

An approach for the evaluation of rural governance in Cameroon: are community forests really forests for the communities?

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Abstract

The aim of this paper is to evaluate the contribution of the traditional exploitation of timber, in a community framework, to the respect of governance principles in actions for the fight against poverty in some rural communities in Cameroon. In 1990, the government of Cameroon adopted laws on the freedom of association that authorised teaming up for the search of possibilities for a better economic welfare of populations. It is in line with this that in 1994, a new forest law which authorises willing communities to organise themselves and request the government to grant them a portion of the national forest of the public domain to be managed by them and for their personal interest. Also, and with the help of the international community, Cameroon elaborated in 1998 its first poverty reduction strategy paper that encouraged amongst others, community actions in the search of solutions to the economic crisis that stroke the country. Through the application of a logit model to the responses collected through a survey carried out on a sample of 200 individuals of the East region of Cameroon, it was noticed that timber exploitation in a community framework does not necessarily lead to the strengthening of the links of belonging to a common community, and to the equitable redistribution of revenues from the exploitation of the community forest.

Key words: Community forests, gender, equity, governance, fight against poverty, participation.

JEL codes: Q230, R200.

1. Introduction

Until 1994, timber was essentially exploited by large industries using heavy and expensive machinery. In order to insure the profitability of their investments, they overexploited the most demanded species and destroyed on their way the less expensive ones. "The industrial exploitation of timber follows more a logic of profit maximisation than that of a participative management and the equitable distribution of revenue" (Auzel and al., 2001). Traditional exploitation in this study is defined as the exploitation of timber using engine saws and the

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transportation of sawed-up timber on human backs. It therefore refers to the exploitation of the resource using rudimentary means which is contrary to industrial exploitation that uses heavy machinery to fell and transport the timber.

Following the wind of democratisation from Eastern Europe in the early 90s, Cameroon adopted a series of laws on the freedom of association that prone objectives of solidarity and teaming-up in different actions for the fight against poverty.

It's in this context that the new forestry law adopted in 1994, and its decree of application signed the following year provided for the creation of community forests. Furthermore, to reinforce this law, a decision of the minister in charge of forest in Cameroon signed in 2001, gives a right of precedence to neighbouring village communities on any forest susceptible to become a community forest. This right is that of pre-emption. However, the first condition for the application for the attribution of a community is that it emanates from a legal moral entity.

More than a decade after the beginning of this new experience, we thought it necessary to make a sort of evaluation of the real impact of this type of exploitation on actions to develop the capacity of villagers in the domains of forestry techniques, on the capacity to reinforce social cohesion, equity, the promotion of gender and governance in such organisations.

2. Theoretical justifications for a community management of forest resources.

The exclusive exploitation of forests by large industrial exploiters led to at least two problems. Firstly, that of the sustainable management of the timber resource, and secondly, that of its weak contribution to local development. "Populations living in forest zones are among the most marginalised groups of the Cameroonian society despite a favourable biophysical environment. The massive exploitation of their timber has brought less to them in terms of the amelioration of their standard of living. About 66% of the populations of Cameroon residing in forest regions live below the poverty threshold...." (Brown and al., 2000). Therefore, there exists a paradox between the ecological wealth of nations and the economic poverty of forests villagers (Buttoud, 1994). The introduction of the concept of forests managed by communities had as objective to include neighbouring populations in the management of their forests in order to gain what they need for their economic and social welfare, without leaving out the capacity to protect their forest ecosystem.

2.1. Principles of participative management

As regards studies relative to the fight against poverty, the capabilities approach developed for the first time by Amartya Kumar Sen (1985) brought new perspectives with respect to the monetary approach that existed until then. The fight against poverty therefore has a multidimensional connotation (Ningaye and al., 2007). According to Sen, the founder of the capabilities approach, it is no more sufficient to measure poverty in terms of access to basic goods (water, health, education, shelter, electricity etc), of resources or real revenues as it has always been the case. Even though this approach is in relation with instruments for the realisation of welfare, they are made up only of means of liberty (Lachaud, 1992).

Emphasis is henceforth placed on increasing basic functional capabilities to attain certain acceptable minimums, that is, on the increase of possibilities of choice (freedom of choice) as well as the amelioration of material wellbeing. Therefore, functions such as to be sufficiently nourished, to be in good health, to be educated, to be well sheltered, etc., being elements of welfare, faculties or capabilities reflect the freedom to follow these objectives, and can have a direct role in welfare since to chose and decide are equally part of life (Lachaud, 1999). Following Sen and the notion of capabilities more developed in its 1991 and 1995 studies, other authors have developed a number of principles that should accompany the monetary perception of poverty and increase the efficiency of the fight against poverty. As such, Rougier

(2001) advocates that macroeconomic and sectoral policies for the fight against poverty should not be independent. In fact, poverty is one of the major causes for the overexploitation of the forest. But on the other hand, it can also be the consequence of the overexploitation of resources. This reciprocal causality has immediate economic policy implications. Economic policy and forest policy are therefore not independent, the former being a necessary prerequisite for the latter. Another principle for the fight against poverty is that of equity in both revenue and access to resources (equitable redistribution of the fruits of growth), in terms of gender (male/female), in spatial terms (rural/urban), in terms of social class (rich/poor), and therefore in economic opportunities, and in its intra and intergenerational dimensions. The principle of participation is also considered as an important factor in the fight against poverty. It stipulates that good programmes should encourage concerned local populations to make choices and act on participative bases to improve their living conditions. This implies the awareness of possessing a potential power at the individual and collective level (Nkengfack, 2007). In fact, participative democracy sought in such organisations leads probably to high quality growth (Tanzi and Chu, 1998). The concept of community forest is in line with this.

Finally, the principle of governance encourages democracy and the good management of public affairs. Despite the multiple actions of international funding agencies and States, poverty and exclusion still persist in Africa. This denotes the inconsistent results obtained up to now of policies for the fight against poverty. Actually, despite successes in the domain of economic growth, Structural Adjustment Programmes (SAPs) have led to the pauperisation of the populations (Anoukaha and al., 2003). Concerning governance, even if rapid and sustainable growth of GDP has been obtained in non-democratic settings (the Chinese and South Korean experience), it seems that democratisation and the fight against corruption are necessary, though not sufficient, conditions for any action on the real causes of poverty. Meanwhile, there are acute problems in the management of revenues generated by community forests (Maharjan, 1998; Dahal and Capistrano, 2006). Bearing in mind these main principles, the government of Cameroon elaborated a reference document that put together the country's multisectoral approaches for the fight against poverty.

2.2. Community initiatives

Community participation is one of the approaches to fight externalities linked to the exploitation of natural resources. It requires that local populations be fully included in the search of their welfare. In fact, with the promulgation of law no 90/53 of 19 December 1990 on the freedom of association, NGOs intervene in various aspects of social life (public liberty, protection of human rights, protection of the environment, defence of the rights of children and women) and also take part in participative development.

On the 14 of August 1992, the law on cooperative societies and common initiative groups (CIG) was promulgated, followed on the 22nd of December by that on Economic Interest Groups (EIG). All these laws have as objective the enhancement of solidarity and teaming-up which are factors of dynamism and development. The PRSP (1998) also presents the characteristics of poverty in Cameroon as well as the different actions undertaken by the public authorities to fight the ill and the community forest constitute a way out, especially in rural zones (Pnud-Cameroun, 1999).

2.3. The concept of community forest

2.3.1. Presentation of the concept of community forest

Community forestry is an instrument of forest management that delegates power to local communities. Law²⁷ no 94/01 regulating forest, fauna and fishery was adopted in Cameroon on

²⁷ Subsequently referred to as the Law and the Decree will stand for Decree no 95/531 PM of 23 August 1995.

20th January, 1994. The following year, the Government signed the Decree no 95/531 PM of 23rd August 1995 fixing the modalities of application of the forest Law. These two important texts marked a new era in the exploitation and the conservation of forest resources and at the same time defined the procedures and applicable administrative norms on which the attribution and management of forests depend (Minef, 1998).

- Definition of community forest

Hobley and al, (1996) define community forest as “a process by which communities of forest users protect forests of the public domain in partnership with the government”

The new forest policy of Cameroon defines community forest as “a non permanent forest of the public domain, which is subject to a management convention between a rural community and the administration in charge of forests. The management of this forest is done by the concerned rural community with the technical assistance of the administration in charge of forests” (Art. 3, al. 11 of the Decree).

According to Bigombé Logo (2002), community forests can also be seen as a set of dynamic processes of the inclusion of rural communities in the management of forest resources, with the aim of contributing to the improvement of their living conditions and to promote local development.


In a similar manner, the Decree defines the management convention of a community forest as being a contract by which the administration in charge of forest grant to a community a portion of forest of “the national domain, for its management, conservation and exploitation in the interest of this community. The management convention is accompanied by a Simple Management Plan (SMP), which outlines activities to be carried out.” (art.3, al. 16).

In all these definitions, solidarity and the inclusion of everyone in the search of collective and individual interest are the key words in the understanding of the concept of community forest.

- General dispositions relative to community forests

Communities benefit much from forests. In fact, “forests products of all sorts resulting from the exploitation of community forest belong entirely to the concerned village community”²⁸. “Consequently, all products, resources, animal and plant species, fishing products as well as special products, except those forbidden by the Law are considered as being the property of the local community”²⁹ according to the spirit of the Laws of 1990, 1992, 1993 (Minef, 1998 and 2002).

- Legal conditions for the creation of community forests

-  Legal personality of the applicant

The application for the attribution of a community forest should come from legal moral entities. The Decree stipulates that “the community should have a moral personality of a form recognised by the legislation in force” (Art. 28, al.3). Acceptable legal entities can be in the form of associations, cooperatives, Economic Interest Groups (EIG) or Common Initiative Groups (CIG).

-  The prior creation of the legal entity

The legal entity should be officially created before the consultation meeting preceding the application for the creation of a community forest. The statutes of the legal entity chosen can be modified if need be. They are thus flexible to subsequent eventualities (Minef, 2004).

²⁸ Art.37, al. 3 of the Law.

²⁹ Community forests attribution manual of procedures, MINEF, April 1998.

According to article 28 of the Decree, all the components of the concerned community should be consulted on the question of the management of a community forest. Consequently, the legal entity chosen should be representative of all the components of the community and not just a small group of persons.

3. Problem Statement

For a long time in the country, the state was the owner and exclusive manager of forests resources (Djeumo, 2001). Around the state were forest exploiters and other elites who accumulated wealth at the detriment of the State and especially the local populations. Even though, certain communities participated in forest management for centuries, the explicit political right to do so dates, for the majority of them, only to two decades. But this participation was so weak that it led to the marginalisation of the local population in forests exploitation (Bigombé Logo, 1998). In fact, this marginalisation started right back during the French colonial period.

The new forest law of 1994 had as objective to comfort the economic, ecological and social functions of Cameroonian forests, three functions that are indispensable to an integrated management of forest resources. An important innovation in this law is the wish to include rural populations in the implementation of this policy notably through "the promotion of forests of communities". The aim here is to guarantee these communities, revenues directly perceived by them while protecting the vegetation cover from unscrupulous exploitation.

In this study, we are interested in the social function of the forest. As such, the main research question is the following: does the traditional exploitation of timber by the local communities improve social cohesion, reinforce capacities in forestry techniques, improve the respect of equity and the good management of resources generated from this exploitation?

4. Objectives of the study

4.1. General objective

The main objective of this study is therefore to see whether the traditional exploitation of community forests improve the lives of concerned populations in the social aspect.

4.2. Specific objectives

To attain our general objective, we have elaborated the following successive specific objectives:

- ✚ Apprehend the advantages generated by participative management of the forest
- ✚ Analyse how revenues generated by the forest are employed and distributed especially when we consider the indelicate roles played by some elites and other influential members of the community as concerns the management of financial resources. In fact, corruption and embezzlement are common practices in this type of organisations. It is not enough to identify the costs and benefits of a community forest but one should also "analyse the way they are distributed among the users and the other participating parties in the management of a community forest" (Maharjan, 1998)
- ✚ Evaluate the place of the Woman in the exploitation activities of the community forest
- ✚ Evaluate capacity building activities in the domain of forestry and on the improvement of the formal educational level of the populations.

5. Hypotheses

By allowing the exploitation of timber in the hands of local communities, the 1994 law implicitly admit that this new approach will strengthen a whole set of links between members of the community (Nkengfack, 2008). In fact, one of the main exigencies for the creation of a community forest is the coming together under a development legal entity or association.

Coming together in such entity strengthens community spirit that can be a stabilising factor of social cohesion. The main hypothesis of this study is therefore the following: the traditional exploitation of forest in a community framework strengthens values of solidarity, equity, justice, participation, social cohesion and governance.

6. Methodology and case study

6.1. Choice of the statistical model

We started from the hypothesis that every member of the community has a preference with respect to the two modes of forest exploitation: Should the community maintain the exploitation of the forest in the community form or on the contrary grant it to an industrial exploiter through a logging contract?

The answer of each member in favour of one or the other alternative informs us on the utility that he might gain from each type of exploitation. Supposing that each member is rational, he will only choose the alternative that maximises his utility, i.e. his welfare.

The dependent variable (y_i) that is « maintain the exploitation in the community form » is a dichotomic discrete variable that can take the value 1 if one opts for the first alternative (traditional community exploitation) and 0 if it is the other alternative that is chosen (exploitation through the logging contract) and the elements that motivate this choice are both discrete and qualitative values. Discrete values concern the revenue of agents, the size of households, the age of the respondent, revenues from the exploitation of the community forests, meanwhile qualitative variables are made up of the type of house, level of education, how sawed-up wood is transported, the population capacity building activities in the domain of forestry techniques, the promotion of gender in this type of activity, their concern about the protection of the environment, etc.

It is therefore necessary to identify a model that would have as main characteristic the forecasting of a value between 0 and 1. The probit and logit models are recommended for this type of problem. Both models are equivalent but differ at the level of their distribution functions. The probit model has as distribution function the density function of the normal law while the logit model has as cumulative curve the density function of the logistic law. They are non-linear statistical models with the objective of keeping the choice of the probability of choice in the interval $[0, 1]$ ³⁰ (Benavent, 1993).

For the specific case of this research, the logit model has been chosen for the manipulation facilities that it offers since the cumulative function of the logit model is easier to manipulate compared to the function of the normal law. The density function of the logistic law is symmetrical about 0 and is bell-shaped. This is similar to the density of the standard normal curve (Griffiths and al, 1993, page 751). Also, the relationship between chances of success and failure that are generated by logistic regressions known as "Odds Ratio" (OR) can be interpreted easily. An "Odds Ratio" superior to 1 indicates that the studied phenomenon has a great chance to be realised (Davies and al, 1998; Bland and al, 2000; Westergren and al, 2001). The logistic function also allows the treatment of discrete independent variables, qualitative or continuous. It does not border about hypotheses of normality and homoscedasticity of ordinary linear regressions.

³⁰ The main limitation of the probabilistic linear model is at this point since for large values of x_i , the corresponding probabilities at times lie out of this interval.

6.2. Model specification

The logit model is thus the following:

$$y_i = \begin{cases} 1 & \text{if the individual opts for exploitation in a community framework} \\ 0 & \text{if the individual opts for industrial exploitation through logging contracts} \end{cases}$$

Supposing that individuals are rational, we have $y_i = \begin{cases} 1 & \text{si } U_{i1} \geq U_{i0} \\ 0 & \text{si } U_{i0} > U_{i1} \end{cases}$

Where U_{i1} is utility that individual i gains from traditional exploitation and U_{i0} , utility gained from industrial exploitation

By so doing, we start from the density function of the random variable y_i .

$$g(y_i) = P_i^{y_i} (1 - P_i)^{1 - y_i}, \quad y = 1, 0 \quad (1)$$

From (1), the probability to choose the alternative 1 is given by

$$g(1) = P[y_i = 1] = P_i \quad (2)$$

While that to choose 0 is

$$g(0) = P[y_i = 0] = 1 - P_i \quad (3)$$

The mean and the variance of such a law are given respectively by

$E[y_i] = P_i$ and $\text{var}(y_i) = P_i(1 - P_i)$.

The problem to be solved becomes that of explaining the variation of y_i from one individual to another through the explanatory factors of the phenomenon. The model to be estimated will be the following:

$$Y(\text{maintaincf}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + \mu \quad (4)$$

Where the "X" are explanatory variables and β , their respective coefficients.

Instead of estimating Y_i , the objective is to estimate $p(Y_i=1)$, where p_i is between 0 and 1. The problem is that a probability measure is limited to the right and to the left. It is therefore necessary to look for a way to suppress these limits. These limits are removed through the logit of P. Hence, we note:

Logit = Log(odds ratio)

$$\text{Logit} = \text{Log}\left(\frac{p}{1-p}\right)$$

(5)

The model that we will estimate therefore takes the form:

$$\text{Log}\left(\frac{p}{1-p}\right) = bX = Z \quad (6)$$

After appropriate manipulation of (6), we obtain a model that express p in function of Z :

$$p = \frac{e^z}{1 + e^z} = \frac{1}{1 + e^{-z}} \quad (7)$$

The first form of the logit is the linearization of this second expression.

6.3. Investigation Methodology

6.3.1. Sampling

The East region of Cameroon is the main forestry domain of the country where major logging companies operate. Also, it is there that the ever first community forestry experiences began, hence the choice of the area of study. The sampling technique used in this study is that of

random, stratified and proportional sampling. In fact, the total population of the three villages of the study (Kongo, Ngola-Achip and Moangue le Bosquet) is estimated at 1717 inhabitants. Considering constraints in human and financial resources, we limited the size of our sample at 200 individuals. This corresponds to a sampling rate of 11.64%. In order to determine the number of individuals to question in each village, we considered its weight in the total population after which the individuals were numbered and selected using a table of random numbers.

Table 1. Sampling plan

Villages	Population of each village	Weight of each village in total population	Number of individuals investigated
Kongo	378	22	44
Ngola-Achip	715	41.65	83
Moangue le Bosquet	624	36.35	73
Total	1717	100	200

Source: Authors.

As such, the population of Ngola-Achip corresponds to 41.65% of the total population giving 83 persons to be questioned. With 22% of the sample, 44 individuals were questioned in Kongo. At Moangue le Bosquet, 73 individuals were investigated corresponding to 36.35% of the total population.

6.3.2. Survey data

The analysis was carried out on the basis of primary data collected from our field survey in the region of Lomié, East-Cameroon, between the 28 April 2006 and the 30 May 2006. We mean microeconomic data on the socioeconomic characteristics of the survey as well as its concerns of environmental order.

6.4. Analysis of the data

To perform the regression of the logit model, we adopted certain methodological precautions. They consisted of carrying out an exploratory analysis on the ordinal variables to verify the consistency of the model to be used and to search for multicollinearity. We also test the stability of coefficients to see whether they significantly differ across different villages through the Chow test.

The exploratory analysis consisted of subjecting all ordinal qualitative variables to a Multiple Correspondence Factorial Analysis (MCFA). The aim was to select the most discriminating variables that bring pertinent information to the model. This analysis was performed with the SPAD version 4.01 software. The modalities of variables were coded sequentially, i.e. in a way that the evolution of the phenomenon is presented through its modalities. As such, from the observation of the coordinates of successive factorial axis, we joint some modalities together to increase information. The modalities of variables as well as certain variables finally retained are those that satisfy the exigencies of the exploratory analysis.

Given that ours sample was made up of three sub-samples corresponding to the three villages studied, we carried out a stability test of the coefficients to verify whether the results of the analysis does not vary significantly from one village to another. The test chosen is that of Chow. Initially, the Chow test as was constructed in 1960 is based on the comparison of parameters in two sub-populations (Wikipedia Encyclopedia, 2006). This is why we thought it logical to create tree combinations of two sub-samples between the three villages studied.

6.5. Test of validity of the model

After performing the logit regression, the next step is to evaluate the model that was constructed. To do this, the literature proposes many different methods of evaluating a logistic model. These are the likelihood test and discriminance analysis (Benavent, 1993). We have chosen to use the likelihood test to verify the validity of the specified model. By this method, a good model is one that has a large likelihood ratio, that is, it tends towards 1. The test used is Pearson's goodness of fit test that has as statistic:

$$Z^2 = \sum \frac{(Y_i - p_i)^2}{p_i(1-p_i)}$$

To test the fitness of the model, we write the following hypotheses:

$H_0: Z^2 = 0$ against $H_a: Z^2 = 1$, with Z^2 distributed like a Chi-square with $N-p$ degrees of freedom and where N is the size of the sample and p the number of parameters. The decision rule is the following: if the probability is less than the chosen risk level α , we reject H_0 admitting that the model is not good. If on the contrary, this probability is greater than α , we accept H_0 that the model is good.

7. Results and interpretation

Considering the strong multicollinearity between independent variables, certain variables, even the ones deemed important, had to be removed from the logit model. The data were analysed using Stata 8.0 software. Finally, we verify if there is any link between the dependent variable "maintaincf" and some social characteristics that we have called "capabilities" in the literature. The characteristics considered are age of the respondent, sex, level of education, number of people in charge and the revenue of the head of household, food expenditure and the amelioration of habitat due to the exploitation of the community forest. At last, we also considered how the populations of the exploitation of the CF on their welfare.

7.1. The model retained

After removing the variables of multicollinearity, the retained model is the following:

logit maintaincf sexe_1 age_2 age_3 nivedu_1 stamat_1 nomper_1 nomper_3 rev2_2 rev2_3 depsant2_1 depsant2_2 depnut2_1 depnut2_2 depnut2_4 depscol2_1 depscol2_2 logemfc_1.

The results of the regression is summarised in the table below. This table also bring out the « odds ratio » that allow and easier interpretation of the results.

Table 2: Regression results of logit model and likelihood test.

Variables	Coefficients	Odds Ratio (OR)	Standard deviation (of OR)	p-value	Level of significance
sexe_1	-0.756	0.927	0.402	0.862	*
age_2	0.653	1.922	1.126	0.264	*
age_3	0.349	1.419	0.801	0.535	*
nivedu_1	0.266	1.305	0.615	0.572	*
stamat_1	0.595	1.814	1.020	0.289	*
nomper_1	0.092	1.096	0.549	0.854	*
nomper_3	1.116	1.889	0.385	0.002	**
rev2_2	0.100	1.105	0.517	0.831	*
rev2_3	0.025	1.025	0.749	0.004	**
depsant2_1	0.449	1.566	1.760	0.689	*
depsant2_2	-0.773	0.461	0.529	0.500	*
depnut2_1	-1.332	0.263	0.157	0.025	**
depnut2_2	-1.993	0.136	0.107	0.011	**
depnut2_4	-2.194	0.111	0.103	0.018	**

depscol2_1	1.342	2.800	2.800	0.066	*
depscol2_2	2.681	14.606	13.394	0.003	**
logemfc_1	-0.181	0.834	0.380	0.691	*
cons	0.566	-	-	0.733	*
Prob>Chi2		0.000			***
Pseudo R²		26.11%			-
Pearson's likelihood test		Pearson chi2(150) =	179.27		-
		Prob > chi2 =	0.0417		**

Source: Own calculations.

***: Significance at level $\alpha=1\%$

**: Significance at level $\alpha=5\%$

*: Significance at level $\alpha \geq 10\%$

With,

sexe_1:	sex of the respondent==female
age_2:	age of respondent==25-35 years
age_3:	age==35 years and above
nivedu_1:	level of education== never been to school and primary school level
stamat_1:	marital status of the respondent== others (not married, bachelor or widower)
nomper_1:	size of household==0-3 individuals
nomper_3:	size of household==10 individuals and above
rev1_2:	income before CF==50 000 F - 100 000 FCFA ³¹
rev1_3:	income before CF==100 000 F and above FCFA
depsant2_1:	health expenditure after CF==0 - 25 000 FCFA
depsant2_2:	health expenditure after CF==25 000 - 100 000 FCFA
depnut2_1:	expenditure on food after CF== 0 - 5 000 FCFA
depnut2_2:	expenditure on food==5000 - 10 000 FCFA
depnut2_4:	expenditure on food==15000 FCFA and above
depscol2_1:	school expenditure after CF==0 - 25 000 F
depscol2_2:	school expenditure after CF==25 000 F - 50 000 FCFA
logemfc_1:	no house built or ameliorated after CF== no house CF
logemfc_2:	house built or constructed thanks to CF== house cf

7.2. Econometric validation of the model

The econometric validation of and estimation is done in two phases. The validation of the model, in general, and the validation of individual coefficients.

7.2.1. Validation of the model in general

From the results, the exogenous variables explain at 26.11% the choice in favour of exploitation in a community framework. This is the pseudo R² that plays here the role of the coefficient of determination since we are using a logit model. This rate is not high but it accommodates well with the nature of the study. In fact, the study used both qualitative and quantitative variables. This makes our model different from a purely quantitative model, that is, a forecasting model for which the R² is extremely important. Also, the data collected from certain economic agents such as households for a short period of time (transversal data) generally produce very low R² (Griffiths and al, 1993; Page 253).

Again, we have a chi2 significant at 1%. It plays the role of Fisher in ordinary regressions. Among others, the constant is not significant suggesting a good specification of the model.

³¹ 1 Euro = 655.957 F CFA.

Finally, the Pearson likelihood test (goodness - of- fit) give a statistic of 0, 0417 that is significant at 5%.

Still with the aim of verifying the global significance of the model, we carried out the Chow test considering the fact that our sample is made up of three sub-samples. If calculated Fisher, that is, $\frac{(S_c - (S_1 + S_2))/k}{(S_1 + S_2)/(N_1 + N_2 - 2k)}$ is greater than the critical value read from the table

$(F_{(k, N_1+N_2-2k)})$ at a given level α , we reject H_0 and the conclusion is that a study of the phenomenon using the sub-samples is more appropriate.

Table 3. The Chow test results

Degree of freedom	First test (Kongo/Ngola)	Second test (Kongo/Moangue)	Third test (Ngola/Moangue)
S_c	23.264	15.174	21.568
S_1	5.775	5.775	11.709
S_2	11.709	6.551	6.551
K	19	19	19
N_1+N_2-2k	81	71	110
F_{cal}	1.548	0.960	1.125
$F_{theo. at \alpha = 5\% level (read)}$	1.96	1.97	1.92
Decision	Do not reject H_0	Do not reject H_0	Do not reject H_0

Source: Own calculations.

S_c is the constrained variance of the regression for the whole set of the three villages; S_1 and S_2 are respectively the constrained variances of the regression in each village of the pair of villages taken into consideration. N_1 and N_2 are respectively the number of individuals in each pair of villages taken into consideration.

From the results in table 3, all the F-calculated are less than the F-read, thus H_0 is not rejected and the model is accepted in the form of a mix of the three sub-populations. All these results validate the model in general.

7.2.2. Individual validation of parameters and interpretation

After verifying the general significance of the model, we now turn to the individual significance of estimated parameters. At this level, the work consist in verifying if each variable taken individually contribute in explaining variations in the choice of the way of exploiting the community forest. The tool appropriate for this is the Student test. It consists of testing for every variable the (H_0) hypothesis of nullity of the parameter against that of (H_1) that in is non-zero. In reality, we observe that variables expressing the increase in number of individuals in the household ("nomper_3" and "rev2_3"), in food expenditure ("depnut2_1", "depnut2_2" and "depnut2_4"), school expenditure ("depscol2_1" and "depscol2_2") are significant. They all have p-values greater than 1% for some and 5% for others. But the signs of food expenditure are negative. An explanation can be that the traditional exploitation of timber is more likely the only way to ensure the protection of food crops cultivation that they consume themselves. This situation is even confirmed by its "odds ratio" greater than 1.

These results are interesting for many reasons. Firstly, it is a stylised fact that schooling and going to the hospital are not part of the habits of the inhabitants of the region, notably the Baka pygmies. Secondly, the populations of the Lomié region lived essentially from gathering and hunting. The market economy is yet marginal, since barter was the current practice. This is to say that the introduction of the CF has contributed to introduce a little monetary exchange in the social habits. The experience of the CF has therefore changed a bit the social habits of the local populations. It is the same with food expenditure which practically did not exist in the budgets of households. Today, with the development of mentalities and exposure to modernity, without being very important, the expression "food money" now exists in the

vocabulary of heads of households in the region. For the other variables, we notice that sex, age and level of education do not favour the exploitation of the community forest in a community manner.

7.3. Some other results

7.3.1. Community forest, social cohesion and equity

Concerning equity in the redistribution of the benefits from the exploitation of the CF, it is important to first of all specify that with the absence of a suitable register to inform about the evolution of sales and other financial charges, it was difficult to technically determine how the profits have been used. We were left only with the choice of questioning the population how they perceived the management of the funds generated by the CF. This variable was denoted "gesrevfc" that is "management of revenues from the CF".

Table 4. Populations perception with respect to the management of money generated by CF

Sex	Perceptions on how the funds resources are managed ("gesrevfc")			
	Poor management	%	Good management	%
Female	39	19.5	19	9.5
Male	123	61.5	19	9.5
Total	162	81.00	38	19.00

Source: Own calculations.

In general, the local population have a very poor perception of the way the revenues generated by the exploitation of their CF are managed. The large majority, 81% think that resources are poorly managed (Table 4).

As concerns the distribution of the income of the exploitation of the CF in the framework of a CIG of the village, actions towards the improvement of social houses have not benefited from equitable criteria. Some members who are closer to the executive of the association have gained a lot while simple members have not. Also, the minority Baka-pymies have been victims of the unequal distribution due to lack of consideration as is always the case.

Table 5. Impact of the project of improving social houses by the CF in the different villages and ethnic groups studied

Villages		No improvement of house CF	Improvement of house CF	Number of individuals investigated	% improvement of house CF
Kongo		19	25	44	56.81
Ngola		52	31	83	37.34
Moangue		70	3	73	4.1
Total		141	59	200	29.5
Ethnicgroup	Bantu	61	56	117	47.86
	Baka	80	3	83	3.61
Total		141	59	200	29.5

Source: Own calculations.

From the above table, we notice that in general, actions for the improvement of social houses have more impact in the Kongo village than anywhere else. In fact, 56.81% of respondents benefited building materials for the construction or renovation of their houses. Everywhere else, this action failed drastically. In Moangue, the situation is more alarming as only 4% of the

population benefited from these materials before the distribution was stopped due to numerous frauds. Today, the materials are in stock, waiting that more equitable distribution criteria are adopted.

With the CF experiences, community spirit among the individuals has not been reinforced. This may be due to the fact that the distribution of building materials for the renovation of their houses such as zinc sheets, nails, rafters, etc. benefited only few people. This state of things damaged the spirit of solidarity and belonging to a same community that animated the majority of villagers.

7.3.2. Community forest, participation and capacity building

The advent of the CF is supposed to develop the capacities of the populations in matters of forest management and the understanding of the forest legislation. Before the putting in place of the experience, the populations of the Lomié region benefited from the assistance of some NGOs such as "World Wildlife Fund" (WWF). These NGOs organised training seminars on various forestry techniques and on the drafting of a Simple Management Plans (SMP), an important document in the creation of a CF as they describe the different activities to be carried out in the CF for a period of five years.

Table 6. Implication and training of the populations in the process of creating a CF

		Sex	Female	%	Male	%	Whole	%
Trainings								
Simple Management Plan (SMP)	Ignorance		38	43.67	49	56.33	87	45.5
	Awareness		20	17.69	93	82.31	113	56.5
Preparatory meeting for SMP	Did not participate		40	40.4	59	59.6	99	49.5
	Participated		18	17.82	83	82.18	101	50.5
Field work	Did not participate		54	40.29	80	59.71	134	67
	Participated		4	5.88	62	91.18	68	33
Drafting of SMP	Did not participate		57	32.20	120	67.80	177	88.5
	Participated		1	4.34	22	95.66	23	11.5
Training in forestry techniques	Did not participate		57	35.62	103	64.38	160	80
	Participated		1	2.5	39	97.5	40	20

Source: Own calculations.

In general, the majority of respondents (56.5%) are aware of the existence of the simple management plan. Our curiosity led us to notice that the populations not only were aware of the existence of the SMP but for most of the time knew its role and importance. Also, more than 50.5% of respondents participated at least once to general meetings organised in order to draw-up the SMP. All these, thanks to the actions of NGOs such as WWF or the "Netherlands Development Organisation" (SNV), which did a good work of sensitisation towards the populations. Meanwhile, during the drafting of the final document, 88.5% of people affirm to have not been consulted, this situation can be explained partly by the very low level of education of the populations of this region.

Looking at capacity building actions in forestry techniques, we can confirm that very few individuals were concerned. In fact, only 20% of persons benefited from training seminars on field work. Meanwhile the experience of community forestry should have been preceded by training sessions on forestry techniques, as well as, trainings in management and project management in favour of the populations. Indeed, people just found themselves management large sums of money. As they had limited knowledge in accounting, it was impossible for them

to draw up any exploitation account of their activity. Consequently, sales revenues were confused with profits. The consequence being the fraudulent siphoning of funds observed everywhere the experience was undertaken. Confrontations from this situation sometime led to deaths.

7.3.3. Gender analysis: participation of women in the activity

We also tried to see whether women could easily participate in the CF given that the jobs entail great physical power.

Table 7. Participation of women in the activities of the CF

Activities Sex	Sawyer	« Carriers »	Chain saw mechanic	Prospector.	Meterer	Guide	Total	Participation rate
Female	0	37	0	0	0	0	37	29.6
Male	3	54	7	16	4	4	88	70.4
Total	3	91	7	16	4	4	125	100

Source: Own calculations.

Female participation in activities directly linked to the CF is essentially in the domain of transporting the sawed-up timber. In fact, 37 investigated women intervene in the transportation of the wood. This gives a participation rate of 30% of the total population participating in the CF. This participation rate is important considering that for now, women do not yet have skills to manipulate chain saws and less again have had training to perform the other duties. Meanwhile these other activities do not need much physical effort compared to that of carrier.

Men also intervene much in the activity of carrier. Generally, the activity of carrier occupies 91 people out of 125 that have intervened directly in an activity of the CF, giving a rate of 70%. The other activities occupy only a negligible number of workers. These are more or less specialised jobs such as that of sawyer (engine saw operator) and mechanics.

8. Conclusions

At the end of this study, one can noticed that the impacts of traditional exploitation of the timber in the community framework on social development are mitigated.

Equity is not always respected in the distribution of profits generated by the CF. Good governance of the resources generated by the CF is not also done. Many suspicions of embezzlement weigh on executive members of the community associations. This makes the CF not to be a factor of social cohesion. The minority populations (Baka-pygmyes) are marginalised in the management of the CF. The exploitation of the CF has not profited the populations in terms of capacity building actions, be it in forestry techniques, formal education, accounting and financial skills. In fact, the level of participation of actors to the elaboration of the project is not satisfactory. Nonetheless, a very positive point in the management of the CF is the strong level of the participation of women.

Despite all hopes, both in the domain of economic and social development, placed in the experience of the CF in rural communities, the impacts of CF to actually change, positively, the daily lives of the populations is still possible. Much needs to be done for this management to be carried for the interests of the populations.

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