used for transporting and laying concrete must be washed in areas provided for this purpose.

### **Careers and loan sites**

The Contractor is required to have the required authorizations for opening and operating quarries and borrow pits (temporary and permanent) in accordance with national legislation in this area. The Contractor must, as far as possible, preferably use an existing site. All sites must be approved by the work supervisor and meet current environmental standards.

### **Use of a permanent quarry and / or borrow site**

At the end of the operation of a permanent site, the Contractor must (i) re-establish the previous natural flows by leveling the unused discovery materials; (ii) remove the dilapidated appearance of the site by distributing and concealing the large boulders. At the end of the operation, an inventory report is drawn up in conjunction with the Project Manager and the competent services.

### **Use of a quarry and / or temporary borrow site**

Before starting operations, the Contractor must bear in mind that the borrow site and / or the temporary quarries will be rehabilitated at the end of the work. To this end, he must carry out an environmental impact study of the site to be operated and submit a restoration plan to the Project Manager and to the national bodies responsible for mines and the environment. During operation, the Contractor must: (i) store separately the topsoil to be used to rehabilitate the site and preserve the plantations delimiting the quarry or borrow site; (ii) level the discovery materials and the topsoil in order to facilitate the percolation of water, grassing and planting if prescribed; (iii) re-establish previous natural flows; (iv) remove the dilapidated appearance of the site by distributing and concealing the large boulders; (v) build guard ditches to prevent erosion of the leveled land; (vi) build ditches to collect runoff water.

At the end of the operation, the Contractor must take all the measures required for new vegetation to grow after the cessation of the operation of a quarry or a temporary borrow site. To this end, the Contractor must: (i) prepare the ground; (ii) fill the excavation and cover it with topsoil; (iii) reforest or seed the site; (iv) keep the access ramp, if the quarry is declared usable for livestock or residents, or if the quarry can serve as a protective structure against erosion; (v)

rehabilitate the environment around the site, including planting if required. At the end of the restoration, a report is drawn up in connection with the Project Manager.

### **Dust control**

The Contractor must choose the location of crushers and similar equipment according to the noise and dust they produce. Wearing glasses and dust masks is compulsory.

Annex 4: DECREE N ° 2009-415 OF 20/11/09 ON ESIA

Link: <http://extwprlegs1.fao.org/docs/pdf/con93661.pdf>

## Annex 5: Proposed content of ESIAs and ESMPs for Congo FVC projects

Source of this annex: World Bank, Republic of Congo (2016). Strategic environmental and social assessment of the REDD + process in the Republic of Congo.

<https://www.forestcarbonpartnership.org/sites/fcp/files/2016/Aug/SESA.%20Models%20for%20impact%20analysis.pdf>

### 1 Introduction

The introduction should:

- state the purpose of the TOR;
- identify the promoter of the project;
- to describe the sub-project to evaluate ;
- present the measures taken at this stage for achieve ESIA: administrative measures, technical approach, stakeholder consultations, communication mechanism ...

### 2 Context of ESIAs

This section should:

- present the institutional context, geographical, environmental, social and economic, in which the project fits;
- provide relevant information on the objectives of the project, its project components, the area
- bring all information complementary so that all people awarded be able to understand the situation, its constraints and advantages, its challenges;
- mention any source of information that could to be useful for production ESIA and CGES.

### 3. Regulatory requirements

This section must indicate :

- what is (what are) the frame (s) regulatory (s) of reference ;
- what are the policies and guidelines who have to to be followed then of the production of the ESIA, as by example :
  - the policies of backup of FVC, FAO, IFC ;
  - the guidelines environmental and social of the FVC (IFC) and the documents relative to aspects social such than the relocation involuntary, the heritage cultural, etc. ;
  - the conventions international in matter environmental and social, ratified by lat Republic of Congo ;
- what are the backups specific applicable at field sectoral of project :
  - PCI-REDD + for the projects or components of projects REDD + ;

- Other backups specific proposed the case applicable, by FAO, AFD, International NGOs ...

#### 4. Objectives and scope of the study

This section must :

- to define the Goals of ESIA ;
- abstractr the scope of job at accomplish, knowing than the scope and the level effort required for the preparation of ESIA have to to be proportional to the impacts potentials of project, by example: a ESIA for a sub-component who will have of impacts negative major sure the components social, But little impacts at level environmental, will have to mainly to put accent sure the components social affected ;
- indicate the yourches at achieve during the study, especially in including the points following :
  - drive of consultations nearby of parts stakeholders, to of know their interests and concerns by report at project. These consultations have to itself hold,
    - of a leaves during the preparation of report of ESIA to of comfort identification of main issues and impacts environnementaux et sociaux ;
    - d'autre part, après la préparation du rapport préliminaire de l'EIES, afin de recueillir les observations des parties prenantes sur ses résultats, notamment sur les mesures d'atténuation et d'optimisation proposées ;
  - décrire le projet proposé, en apportant une description synthétique de ses composantes, avec les plans, cartes, figures et tableaux nécessaires pour sa compréhension et sa situation ;
  - préciser le cadre politique, légal et administratif dans lequel s'inscrit le projet ;
  - définir et justifier la zone d'étude du projet, sur laquelle porte l'évaluation des impacts environnementaux et sociaux ;
  - décrire la situation de départ (avant exécution du projet) des milieux physique, biologique, socio-économique... de la zone d'étude, avec leurs interrelations et l'importance que la société et les populations locales attachent à ces milieux, de façon à cerner les composantes environnementales et sociales importantes, ou chargées d'un enjeu ou d'un intérêt particulier ;
  - présenter et décrire les éventuelles solutions environnementales et sociales alternatives pour le projet proposées, incluant la description de l'option "sans projet" (ou 'business as usual') et comparant les alternatives possibles, sur la base de critères techniques, économiques, environnementaux et sociaux ;
    - Si une alternative est retenue, alors identifier et évaluer l'importance des impacts potentiels environnementaux et sociaux négatifs et positifs, directs et indirects, à court et à long terme, provisoires et permanents, qui justifient cette option, sur la base d'une méthode présentée ;
- indiquer les mesures appropriées d'atténuation, visant à prévenir, minimiser, atténuer ou compenser les impacts négatifs, ou les mesures appropriées d'optimisation, visant à accroître les bénéfices environnementaux et sociaux du projet, en incluant les responsabilités et les coûts associés ;
- présenter un programme de suivi environnemental et social, incluant des indicateurs de suivi et de résultats, ainsi que les responsabilités institutionnelles et les coûts associés ;

- préparer un PGES sur la base des données et conclusions de l'EIES, avec, le cas échéant, les plans spécifiques associés aux risques identifiés. Par exemple : un Plan de réinstallation involontaire - PRI, un Plan de prise en compte des PA ; un Plan de gestion du risque environnemental et social – PGRES (incluant une analyse du risque d'accident, l'identification des mesures de sécurité appropriées et le développement d'un plan d'urgence préliminaire), un Plan de Gestion de Lutte Antiparasitaire... ; un plan environnementale et social de sortie de projet... ;
- identifier et organiser les responsabilités institutionnelles avec les parties prenantes ;
- si nécessaire, identifier les besoins en renforcement des capacités pour la mise en œuvre,
- des recommandations de l'EIES-PGES, et organiser son application ;
- préparer le rapport d'EIES et de PGES, conformément au contenu type demandé par la réglementation nationale et/ou, le cas échéant, par la réglementation du bailleur de fonds (FVC, FAO, IFC), ou par toute autre réglementation reconnue au niveau internationale dans ce secteur ;
- préparer un Plan de Gestion Environnementale et Sociale (PGES) conformément au contenu typique présenté dans ce Cadre de gestion environnementale et sociale (CGES).

## 5. Échéancier

Cette section doit :

- spécifier les échéances de tenue des consultations et des actions de communication en direction des parties prenantes ;
- spécifier les échéances de livraison de l'EIES et du PGES, en version préliminaire et finale ;
- spécifier tout autre événement et dates importantes.

## 6. Équipe d'experts, niveau d'effort requis et logistique

Cette section doit :

- indiquer les références des maîtres d'œuvre et d'ouvrage ;
- indiquer le montant total de l'étude et les délais de réalisation prévus ;
- préciser les types d'experts requis pour réaliser l'EIES et le PGES ;
- indiquer les tâches, les moyens et les délais à mettre en œuvre par chacun d'eux ;
- donner toutes coordonnées utiles (organismes, personnes ressources, site Web...) permettant aux parties prenantes d'accéder à une information ou de présenter dans les forme, une réclamation.

## Annexe 6 : Proposition de contenu de PGES pour des projets FVC Congo

Le Plan de gestion environnementale et sociale (PGES) est un instrument qui présente de manière détaillée (a) les mesures à prendre lors de la mise en œuvre et de l'exploitation d'un projet afin d'éliminer ou compenser les effets indésirables E&S, ou pour les ramener à des niveaux acceptables.

Source de cette annexe : Banque Mondiale, République du Congo (2016). Évaluation environnementale et sociale stratégique du processus REDD+ en République du Congo.

<https://www.forestcarbonpartnership.org/sites/fcp/files/2016/Aug/SESA.%20Models%20for%20impact%20analysis.pdf>

Le Décret n° 2009-415, du 20 novembre 2009 de la République du Congo, ne fixe pas le contenu des PGES de projet, nous proposons de suivre les recommandations pour les PGES du cadre de la REDD+ qui eux-mêmes suivent les recommandation de la Banque Mondiale et IFC qui font aussi référence pour le FVC.

Ces recommandations proviennent de l'OP 4.01 de la BM dans son Annexe C, qui décrit les dispositions nécessaires à la mise en œuvre de ces mesures d'atténuation des impacts, dans un PGES ; ceux-ci doivent se concrétiser dans des contrats, par des clauses environnementales et sociale et comporter les éléments suivants :

- l'atténuation des nuisances, avec :
  - un bref rappel des effets négatifs environnementaux et sociaux identifiés ;
  - la description technique des mesures d'atténuation ;
  -
- l'évaluation des impacts potentiels de ces mesures sur l'environnement ;
- l'identification des liens avec, le cas échéant, avec les autres plans d'atténuation (plan d'action de réinstallation par exemple).
- la surveillance et le suivi environnemental et social, avec :
- la description technique des mesures de surveillance, y compris les paramètres à mesurer ; les méthodes à employer ; les lieux de prélèvement d'échantillons ; la fréquence des mesures ; les limites de détection (le cas échéant) et la définition de seuils signalant la nécessité de prendre des mesures correctives ;
- les procédures de surveillance et suivi ;
- l'établissement de rapports.
- les aspects institutionnels, avec :
  - l'estimation du rôle et des capacités des services de l'environnement ;
  - les responsabilités de mise en œuvre des mesures d'atténuation ;
- le renforcement des capacités des organismes chargés de l'exécution, en matière de gestion environnementale ;
- le calendrier d'exécution et estimation des coûts, avec :
  - le calendrier d'exécution des mesures à prendre dans le cadre du projet ;
  - l'estimation des coûts d'investissement et de fonctionnement pour l'atténuation des nuisances, la surveillance et le suivi et le renforcement des capacités ;
- enfin, l'intégration du PGES au projet, avec la prise en compte du PGES lors de la planification, de la conception, de l'établissement du budget et de l'exécution du projet.





<b>Tableau 1. Typologie de participation dans le processus décisionnel</b>	
<b>Forme/niveau de participation</b>	<b>Éléments caractéristiques</b>
<b>Participation nominale</b>	L'individu est membre d'un groupe ou d'une communauté mais ne participe pas à la prise de décisions.
<b>Participation passive</b>	L'individu est informé des décisions ex-post facto; il participe aux réunions et écoute les décideurs sans intervenir.
<b>Participation consultative</b>	L'individu est consulté sur des questions spécifiques sans avoir la garantie que ses opinions influencent les décisions qui seront prises.
<b>Participation spécifique à une activité</b>	L'individu est invité (ou participe volontairement) à assumer des tâches spécifiques dans le processus décisionnel.
<b>Participation active (collaborative)</b>	L'individu exprime ses opinions, qu'elles soient ou non sollicitées, ou prend d'autres types d'initiatives.
<b>Participation interactive (autonomisation)</b>	L'individu fait entendre sa voix et influence les décisions qui seront prises.
	<a href="http://www.fao.org//sustainable-forest-management/toolbox/modules/participatory-approaches-and-tools-in-forestry/basic-knowledge/fr/?type=111">http://www.fao.org//sustainable-forest-management/toolbox/modules/participatory-approaches-and-tools-in-forestry/basic-knowledge/fr/?type=111</a>

## Annexe 8 : Listes indicatives des types de Projets par catégories

Exemples issus de (FAO, 2012) :

Exemple de projets relevant de la catégorie A :

1. Projets agro-industriels de grande ampleur avec passages à des technologies de production intensive.
2. Bonification des terres à grande échelle.
3. Fourniture d'intrants externes en grandes quantités (engrais, pesticides, etc.).
4. Projets de boisement/reboisement à grande échelle, y compris opérations d'exploitation forestière, exploitation de mangroves et de terres marécageuses.
5. Opérations d'industries forestières, telles que scieries et industries des pâtes et papiers.
6. Systèmes de retenue d'eau, de drainage ou d'irrigation de moyenne ou grande ampleur, y compris mise en valeur des eaux souterraines.
7. Bonification et mise en valeur de nouvelles terres, y compris nivellement à des fins agricoles, et réinstallations à grande échelle.
8. Production animale à grande échelle, y compris opérations de type pastoral et industriel, comme les parcs d'engraissement.
9. Projets de mise en valeur de bassins hydrographiques.
10. Développement de la pêche industrielle; aquaculture/mariculture à grande échelle.
11. Nouvelles introductions d'espèces exotiques (végétales, animales, et insectes), y compris OgM.
12. grands programmes de mécanisation agricole.
13. Colonisation agraire (programmée et non programmée).
14. grands projets de mise en valeur des zones côtières.
15. Réinstallation des populations locales.
16. Projets susceptibles d'avoir des effets négatifs importants sur les ressources culturelles physiques.

Exemple de projets relevant de la catégorie B :

1. Projets agro-industriels de petite et moyenne ampleur.
2. Petits systèmes de retenue d'eau, d'irrigation et de drainage.
3. Petits ou moyens systèmes de production végétale et animale nécessitant l'utilisation de technologies et/ou d'intrants «exogènes» (techniques de culture ou d'élevage, machines agricoles ou équipement de post-récolte, lutte contre les maladies et les ravageurs, semences, engrais et outils qui ne sont pas couramment utilisés ou commercialisés dans la zone du projet).
4. Aménagement ou remise en état d'un bassin versant, planification de la gestion des bassins fluviaux, gestion internationale des ressources en eau, et accords relatifs à des projets de moyenne ampleur.
5. Aménagement des terres de parcours et des pâturages et gestion du bétail, y compris élimination des déchets et aspects zoosanitaires.
6. Petite et moyenne aquaculture, y compris pêches industrielles et artisanales à petite et moyenne échelle.
7. Projets bioénergétiques, d'ampleur limitée.
8. Projets d'adaptation au changement climatique.
9. Petites ou moyennes plantations axées sur la production de bioénergie ou de bois à pâte, ou sur d'autres utilisations agricoles.
10. Boisement/reboisement.

11. Développement des industries forestières, à des fins industrielles et communautaires.
12. Introduction d'organismes génétiquement modifiés.
13. Projets de construction, d'entretien et de réfection de routes, de faible et moyenne ampleur.
14. Changements significatifs du patrimoine génétique végétal/animal.
15. Changements d'affectation des terres ayant une incidence sur la biodiversité.
16. Projets susceptibles d'avoir des impacts négatifs mineurs sur les ressources culturelles physiques .

Exemple de projets relevant de la catégorie C :

1. Évaluations et surveillance des ressources naturelles.
2. Analyse de l'environnement et du développement durable.
3. Exercices de suivi et d'évaluation.
4. Études sur dossier, ateliers, réunions.
5. Recherche scientifique et enquêtes sur le terrain. (Toutefois, certaines activités de recherche sur le terrain nécessitant l'emploi de produits agrochimiques et de biotechnologies peuvent être classés dans la catégorie B.)
6. Recherche et vulgarisation, dans le secteur de l'agriculture, des forêts et des pêches.
7. Télédétection et analyse géospatiale.
8. Programmes de renforcement des capacités, de communication et de vulgarisation, y compris formation.
9. Travaux de construction mineurs et entretien des installations.
10. Développement institutionnel, y compris travaux de normalisation.
11. Programmes de santé et d'éducation.
12. Programmes/projets de micro-crédit.
13. Appui au développement d'activités rémunératrices au niveau des ménages et des organisations d'agriculteurs (ex: petit artisanat familial).  
Distribution – aux ménages vulnérables ou victimes de catastrophes – d'intrants agricoles (semences, engrais, outils, petit bétail) déjà connus des groupes cibles et disponibles au niveau local.